CSA Global
Mining Industry Consultants

NI 43-101 TECHNICAL REPORT

Moa Nickel Project, Cuba

CSA Global Report № R117.2019
Effective Date: 31 December 2018
Signature Date: 6 June 2019

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Qualified Persons
Michael Elias, FAusIMM (CSA Global)
Paul O'Callaghan, FAusIMM (CSA Global)
Adrian Martinez, P.Geo (CSA Global)
Kelvin Buban, P. Eng. (Sherritt International Corporation)

Report prepared for

Client Name	Sherritt International Corporation
Project Name/Job Code	STO.MSA.01v1
Contact Name	Kelvin Buban
Contact Title	Director of Operations Support
Office Address	8301-113 Street, Fort Saskatchewan, Alberta T8L 4K7

Report issued by

CSA Global Office	**CSA Global Pty Ltd** Level 2, 3 Ord Street West Perth, WA 6005 AUSTRALIA PO Box 141 West Perth WA 6872 AUSTRALIA T +61 8 9355 1677 F +61 8 9355 1977 E csaaus@csaglobal.com
Division	Mining

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Author and Qualified Person Signatures

Coordinating Author and Qualified Person	Michael Elias BSc (Hons), MAIG, FAusIMM CSA Global Pty Ltd	Signature:	*[“Signed”]* {Michael Elias} at Perth, Australia
Co-author and Qualified Person	Paul O’Callaghan BEng (Mining), FAusIMM CSA Global Pty Ltd	Signature:	*[“Signed”]* {Paul O’Callaghan} at Perth, Australia
Co-author and Qualified Person	Dr. Adrian Martinez Vargas PhD., P.Geo. (BC, ON) CSA Global Pty Ltd	Signature:	*[“Signed & Sealed”]* {Adrian Martinez Vargas} at Ottawa, Ontario, Canada
Co-author and Qualified Person	Kelvin Buban BSc. Chem. Eng., P.Eng. (AB) Sherritt International Corporation	Signature:	*[“Signed & Sealed”]* (Kelvin Buban) at Fort Saskatchewan, Alberta, Canada

Certificates

Certificate of Qualified Person – Michael Elias

As a Qualified Person of this Technical Report titled "NI 43-101 Technical Report for the Moa Project, Cuba", prepared for Sherritt International Corporation with an effective date of 31 December 2018 and signature date of 6 June 2019 (the "Technical Report"), I, Michael Elias do hereby certify that:

- I am a Principal Consultant with CSA Global Pty Ltd at its head office at Level 2, 3 Ord Street, West Perth, Western Australia 6005, Australia.
- I am a professional Geologist having graduated with a BSc (Hons) Geology from the University of Melbourne (1973).
- I am a Fellow of the Australasian Institute of Mining and Metallurgy and a Chartered Professional in the field of Geology.
- I have practised my profession as a Geologist for the past 45 years in the mineral resources sector and engaged in the exploration for, assessment, development and operation of numerous mineral projects both within Australia and overseas.
- I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "Qualified Person" for the purposes of NI 43-101.
- I am responsible for Sections 2 to 8 and jointly responsible for Sections 12 and 25 to 27 of the Technical Report.
- I personally visited the property that is the subject of the Technical Report for two days from 8 to 9 May 2018.
- I am independent of the issuer as described in Section 1.5 of NI 43-101.
- I have read NI 43-101, and the Technical Reports has been prepared in compliance with NI 43-101.
- As of the effective date, the Technical Report, to the best of my knowledge, information, and belief, contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: 31 December 2018

Dated at Perth, Australia this 6th day of June 2019

["Signed"]
{Michael Elias}

Michael Elias, BSc (Hons), FAusIMM (CP)
Principal Consultant – Nickel, CSA Global Pty Ltd

Certificate of Qualified Person – Paul O'Callaghan

As a Qualified Person of this Technical Report titled "NI 43-101 Technical Report for the Moa Project, Cuba", prepared for Sherritt International Corporation with an effective date of 31 December 2018 and signature date of 6 June 2019 (the "Technical Report"), I, Paul O'Callaghan do hereby certify that:

- I am a Principal Mining Engineer with CSA Global Pty Ltd at its head office at Level 2, 3 Ord Street, West Perth, Western Australia 6005, Australia.
- I am a professional mining engineer having graduated with a Bachelor of Engineering (Mining) from the Western Australian School of Mines, Kalgoorlie, Western Australia (1991).
- I am a Fellow of the Australasian Institute of Mining and Metallurgy (FAusIMM).
- I have practised my profession as a Mining Engineer for the past 25 years in the mineral resources sector and engaged in the assessment, development and operation of numerous mineral projects both within Australia and overseas.
- I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "Qualified Person" for the purposes of NI 43-101.
- I am responsible for Sections 15, 16 and 21 to 23 and jointly responsible for Sections 1, 18 and 25 to 27 of the Technical Report.
- I have not visited the property that is the subject of the Technical Report.
- I am independent of the issuer as described in Section 1.5 of NI 43-101.
- I have had no prior involvement with the property that is the subject of the Technical Report.
- I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101.
- As of the effective date, the Technical Report, to the best of my knowledge, information, and belief, contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: 31 December 2018

Dated at Perth, Australia this 6th day of June 2019

["Signed"]
{Paul O'Callaghan}

Paul O'Callaghan, BEng (Mining), FAusIMM
Principal Mining Engineer, CSA Global Pty Ltd

Certificate of Qualified Person – Adrian Martinez

I, Adrian Martinez Vargas, Ph.D., P.Geo. (BC, ON), do hereby certify that:

- I am employed as a Senior Resource Geologist with the firm of CSA Global Canada Geosciences Ltd located at 365 Bay Street, Suite 501, Toronto, Ontario, Canada M5H 2V1.
- I graduated with a degree in Bachelor of Science, Geology, from the Instituto Superior Minero Metalurgico de Moa (ISMM), 2000. I have a Postgraduate Specialization in Geostatistics (CFSG) MINES ParisTech, 2005, and a Ph.D. on Geological Sciences, Geology, from the ISMM in 2006.
- I am a Professional Geoscientist (P.Geo.) registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC, Licence 43008) and the Association of Professional Geoscientists of Ontario (APGO, Membership 2934).
- I have worked as a geologist since my graduation 18 years ago, and I have experience with mineral projects of nickel and cobalt laterites, including Mineral Resource estimation.
- I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that because of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "Qualified Person" for the purposes of NI 43-101.
- I visited the property that is the subject of the Technical Report for five days from 7 to 11 May 2018 and for nine days from 26 November to 5 December 2018.
- I am an author of the technical report titled: "NI 43-101 Technical Report for the Moa Project, Cuba", prepared for Sherritt International Corporation with an effective date of 31 December 2018 and signature date of 6th June 2019 (the "Technical Report").
- I am responsible for Sections 9 to 11 and 14 and jointly responsible for Sections 12 and 25 to 27 of the Technical Report.
- I have had prior involvement with the properties that are the subject of the Report. I was hired in the year 2007 and 2008 as an external consultant to complete internal resource estimate updates of the calcium carbonates, and Moa Oriental concessions, and to complete geological mapping and interpretation of Camarioca Norte and Sur deposits.
- As of the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.
- I am independent of the issuer applying all the tests in section 1.5 of NI 43-101.
- I have read NI 43-101 and Form 43-101F1, and the Report has been prepared in compliance with that instrument and form.

Effective Date: 31 December 2018
Dated at Ottawa, Ontario, Canada this 6th day of June 2019

["Signed & Sealed"]
{Adrian Martinez Vargas}

Adrian Martinez Vargas, PhD., P. Geo.
Senior Resource Geologist, CSA Global Canada Geosciences Ltd

Certificate of Qualified Person – Kelvin R. Buban

I, Kelvin R. Buban, residing at 71 Westpark Way, Fort Saskatchewan, do hereby certify that:

- I am a Chemical Engineer employed by Sherritt International Corporation.
- I am a co-author of the technical report "43-101 Technical Report, Moa Nickel Project, Cuba" with an Effective Date of 31 December 2018 and signature date of 6th June 2019 (the "Technical Report").
- I hold a Bachelor of Science in Chemical Engineering degree from the University of Alberta. I am licensed as a Professional Engineer with the Association of Professional Engineers and Geoscientists of Alberta (M52532). I have worked as an engineer in the metallurgical industries for over 25 years with Hudbay Minerals and Sherritt International Corporation. I have read National Instrument 43-101's definition of "Qualified Person" and certify that, by reason of my education, registration with a professional association and past relevant work experience, I fulfil the requirements of a "Qualified Person" for the purposes of National Instrument 43-101.
- I have visited the Central Moa deposits six times since 2014.
- I am responsible for Sections 13, 17, 19, 20, 24 and jointly responsible for Sections 1 and 18 of the Technical Report.
- As an employee of Sherritt, I am not independent of the issuer, as defined in Section 1.5 of National Instrument 43-101.
- My previous experience with the properties of the Moa Joint Venture includes development and optimisation testwork and three site visits in 2012/2015 for process optimisation and troubleshooting. Since assuming the role of Director of Operations Support, I have visited the Moa Joint Venture Operations in August and November of 2018 and in February 2019. Each site visit was of one to two weeks duration.
- I have read National Instrument 43-101 and the final Technical Report and confirm that the parts of the Technical Report for which I am responsible for have been prepared in compliance with National Instrument 43 101.
- As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: 31 December 2018

Dated this 6th day of June 2019, in Fort Saskatchewan, Alberta, Canada.

["Signed & Sealed"]
{Kelvin R. Buban}

Kelvin R. Buban, P.Eng.
Sherritt International Corporation

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1 Summary

Sherritt International Corporation (Sherritt) and General Nickel Company S.A. (GNC), a Cuban State company, are partners in the Moa Joint Venture (Moa JV), an enterprise that explores, develops, mines and processes nickel laterite deposits in eastern Cuba for refining into finished nickel and cobalt in Canada that is marketed to customers internationally. The regional development program of the Moa JV includes several geographically separate projects across a large area spanning more than 100 km^2 along the north-eastern coastal region of the island of Cuba.

Moa Nickel S.A. (Moa Nickel), one of the three companies of the Moa JV, owns and operates the mining and processing facilities located at Moa, Cuba. Since its creation in 1994, the primary focus of Moa Nickel has been on the mining and processing of a group of deposits that are referred to, collectively, as the Central Moa deposits that lie immediately to the south and west of the city of Moa on the north-eastern coast (Figure 1). In 2006, Moa Nickel acquired and started exploring three concessions located 10–15 km southeast of the Moa Nickel processing plant and 3–10 km southeast of the town of Punta Gorda. These new concessions are referred as the Satellite deposits (Figure 1).

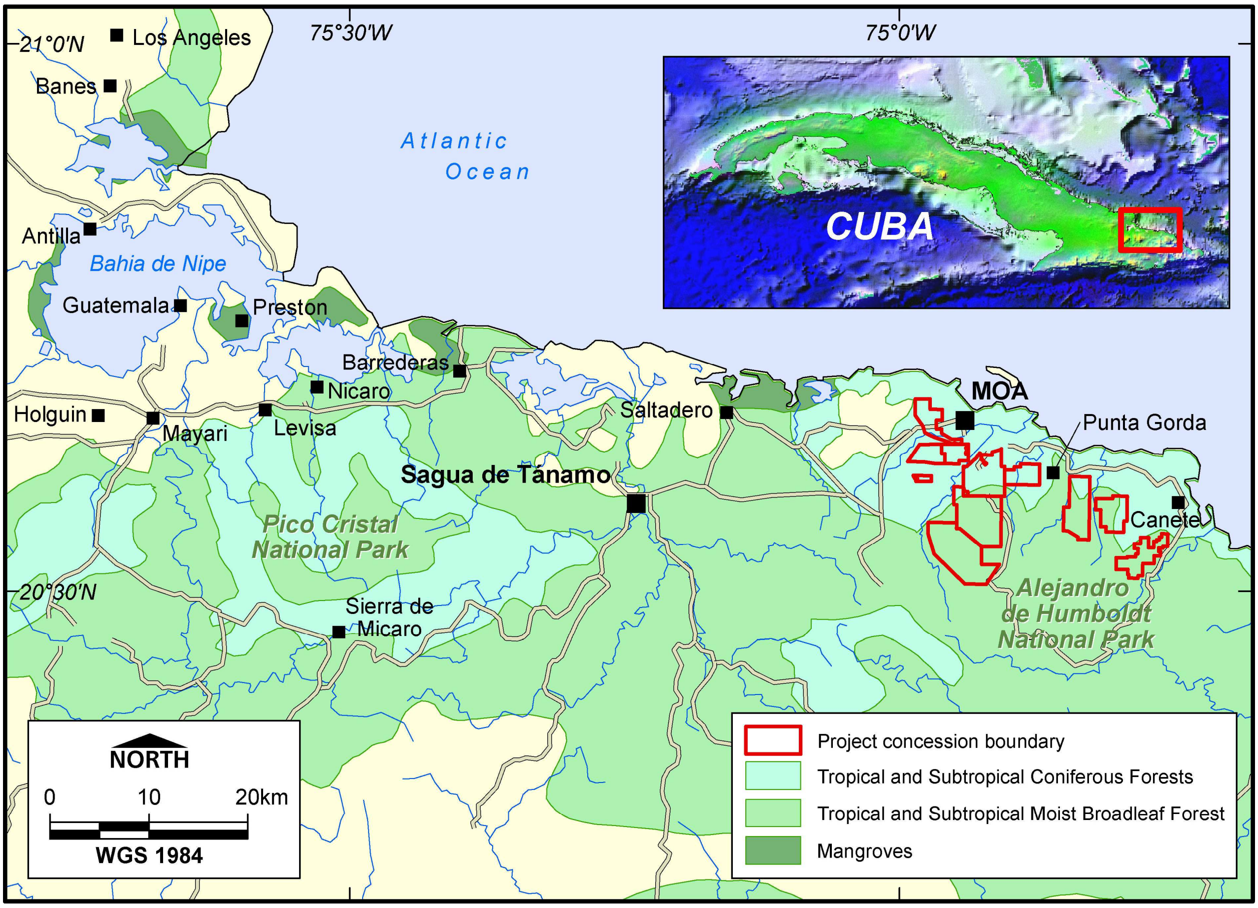

Figure 1: Location of the Moa concessions

This Report provides the technical and economic information that supports the updated Mineral Resource and Mineral Reserve estimates for the Moa operation, including both Central Moa and the Satellite deposits. The deposits over which Moa Nickel has mining or exploration rights are spread over a number of separate mineral concessions, as shown in Figure 2. The main active areas are Zona Central (formerly part of Moa Occidental), Moa Oriental and Camarioca Norte. Mining operations in Camarioca Sur will commence in 2023.

1.1 Property Description and Location

The Moa nickel laterite deposits are located south, west and southeast of the city of Moa in the province of Holguin in north-eastern Cuba (Figure 1); the Pedro Sotto Alba processing plant operated by Moa Nickel lies on the southern edge of the residential area of the city of Moa.

Mineral rights are the property of the Cuban state and give exclusive rights to the title holders. There are three types of concessions which can be granted: exploration, exploitation and processing. In addition, there are permits for geological reconnaissance that are not exclusive to the permit holder.

Moa Nickel holds a processing concession for its plant, exploitation concessions for all the areas currently in exploitation and the Camarioca Sur deposit (see Table 4).

Historically, Moa Nickel has had the right to mine the limonite, but since 2013 Moa Nickel also has the right to explore and mine saprolite underlying the limonite in some of the deposits (e.g. Camarioca Sur).

Mineral exploration concessions are usually granted to conduct geological investigation to upgrade resource classification or to validate existing information. The two exploration concessions, Playa La Vaca-Zona Septentrional II and Santa Teresita, have expired. The conversion of Santa Teresita to an exploitation concession is pending the evaluation. The Moa JV is currently finalizing the final exploration report for Santa Teresita and is in the process of deciding whether to apply for exploitation concessions.

Moa Nickel also holds a concession to mine calcium carbonate muds (Limestone Mud) in a lagoon deposit located in the sea, between Cayo Moa and Moa, used to neutralise acid solutions used in processing.

1.2 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The city of Moa, with a population of approximately 75,000, lies along the paved highway that connects the provincial capital of Holguin to the smaller towns of Cueto, Mayari, Nicaro and Sagua de Tanamo. The city of Holguin is about 190 km to the west, a driving time of about 2.5 to 3.0 hours. There is a public bus service to all neighbouring towns. Moa has a small commercial airport with limited flights to Havana. The nearest large international airports are at Holguin to the west, and at Santiago de Cuba on the south coast.

The Moa region has a tropical humid climate, with average daily high temperatures above 30°C in summer and average daily lows below 20°C in the winter. Monthly rainfall is consistently above 100 mm with peak rainfall months in October to December.

In addition to the nickel-cobalt mixed sulphides being produced by Moa Nickel, another major nickel laterite mine operates to the east of Moa Oriental, feeding the Che Guevara plant at Punta Gorda. Apart from the nickel-cobalt operations, there is small-scale farming in the Moa area, with many farmers also engaged in the production of charcoal.

The water supply for Moa and the processing plant are drawn from one water bore at Veguita, near the Moa Nickel plant, and from the Nuevo Mundo reservoir on the Moa River.

The city of Moa and the Moa Nickel plant are served by the national electric power grid, and grid powerlines cross the mine site. The nearest power plant is at Felton, some 85 km west of Moa.

Moa Nickel's mineral deposits lie on the undulating north slope of the Cuchillas del Moa, an east-west trending range of forested mountains with a total relief of about 1,175 m that form the surface expression of the Moa-Baracoa ophiolite massif. All concessions lie on the piedmont of the range.

1.3 History

The existence of economically viable nickel and cobalt resources in the laterite of eastern Cuba was first established in the 1940s, and exploitation and production operations have existed continuously since then.

The world's first high pressure acid leach (HPAL) process plant was constructed in Moa in 1961 and is still operating. The Cuban Government's state mining company was the sole operator, with technical assistance from the Soviet Union, until the early 1990s.

In 1994, Moa Nickel S.A. was formed as a joint enterprise, an equal 50:50 partnership between Sherritt International Corporation and General Nickel Company S.A., a Cuban state company. Moa Nickel was granted mining rights on 1 December 1994. It has continued mining operations at Moa Occidental and initiated mining operations at Moa Oriental across the Moa River from Moa Occidental in 2000. The Camarioca concessions (Norte and Sud) were first explored in the early to mid-1970s by Soviet Union geologists.

To the east of the Moa Oriental and Camarioca deposits, and separated from them by mineral concessions assigned by the Cuban state to other nickel laterite mining operations, is a group of smaller nickel laterite deposits. These are; La Delta, Cantarrana and Santa Teresita (Figure 2), referred to collectively by Sherritt as the Satellite deposits.

1.4 Geology and Mineralisation

Nickel laterites on the Moa Nickel properties are formed over the Moa-Baracoa ophiolite massif, composed of partially serpentinised harzburgites and lesser dunites. The Moa-Baracoa massif, together with the adjoining Mayarí-Cristal ophiolite, is the most extensive complex in the belt of ultramafic rocks of an ophiolite belt that crops out discontinuously for more than 1,000 km along the northern margin of Cuba.

The laterite profile overlying the bedrock is composed of four principal horizons. From bottom to top, these are: (1) serpentinised peridotite, (2) saprolite, (3) limonite and (4) ferricrete. The saprolite zone at Moa Oriental is poorly developed relative to the overlying limonite, but is more commonly seen in the Camarioca deposits. The boundary between the saprolite zone and the peridotite substrate (the "weathering front") is extremely irregular. The saprolite zone passes upwards in the section to a limonite zone, which is defined by its dominant mineralogic composition of goethite and hematite. Two subzones are defined: a lower limonite with faint remnants of primary structure and upper limonite in which the structure is collapsed. Finally, all zones of the profile are overlain by ferricrete.

Typically, nickel (Ni) grade increases from surface downwards in the profile. Cobalt (Co) is low near surface, and peaks near the upper limonite/lower limonite contact, where it is associated with manganese (Mn) oxide minerals. Massive limonite is a massive red-brown earthy fine-grained soil with no visible structure. Structured limonite is the largest and most important zone in terms of Ni and Co. Ni grade ranges from 1% to 1.5% Ni in the limonite zone, with about 0.1% to 0.15% Co. Where it is developed, saprolite consists of a zone of intercalated structural limonite and grey/green to yellow/green saprolitic clay displaying fairly well-preserved remnant mineral structures of the underlying ultramafic.

1.5 Exploration and Drilling

Exploration activities at the property, other than drilling and pitting, have included topographic surveys, hydrogeological studies, geological mapping and geophysical surveys with ground penetrating radar (GPR).

Topographic surveys were completed in different campaigns usually to locate exploration drillhole collars. Topographic surveys were completed using digital total stations and were connected to geodesic points surveyed and monitored by the Instituto Cubano de Geodesia y Cartografía.

Geological mapping has been completed by the Centro Internacional de la Habana S.A, composed of professionals and local university professors. Field work was completed along accessible outcrops and cleared paths prepared for drilling.

Approximately 150 km of GPR lines were acquired and interpreted in Camarioca Sur and Norte in 2005–2006. The GPR survey was used to predict a high-resolution surface contact between the laterites and the bedrock, and the contact between the limonite and saprolite, along GPR lines. The resulting surfaces were calibrated against drillhole data.

Exploration drilling on the property has comprised ordinary drillholes, mineralogical drillholes, and basement drillholes. There are also exploration pits, which are the only source of density samples used to estimate resources. To date there are in total more than 47,000 exploration drillholes and around 460,000 m drilled.

Over 85% of the drillholes used for resource estimation are post 1995 Moa JV drillholes. Various drilling programs from 2005 through to 2008 were carried out by Moa Nickel's contractor, Geominera using a Russian built truck-mounted 135 mm diameter spiral auger drill. A hollow core auger was also used in order to penetrate bedrock in regions where mapping of the bedrock geology had been recommended. In 2008, Moa Nickel acquired its own Canadian-built rotary-head M5Xd drilling machine mounted on a Japanese-built carrier for use in the large development drilling programs on Camarioca Norte and Sur. These were capable of drilling auger, hollow auger and diamond core holes.

Exploration pits were dug with 1.5 m x 1.5 m squared sides and variable depth, but generally cut almost the entire lateritic section. Exploration pits were placed 0.5 m from ordinary drillholes. Samples were extracted from four vertical channels in the walls without altering the volume of the material in its natural state, wrapped in plastic, and sent to the laboratory in Santiago de Cuba for density measurement.

1.6 Sampling and Analysis and Security of Samples

The assay grades used for resource estimation are from samples collected in historical drilling campaigns of the 1970s and up to 1995, and samples collected from Moa Nickel (Moa JV) campaigns during various periods from 1995 to 2019. The main operator of these campaigns was Geominera Oriente, the main drilling contractor in eastern Cuba, and most assays are believed to be completed in their laboratory "Elio Trincado", located in Santiago de Cuba. Ni and Co assays were completed using atomic absorption spectroscopy (AAS) from 1975; Fe was also assayed using this technique from 1977. Before 1975, assays of Ni and Co were completed with ultraviolet–visible spectrophotometry. In 1996, inductively coupled plasma-optical emission spectrometry (ICP-OES) assays were introduced in the main Cuban laboratories doing assays for Fe, Ni, Co, Si, Al, Mg, Cr and Mn in nickel laterites, including the Geominera Oriente's Elio Trincado Laboratory, Laboratorio Central de Minerales "José Isaac del Corral" (LACEMI) located in Havana, and Centro de Investigaciones para la Industria Minero Metalúrgica (CIPIMM), also in Havana.

Drilling samples are collected directly from the auger after removing the contamination from the walls and placed in a plastic bag, logged, tagged and sealed. The samples are split with a quartering tool and two opposite quarters are placed in a metallic tray, along with the corresponding sample tag, and then dried in electric ovens at 105°C for 24–48 hours. Dried samples are crushed and then split with a rotary splitter. The crushed samples are then pulverised with a disk mill to 200 mesh and split with a riffle splitter to obtain a sample of approximately 100 g. The 100 g pulp samples are placed in paper bags in batches into cardboard boxes and sent for assay at the Elio Trincado laboratory.

At the laboratory, chemical analyses for regular samples are completed for Al_2O_3, SiO_2, MgO, Cr_2O_3, MnO, NiO, CoO, CaO, Fe_2O_3, and loss on ignition (LOI) by sodium carbonate fusion followed by inductively coupled plasma atomic emission spectroscopy (ICP-AES). Fe is also assayed volumetrically by titration with potassium dichromate.

Approximately 6–10% pulp duplicate samples, known on site as "*control interno*", previously prepared by Moa Nickel personal, are sent in each 100-sample batch to the primary laboratory. Moa Nickel has no other quality assurance/quality control (QAQC) sample protocol is in place; no blanks or standards (certified reference materials) are inserted into the sample batch prior to delivery to the lab. Approximately the same percentage of pulp duplicates are sent to an external lab. The primary lab carries out its own internal QAQC introducing two standards known as L1 and L2; however, the results are not provided to Moa Nickel.

The author is of the opinion that the QAQC protocols currently in place could be improved to include more robust procedures. This would improve confidence in future data collection used for upgrading resources. However, the work completed to date does demonstrate repeatable results through various laboratories. The author is of the opinion that although the QAQC procedures are not robust, the samples are appropriate for Mineral Resource estimation.

Drillhole databases are usually stored in Microsoft Access file format. Compilation of the databases is completed on site or subcontracted to a consulting group adjunct to the local university, ISMM, and then reviewed by the resource and exploration geologist team on site. Drillhole logs are entered manually in the database and then combined with drillhole assays, which are always received in digital format from the labs.

It is the Qualified Person's opinion that security, sample collection, preparation and analytical procedures undertaken on the Moa Project during the 1995–2018 drill programs are appropriate for the style of mineralisation. Duplicate assays provided sufficient confidence in assay values for their use in the estimation of CIM-compliant Mineral Resources.

The Qualified Person notes that no blank and standard samples are introduced in the current QAQC program and that quality assurance protocols (standard operating procedures – SOPs) need to be updated; the Qualified Person recommends introducing blanks and reference materials (standard samples) with grade ranges representative of the different limonitic horizons.

1.7 Resource and Reserve Estimate

1.7.1 Mineral Resource Estimate

This Mineral Resource estimate was prepared by Dr Adrian Martínez Vargas, Senior Consultant, P.Geo., and internally peer-reviewed by Dmitry Pertel, Principal Consultant; both full-time employees of CSA Global Pty Ltd (CSA Global). Mineral Resources were estimated for 11 zones on the Moa JV property (Figure 1), using all drillhole data available by November 2018 and has an effective date of 31 December 2018. Additional resources in three small concessions were prepared by the Moa Nickel team and reviewed by Dr Adrian Martínez Vargas. Mineral Resources are summarised in Table 1.

There are 2.75 million tonnes (Mt) of limonite in reject ponds at 1.32% Ni and 0.11% Co that are not considered resources nor reserves. However, these rejects have been historically mined and reprocessed. Limonite in reject pounds are formed by the fine and oversize material that is washed out from oversize reject from the slurry preparation plant and impounded downstream.

Table 1: Moa JV (100% basis) Mineral Resource estimate over cut-off Net Value zero

Classification	Mt	Ni	Fe	Co	SiO_2	Al	Mg
Measured	111.92	1.03	44.95	0.13	5.51	5.13	1.15
Indicated	46.04	0.94	43.64	0.12	7.12	5.16	1.46
Inferred	32.60	0.89	44.02	0.13	6.38	5.35	1.26
Additional resources on small concessions[9]							
Measured	1.25	1.32	42.10	0.13	-	-	-

Notes:

1. *Sherritt and GNC are equal (50:50) partners in the Moa JV.*
2. *Numbers have been rounded to reflect the precision of a Mineral Resource estimate.*
3. *The reporting cut-off is calculated as a Net Value = Revenue from Ni + Revenue from Co – Costs >0. The costs are equal to the sum of processing cost, Ni selling cost of US$2.12/lb, and Mining cost of US$5.15/t. The processing cost has a fixed component of US$47.12/t a haulage cost of 5.13/t and a variable cost related to Mg and Al content. Revenue was calculated at a market price of US$6.82/lb Ni and US$25.23/lb Co, with a Ni and Co recovery of 85% and 84% respectively.*
4. *These are Mineral Resources and not Reserves and as such, do not have demonstrated economic viability.*
5. *The average grade estimates reflect nickel and cobalt resources in situ, and do not include factors such as external dilution, mining losses and process recovery losses.*
6. *Resource classification as defined by the Canadian Institute of Mining, Metallurgy and Petroleum in their document "CIM Definition Standards for Mineral Resources and Mineral Reserves" of 10 May 2014.*
7. *The Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Mineral Reserves (Section 15).*
8. *No stockpiled material is included in the Mineral Resources.*
9. *Additional resources existing in remnant or small concessions reported over traditional cut-off grade 1% Ni, 35% Fe.*

Mineral Resources were interpolated using the drillhole data available at November 2018. The interpolation was in block models with blocks with a horizontal section of 8.33 m x 8.33 m, and 12.5 m x 12.5 m. Three-metre high blocks were created for Moa Oriental, Camarioca Norte, and Zona A, to maintain the block definition in areas with active mining; 2-m high blocks were used in the other concessions.

Two main domains were defined to interpolate grade variables; limonite and saprolite. The material ranging from rocky saprolite to fresh bedrock (the bedrock domain) was not interpolated. Laterite with an iron grade over 35% were assigned to the limonite domain, intervals with iron grade between 35% and 12% were assigned to the saprolite domain, and intervals with iron grades below 12% were assigned to the bedrock domain. Drillhole intervals were flagged with geochemical domains and then simplified into one single sequence of limonite, saprolite and bedrock. The contact points between domains were extracted and used to generate gridded surfaces that represent the estimation domains boundaries. Blocks were assigned with the interpolation domain with maximum proportion. Drillholes, domain surfaces and block models were then flattened (or unfolded) using the topographic surface before mining as reference.

The interpolation used unfolded coordinates, using ordinary kriging with variogram models deduced from unfolded 1 m composites. Each block was estimated selecting, when possible, four drillholes around the blocks and restricted to the samples located at the same level of the blocks in the unfolded block model. The block models were then unfolded, and interpolations were validated with a visual comparison of drillholes and blocks in sections, comparison of average grades and statistical distributions, validation with swath plots, and global change of support (GCOS). All validations were completed per separate estimation domain. All the model validations were satisfactory, and the estimates were considered appropriate for Mineral Resource reporting.

Density values were assigned as the average of the density values measured in exploration pits. Different average density values were assigned to saprolites, limonite, and the limonite with ferricrete and pisolite. These lithology groups were selected using Fe, Ni and Co grade thresholds deduced with classification trees.

Resources were depleted with the surface of the mining surface with the effective date of November 2018. In addition, block models were flagged with environmental protection polygons along rivers created by the Moa Nickel team for this Minera Resource estimate, using the Cuban guidelines NC 23 published by the Oficina Nacional de Normalización in 1999.

Resource classification was in adherence to the "Definition Standards for Mineral Resources and Mineral Reserves" adopted by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Council on 10 May 2014 (CIM Council, 2014). The classification of Mineral Resources into Measured, Indicated and Inferred categories was based on the confidence, quality and quantity of the informing data, the confidence in the geological interpretation of the deposit and the "reasonable prospects for economic extraction" of these resources.

Mineral Resources in areas with a drillhole spacing of 40 m or less were classified as Measured Resources, as this level of drilling provides high confidence in the geology and grade continuity. The category of Indicated Mineral Resources was assigned to blocks informed by drillhole with spacing between 40 m and 80 m. This level of drilling provides adequate data to have moderate to high confidence in the deposit geology and grades. Inferred Mineral Resources were informed by drillholes with a spacing of 80–120 m. The classification was completed by selecting blocks within classification polygons created as squared buffer zones around drillhole locations. The classification polygons were manually edited to remove isolated drillholes and small islands before using them for classification. Blocks within environmental protection polygons along rivers were not classified as Mineral Resources.

1.7.2 Mineral Reserve Estimate

The Mineral Reserves for Moa are a subset of the Mineral Resource (i.e. the Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Mineral Reserves).

The Mineral Reserve has been estimated to be 53.4 Mt at a nickel grade of 1.16% and a cobalt grade of 0.13%. The modifying factors applied to the Mineral Resource have been summarised in Section 15.2.

The Mineral Reserve is effective as of the date 31 December 2018 and has taken account of production from the property during 2018.

There has been no stockpiled material included in the Mineral Reserve.

Modifying factors have been applied to the Mineral Resource as outlined in Section 15.

Table 2: Moa JV (100% basis) Mineral Reserve as at 31 December 2018

Deposit	Classification	Tonnage (Mt)	Ni (%)	Co (%)	Fe (%)	Ni metal (kt)	Co metal (kt)
Moa Oriental	Proven	3.5	1.08	0.14	44.56	38.0	5.0
	Probable	-	-	-	-	-	-
	Proven + Probable	**3.5**	**1.08**	**0.14**	**44.56**	**38.0**	**5.0**
Camarioca Norte	Proven	12.9	1.17	0.13	41.91	150.6	16.3
	Probable	2.9	1.13	0.12	40.62	32.5	3.5
	Proven + Probable	**15.7**	**1.16**	**0.13**	**41.67**	**183.1**	**19.8**
Camarioca Sur	Proven	13.2	1.21	0.12	41.16	160.6	15.9
	Probable	5.0	1.14	0.12	39.72	57.5	5.9
	Proven + Probable	**18.3**	**1.19**	**0.12**	**40.76**	**218.1**	**21.7**
Yagrumaje Oeste	Proven	2.2	1.05	0.14	45.00	23.2	3.1
	Probable	0.4	1.12	0.13	44.14	4.3	0.5
	Proven + Probable	**2.6**	**1.06**	**0.14**	**44.87**	**27.5**	**3.6**
La Delta	Proven	4.6	1.20	0.14	42.68	54.4	6.3
	Probable	0.5	1.16	0.13	42.29	6.2	0.7
	Proven + Probable	**5.1**	**1.19**	**0.14**	**42.64**	**60.6**	**7.0**
Cantarrana	Proven	4.5	1.15	0.16	44.29	51.2	7.1
	Probable	0.3	1.14	0.13	44.22	2.8	0.3
	Proven + Probable	**4.7**	**1.15**	**0.16**	**44.28**	**54.1**	**7.4**
Zona Central	Proven	0.8	1.04	0.12	41.36	8.2	1.0
	Probable	0.5	1.03	0.12	40.16	5.1	0.6
	Proven + Probable	**1.3**	**1.03**	**0.12**	**40.90**	**13.3**	**1.6**
Zona A	Proven	1.1	1.17	0.11	40.69	12.8	1.2
	Probable	0.2	1.10	0.13	41.17	1.9	0.2
	Proven + Probable	**1.3**	**1.16**	**0.11**	**40.76**	**14.6**	**1.4**
Yamaniguey Cuerpo	Proven	0.8	1.32	0.12	39.43	11.0	1.0
	Probable	0.1	1.40	0.13	39.52	1.4	0.1
	Proven + Probable	**0.9**	**1.33**	**0.12**	**39.44**	**12.4**	**1.1**
All Deposits	**Proven**	**43.6**	**1.17**	**0.13**	**42.29**	**510.0**	**56.8**
	Probable	**9.8**	**1.14**	**0.12**	**40.45**	**111.7**	**11.8**
TOTAL MINERAL RESERVE	**Proven + Probable**	**53.4**	**1.16**	**0.13**	**41.95**	**621.7**	**68.6**

Note: Sherritt and GNC are equal (50:50) partners in the Moa JV.

1.8 Mining Operations

Moa employs conventional open cut mining techniques using a various assortment of backhoe hydraulic Liebherr excavators (up to 7 m^3 bucket) and articulated Volvo and Bell haul trucks (40–55 t). Due to the shallow nature of the orebody and the composition of the limonite, there is no requirement for blasting on site.

Mining commences through the clearing and stripping of local vegetation (small trees and brush) via the usage of bulldozers. The dozers push the vegetation into a series of piles that are removed by backhoe excavators and trucks to various dump sites where rehabilitation takes place.

Following the removal of vegetation and topsoil, overburden or waste material is removed in either 2 m or 3 m benches. Overburden is removed through the usage of backhoe excavators and articulated trucks and transported to mined out areas or established dumps outside of the main deposit. The overburden is removed in conjunction with the short-term mining plan to maintain an annual average of at least three months of exposed material for plant feed.

Mining of the plant feed is done in a very similar fashion to the removal of the overburden. In lower grade zones, mining is often carried in terraces, taking the ore out to its full depth maintaining full extraction of the orebody. The plant feed is chosen based on fixed cut-off grades for nickel and iron and is hauled direct to the Slurry Preparation Plant (SPP) where it is dumped over a set of grizzly bars for further processing. If direct dumping on the grizzly is not available, the feed will be dumped in an open area close to the SPP so that rehandling equipment can access it when material is required. This is especially important during the wet season where closely located stockpiles need to be accessed.

1.9 Processing Facilities

The Moa JV includes unit operations, located adjacent to the mine site at Moa, that produce a mixed sulphide intermediate product. The mixed sulphide intermediate is then transported to the refinery in Fort Saskatchewan where refined nickel and cobalt metal is produced.

At Moa the main unit operations include slurry preparation, high pressure acid leach, countercurrent decantation wash circuit, neutralization and sulphide precipitation. The main unit operations at the refinery in Fort Saskatchewan include an oxidizing leach, a nickel-cobalt separation step, purification circuits and finally nickel and cobalt hydrogen reduction to produce metal products.

1.10 Capital and Operating Costs

CSA Global was provided predicted annual capital expenditure by Sherritt. These expenditures are for items such as the new SSP, future tailings storage and expansion, mining fleet replacement and upgrades, and sustaining equipment costs in both the processing plant in Moa and the refinery in Fort Saskatchewan.

The capital costs allowed for over the next five years (2019 to 2023), in Canadian dollars are $93.0 million, $95.8 million, $96.8 million, $89.0 million and $89.1 million.

Based on current site costs for road construction and access roads for Camarioca Norte and Camarioca Sur, there is an estimated capital cost of US$330,000 per kilometre of road construction.

The operating costs were based on 2016 and 2017 operational performance for the Moa JV. The derived values were selected to be conservative relative to recent years performance to allow for future variability over the life of mine. The following three average unit rates were used for the mineral reserve estimation:

- For mining, an average cost of US$5.15 per tonne of material moved (both waste and ore);
- For processing, an average cost of US$77.50 per tonne of SPP material processed (this includes sustaining capital costs);
- For transport, refining and royalties, an average cost of US$1.92 per nickel pound recovered.

1.11 Conclusions and Recommendations

Based on the current identified Mineral Resources and Mineral Reserves and the assumed prices and parameters, the authors of this Technical Report have concluded that profitable operations can be sustained until 2033 or for approximately 15 years at the Moa Project. It is likely that mine life could extend beyond the 15 years by implementing the recommendations outlined through this report.

This update to the Mineral Reserve for Moa has an effective date of 31 December 2018 and reflects a change in the understanding of the Mineral Resources, the mining strategies and the process drivers.

The opinion of CSA Global is that the Mineral Resource and Mineral Reserve presented in this Technical Report is a reasonable estimate on the basis of information available at the time of reporting.

The key recommendations that CSA Global believes would improve the operations at Moa and likely extend the mine life are:

- Improve the QAQC procedures for geological data capture to improve confidence in the base data for future Mineral Resources upgrades;
- Review the concession status of Santa Teresita and Playa La Vaca so that resources can be converted to reserves in these areas;
- Undertake a geometallurgical study at the project to better understand the mineralogical domains in the deposit and the performance of lower grade material through the SPP and Mixed Sulphides Plant (MSP) to support moving towards an economic cut-off strategy for the Mineral Reserves – this will require additional metallurgical testwork;
- Move to an economic cut-off methodology for future Mineral Reserve estimation and update the current mining practices to support such a change, particularly a stock piling strategy to optimise ore feed to the plant;
- Complete a Lidar survey of current mining areas to better define the surface topography and to assist with a review of stockpiles, waste dump and previous mined areas with the aim of quantifying additional economic material to feed the plant;
- Review the performance of the SPP to assess if there are opportunities to reduce the rejection rate; and
- At completion of the above recommendations review the mining reserve and complete more detailed scheduling.

More detailed recommendations are presented throughout the report and are presented in Section 25 and Section 26.

2 Introduction

2.1 Issuer

This Technical Report has been prepared for Sherritt International Corporation (Sherritt), a producing issuer in Canada, as defined in NI 43-101.

The Moa Project is a producing nickel and cobalt project located in Cuba that explores, develops, mines and processes nickel laterite deposits for refining into finished nickel and cobalt in Canada that is marketed to customers internationally. The project has a designed annual production capacity of 35,000 tonnes of nickel and 3,600 tonnes of cobalt in mixed sulphides, and an estimated life of approximately 15 years (until 2033). This life of mine (LOM) is based on current Mineral Reserves and does not consider potential upgrading of remaining Mineral Resources exclusive of Mineral Reserves.

Sherritt and General Nickel Company S.A. (GNC), a Cuban State company, are equal partners in the Moa Joint Venture (Moa JV) which is the operator of the Moa Project. The Moa JV comprises three companies:

- Moa Nickel S.A. (Moa Nickel) – owns and operates the Moa, Cuba mining and processing facilities;
- The Cobalt Refinery Company Inc. (CRC) – owns and operates the Fort Saskatchewan, Alberta metals refinery;
- International Cobalt Company Inc. (ICCI) – located in Nassau, Bahamas, acquires mixed sulphides from Moa Nickel and other third-party feeds, contracts with CRC for the refining of such purchased materials and then markets finished nickel and cobalt.

2.2 Terms of Reference

CSA Global Pty Ltd (CSA Global) was retained by the Issuer to prepare a technical report on its Moa JV Mineral Resource and Mineral Reserve estimates in accordance with Canadian Institute of Mining, Metallurgy and Petroleum (CIM) guidelines and NI 43-101 Technical Reporting requirements. Terms of reference are detailed in Section 2.2.1 below.

2.2.1 CSA Global Terms of Reference

Phase 1:

- Data collation, site visit to be completed by a Principal Resource Geologist and Principal Mining Engineer to Moa projects for the purposes of inspection, ground truthing, review of activities, procedural review and information data collection and collation and to satisfy NI 43-101 "personal inspection" requirements.

Phase 2:

- Review geology and establish key parameters and mineral domains for estimating Mineral Resources and Mineral Reserves. Review of current models, depletion areas and key target areas for the next phase of mining. Contribution to the final report for the geology sections.
- Review of current Mineral Resource estimation models, where these have been prepared by Sherritt (or where these have been reported by previous owners and have not been the subject of recent focus by Sherritt), reasonableness testing, and provision to update and improve on those material projects based on areas of improvement identified and/or as a result of new drilling data, informed as required by grade control and production data.

Phase 3:

- Following Phase 2 works, and where applicable, critically review Mineral Reserves prepared by Sherritt in-house and/or by previous consultants, reasonableness testing, review of all available modifying factor data and information in support of formal reporting of Mineral Reserves under the CIM guidelines and NI 43-101 Technical Reporting;
- Review of in-house mining optimisations, pit shell selection, pit designing, production schedules and economic models and completion of reasonableness testing. Update if necessary.

Based on discussions, CSA Global undertook the following:

- Regularised updated Mineral Resource block models;
- Reviewed production data in terms of costs and operations for mining and processing;
- Completed optimisation of the depleted Mineral Resources using the fixed cut-off grades stipulated by the government of Cuba for limonite ore. Given that these pits are shallow, basic mine designs were generated to account for staging, ramps haul roads and dumps;
- Assessed the economic cut-off grades for the operation based on agreed parameters to assess the economic benefit to Sherritt and the Government of Cuba should they wish to explore this option in the future;
- This phase included collaboration with Sherritt as regards gathering of modifying factor data and in-house pit optimisations data, provision for updating and determination of appropriate Ore Reserve classification and preparation of an Ore Reserve statement.

Phase 4:

- Compilation and finalisation of the Technical Report in accordance with CIM guidelines, reported under NI 43-101 Technical Reporting requirements and signed off by appropriate Qualified Persons.

2.3 Principal Sources of Information

The preparation of the Technical Report has been coordinated and completed by CSA Global largely based on information provided by the Owner (Moa Nickel):

- CSA Global – Estimation of Mineral Resources and review of Mineral Reserves.
- Documents and electronic data files provided by Moa Nickel;
- Information gathered during visits to the Moa Project by Adrian Martinez Vargas, the Qualified Person for the Mineral Resource estimate;
- Information gathered during a visit to the Moa Project by Michael Elias (CSA Global), the Qualified Person for reviewing geological setting and mineralisation, exploration and drilling;
- Information gathered from the mining geology technical literature;
- Information gathered from SEDAR (System for Electronic Document Analysis and Retrieval);

Citations to the relevant reports, articles, documents and websites are provided in Section 27 of this report.

2.4 Qualified Person Section Responsibility

This report was prepared by or under the supervision of the Qualified Persons identified in Table 3 for each of the sections of this report.

Table 3: Qualified Person section responsibility

Section	Section title	Qualified Person(s)
1	Summary	Paul O'Callaghan, Kelvin Buban
2	Introduction	Michael Elias
3	Reliance on Other Experts	Michael Elias
4	Property Description and Location	Michael Elias
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Michael Elias
6	History	Michael Elias
7	Geological Setting and Mineralisation	Michael Elias
8	Deposit Types	Michael Elias
9	Exploration	Adrian Martinez
10	Drilling	Adrian Martinez
11	Sample Preparation, Analyses and Security	Adrian Martinez
12	Data Verification	Adrian Martinez, Michael Elias
13	Mineral Processing and Metallurgical Testing	Kelvin Buban
14	Mineral Resource Estimates	Adrian Martinez
15	Mineral Reserve Estimates	Paul O'Callaghan
16	Mining Methods	Paul O'Callaghan
17	Recovery Methods	Kelvin Buban
18	Project Infrastructure	Paul O'Callaghan, Kelvin Buban
19	Market Studies and Contracts	Kelvin Buban
20	Environmental Studies, Permitting, and Social or Community Impact	Kelvin Buban
21	Capital and Operating Costs	Paul O'Callaghan
22	Economic Analysis	Paul O'Callaghan
23	Adjacent Properties	Paul O'Callaghan
24	Other Relevant Data and Information	Kelvin Buban
25	Interpretation and Conclusions	Michael Elias, Adrian Martinez and Paul O'Callaghan
26	Recommendations	Michael Elias, Adrian Martinez and Paul O'Callaghan
27	References	Michael Elias, Adrian Martinez and Paul O'Callaghan

2.5 Qualified Person Site Inspections

2.5.1 CSA Global Pty Ltd

Michael Elias, Principal Consultant-Nickel, undertook a site visit to Moa for three days from 7 to 9 May 2018 to observe all aspects of the geology, exploration and sampling operations.

Adrian Martinez Vargas, Senior Resource Geologist, visited the site for five days from 7 to 11 May 2018 and nine days from 26 November to 5 December to review resource estimation procedures including data collection, database compilation, deposit modelling and grade interpolation.

2.5.2 Sherritt International Corporation

Mr Kelvin Buban's involvement with the properties of the Moa JV has included development and optimisation testwork, and three site visits in 2012/2015 for process optimisation and troubleshooting. Since assuming the role of Director of Operations Support at Sherritt, he has visited the Moa JV Operations in August and November 2018 and in February 2019. Each site visit was of one to two weeks duration.

2.5.3 Current Site Visit

The authors consider the site visits by Michael Elias and Adrian Martinez Vargas to be "current" independent site visits under NI 43-101 Section 6.2.

2.6 Report Effective Date

The Report is based on information known to CSA Global and the authors as of 31 December 2018, the Effective Date of this Report.

3 Reliance on Other Experts

The authors of this Technical Report have not undertaken an independent review and assessment of legal, environmental and political considerations. On these issues, the Technical Report relies entirely on information provided by the issuer experts or on documents publicly disclosed by the Issuer.

The content provided in section 19 that relates to marketing and contracts was provided by Ms Tina Litzinger, VP, Marketing, Operations/Marketing for the issuer. The information was provided via email correspondence during the course of our engagement with Sherritt. Section 24 of this Technical Report is based on the 2018 Sherritt International Corporation Annual Information Form dated 13 February 2019.

4 Property Description and Location

4.1 Location

The Moa nickel laterite deposits are located south, west and southeast of the city of Moa in the province of Holguin in north-eastern Cuba (Figure 1); the Pedro Sotto Alba processing plant operated by Moa Nickel lies on the southern edge of the residential area of the city of Moa.

4.2 Property Description

In Cuba, mineral rights are the property of the state, as dictated by the Mining Law, Law No. 76, 23 January 1995 and are granted exclusively to titleholders. There are three types of concessions: exploration, exploitation, and processing. In addition, there are permits for geological reconnaissance that are not exclusive to the holder. Mineral exploration and mining concessions are granted under decrees or resolutions by Cuban Council of Ministers and are administered by Oficina Nacional de Recursos Minerales (ONRM), the Cuban government agency that oversees and regulates mining activity in the country. Exploration concessions are granted for three years and can be extended for up to two more years. Exploitation concessions are granted for a maximum of 25 years, and can be successively extended for additional periods of 25 years.

Moa Nickel holds a processing concession for its plant, exploitation concessions for all the areas currently in exploitation and the Camarioca Sur deposit. Some of the mining concessions were transferred to Moa Nickel from other mining companies operating in the areas, including the Yagrumaje Oeste and the Camarioca Norte and Sur deposits. Moa Nickel also re-acquired parts of its own mining concessions that were reverted to the ONRM, as in the case of Zona A and Yamaniguey Cuerpo I. Changes in the extent and shape of the concessions also occur frequently.

Historically, Moa Nickel has had the right to mine the limonite, along with normal mining dilution at the top and bottom of the limonite horizon. Since 2013, Moa Nickel also has the right to explore and mine saprolite underlying the limonite in some of the deposits (e.g. Camarioca Sur).

Mineral exploration concessions are usually granted to conduct geological investigation to upgrade resource classification or to validate existing information. The only two exploration concessions, Playa La Vaca-Zona Septentrional II and Santa Teresita, have expired. The conversion of the Santa Teresita deposit to an exploitation concession is pending the evaluation of the exploration results and ONRM approval. A corporate decision to apply for an exploitation concession at Playa La Vaca–Zona Septentrional II is pending. As of the Effective Date of this Report, it is assumed that the exploration concessions currently held by Moa Nickel will be converted by ONRM into exploitation concessions.

The deposits over which Moa Nickel has mining rights are spread over a number of separate mineral concessions as shown in Figure 2 and Table 4. There is currently ongoing exploitation at Zona A, Moa Occidental, Moa Oriental and Camarioca Norte. Mining operations at Camarioca Sur are scheduled to start in 2019.

Moa Nickel also holds a concession to mine calcium carbonate muds (Limestone Mud) in a lagoon deposit located in the sea, between Cayo Moa and Moa. This material is used to neutralise the nickel and cobalt concentrates (Figure 2 and Table 4).

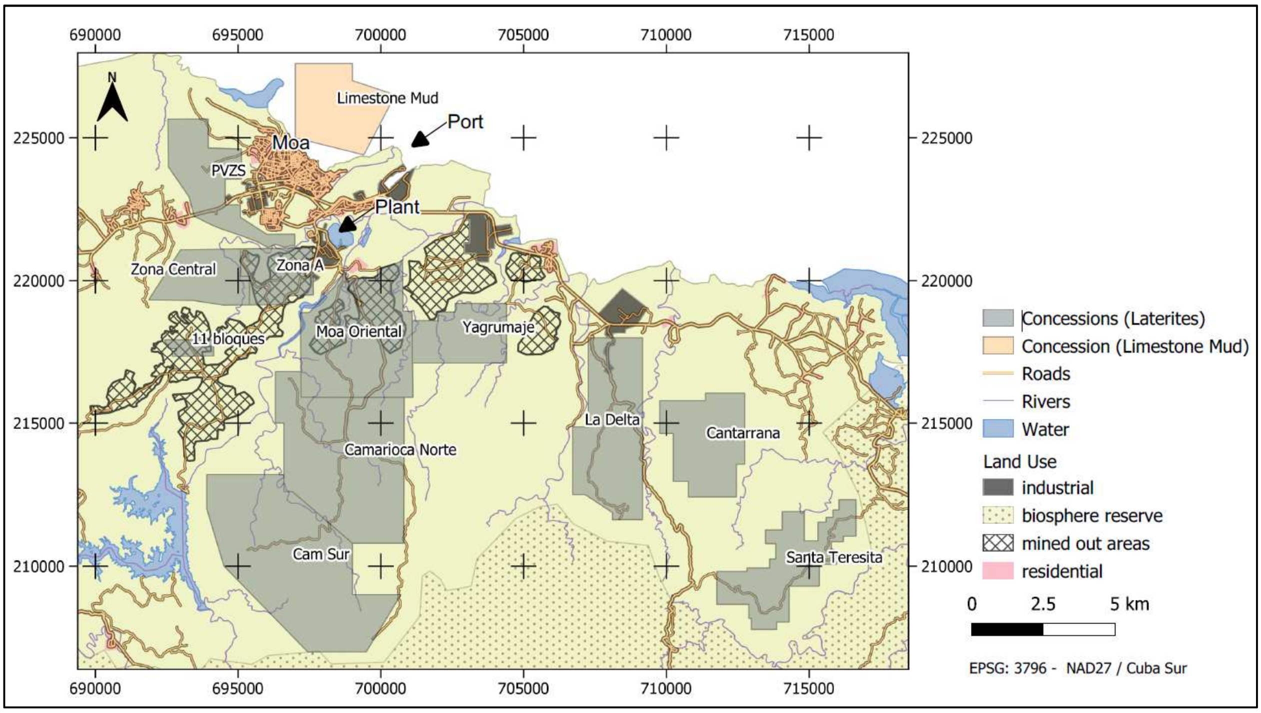

Figure 2: Moa Nickel mining and exploration concessions

4.3 Royalties, Back-in Rights and Other Payments

Moa Nickel pays the Cuban state a royalty calculated on the basis of 5% of the net sales value (free on board Moa port, Cuba) of its production of nickel and cobalt contained in mixed sulphides, and an annual canon of US$2.00, US$5.00 or US$10.00 for each hectare of each concession depending on whether the area is a prospecting, exploration or exploitation area.

4.4 Permits

Mineral exploration, exploitation, and processing concessions are granted with all respective permits required to conduct the requisite work. More detailed information is provided in Section 4.2.

The Cuban government also required the Moa JV to obtain an environmental permit which sets operating standards in connection, amongst others with its water and air discharges and, a permit to operate bank accounts for each currency in which the joint venture does business in Cuba.

4.5 Environmental Liabilities

The environmental and associated risks are discussed in more detail in Section 20.

Table 4: Moa Mining Concession detail

Concession	Area (ha)	Start	Expiry	Renewal
Moa Occidental Sector I (Zona A) and Zona Septentrional [1]	943	Nov 1994	-	see note
Scrap Yard [1]	2	Nov 1994	-	see note
Moa Occidental III (Pilar Camino, Cuerpo 3 Yamanigüey Oriental) [2]	12	Oct 2014	Oct 2019	see note
Sector 5 Block Periferia 33 and Sector North of Zona Sur [3]	142	Feb 2018	-	see note
Sector 11 Block of Yamanigüey Cuerpo I [3]	91	May 2018	-	see note
Zona A Sector II	8	May 2012	May 2032	Feb 2032
Moa Occidental Block O-30	9	May 2012	May 2032	Feb 2032
Moa Oriental [4]	1,531	Nov 1994	-	see note
Calcium Carbonate [1]	805	Nov 1994	-	see note
Serpentine Quarry	9	Sep 2014	Sep 2019	Jun 2019
Camarioca Norte	2,007	Mar 2005	Mar 2030	Jan 2029
Camarioca Sur	2,367	Mar 2005	Mar 2030	Jan 2029
Yagrumaje Oeste	569	Feb 2013	Feb 2038	Nov 2037
La Delta [5,6]	1,300	Sep 2018	Jul 2043	April 2043
Cantarrana [5]	871	Sep 2018	Jul 2043	April 2043
Santa Teresita [7]	925	-	Expired	see note
Playa La Vaca–Zona Septentrional II [8]	754	-	Expired	see note

Notes:

1. *The rights expire when the resources inside of the concession for exploitation are depleted.*
2. *The granted resources have been depleted.*
3. *Moa Nickel was granted permission to mine a total of 1.57 Mt of resources in the Block Periferia 33 and Sector North of Zona Sur; and 900,000 t in Yamanigüey Cuerpo I (Sector 11 Block).*
4. *The decrease in hectares is due to the exclusion of the area for the new Slurry Preparation Plant in Moa Oriental, Agreement 8366/2018.*
5. *In September 2018, the La Delta and Cantarrana deposits were approved as concessions for exploitation, Agreement 8455/2018.*
6. *In the South Sector of La Delta (87.58 ha), the agreement limits the exploitation, until 20 years after the initial approval due to environmental reasons.*
7. *The conversion of the Santa Teresita deposit to a concession for exploitation is pending the evaluation of the exploration results and ONRM approval.*
8. *Exploration permit was extended to March 2017. Exploration program was completed in the Playa La Vaca-Zona Septentrional II concession. Decision to apply for exploitation licence is pending.*

4.6 Other Risks

The Moa Project is subject to certain risks which could affect access, title, or the right or ability to perform work on the properties, tailings management facility, plant site and/or port. These are discussed in more detail Section 24. Such risks include the implementation of all facets of the Helms-Burton Act in the US.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Physiography

Moa Nickel's mineral deposits lie on the undulating north slope of the Cuchillas del Moa, an east-west trending range of forested mountains with a total relief of about 1,175 m that form the surface expression of the Moa-Baracoa ophiolite massif. All concessions lie on the piedmont of the range.

The northern slope of the Cuchillas de Moa is dissected by a slope-parallel network of incised, meandering ravines that serve as tributaries to the right bank of the Moa River, draining to the north-northwest. The deposits tend to form relatively uneroded remnants of a sheet of laterite that was much more extensive before it was incised by ravines that now separate the laterite into plateaux and gentle spurs.

Vegetation on the ultramafic parts of the Moa-Baracoa complex generally comprises a pine forest with a dense understory of broad-leaved saplings to small trees. The *Pinus Cubensis* is the most abundant pine tree species; however, many other species of plants have been identified in the area during environmental studies completed by Moa Nickel (Moa Nickel, 2008, 2014, 2015, 2018). The concessions Camarioca Sur, La Delta, Cantarrana and Santa Teresita are located close to the Humboldt Park and the Cuchillas del Toa Biosphere and part of these concessions are within the buffer zone of this protected area. In these concessions there is high biodiversity and endemism of species of animals and plants (Moa Nickel, 2008, 2014, 2015, 2018); however, mining is allowed in the buffer area, and extra environmental constraints were imposed on Moa Nickel in the environmental permits for mining and geological exploration in these concessions (CITMA, 2005). Mining permits for areas within the biosphere park boundaries are unlikely to be granted to any mining company, and nickel laterite deposits existing within the park boundaries, such as Pilotos, cannot be explored or mined under any circumstances (UNESCO, 2001). The park boundary approximately coincides with the drainage divide, and the park and concessions shown in Figure 2 are in separate watersheds.

At concessions located at low elevations, such as Zona Central and Playa La Vaca, the ground cover over laterite comprises broad-leaf thicket to semi-open meadows. The same is true of areas at low elevations (<200 m) east of Punta Gorda where there is no laterite at all. Generally, the valleys in the area of the mine are forested but in Zona Central, the lowest of the resource areas, the valleys' bottoms are up to several hundred metres wide, filled with alluvium and flat, which provides suitable conditions for small farms.

Low-lying areas in and close to the city of Moa are commonly forested by plantations of Australian Pines (*casuarina equisetifolia*), an introduced species.

5.2 Access

The city of Moa, with a population of approximately 75,000, lies along the paved highway that connects the provincial capital of Holguin to the smaller towns of Cueto, Mayari, Nicaro and Sagua de Tanamo (Figure 3). Holguin is about 190 km to the west, a driving time of about 2.5 to 3.0 hours. There is a public bus service to all neighbouring towns.

Moa has a small commercial airport with limited to no scheduled flights to Havana. The nearest large international airports are at Holguin to the west, and at Santiago de Cuba, across the island on the southern coast.

Figure 3: Roads and population centres between Holguin and Moa
Source: CSA Global compilation using ©OpenStreetMap data

The artificial harbour, about 950 m x 250 m, opens to the northeast into the 33 km long lagoon behind a coral barrier reef and sea-island which lies as far as 5 km offshore. It is used to import coal, sulphur and petroleum products and to ship mineral products from the nickel processing plants in the area.

Moa Nickel's main facilities, the site of the processing plant and the offices for technical and administrative work, are easily accessible from the city, with many workers commuting to the plant by local buses.

A well-developed network of secondary paved roads and dirt roads provides access from the plant site to the operating mining areas of Moa Occidental and Moa Oriental that lie south of the city and the plant site (Figure 2). Dirt roads provide access from Moa Oriental into the Camarioca concessions. In the dry season, the Camariocas roads can be navigated by pickup trucks; in the wet season, even four-wheel drive trucks sometimes have difficulty navigating the roads into Camarioca Sur, especially at the crossing of the Rio Arroyo. Satellite concessions La Delta, Cantarrana, and Santa Teresita are accessible by dirt roads and forestry roads connected to the paved highway that links the towns of Moa and Baracoa. Playa La Vaca area can be accessed directly from the paved and dirt roads connected to the Holguin-Moa paved highway and to the town of Moa. The use of forestry roads and access through third parties is legally regulated by articles 50 to 55 of the Mining Law, Law No. 76, January 23, 1995.

5.3 Climate

The Moa region has a tropical humid climate, with average daily high temperatures above 30°C in summer and average daily lows below 20°C in the winter (Figure 4). Monthly rainfall (Figure 5) is consistently above 100 mm with peak rainfall months in October to December. The mine and processing plant are operational year-round. The intense rains may temporarily impact access to remote locations and mining activities; however, the risk of floods impacting the processing plant and other facilities is minimised by the Nuevo Mundo water dam, located west of Camarioca Sur (Figure 2).

There is a risk of tropical storms and hurricanes from June to November. The most recent events affecting the area have been Tropical Storm Erika in August 2015, Hurricane Matthew in 2016, and Hurricane Irma in 2017. None of those events severely affected the processing plant or any other facility.

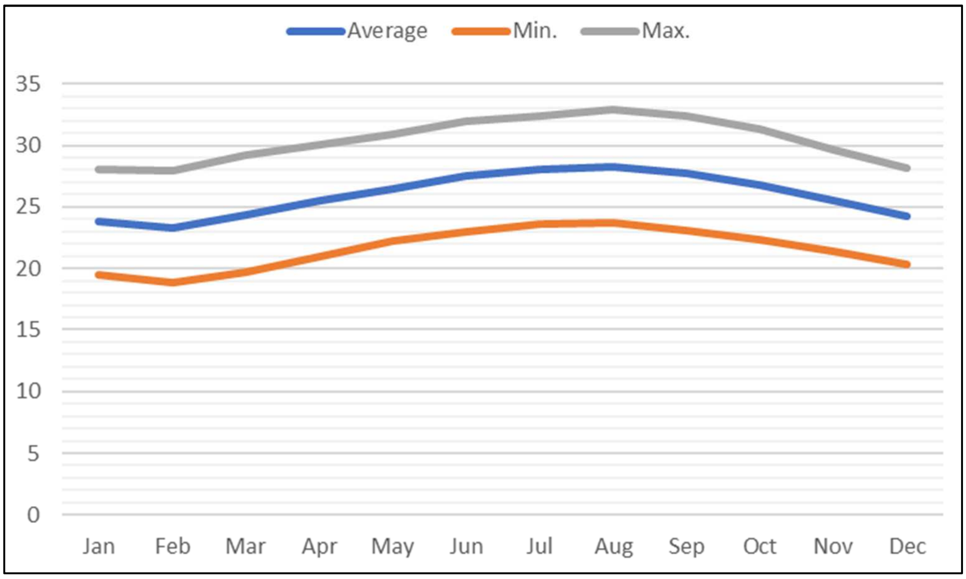

Figure 4: Average daily temperature (°C) by month at Moa

Source: www.climate-data.org

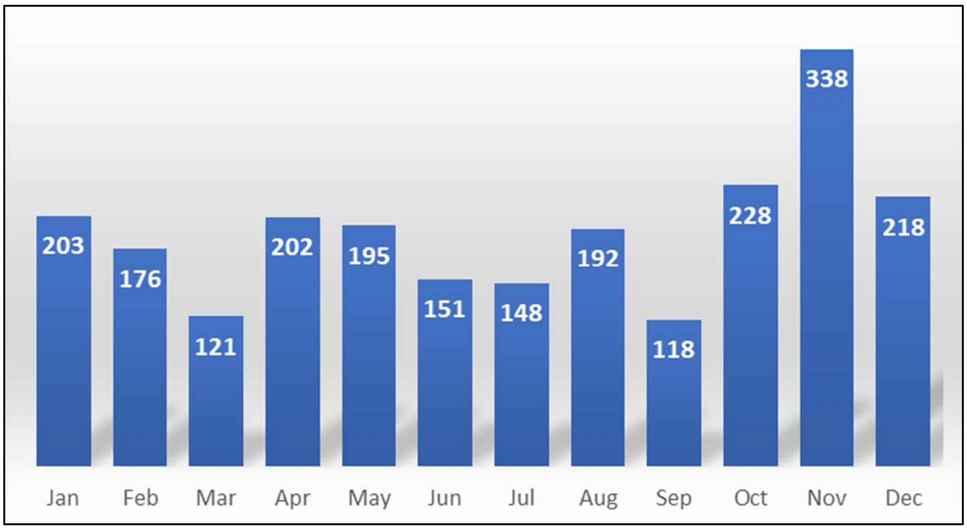

Figure 5: Average monthly rainfall (mm) at Moa, 2010 to 2015

Source: Anuario Estadístico de Moa (2015)

5.4 Local Resources and Infrastructure

In addition to the nickel-cobalt mixed sulphides being produced by Moa Nickel, another major nickel laterite mine operates to the east of Moa Oriental, feeds the Che Guevara plant at Punta Gorda. This plant is a refinery that uses the Caron process, which involves a selective reduction and an ammonia leach to recover nickel and cobalt.

The calcareous sediment in Moa Bay is dredged from the lagoon, brought ashore and beneficiated in a harbour-side facility, with the fine fraction being used for neutralisation at the Moa Nickel plant.

Apart from the nickel-cobalt operations, there is small-scale farming in the Moa area, with many farmers also engaging in the production of charcoal.

Moa has a university, the Dr Antonio Núñez Jiménez Instituto Superior Minero Metalúrgico de Moa (http://www.ismm.edu.cu), and a hospital. The water supply for the town and the processing plant are drawn from one water-bore at Veguita, near the Moa Nickel plant, and from the Nuevo Mundo reservoir on the Moa River, 10 km south-southwest of the Moa Nickel plant and 1 km west of Camarioca Sur concession. Water from Mundo Nuevo enters an intake at a small dam just upstream from the haulage road bridge linking the plant to Moa Oriental.

The city of Moa and the Moa Nickel plant are served by the national electric power grid and grid powerlines cross the mine site. The nearest power plant is at Felton, some 85 km west of Moa.

The processing plant is located 7 km west of the city of Moa and the TMF and waste disposal areas are immediately to the east of the plant.

Moa Project surface rights are sufficient for mining and processing operations.

6 History

The laterite deposits near Moa, Cuba, host one of the world's largest regional accumulations of nickel and cobalt. They have been mined for nearly 50 years and still hold decades of remaining resources and reserves.

The existence of economically viable nickel and cobalt resources in the laterites of eastern Cuba was first established in the 1940s. By the early 1940s, an American company was mining the nickel laterites near Nicaro, where they fed a Caron process smelter. By the late 1950s, just prior to the Cuban Revolution, another American company was mining the nickel laterites near Moa, where they fed the world's first high pressure acid leach (HPAL) process plant, which has been operating continuously since 1961.

The Cuban government's state mining company began mining in the Moa Occidental concessions in the early 1960s, and continued as the sole operator, with technical assistance from the Soviet Union, until the early 1990s. In 1994, Moa Nickel S.A. was formed as a joint enterprise, an equal 50:50 partnership between Sherritt International Corporation and General Nickel Company S.A., a Cuban state company. Moa Nickel was granted mining rights to Moa Oriental and Moa Occidental on 1 December 1994. It has continued mining operations at Moa Occidental and initiated mining operations at Moa Oriental across the Moa River from Moa Occidental in 2000.

Moa Nickel has continued to successfully operate the Moa Nickel plant and to achieve steady improvements in the efficiency and performance of the HPAL process.

The Camarioca concessions (Norte and Sud) were first explored in the early to mid-1970s by Soviet geologists in a program designed to outline nickel laterite resources (Sitnikov *et al.,* 1976). This early exploration program included auger drilling, test pits, geological mapping and petrographic studies. Evaluation was resumed by Empresa Geominera Oriente of Santiago de Cuba (Geominera) in 2003. In 2005, Moa Nickel was granted the right to continue the exploration and evaluation of the Camariocas deposits.

To the east of the Moa Oriental and Camarioca deposits and separated from them by mineral concessions assigned by the Cuban state to other nickel laterite mining operations, is a group of smaller nickel laterite deposits. These are La Delta, Cantarrana and Santa Teresita (Figure 2), sometimes referred to as the Satellite deposits.

Cantarrana and La Delta were first explored in the 1960s by Soviet Union geologists in a program designed to outline nickel laterite resources (Adamovich and Chejovich, 1962; Sitnikov *et al.,* 1976). A second exploration program, the Cupey Project, was conducted by Geominera for Gencor (former South African based mining company) in 1996 as a due diligence check on the earlier work. These early exploration programs included auger drilling, test pits, geological mapping, petrographic studies, bulk sampling and closely spaced drilling for mining variability studies.

In 2006, Moa Nickel was granted the right to explore and evaluate the three Satellite Deposits.

6.1 Previous Mineral Resource and Mineral Reserve Estimates

Mineral Resources and Mineral Reserves, with an effective date of 31 December 2010, were previously reported for the Central Moa deposits (Moa Oriental, Camarioca Norte, Camarioca Sur, and the Moa Occidental zone) in accordance with CIM Definitions and Standards in the Moa 2010 NI 43-101 technical report (Beaton *et al.,* 2011). Mineral Resources and Mineral Reserves for the Satellite deposits (La Delta and Cantarrana) were reported with an effective date of December 2008 in a NI 43-101 technical report dated 8 May 2009 (Golightly *et al.,* 2009).

The Mineral Resource and Mineral Reserve estimates noted in this section are now considered "historical" in nature. A Qualified Person has not done the work necessary to verify the historical estimates as current estimates under NI 43-101 and as such they should not be relied upon. The authors, CSA Global and Sherritt are not treating the historical estimates as current Mineral Resource and Mineral Reserves; they are instead presented for informational purposes only. The 2010 Mineral Resource and Mineral Reserve estimates are superseded by the 2018 Mineral Resource estimate and Mineral Reserve estimate presented in Sections 14 and 15 of this Report respectively.

6.1.1 Previous Mineral Resource Estimates

Table 5 shows the combined resources of Central Moa deposits (Moa Oriental, Camarioca Norte, Camarioca Sur, and the Moa Occidental zone) and the Satellite Deposits (La Delta and Cantarrana). These Mineral Resources were reported in 2010 and 2009 respectively, using a cut-off of 1% Ni and 35% Fe. These resources do not include the Playa La Vaca and Zone Septentrional, and Santa Teresita deposits and other minor variations on concessions outlines and ownership. Since 2010 extensive mining was completed in Central Moa, mostly in Moa Oriental, producing a significant depletion of this deposit.

Table 5: 2010 Central Moa and 2008 Satellites Mineral Resource estimates

Zone	Classification	Tonnage (Mt)	Ni (%)	Co (%)	Fe (%)
Central Moa (effective date: 31 December 2010)	Measured	36.51	1.24	0.13	44.5
	Indicated	30.09	1.28	0.13	42.5
	Measured + Indicated	**66.60**	**1.26**	**0.13**	**43.6**
Satellites (effective date: 31 December 2008)	Indicated	9.00	1.16	0.15	46.4

6.1.2 Previous 2008 and 2010 Mineral Reserve Estimates

Table 6 provides a summary of the Proven and Probable Mineral Reserves for the Moa Project as at 31 December 2010. The Resource and Reserve estimates for 2010 were reviewed and approved by the independent Qualified Person, Mr R. Mohan Srivastava. Table 7 provides a summary of the Probable Mineral Reserves for the Satellite deposits as at 31 December 2008. The Resource and Reserve estimates for 2008 were reviewed and approved by the independent Qualified Person, Mr R. Mohan Srivastava.

Table 6: Moa Mineral Reserve as at 31 December 2010

Concession	Classification	Tonnage (Mt)	Ni (%)	Co (%)	Fe (%)
Moa Occidental	Proven	2.38	1.17	0.11	39.6
Moa Oriental	Proven	10.17	1.18	0.14	45.7
Camarioca Norte	Proven	18.22	1.17	0.12	44.0
All Central Moa Concessions	**Proven**	**30.77**	**1.17**	**0.13**	**44.2**
Camarioca Norte	Probable	2.22	1.13	0.11	42.3
Camarioca Sur	Probable	14.79	1.25	0.13	42.7
All Central Moa Concessions	**Probable**	**17.01**	**1.23**	**0.13**	**42.6**
ALL CENTRAL MOA CONCESSIONS	**Proven + Probable**	**47.77**	**1.19**	**0.13**	**43.7**

Table 7: Satellite Mineral Reserve as at 31 December 2008

Concession	Classification	Tonnage (Mt)	Ni (%)	Co (%)	Fe (%)
La Delta	Probable	3.39	1.13	0.13	45.4
Cantarrana	Probable	3.68	1.09	0.15	47.1
ALL SATELLITE CONCESSIONS	**Probable**	**7.07**	**1.11**	**0.14**	**46.3**

6.2 Production

The Moa Joint Venture was formed in 1994 and has been consistently producing nickel and cobalt since that time. Through improved reliability of operations and a number of debottlenecking efforts, metals production has steadily risen to increased levels. The nickel and cobalt product since the formation of the Moa Joint Venture is presented in Figure 6.

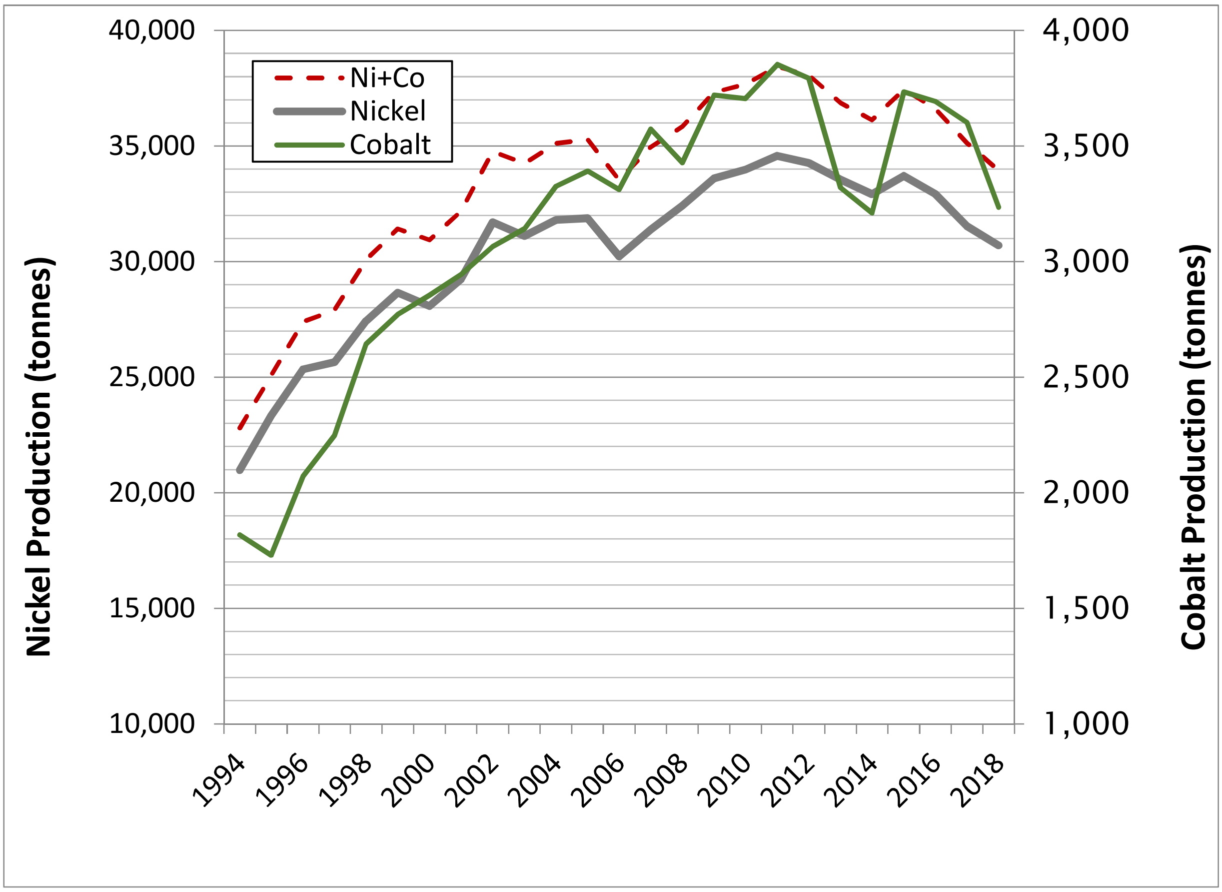

Figure 6: Summary of annual production 1994 to 2018

7 Geological Setting and Mineralisation

7.1 Regional Geology

The extensive nickel laterite deposits of Cuba are developed over the ultramafic rocks of an ophiolite belt that crops out discontinuously for more than 1,000 km along the northern margin of Cuba. The largest ophiolite complex is in Eastern Cuba which is subdivided in two massifs: Moa-Baracoa and Mayarí-Cristal (Figure 7).

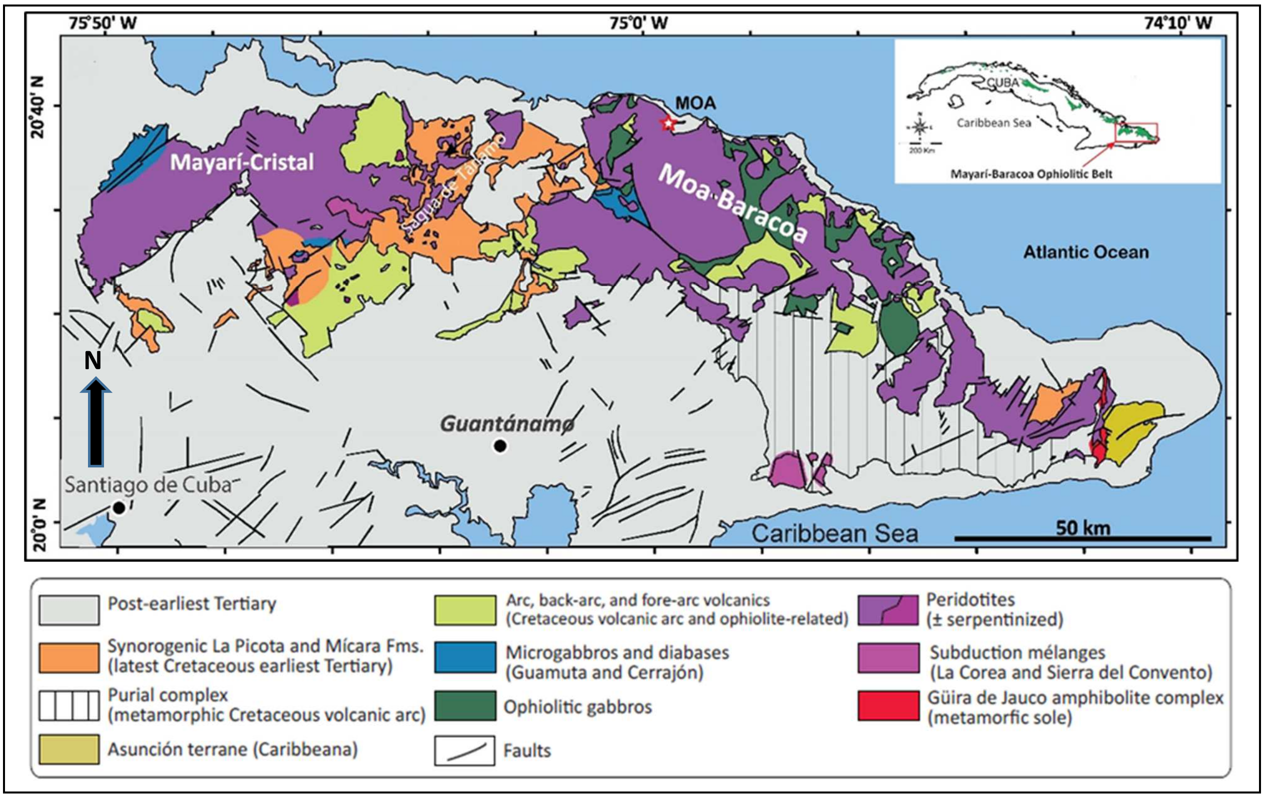

Figure 7: Mayari-Baracoa regional geological map (refer to Figure 2 for location of properties)
Source: Adapted from Proenza et al (2018)

The ophiolite complexes mainly comprise partially serpentinised harzburgites with minor occurrences of dunites, in places cut by gabbroic dykes. The Moa-Baracoa massif exhibits a well-developed Moho transition zone. All Cuban ophiolites were emplaced by obduction in the latest Cretaceous to late Eocene.

7.2 Local and Property Geology

Nickel laterites on the property are formed over the Moa-Baracoa ophiolite massif, composed of partially serpentinised harzburgites and lesser dunites. There are also some scattered gabbroic dykes, and ultramafic recrystallised rocks with abundant antigorite that produce barren laterites.

The landscape in the area slopes to the north resulting in partial remobilisation and redeposition of limonite downslope. The deposits located to the north, now mined, had a lateritic profile with over 40 m thickness, while the upslope laterite profile is much thinner. To the north near the coast, some rare and small sand lenses of marine origin and with calcium carbonate composition have been observed within the limonites, resulting from cyclic marine transgression and regression. Paleontological samples indicate that the marine intercalations are Early Miocene to Pliocene in age.

7.2.1 Mineralisation

The laterite profile overlying the bedrock is composed of four principal horizons. From bottom to top these are: (1) serpentinized peridotite, (2) saprolite, (3) limonite and (4) ferricrete. The lowest part of the profile is represented by tectonized, serpentinized peridotite in which the first stages of weathering are seen at the top. The saprolite zone which is poorly represented relative to the overlying limonite is characterised by the preservation of the primary fabric, a reduction in the quantity of primary minerals and the formation of alteration minerals in the most fractured zones. The boundary between the saprolite zone and the peridotite substrate (the “weathering front”) is extremely irregular. The saprolite zone passes upwards in the section to a limonite zone, which is defined by its dominant mineralogic composition of goethite and hematite. Two subzones can be defined: a lower limonite with faint remnants of primary structure (*“ochre estructural”* or structured limonite) and upper limonite in which the structure is collapsed (*“ochre inestructurale”* or massive limonite). Finally, all zones of the profile are overlain by ferricrete which takes the form of unconsolidated pisolites in a fine-grained matrix or massive hematite comprising amalgamated or welded hematitic pisolites.

Typically, Ni grade increases from surface downwards in the profile. Co is low near surface, and peaks near the upper limonite/lower limonite contact, where it is associated with Mn oxide minerals. Massive limonite is a massive red-brown earthy fine-grained soil with no visible structure. Structured limonite is the largest and most important zone in terms of Ni and Co. Structured limonite is yellow/brown in colour and exhibits remnant structure suggestive of pyroxene, represented by colour changes from deposition of minerals such as MnO and MgO. Ni grade ranges from 1% to 1.5% Ni in the limonite zone, with about 0.1% to 0.15% Co.

Saprolite at Moa is quite rare in the northern deposits but is more represented in the slopes of Camariocas Sur and Norte. Typical saprolite consists of a zone of intercalated structural limonite and grey/green to yellow/green saprolitic clay displaying fairly well-preserved remnant mineral structures of the underlying ultramafic. Normally in laterite deposits, the Ni content is concentrated in the saprolite zone, but there is little enrichment at Moa.

The Moa-Baracoa peridotites have variable amounts of gabbro dykes and sills. Such bodies produce a markedly different soil profile, more akin to bauxite. They are red or orange in colour, and contain high Al_2O_3, and TiO_2 and low Ni contents. The high Al_2O_3 content is an undesirable element in the Moa metallurgical process.

8 Deposit Type

Nickel laterite is the product of lateritisation of Mg-rich or ultramafic rocks which have primary Ni contents of 0.2% to 0.4% (Golightly, 1981). Such rocks are generally dunites, harzburgites and peridotites occurring in ophiolite complexes, and to a lesser extent, komatiites and layered mafic-ultramafic intrusive rocks in cratonic platform settings (Brand *et al.,* 1998).

The process referred to as "lateritisation" is essentially chemical weathering taking place in seasonally humid climates over long periods of time in conditions of relative tectonic stability, allowing the formation of a thick regolith with distinctive characteristics. In summary, the process involves the breakdown of primary minerals and release of some of their chemical components into groundwater, the leaching of mobile components, the residual concentration of immobile or insoluble components, and the formation of new minerals which are stable in the weathering environment. The net effect of the mineral transformations and the differential mobility of elements involved produces a stratified or layered mantle of weathered material overlying the parent rock from which it was formed, which is generally referred to as the "laterite profile". The processes, and the character of the resulting laterite, are controlled on regional and local scales by the dynamic interplay of factors such as climate, topography, tectonics, primary rock type and structure.

Despite the complexity and interplay of controls, there are a number of broad features of the laterite profile that are common to most examples, and it is possible to describe the range of laterite types formed over ultramafic rocks in terms of three main categories on the basis of the dominant mineralogy developed in the profile:

- **Oxide laterites:** Comprise largely Fe hydroxides and oxides in the upper part of the profile, overlying altered or fresh bedrock;
- **Clay laterites:** Comprise largely smectitic clays in the upper part of the profile;
- **Silicate laterites:** Comprise hydrated Mg-Ni silicates (serpentine, garnierite) occurring deeper in the profile, which may be overlain by oxide laterites.

The Moa deposits are considered to be the best-known example of the oxide type of nickel laterite (Gleeson *et al.,* 2003).

In the presence of water, primary rock-forming minerals (mainly olivine and/or serpentine, orthopyroxene and less commonly clinopyroxene) break down by hydrolysis, releasing their constituents as ions in aqueous solution. Olivine is the most unstable mineral and is the first to be weathered; in humid tropical environments its Mg^{2+} is totally leached and lost to groundwater, and Si is largely leached and removed. Fe^{2+} is also released but is oxidised and precipitated as ferric hydroxide, initially amorphous or poorly crystalline but progressively recrystallising to goethite which forms pseudomorphs after olivine. Orthopyroxene and serpentine hydrolyse after olivine, also releasing Mg, Si and being replaced by goethitic pseudomorphs. Initially, while co-existing ferro-magnesium minerals remain unweathered and support the rock fabric, the transformation is isovolumetric and primary rock textures are preserved, but as the extent of destruction of primary minerals increases, relict primary textures are lost by collapse and compaction of the fabric resulting in a textureless massive goethite. The mineralogical transformation involving loss of Mg and residual concentration of Fe results in the obvious and familiar chemical trend in laterites of Mg decreasing upwards and Fe increasing upwards through the laterite profile.

Ni and Co behave differently to the major elements. Nearly all of the original Ni and Co in the ultramafic bedrock occurs in solid solution in olivine and olivine-derived serpentine. As these minerals break down, the released Ni and Co ions have a chemical affinity for the newly formed poorly-crystalline Fe hydroxides and are incorporated and concentrated into their structure by a combination of adsorption and replacement of Fe^{3+}. Contents of 1.5% Ni and 0.1% Co are seen in massive goethite developed from olivine containing 0.3% Ni and 0.02% Co. Ni and Co are also incorporated strongly into Mn oxides (asbolanes) where these are precipitated by redox reactions as veins and surface coatings on minerals and in fractures.

The first-formed Fe hydroxides resulting from the breakdown of ultramafic minerals are amorphous or poorly crystalline. Their crystallinity improves with time to well-structured goethite with a characteristic yellow-brown colour, which is progressively replaced by red-brown hematite is the goethite dehydrolises. The colour change is reflected in the commonly used terminology of “yellow limonite” and “red limonite” for the lower and upper parts of the “limonite” zone respectively. The transformation of goethite to hematite is accompanied by a loss of Ni, as hematite cannot accommodate in its lattice the Ni formerly contained in the goethite. At the very top of the profile, a nodular fabric develops in the red limonite, which develops further to an indurated crust as the nodules coalesce and harden. The crust is known as ferricrete or iron crust.

9 Exploration

Exploration activities at the property, other than drilling and pitting, have included topographic surveys, hydrogeological studies, geological mapping and geophysical surveys with Ground Penetrating Radar (GPR). These activities are generally conducted to better understand the geology and hydrogeology of the deposits but not to identify new mineral occurrences or targets.

Topographic surveys were completed in different campaigns to locate exploration drillhole collars. Most of the topographic surveys completed on behalf of the issuer, have been executed by the company's contractors, GEOCUBA Oriente Sur and Geominera Oriente. Collar locations surveys have been completed in different campaigns, for example, Camarioca Sur was surveyed in 2011 by GEOCUBA to locate collars from the 35x35 drilling campaign, and in 2008 by Geominera Oriente to locate drillholes from the 33x33 drilling campaign. Topographic surveys are completed using digital total stations (e.g. Leica TC 805 and TS 06). Surveys are connected to geodesic points surveyed and monitored by the Instituto Cubano de Geodesia y Cartografía (ICGC). Topographic surveys are also completed by the company, on daily basis, in areas with active mining, using digital total stations. The company surveys are intended to deplete mined material and only account for the base of the mined surfaces, and not for in-pit dumped material such as waste piles and mining roads. Surveying with drones has been tested in 5 Bloques (known as Transfer Zona Sur Pilar) and in a sector of Moa Oriental.

The current digital elevation models in the property are a combination of topographic surveys completed for exploration and exploitation in different time periods and may not be accurate outside the drilled region. The actual topography does not include the material that has been remobilised. CSA Global recommends updating the topography using LiDAR or a similar technology.

Hydrogeology studies were completed by Geominera Oriente in all deposits with recent exploration, including Camarioca Sur, the Satellite deposits, and Playa La Vaca-Zone Septentrional. The studies included measurements of the water level in hydrogeological wells, and in some ordinary drillholes; pumping and permeability tests on hydrogeological drillholes; streamflow measurements of the main surficial streams crossing the property; and chemical assays of underground and surface waters.

Geological mapping has been completed by the Centro Internacional de la Habana S.A, which consists of professionals and professors of the local university. Field work was completed along accessible outcrops and cleared paths prepared for drilling. A total of 270 km of traverse was completed in Camarioca Sur, 13.75 km in Playa La Vaca-Zona Septentrional, 20 km in Santa Teresita, 57 km in La Delta, and 88 km in Cantarrana. Outcrop samples collected, documented, and used for mineralogical and petrographic studies, along with samples collected from drillholes (Figure 8). Geological maps were prepared, also using supplemental information from drillhole data.

Historical mapping and reports completed in 1970s campaigns (e.g. in Camarioca Sur and Norte) were reviewed and reinterpreted. Historical mapping included mapping of the basement and paleontological samples that were used to investigate the energy of the redeposition of non-in-situ limonite (López-Martínez *et al.,* 2008).

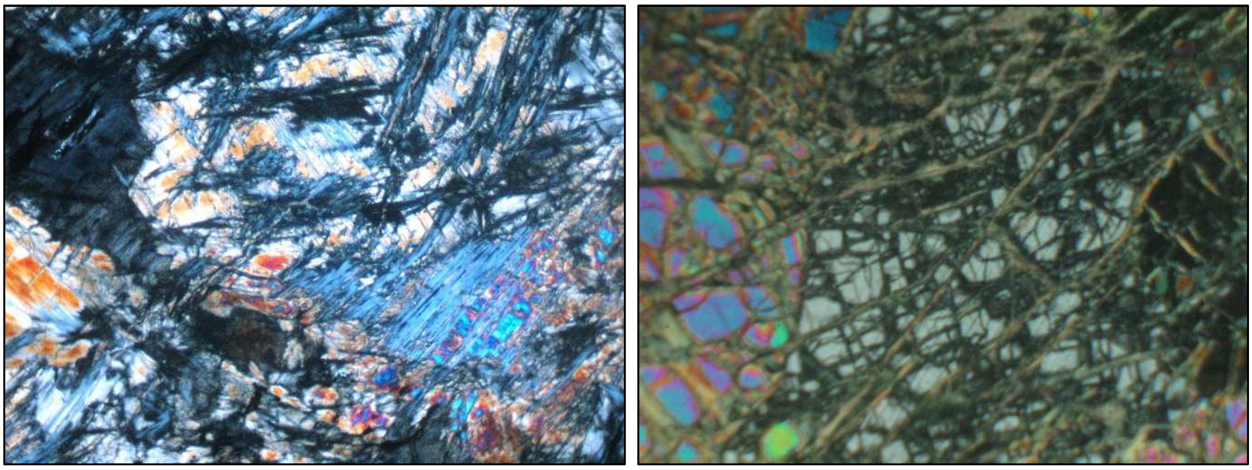

Figure 8: Examples of thin sections from Camarioca Sur on cross-polarised light showing harzburgite with serpentinization

Approximately 150 km of GPR lines were acquired and interpreted in Camarioca Sur and Norte by GroundProbe Pty Ltd around 2005 and 2006 (Figure 9). The survey used a 50 MHz towed antenna system, that GroundProbe Pty Ltd claims was designed specifically for the electrical properties of the laterites.

The GPR survey was used to predict a high-resolution surface contact between the laterites and the bedrock, and the contact between the limonite and saprolite, along GPR lines. The resulting surfaces were corrected using drillhole data. Other concessions were not tested with GPR. GPR lines were completed along parallel lines 100 m and 50 m apart, capturing only a low-resolution lithological contact between GPR lines; and for this reason, GPR lines were not used for Mineral Resource estimation. However, the results look promising and could be used for resource estimation after completing infill GPR surveys and validations of the technique with drillhole data, trenching, and mining.

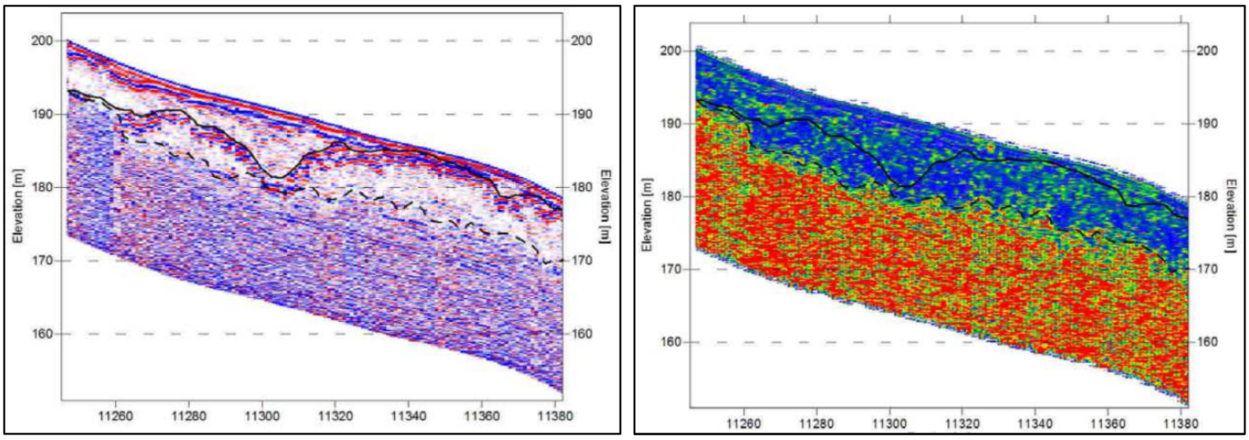

Figure 9: Example of true relative amplitude and instantaneous polarity plots showing interpretations of the base of the bedrock and the rocky saprolite

10 Drilling

There are three main categories of exploration drilling in the property, ordinary drillholes, mineralogical drillholes, and basement drillholes. There are also exploration pits, which are the only source of density samples used to estimate resources, and hydrogeological drillholes which are not described in this section. There were more than 47,000 exploration drillholes as of the Effective Date and around 460,000 m drilled (Table 23).

The spatial distribution of the exploration drillholes used for Mineral Resource estimation is shown in Figure 17. All concessions are have been drilled using regular spaced squared grids at varying densities, and generally aligned with an east-west axis. Drillhole grid spacing starts with 300 m grid that is subsequently infilled to 100 m and 33.3 m (or 100/3 m) grid spacings. A final infill drillhole grid with a 16.6 m spacing (or 100/6 m) spacing is sometimes completed before mining and is commonly named the "mining grid". However, there are drillholes at 16 m spacing that were drilled and assayed as regular exploration drillholes, using the same laboratories, sample preparation, and assaying protocols. There is also 35 m x 35 m grid drilling based on a diamond shape, or rotated square, infill grid of the 100 m grid.

10.1 Historical Drillholes (pre-1995)

In most areas, there are holes drilled based on a 100 m grid, dating from the 1970s; for example, in Camarioca Sur this historical drilling represents 11% of the total number of drillholes. Drillholes from the 1970s in general tend to be longer because they were intended to evaluate both the limonite and the highly saprolitic material suitable for the Caron metallurgical process.

The exploration drilling programs from the 1960s and 1970s used a Russian built truck-mounted 135 mm diameter spiral auger drill (Beaton *et al.,* 2011). The author and Qualified Person of this section did not have access to protocols describing the drilling, sampling and assaying procedures used in historical drilling campaigns.

10.2 Current Moa Nickel Drillholes (post-1995)

Most of the remaining drillholes, over 85% of the drillholes used for resource estimation, are post-1995 Moa JV ordinary drillholes. These drillholes tend to stop within the first few metres of the saprolite, or when hard rock is intersected. Moa JV also drills a small percentage of "basement drillholes" to complete a characterization of the lower horizons of the lateritic profile and of the basement. Only few mineralogical drillholes are drilled per deposit (under 1% of the total number of drillholes), usually using hollow auger drilling, to collect samples for mineralogical analysis with x-ray diffraction, and to investigate geochemical composition by granulometric fraction. Mineralogical samples are also collected from ordinary drillholes and basement drillholes.

Moa Nickel's contractor, Geominera used a Russian built truck-mounted 135 mm diameter spiral auger drill for various drilling programs from 2005 to 2008. In 2003, a hollow core auger with an 89 mm outer diameter and a 71 mm inner diameter was also used in order to penetrate bedrock in regions where mapping of the bedrock geology had been recommended (Beaton *et al.,* 2011).

In 2008, Moa Nickel acquired its own Canadian-built rotary-head M5Xd drilling machine mounted on a Japanese-built MST 800 Morooka Carrier for use in the large development drilling programs on Camarioca Norte and Sur. The drill fleet consists of four units capable of drilling up to 178 mm diameter solid stem auger holes, 95 mm diameter hollow auger holes, and 71 mm diameter core holes (Beaton *et al.,* 2011).

Ordinary drillholes and some of the basement drillholes are drilled with auger drilling, generally using a truck-mounted rig pre-2008, and a track-mounted rig post-2008, as shown in Figure 10. The access route is first cleared and drilling pads are prepared as required, then drillholes collar locations are marked with a stake labelled with the identification of the planned drillhole. If the drillhole cannot be completed for any reason, the drill rig is moved few metres and the hole is restarted.

Sampling is completed at the drill site. The bit is extracted, moved away from the drillhole collar by two operators using a rope. About one inch of material representing possible contamination is removed with a metal blade. Contamination can be visually identified by experienced drillers (Figure 10). Samples are collected in plastic bags at 1 m intervals or when there is a change in lithology, and then placed in an ordered line. A field geologist completes the logging, and a sample identification tag is added to the sample bag and sealed. Sample bags are then placed in a pickup truck or in the drilling rig support truck and transported to a local base camp. The stake with the drill ID is placed back and surveyed by a surveyor using total station instruments. The drilling process is very dynamic, since most drillholes are only 5–20 m in length. The diameters of auger drilling bits used to drill historical (pre-1995) and current drillholes are 135 mm and 140 mm. The process for basement drillholes is similar, but the drillholes are continued into the fresh rock for at least 2 m, using diamond drilling.

Figure 10: Ordinary exploration drilling completed by Moa Nickel operators

Top photos: Drilling machine entering in a drill pad; middle extracting drill bits, bits with contaminated material, and drilling bits after cleaning contamination.
Bottom photos: Sample collection and documentation.

10.3 Exploration Pits

Exploration pits are usually contracted to Geominera Oriente, an external Cuban contractor, and are dug with 1.5 m x 1.5 m squared sides and variable depth, but generally cut almost the entire lateritic section. The location of the pits is planned to cover the entire area of the deposit. Exploration pits are placed 0.5 m from ordinary drillholes. The number of pits per deposit may vary from one concession to another, as shown in Figure 17. The exploration pit walls are carefully mapped. Monologic squared samples are extracted from four vertical trenches in the walls without altering the volume of the material in its natural state, wrapped in plastic, and sent to the laboratory in Santiago de Cuba for density measurement. Figure 11 shows an example of an exploration pit.

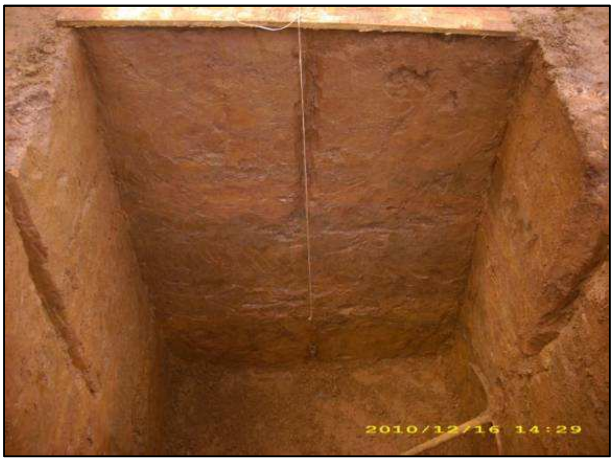

Figure 11: Left: Markdown of an exploration pit located in Camarioca Sur located next to drillhole with coordinates X=696 404.44, and Y=211 407.50; Right: Same exploration pit after completion and sample trenches on the walls of the pit

11 Sample Preparation, Analyses and Security

The assay grades used for resource estimation are from samples collected in historical drilling campaigns of the 1970s and up to 1995, and samples collected from Moa Nickel (Moa JV) campaigns during various periods from 1995 to 2019. These sample preparation, analysis, and security are described in detail in this section.

Other laterites samples collected at the property come from grade control drilling, known as exploitation drilling, haul truck sampling, and samples collected before and after process flow stream at the Slurry Preparation Plant (SPP) and in the Mixed Sulphides Plant (MSP). There is also sampling on the calcium carbonates deposit. These samples are not relevant to the Mineral Resource and Mineral Reserve estimates presented in this report and are not described in detail. However, these samples are important for the operation (e.g. for grade control and reconciliation).

11.1 Sample Preparation and Analysis (1970s to 1995)

Most nickel laterites of Moa region have been drilled using auger drilling and using sampling procedures similar to those used for the 1995 to 2019 drilling campaigns. The main operator of these campaigns was Geominera Oriente, the main drilling contractor in eastern Cuba, and most assays are believed to be completed in their laboratory "Elio Trincado", located in Santiago de Cuba. Ni and Co assays were completed using atomic absorption spectroscopy from 1975; Fe was also assayed using this technique from 1977. Before 1975, assays of Ni and Co were completed with ultraviolet-visible spectrophotometry (Maricela Sánchez González, 2011). In 1996, ICP-OES assays were introduced in the main Cuban laboratories doing assays for Fe, Ni, Co, Si, Al, Mg, Cr and Mn in nickel laterites, including the Geominera Oriente's Elio Trincado Laboratory (DELABEL), Laboratorio Central de Minerales "José Isaac del Corral" (LACEMI) located in Havana, and Centro de Investigaciones para la Industria Minero Metalúrgica (CIPIMM), also in Havana (Elizabet Abad Peña, 2014).

The Qualified Person of this section did not complete any validation or verification of samples collected between 1970 and 1995, and did not have access to protocols describing, the drilling, sampling and assaying procedures used in historical drilling campaigns. However, historical drilling has been validated by the Moa JV, as discussed in the Section 12 of this Report.

11.2 Sample Preparation and Analysis (1995 to 2019)

11.2.1 Sampling and Sample Preparation

A sample of auger drilling usually consists of seven consecutive chips (auger screw lifts) representing 1 m of drilling. The samples are collected directly from the auger after removing the contamination from the walls and placed in a plastic bag, logged, tagged and sealed. Sample batches are then transported to the local camp or directly to Geominera's sample preparation facilities in Moa by company staff in a company-owned pickup truck (Figure 12).

The samples are split with a quartering tool and two opposite quarters are placed in a metallic tray, along with its corresponding sample tag, and then dried in electric ovens at 105°C for 24 hours (Figure 12). Dried samples are crushed with a cylinder or jaw crusher to reduce particles sizes to approximately 1 mm, and then split with a rotary splitter. The crushed samples are then pulverised with a disk mill to 200 mesh and split with a riffle splitter to obtain a sample of approximately 100 g. The 100 g pulp samples are placed in paper bags with its original sample tag and placed in batches of 94 samples and six duplicate samples into cardboard boxes and sent for assay at the Elio Trincado laboratory (Figure 13).

An air brush and a manual brush are used to clean the pulveriser between every sample (Figure 13). The same equipment is used to clean the crusher.

Figure 12: Sampling in progress at Moa during the site visit by the Qualified Person

Figure 13: Subsampling equipment at Geominera's sample preparation facility in Moa

11.2.2 Other Samples

Settling samples are collected to assess the speed of settling of the fines in suspension. These samples are collected to predict the performance in the ore thickening tanks located in the processing plant. However, it is known that flocculants are used to help settling in the thickeners but not in the sample settling test. Settling speed was not used for Mineral Resources or Mineral Reserve estimation.

Some mineralogical samples are collected from regular and mineralogical drillholes for qualitative mineralogy tests with x-ray diffraction and chemical analysis of granulometric fractions. Rock samples of the basement have been also collected to create thin sections for optical mineralogy analysis. This information was not used for resource estimation but reviewed to verify the mineralogical assumptions about the composition of the basement rocks. The number of samples collected is appropriate for general studies or characterisations but not for modelling.

Grade control samples are collected from exploration drillholes and haul trucks. These samples are prepared and assayed by the Moa Nickel process control laboratory located on site, along with thickener slurry samples. These samples are assayed by x-ray fluorescence analysis. Grade control samples were not used for Mineral Resource estimation.

11.2.3 Assaying

Chemical analyses for regular samples are completed in the Moa JV's primary laboratory: Geominera's Laboratory Elio Trincado (DELABEL), located in Santiago de Cuba. Analysis of Al_2O_3, SiO_2, MgO, Cr_2O_3, MnO, NiO, CoO, CaO, Fe_2O_3, and LOI are done by sodium carbonate fusion followed by ICP-AES. Fe is also assayed volumetrically by titration with potassium dichromate. Other additional assaying techniques may be used for mineralogical samples.

Geominera's DELABEL Laboratory is not considered independent from the Moa Nickel company and the Moa JV project. Also, up to approximately 2008 when the Moa JV acquired its own drills, Geominera was also contracted to conduct the drilling and sampling. Geominera still conducts the exploration pitting for the Moa JV (Section 10.3). The DELABEL laboratory achieved International Standards Organization (ISO) 17025:2000 certification (ISO for laboratories) registered with ONARC (National Accreditation Body for the Republica de Cuba) on 12 June 2002. The certification included the ICP-AES and the Fe volumentric described above and it expired on 12 June 2005. DELABEL stated that their lab analyses more than 80% of Cuba's laterite samples.

Recent academic research showed that there is exploration potential for scandium, a high-tech element, along with other critical metals, in the laterites of the Moa region (Aiglsperger *et al.,* 2016). The Qualified Person recommends assaying for this element. This can be completed, probably at no extra cost, by selecting an assaying protocol that includes Sc. This metal is included in most Fusion ICP-AES assaying packages of SGS Minerals Services (SGS), the umpire laboratory used for external duplicate assays.

11.2.4 Quality Assurance/Quality Control

Approximately 6% to 10% of pulp duplicate samples, known on site as "*control interno"*, previously prepared by Moa Nickel personal, are sent in each 100-sample batch to the primary laboratory. Moa Nickel has no other QAQC sample protocol is in place; no blanks or standards (certified reference materials) are inserted into the sample batch prior to delivery to the lab. Approximately the same percentage of pulp duplicates are sent to an external lab, usually SGS laboratories in South Africa and Laboratorios Isaac del Corral in Havana.

SGS is independent from the Moa Nickel company and the Moa JV project. SGS Minerals Services has a quality system compliant with the ISO 9001 Model for Quality Assurance and ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories. Laboratorios Isaac del Corral is not certified and cannot be considered independent from the Moa Nickel company and the Moa JV project given its relationship with the Cuban government which is 50% owner of the Moa JV.

The primary lab carries out its own internal QAQC introducing duplicates and standards known as SNi, L1, L2, L3, and L4, which are representative of saprolite and different grade ranges of limonite. However, the results of the internal QAQC are not provided to Moa Nickel. The author of this section did not complete a visit to the primary lab but reviewed the results of non-independent laboratory audits completed by Sherritt personnel. The author suggests Sherritt develop written protocols to deal with samples that are deemed to be outside of control limits within the external or internal laboratories.

The results of the external and internal duplicate control samples were reviewed. Internal duplicate controls reproduced properly but external duplicate controls (check samples) sent to SGS laboratories show a tendency to a negative bias (Figure 14). However, some of the external samples were re-assayed in Sherritt's analytical laboratories in Fort Saskatchewan, and results were in favour of the primary lab (Figure 15), showing lower relative error and bias in the comparison with SGS results. This Sherritt Analytical laboratory has current ISO jv9001:2015 accreditation.

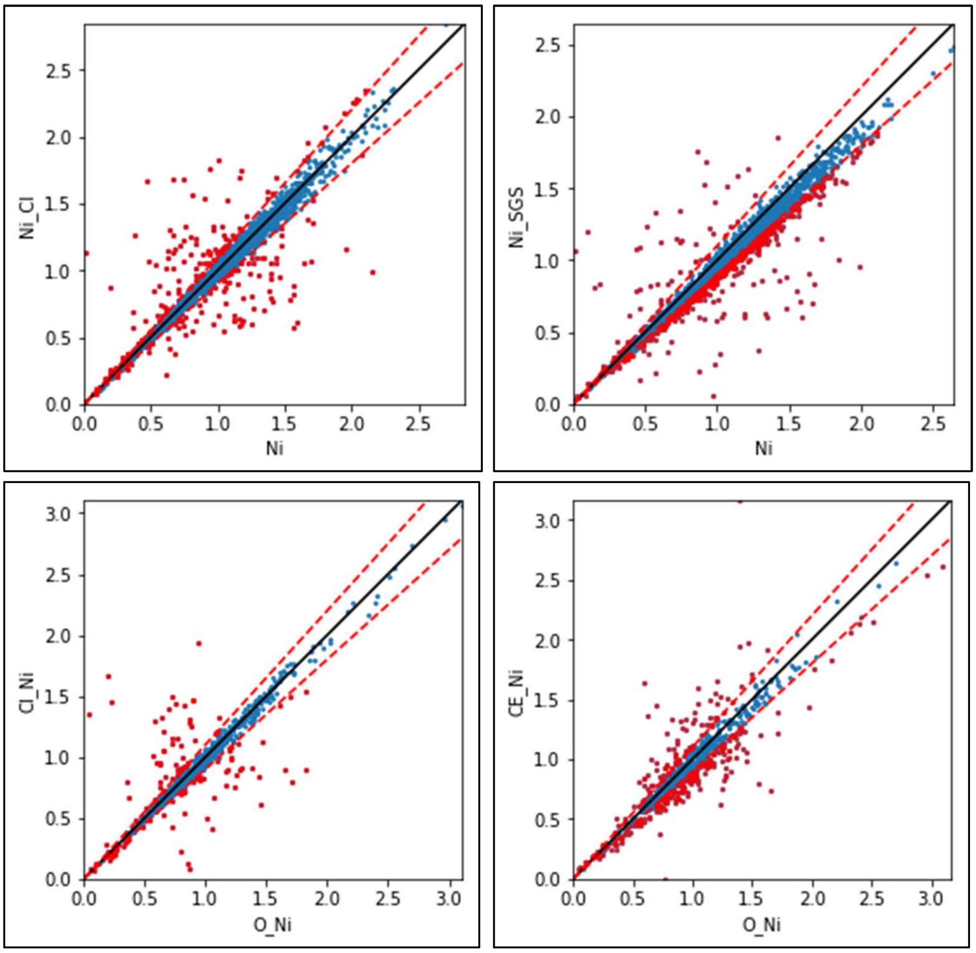

Figure 14: Scatterplots of pulp duplicated assays (y axis) vs primary assays (x axis) (dashed red lines represent ±10% error)

Left column shows primary lab, right column shows external lab results.
Above are samples from Camarioca Sur, and below from Cantarrana.

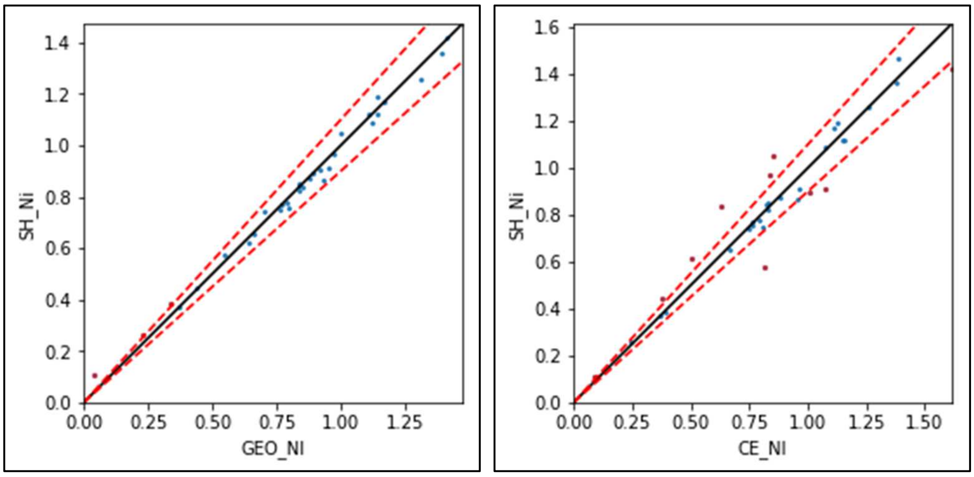

Figure 15: Scatterplots of duplicates from Cantarrana (dashed red lines represent ±10% error)

Left: Sherritt Fort Saskatchewan lab (y axis) vs Primary lab (x axis).
Right: Sherritt Fort Saskatchewan lab (y axis) vs SGS lab (x axis).

The author is of the opinion that the QAQC results do not currently meet what is considered the industry standard for robust QAQC protocol. However, the work does demonstrate repeatable results through various laboratories. The author is of the opinion that although the QAQC procedures are not robust, the samples are appropriate for Mineral Resource estimation. This is due to several factors – the high number of drillholes/samples distributed through the deposit, there is reasonable correlation between the exploration datasets and the mining results and the fact that operations have been ongoing using these data for almost 20 years. However, there is room for improvement in the quality assurance protocols and quality control procedures. The author recommends:

- Updating sampling and assaying written protocol documents (SOPs);
- Including blind QAQC standard samples (certified reference material) representative of grade distribution and material types, coarse blanks, and field/coarse reject duplicates, introduced by Moa Nickel, into the sample preparation and analysis chain. It is recommended starting at a rate of one of each QAQC sample in 20 samples. However, this ratio can be increased over time, depending on the results obtained;
- Regular review of QAQC results – this should happen for each batch of samples returned but at least monthly as a default;
- Develop a standard operating plan (SOP) that clearly state actions required when QAQC samples show irregularities and document any actions that are taken.

11.2.5 Database Compilation and Validation

Drillhole databases are usually stored in Microsoft Access file format. Compilation of the databases is completed on site or subcontracted to a consulting group adjunct to the local university, ISMM, and then reviewed by the resource and exploration geologist team on site. Drillhole logs are entered manually in the database and then combined with drillhole assays, which are always received in digital format from the labs.

The Qualified Person notes that the databases are not available to the corporate office or Sherritt facilities in Fort Saskatchewan and recommends maintaining a backup of drillhole data for security reasons in either of the two offsite locations, along with digital block models and other relevant resource and reserve data.

11.3 Qualified Person's Opinion and Conclusions

As noted in Section 11.1, the author of this section was unable to verify the sampling and assaying quality of the historical samples collected between 1970 and 1995. However, the author believes these samples are appropriate to use for this Mineral Resource estimate since validations completed by Moa Nickel show satisfactory results.

It is the Qualified Person's opinion that security, sample collection, preparation and analytical procedures undertaken on the Moa Project during the 1995–2018 drill programs are appropriate for the style of mineralisation. Duplicate assays provided sufficient confidence in assay values for their use in the estimation of CIM-compliant Mineral Resources.

The Qualified Person notes that no blank and standard samples are introduced in the current QAQC program and that quality assurance protocols (SOP) need to be updated; the Qualified Person recommends introducing blanks and reference materials (standard samples) with grade ranges representative of the different limonitic horizons. The reference materials can be prepared with samples collected from the property.

12 Data Verification

The Moa project was visited by co-authors and Qualified Persons, Dr Adrian Martinez Vargas, P.Geo., and Mr Michael Elias, of CSA Global. Dr Martinez Vargas visited Moa in two occasions to complete work related to this report, for five days from 7 to 11 May 2018, and for nine days from 26 November to 5 December 2018. Mr Elias completed a three-day site visit from 7 to 9 May 2018. The purpose of these visits was to conduct an inspection of the Moa mine site and the processing plant facilities, as well as to collect the data required to complete the Mineral Resource and Mineral Reserve estimates.

The visit included a field trip by both Mr Elias and Dr Martinez Vargas to Camarioca Sur, Camarioca Norte, Moa Oriental, and la Delta deposits, and a visit to the sample preparation facility of Geominera Oriente in Moa. During this trip, the Qualified Persons observed the ongoing drilling, sample collection, and sample logging in Camarioca Sur (Figure 16A); mining operations in Moa Oriental (Figure 16B); sample preparation facilities and equipment, sample preparation procedures and security in Geominera sample preparation facilities in Moa (Figure 16C and D) and sample storage and QAQC sample selection in the Mining Department of Moa JV (Figure 16E and F). The visit included interviews with field geologists conducting exploration, the exploration managers, and Geominera personnel in the sample preparation facility.

Figure 16: Some of the activities and facilities observed in the site visit.

A: Auger drilling observed in Camarioca. B: Mining in Moa Oriental. C: Sample drying in the sample preparation facility of Geominera Oriente in Moa. D: Batch of samples from Camarioca Sur ready to go from Geominera Oriente sample preparation to its laboratory in Santiago de Cuba. E and F: Sample storage facility located in the Mining Department of Moa Nickel.

Written protocols for sampling, assaying, sample QAQC, logging, database storage, and sample security, were reviewed and discussed with the local team. The authors note that protocols are out of date or incomplete with respect to the actual practices employed at Moa Nickel; however, procedural updates are further discussed and documented in internal reports produced for ONRM and coincide with procedures observed in the field. There is a QAQC program in place that includes the use of duplicated pulp assays sent to the primary lab and to an umpire lab, either SGS (previously in Toronto, Canada and now in South Africa; accredited), Laboratorios Isaac del Corral in Havana (not accredited), and Sherritt labs located in Fort Saskatchewan Canada (accredited). The current QAQC program does not include the use of blanks, standards or field/coarse reject duplicates.

Some of the current concessions were transferred from other companies to Moa JV, always through ONRM. An example is Yagrumaje Oeste, previously held by the mining company Ernesto Che Guevara. These concessions were transferred, including drilling results obtained by previous owners. Moa JV has in place verification procedures that include drillhole twining, metallurgical tests, and resurvey of 5% of the collar locations. This validation also includes drillholes from historical campaigns, drilled between 1970 and 1995. The author of this section, Dr Martinez Vargas, reviewed the validation procedures, results and accompanying reports and considers that the validation results are satisfactory and both historical drillhole data, and drillhole data obtained with deposit transferred are appropriated for Mineral Resource estimation

The relevant Qualified Persons have reviewed the sample collection and analysis methodologies and are of the opinion that those methodologies are to current industry standards and permit a meaningful investigation of the mineralisation at the Moa Project for the purpose of resource estimation under CIM guidelines and provide the basis for the conclusions and recommendations reached in this Report.

Prior to resource estimation, Dr Martinez Vargas completed a validation of the drillhole database as described in Sections 14.1 and 14.2.

It is the opinion of CSA Global and the relevant Qualified Persons that the data made available to CSA Global are a reasonable and accurate representation of the Moa Project and are of sufficient quality to provide the basis for the conclusions and recommendations reached in this Report.

13 Mineral Processing and Metallurgical Testing

13.1 Mineral Processing

Moa Nickel's processing plant uses a HPAL process to recover nickel and cobalt from lateritic ores. In an HPAL process, metals are dissolved from the laterite using sulphuric acid at high temperatures (about 250°C) and high pressures (about 4,000 kPa). Nickel and cobalt are carried in the acidic solutions as sulphates, while various aluminium, iron and silicate compounds are left as solids.

13.2 Metallurgical Testing

In 2001, batch and continuous testwork was carried out on samples of limonite and limonite/saprolite blends from the Moa Oriental and Camarioca Norte concessions. The samples were taken from drill cores obtained on a 100 m x 100 m grid representing the complete laterite profile and are considered to be representative of the orebodies. The continuous testwork comprised of ore slurry settling, leaching, and counter-current decantation (CCD) washing of the leach discharge residues. Drillhole samples indicate that the Camarioca Norte and Camarioca Sur ores typically average 1.5% to 1.7% Mg and 6.4% to 7.5% SiO_2, which is higher than ores historically processed at Moa Nickel. This testwork therefore offers insight into the behaviour of higher magnesium and silica content ores in the ore thickeners, HPAL and CCD wash circuit.

Table 8 summarises the chemical analyses of the ore types tested.

Table 8: Chemical composition of ore types tested

Ore	Ore type	Ni %	Co %	Al %	Cr %	Fe %	Mg %	Mn %	Si %
Moa Oriental Ores	Limonite	1.52	0.144	3.87	1.79	48.0	0.22	0.53	1.26
	2% Mg blend	1.57	0.130	3.62	1.70	43.7	2.27	0.47	3.37
	4% Mg blend	1.58	0.119	3.41	1.61	39.2	4.17	0.43	5.32
Camarioca Norte Ores	Limonite	1.56	0.156	3.64	1.89	50.1	0.37	0.68	1.17
	2% Mg blend	1.74	0.116	3.20	1.67	46.4	2.11	0.54	2.75
	4% Mg blend	1.91	0.100	2.74	1.43	40.8	4.32	0.39	4.82

13.3 Ore Thickening

Testwork was carried out in a continuous laboratory scale Supaflo thickener, using flocculant Percol 455. The settling tests were carried out at 25°C and a feed solids content of about 5%. Initial scoping tests were carried out in graduated cylinders to define the feed density and flocculant dosage. 200-litre samples were prepared, and slurry was pumped into the feed well of the thickener using a variable speed peristaltic pump.

A bed of solids was allowed to build until the bed reached the lower portion of the feed well. The underflow peristaltic pump was then started at a flow rate which maintained the bed at a constant level. Underflow samples were taken when the system reached steady state. Samples of overflow were also taken at steady state to determine the overflow clarity. The results are summarised in Table 9.

Table 9: Results of ore thickening testwork

Ore type	Loading (t/m² hr)	Flocculant (g/t)	Underflow (% solids)
Moa Oriental Limonite	0.25–0.30	40	45
Camarioca Norte Limonite	0.40	50	45
Moa Oriental 2% Mg Blend	0.20–0.30	70	45
Camarioca Norte 2% Mg Blend	0.12–0.20	50	45
Moa Oriental 4% Mg Blend	0.30	80	45
Camarioca Norte 4% Mg Blend	0.20–0.30	50	45

In general, results for the limonite and limonite/saprolite blends were similar. Highest loadings were achieved with Camarioca Norte limonite. Flocculant requirements generally increased with increasing magnesium and silica content of the ore.

13.4 High Pressure Acid Leaching

13.4.1 Moa Oriental

Batch pressure acid leach tests were conducted in a 4-litre autoclave to evaluate the leach performance of limonite/saprolite blends in comparison with limonite alone, under the same conditions used in the commercial plant at Moa Nickel. The tests included characterisation of the liquid-solid separation behaviour of the leach discharge slurries. Test conditions and results are summarised in Table 10.

Table 10: Results of leach performance testwork for Moa Oriental ores

	Test				
	M1	**M1a**	**M2**	**M5**	**M7**
Feed	Lim 1	Lim 2	70:30*	4% Mg	2% Mg
Slurry solids (%)	35.2	35.4	35.1	35.0	35.1
Mg analysis (%)	0.21	0.25	4.16	4.17	2.27
Temperature (°C)	245	245	245	245	245
Retention time (minutes)	90	90	90	90	90
Acid (kg/t)	250	250	390	375	375
Nickel extraction					
45 minutes	96.1	96.3	88.1	90.2	70.1
60 minutes	96.8	97.0	93.8	95.0	79.8
Cobalt extraction					
45 minutes	95.7	96.9	95.2	93.4	92.9
60 minutes	95.9	96.6	96.7	95.2	95.1
H_2SO_4 (g/L)					
90 minutes	40.2	33.0	39.8	41.5	31.5

**A blend of 70% limonite and 30% saprolite*

The results confirm that nickel extractions in excess of 95% are attainable in the acid leach process. The results also highlight the importance of acid addition on final metal extraction and extraction kinetics, particularly at elevated magnesium contents.

Batch settling tests, in 2-litre cylinders, were carried out on the discharge residues from the batch leach tests. Slurries were diluted with synthetic wash circuit product solution and tests were carried out at 65°C. Results are presented in Table 11. While high flocculant addition and low final solids content were features of the settling tests on the batch leach discharge residue slurries, significantly improved results were obtained in the settling tests carried out on the continuous leach residue slurries.

Table 11: Results of batch settling testwork for Moa Oriental ores

Test	Flocculant (g/t)	% Solids		Settling rate (cm/hr)	Unit area (m^2/t/d)	Suspended solids (mg/L)
		Initial	Final			
M1	123	10.5	54.0	350	0.084	53
M1a	213	8.5	48.3	406	0.093	30
M2	303	8.9	39.5	364	0.092	34
M5	156	8.6	42.4	743	0.048	43
M7	212	10.5	42.9	1,177	0.023	55

A 198-hour continuous mini-plant campaign was conducted in a 30-litre autoclave to evaluate the response of Moa Oriental limonite ore and limonite/saprolite blends (2% Mg and 4% Mg) to pressure acid leaching and liquid-solid separation under the conditions operated at Moa Nickel. The ore slurry feed to the autoclave contained 35% solids. Acid addition targeted specific free acid concentrations in the discharge solution (DX). Leaching was carried out at a temperature of 245°C and retention times varied from 60 to 90 minutes. Results are summarised in Table 12. Metal extractions in excess of 95% were achieved for the limonite ore, while extractions approached 95% for the 2% and 4% Mg blends. With further optimisation of acid addition, extractions in excess of 95% can be expected for the higher magnesium and silica content ores.

Table 12: Results of mini-plant campaign testwork for Moa Oriental ores

	Time period				
	1	2	3	7	8
Ore type	Limonite	4% Mg blend	4% Mg blend	2% Mg blend	Limonite
Duration (hours)	24	18	18	18	18
Acid addition (kg/t)	247, 246	374, 420	359	302	245
Temperature (°C)	244	245	245	245	245
Retention time (minutes)	88	88	90	90	62
DX H_2SO_4 (g/L)	28, 32	42, 45	34	35	29
DX extraction (%)					
Nickel	96.6	94.8, 95.9	94.8	94.6	96.4
Cobalt	96.2	95.3, 95.2	95.9	94.9	95.9

A two-stage CCD wash circuit was integrated with the continuous pressure leach circuit. The settling behaviour of the autoclave discharge slurry was also assessed hourly by free settling in a benchtop cylinder. The settling velocity of the residue generated from the limonite feed was higher than the settling velocity of the residues generated from the blends. Leach discharge slurry was diluted to 15% solids prior to flocculation with Magnafloc 455. Flocculant additions to the first thickener varied from 80 g/t to 180 g/t. Results are summarised in Table 13.

Table 13: Results of mini-plant campaign testwork for Moa Oriental ores with integration of two-stage CCD wash circuit

	Time period				
	1	2	3	7	8
Ore type	Limonite	4% Mg blend	4% Mg blend	2% Mg blend	Limonite
Feed (% solids)	15	13	14	15	15
Flocculant addition (g/t)	78	104	130	162	181
Underflow (% solids)	56	44	36	46	52
Overflow clarity (mg/L)	117	86	123	342	121
Unit area (m^2/t/d)	0.47	0.47	0.47	0.44	0.32

In parallel, samples of the leach discharge residue were subjected to thickening tests in a continuous laboratory scale Supaflo thickener, using flocculant Percol 455. The settling tests were carried out at 65°C and a feed solids content of about 10%. Initial scoping tests were carried out in graduated cylinders to define the feed density and flocculant dosage. 100-litre samples were prepared, and slurry was pumped into the feed well of the thickener using a variable speed peristaltic pump. A bed of solids was allowed to build until the bed reached the lower portion of the feed well. The underflow peristaltic pump was then started at a flow rate which maintained the bed at a constant level. Underflow samples were taken when the system reached steady state. Samples of overflow were also taken at steady state to determine the overflow clarity. Results are summarised in Table 14.

Table 14: Results of thickening tests for mini-plant campaign testwork of Moa Oriental ores

	Time period				
	1	2	3	7	8
Ore type	Limonite	4% Mg blend	4% Mg blend	2% Mg blend	Limonite
Loading (t/m^2 hr)	0.34	0.19–0.29	0.20–0.40	0.20	0.30
Flocculant (g/t)	68	47	48	53	48
Underflow (% solids)	61.7	47.2–48.1	44.5–45.0	45.3	51.2

The underflow solids content and solids loading decreased with increasing magnesium content of the feed blends. Overflow clarities were generally poor, indicating the need for further optimisation of flocculant type.

In 2008, studies were undertaken to understand the effect of magnesium content of the ore in relation to acid consumption. Magnesium consumes acid when magnesium-bearing minerals are dissolved and through buffering effects via the formation of the bisulphate ion at higher temperatures. Comparisons of laboratory data were made to Moa Nickel plant data.

Ore sampled from January 2008 was used in 43 batch leach tests. In January, the plant was feeding about 80% of its ore from Moa Oriental at this time. The average chemical composition of these samples is shown in Table 15.

Table 15: Average chemistry of samples used for batch leach tests

% Ni	% Co	%Ni + Co	% Fe	% Mg	% Mn	% Al	% SiO_2	% Cr	% Cu	% Zn
1.13	0.129	1.259	44.7	0.98	0.82	4.53	6.13	1.86	0.014	0.036

The results of the batch leach tests showed that nickel and cobalt extractions increased with increasing acid concentrations, but extractions decreased as magnesium concentrations increased, indicating a reduction in leach kinetics. The decreased extraction is due to the increased presence of dissolved sulphate ions associated with magnesium resulting in the reduction of "at temperature" acidity. The result is that an additional 30 kg/t of acid would be required to compensate for the buffering effect alone of a 1% weight increase in magnesium content of the feed. In total, combined with acid consumed in the dissolution of magnesium from the ore, an additional acid requirement of 70 kg/t per 1% weight increase in magnesium. Plant data from January 2008 to February 2009 indicated additional acid of between 60 kg/t and 70 kg/t in the ore for nickel extraction between 93% and 95%, confirming good agreement with the plant data.

Nickel and cobalt extractions increased with increasing acid addition to typically in excess of 97% for acid addition above 300 kg/t. Settling rates and trends for undiluted and diluted leach slurries appear to be similar to those reported by Moa for plant operations.

13.5 Camarioca Norte

Batch pressure acid leach tests were conducted to evaluate the leach performance of limonite/saprolite blends in comparison with limonite alone, under conditions used in the commercial plant at Moa Nickel. Test conditions and results are summarised in Table 16. The results confirm that nickel extractions above 95% are attainable in the acid leach process. Nickel and cobalt extractions for the 2% and 4% Mg blends were significantly lower than for the limonite, indicating the need for further optimisation of acid addition and retention time. The results indicate that acid concentrations in excess of 290 kg/t are required to achieve nickel extractions of 95% with the high magnesium content ores.

Table 16: Results of leach performance testwork for Camarioca Norte ores

	Test		
	C1	**C2**	**C4**
Feed	Lim 1	4% Mg	2% Mg
Slurry solids (%)	35.1	35.2	35.2
Mg analysis (%)	0.37	4.32	2.11
Temperature (°C)	245	245	245
Retention time (minutes)	90	90	90
Acid (kg/t)	240	345	295
Nickel extraction			
45 minutes	96.0	90.8	94.7
60 minutes	96.2	93.1	95.5
Cobalt extraction			
45 minutes	95.4	87.6	91.7
60 minutes	95.9	92.0	93.6
H_2SO_4 (g/L)			
90 minutes	27.8	33.0	42.5

Batch settling tests were carried out on the discharge residues from the batch leach tests. Results are presented in Table 17. Underflow solids contents decreased and flocculant addition increased with increasing magnesium content, but overflow clarities were significantly better with the higher magnesium content ores. Unit area requirement for the 2% Mg blend was lower than for the limonite.

Table 17: Results of batch settling testwork for Camarioca Norte ores

Test	Flocculant (g/t)	% Solids		Settling rate (cm/hr)	Unit area (m^2/t/d)	Suspended solids (mg/L)
		Initial	Final			
C1	151	8.9	48.0	529	0.067	231
C2	427	8.4	41.8	396	0.094	17
C4	255	8.8	45.2	719	0.050	15

A 156-hour continuous mini-plant campaign was conducted to evaluate the response of Camarioca Norte limonite ore and limonite/saprolite blends (2% Mg and 4% Mg) to pressure acid leaching and liquid-solid separation under the conditions operated at Moa Nickel. The ore slurry feed to the autoclave contained 35% solids. Acid addition targeted a 35 g/L free acid concentration in the discharge solution (DX). Leaching was carried out at a temperature of 245°C or 255°C and retention times varied from 60 to 90 minutes. Results are summarised in Table 18. Nickel extraction exceeded 95% for the limonite sample with a retention time of 60 minutes, and for the blends with a retention time of 90 minutes.

Table 18: Results of mini-plant campaign testwork for Camarioca Norte ores

	Time period			
	1	**2**	**3**	**5**
Ore type	Limonite	Limonite	4% Mg blend	2% Mg blend
Duration (hours)	27	18	18	18
Acid addition (kg/t)	256	250	363	304
Temperature (°C)	244	245	245	254
Retention time (minutes)	93	60	90	91
DX H_2SO_4 (g/L)	24.9	26.7	31.4	36.4
DX extraction (%)				
Nickel	96.7	95.5	95.4	95.7
Cobalt	96.0	94.8	94.8	94.0

A two-stage CCD wash circuit was integrated with the continuous pressure leach circuit. Leach discharge slurry was diluted to 15% solids prior to flocculation with Magnafloc 455. Flocculant additions to the first thickener varied from 80 g/t to 180 g/t. Results are summarised in Table 19.

Table 19: Results of mini-plant campaign testwork for Camarioca Norte ores with integration of two-stage CCD wash circuit

	Time period			
	1	**2**	**3**	**5**
Ore type	Limonite	Limonite	4% Mg blend	2% Mg blend
Feed (% solids)	16	15	9	14
Flocculant addition (g/t)	168	110	239	201
Underflow (% solids)	50	62	54	51
Overflow clarity (mg/L)	162	178	348	238
Unit area (m^2/t/d)	0.45	0.30	0.55	0.51

In parallel, samples of the leach discharge residue were subjected to thickening tests in a continuous laboratory scale Supaflo thickener, using flocculant Percol 455. Results are summarised in Table 20. The target underflow solids content of 50% solids was achieved for all feeds.

Table 20: Results of thickening tests for mini-plant campaign testwork of Camarioca Norte ores

	Time period			
	1	**2**	**3**	**5**
Ore type	Limonite	Limonite	4% Mg blend	2% Mg blend
Loading (t/m^2 hr)	0.29	0.29	0.30	0.29
Flocculant (g/t)	74	75	82	51
Underflow (% solids)	50.8	50.6	51.2	59.1

In September 2007, about 70 samples from 25 Camarioca Norte drillholes representing each of the major mining areas were selected for studies of the settling rates for the raw and leached slurries. The material selected for these studies spanned a range of chemical compositions so that the tests would be relevant to a variety of ores; the samples' magnesium grades ranged from 0.1% to 2.2%, and their silica grades ranged from 1% to 26%.

The average chemical composition of these samples is shown in Table 21. With 1.37% nickel plus cobalt and 0.47% magnesium, the average ore is of good quality compared to average run-of-mine material from the Moa Oriental area currently being mined.

Table 21: Average chemistry of Camarioca Norte samples used for settling tests.

% Ni	% Co	% Ni + Co	% Fe	% Mg	% Mn	% Al	% SiO_2	% Cr	% Cu	% Zn
1.205	0.164	1.368	45.72	0.47	0.98	4.52	4.16	1.94	0.017	0.042

Leaching was done in a 4-litre capacity pilot autoclave under the followingconditions:

- 300 kg of acid per tonne of ore;
- Temperature of 246°C;
- Pressure of 525 psi;
- 28% dry solids in the slurry;
- Leach retention time of 60 minutes.

The settling behaviour of raw slurry was studied by preparing the samples and adjusting to 12.5% solids in 1-litre glass graduated cylinders without flocculants and other additives. Settling behaviour with respect to impurities (primarily Mg and SiO_2) was studied with no observed relationship between impurity content and observed settling. Observed settling results were quite variable but the average settling velocity value was considered to be acceptable for the process.

Settling tests were conducted after batch leaching by cooling the leached samples to 100°C and then placing the sample in a 1-litre graduated cylinder for measurement after one and two hours. Settling velocities were checked at various Mg and SiO_2 levels with no correlation to impurity levels and the leached settling velocities. Final averaged slurry settling results were considered acceptable although some samples were noted to give below average results.

This work followed earlier work in 2005 and 2006 conducted at Moa Nickel on samples of Camarioca Norte and Sur which indicated settling rates on ore and leached slurry to be variable, highlighting the need for proper ore blending prior to feeding the plant.

13.6 Metal Recoveries

Plant performance is continually monitored, and metallurgical accounting is carried out to monitor overall metals recovery, as well as the efficiency of unit operations. After mining, the major losses of nickel and cobalt occur in the SPP, the HPAL circuit, the CCD wash circuit and mixed sulphide precipitation and the refinery. The two most significant losses are in HPAL where the nickel and cobalt extraction is practically limited to less than 97%, but typically ranges from 93.5% to 95.5%, and in the wash circuit with soluble losses ranging from 5% to 12%, but more typically near the lower end of this range. The recoveries of the plant in Moa, which produces the mixed sulphide intermediate product, and the refinery in Fort Saskatchewan, which produces nickel and cobalt metal products from the mixed sulphide intermediate are provided in Table 22.

Table 22: Metal recoveries from 2016 to 2018

Year	2016	2017	2018	3-year average
Nickel Recovery				
From Slurry Prep Plant to Mixed Sulphide	88.7%	86.2%	85.0%	86.7%
From Mixed Sulphide to Metal	98.2%	98.3%	98.4%	98.3%
Overall	87.1%	84.8%	83.5%	85.2%
Cobalt Recovery				
From Slurry Prep Plant to Mixed Sulphide	93.6%	92.6%	90.1%	92.1%
From Mixed Sulphide to Metal	91.8%	92.3%	90.1%	91.4%
Overall	86.0%	85.5%	81.2%	84.2%

14 Mineral Resource Estimates

14.1 Introduction

This Mineral Resource estimate was prepared by Dr Adrian Martínez Vargas, Senior Consultant, P.Geo. (the Qualified Person and author of this section), and internally peer-reviewed by Dmitry Pertel, Principal Consultant; both full-time employees of CSA Global. Mineral Resources were estimated for 11 zones on the Moa JV property, using all drillhole data available by November 2018, and has an effective date of 31 December 2018.

Sherritt and Moa JV provided the author with drillhole and exploration pits databases, digital elevation models (DTMs), polygons with concession outlines, and polygons with environmental protection areas along rivers, as defined by the Cuban guidelines NC 23 published by the Oficina Nacional de Normalización in 1999. The drillhole databases contain Ni, Co, Fe, SiO_2, Mg, Al, Mn, and Cr assay results. The exploration pits contain in-situ density measurements and Ni, Co, Fe assay grades. The DTMs provided are for both the topography of the deposit before and after mining. The DTMs of the surface after mining have an effective date of 1 October 2018, and are exclusive of in-pit waste dumps, roads, stockpiles, or any other pit filling material.

Dr Martinez Vargas reviewed all the informing data provided and considers that the quality and quantity of the information is appropriate for Mineral Resource estimation. Resources were estimated in the following eleven areas or concessions (Figure 17):

- Playa La Vaca-Zona Septemtrional II (PVZS);
- Ampliación Moa Occidental Sector l, Zona Central (ZC) area;
- Ampliación Moa Occidental Sector l, Zona A and Zona A Oeste (ZA) areas;
- Moa Oriental (MO);
- Camarioca Norte (CN);
- Camarioca Sur (CS);
- Yagrumaje Oeste (Yagrumaje);
- La Delta;
- Cantarrana;
- Santa Terisita;
- Yamaniguey Cuerpo I, Sector known as 11 Bloques.

Mineral Resources in other small resource bodies were not interpolated, but the existing resource estimate were reviewed before reporting. These areas are:

- Moa Occidental III (Pilar Camino, Cuerpo3 Yamaniguey Oriental);
- Moa Occidental III (Zona Sur);
- Zona A Sector II;
- Moa Occidental Bloque O-30.

Previously, limonite rejected by the SPP, along with oversize material, that are stored in artificial ponds have been reported as resources. These reject ponds have been historically mined and fed into the process, but this material is not part of the Mineral Resource because it was previously reported as Mineral Reserves, mined, processed and depleted from the current Mineral Resources.

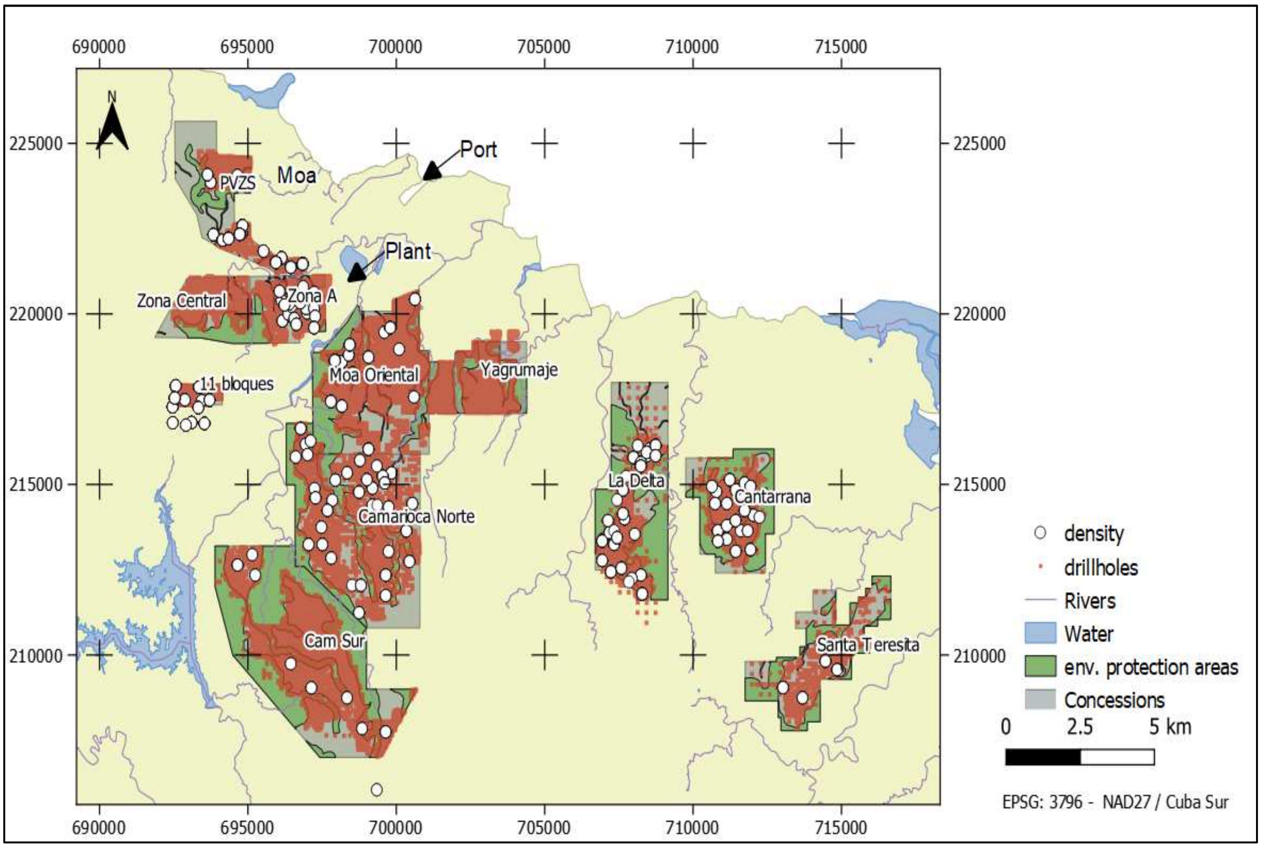

Figure 17: Informing data used for Mineral Resource estimation (density samples and drillholes), concessions, and environmental protection areas

The Mineral Resource estimate workflow was as follows:

- Informing data compilation and validation;
- Interpretation of the geology and mineralisation domains;
- Coding and compositing; capping was not necessary;
- Block modelling;
- Unfolding composites and block model;
- Exploratory data analysis and statistical analysis;
- Variogram analysis;
- Derivation of kriging plan, interpolation and validation;
- Classification and resource reporting.

14.2 Informing Data and Database Validation

Drillhole data was provided in Microsoft Access format, except for Zona Central which was provided in Microsoft Excel spreadsheets. All the databases were exported into Microsoft Excel spreadsheets and formatted with the same data structure and feature names. Drillholes were validated for gaps, overlaps and duplicates using the software, PyGSLIB. The completeness and quality of the data was also reviewed. No major issues were identified. The issues identified were considered minor and the most relevant is the absence of

Mg, SiO_2, Al, Mn, and Cr assay in historical campaigns (prior to 1995), which makes the interpolation of these elements difficult in areas lacking Moa JV's infill drilling.

The informing data used for resource estimation is summarised in Table 23.

Table 23: Drillhole data used for Mineral Resource estimation

Concession or area	Number of drillholes	Metres of drilling (m)	Common spacing between drillholes (m)
Moa Oriental	12,362	123,946	33 x 33, 16 x 16, 25 x 25
Camarioca Norte	8,651	75,503	100 x 100, 33 x 33, 25 x 25
Camarioca Sur	7,343	56,341	35 x 35, 33 x 33, 16 x 16, 25 x 25
Yagrumaje Oeste	4,884	33,355	33 x 33, 25 x 25
Santa Teresita	943	7,239	100 x 100, 35 x 35
La Delta	2,047	21,794	100 x 100, 35 x 35
Cantarrana	2,636	21,828	300 x 300, 100 x 100, 35 x 35
Playa Vaca y Zona Septentrional	1,616	14,024	100 x 100, 35 x 35
Zona Central	815	9,056	100 x 100, 33 x 33
Zona A y Zona A Oeste	4,027	55,333	33 x 33, 25 x 25, 16 x 16
11 Bloques	2,331	41,045	16 x 16
Total	**47,655**	**459,464**	

Topography surfaces were provided as pointsets and triangulated meshes with different file formats. All topography surfaces were reconstructed and visually validated. No major issues were identified. However, the resolution of topographic surfaces varies from one area to another, and there is no high-resolution topography surface covering the entire property. Surfaces of mining areas do not include any in-pit material and there is no way to accurately determine the volume of in-pit waste dumps with the information available.

The exploration pits database was primarily used to model the in-situ density of the laterites and its relationship with grade elements. The author's review revealed that FROM–TO intervals are not available for pits located in Zona A and some of the pits have no assays for Mg, SiO_2, Al, Mn, and Cr. However, the pits database is the most reliable source to obtain lithology with corresponding chemical composition.

14.3 Geological Modelling

The eleven areas or concessions modelled are interpreted as oxide-type nickel laterites developed from the weathering of serpentized peridotites composed mostly by harzburgites, as well as dunites, of the Mayari-Baracoa ophiolite belt. The laterite profile, where it is complete, consists of a downward sequence of a ferricrete cap, limonites, saprolite and the protolith of serpentized peridotites and harzburgites (Marsh and Anderson, 2011). The ferricrete cap is usually absent or commonly appears as disaggregated pisolites gradually transitioning to limonite. The contact between limonite and saprolite tends to be hard, without a gradual transition. Another characteristic considered in creation of the geological model is that there is abundant lateral remobilisation and redeposition with subsequent weathering of remobilised materials; this produces high lateral continuity and decreases the vertical continuity of chemical composition and lithology. Redeposition may also explain the change in thickness of the lateritic profile from south to north.

The subsequent weathering of the remobilised material makes it look like any other lateritic deposit of the oxide-type and remobilised laterite material is difficult to differentiate from in situ laterite material. However, the remobilisation process may produce exotic lateritic profiles in some areas – for example, there are limonite with relatively high iron and magnesium at the top of the profile and repetition of the typical lithology sequence. Cross-stratification and presence lenses of allochthonous clays and sands have been reported (Muñoz-Gómez *et al.,* 2015). Presence of fossiliferous material indicates a Miocene–Pliocene marine depositional environment with different depositional energies in the Camariocas deposits (López-Martínez *et al.,* 2008).

Laterite developed over gabbro were also identified and can be recognised by its high alumina content and low magnesium grade.

14.4 Domains Used for Grade Interpolation

Two main domains were defined to interpolate grade variables, the limonite and the saprolite. The material ranging from rocky saprolite to fresh bedrock (the bedrock domains) was not interpolated. Laterites with iron grade over 35% were assigned to the limonite domain, intervals with iron grade between 35% and 12% were assigned to the saprolite domain, and intervals with iron grades below 12% were assigned to the bedrock domain (Figure 18A and Figure 19). The selection of these thresholds is explained in Section 14.4.1. Gabbro intervals were not modelled due to their limited continuity at the current drillhole spacing.

Drillhole intervals were flagged with geochemical domains and then simplified into one single sequence of limonite, saprolite and bedrock (Figure 18B). This simplification process was completed grouping lithology in the most probable groups, using a technique known as time series segmentation. Grouped intervals were validated visually, and by comparing the averages of iron on each interval with the iron thresholds explained above. A few grouping errors were identified and manually corrected. The contact points between domains were extracted and used to generate gridded surfaces, with contact points included, using a radial basis function interpolator (Figure 18). Drillholes, domain surfaces, and the blocks of the block model, were then flattened (or unfolded) using the topographic surface as reference (Figure 18C).

Note that as a result of this use of simplified interpolation domains, there are non-limonite drillhole intervals in the domains of the limonite. Similarly, there are non-saprolite and non-bedrock intervals in the saprolite and bedrock domains, including gabbros. The impact of mixing different types of materials in estimation domains was minimised using only four drillholes around the blocks for interpolation.

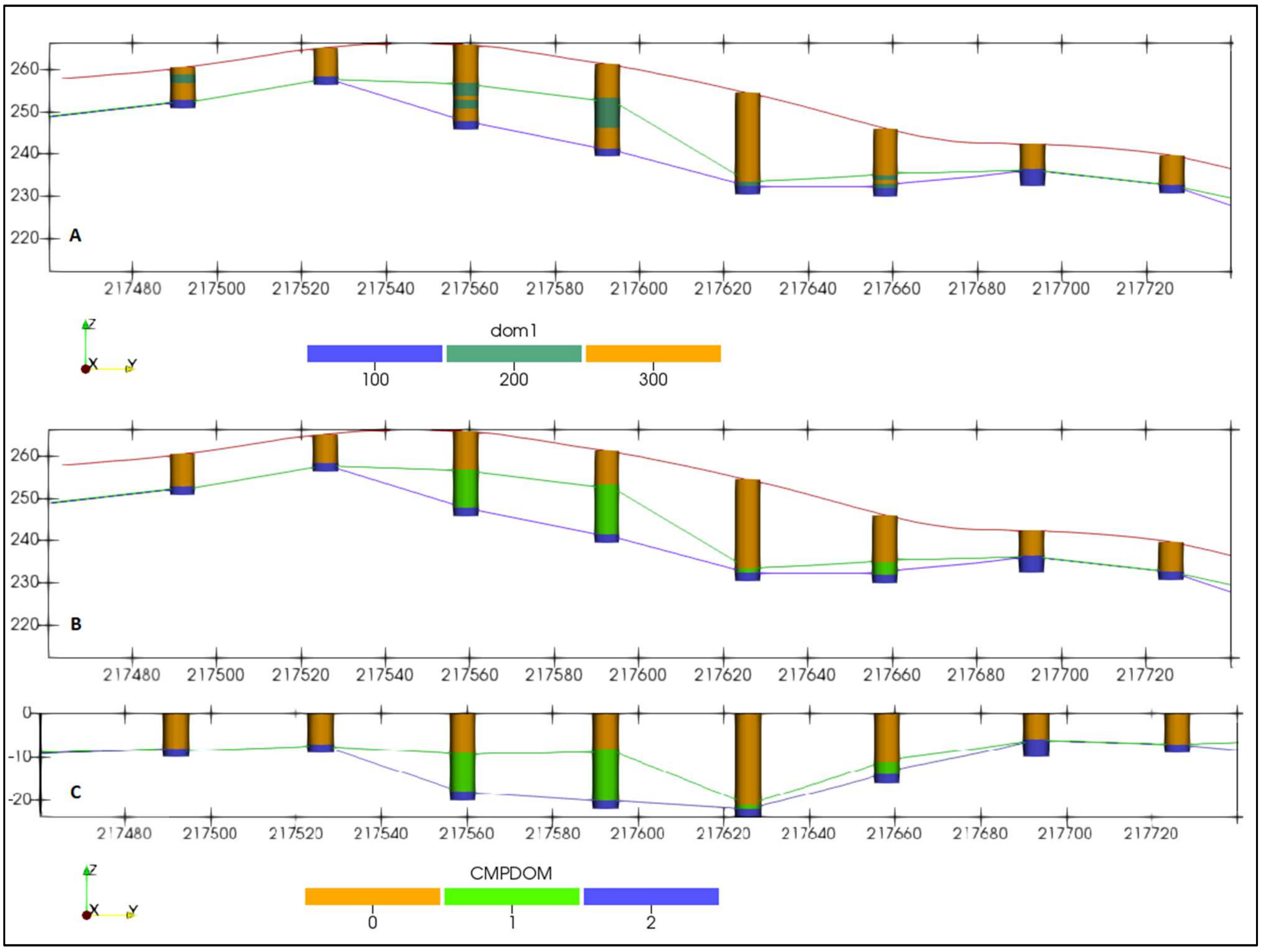

Figure 18: Section of the Moa Oriental concession along E 700465 showing: (A) geochemical domain 100 (bedrock), 200 (saprolite), 300 (limonites) in drillholes; (B) geochemical domain simplified 2 (bedrock), 1 saprolite), 0 (limonites) in drillholes and contact surfaces; and (C) drillhole data and surfaces unfolded using as reference the topography

14.4.1 Domains Used to Assign Density

Geochemical grade values were used to define density domains, as shown in Table 24, and used to assign density to blocks, depending on their Fe, Ni and Co grade values. The domain of limonite was split into two subdomains: limonite with ferricrete and pisolite, and limonite without ferricrete and pisolite.

The thresholds defining each density domain were defined using combined exploration pit data from similar zones, and a combination of classification trees, as implemented in the software, Orange v3.20 (Demsar *et al.,* 2013) (Figure 19 and Table 24), exploratory data analysis, and expert criteria.

Table 24: Conditions used to define density domains and its average density values

Deposit	Condition	Density
Camarioca Norte and Sur, Moa Oriental, Zona A, 11 Bloques and Yagrumaje	Bedrock: Fe <12%	1.3
	Saprolite: 12% <= Fe <35%	0.9
	Limonite without ferricrete: (Fe >35%) and (Ni >= 1%, or Ni <1% and Co >= 0.09%)	1.0
	Limonite with ferricrete: Fe >35% and Ni <1% and Co <0.09%	1.2
La Delta, Santa Teresita, Cantarrana	Bedrock: Fe <12%	1.3
	Saprolite: 12% <= Fe <35%	0.9
	Limonite without ferricrete: (Fe >35%) and (Ni >= 1%, or Ni <1% and Co >= 0.09%)	1.0
	Limonite with ferricrete: Fe >35% and Ni <1% and Co <0.09%	1.3
Playa la Vaca y Zona Septentrional	Bedrock: Fe <12%	1.3
	Saprolite: 12% <= Fe <35%	1.0
	Limonite without ferricrete: (Fe >35%) and (Ni>= 0.5%, or Ni <0.5% and Co >= 0.09%)	1.2
	Limonite with ferricrete: Fe >35% and Ni <0.5% and Co <0.09%	1.6

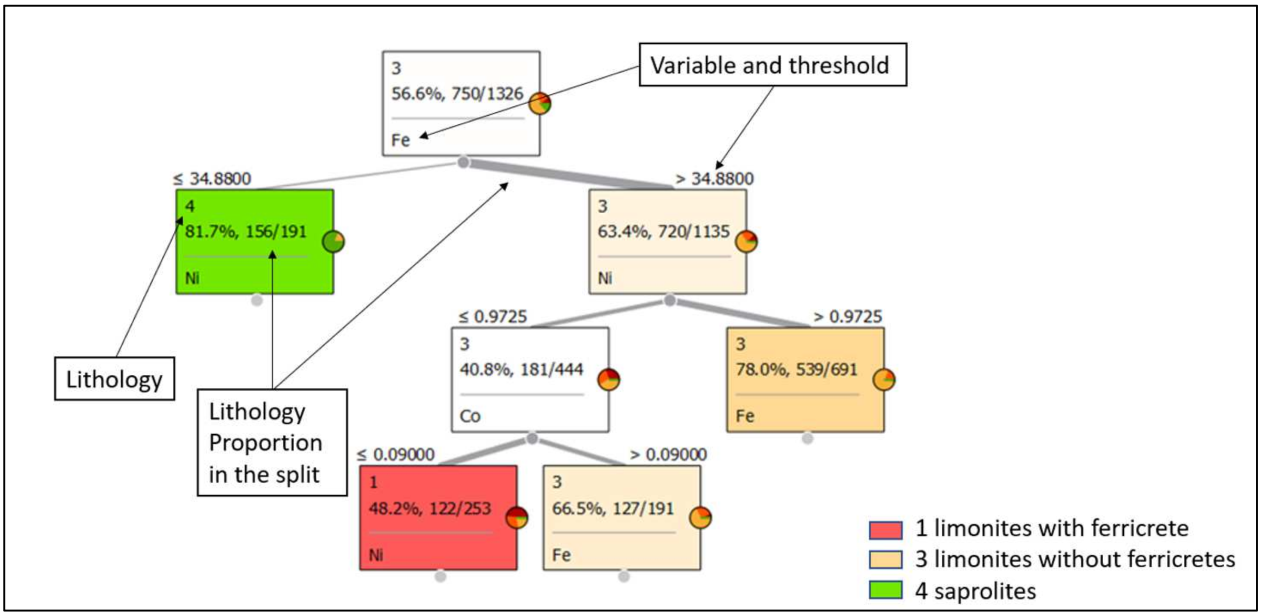

Figure 19: Example of a tree classifier obtained with exploration pit data from Camarioca Sur and Norte, Moa Oriental, Zona A, and 11 Bloques

14.5 Sample Compositing

The sampling interval is usually 1 m, but it can be less than 1 m at contact points or at the end of drillholes. There are few samples with a length over 2 m, usually located in older campaigns. Non-assayed intervals are rare for Fe, Ni, and Co. Samples were composited to 1 m interval, without combining samples from different interpolation domains.

14.6 Statistical Analysis

The statistical analysis was completed per separate interpolation domain using the respective composited intervals. The statistical analysis consisted of de-clustering analysis, exploratory data analysis, construction of histograms and cumulative histograms, univariate statistic calculation, and multivariate statistics review.

Deposits such as La Delta and Santa Teresita have drilling at different spacing, with closer drilling spacing in areas with higher grade and thickness of the lateritic profile. This resulted in a clustering effect that tends to introduce a bias in the calculation of average grades of nickel grades. Decluttering optimisations, completed using the software Supervisor, indicate that large de-clustering windows (e.g. 231 m x 231 m x 3 m (or 2 m)) effectively minimises the clustering effect. These de-clustering weights do not impact the estimate but are necessary to obtain the unbiased means and cumulative distribution function (CDF) histograms required to validate estimations.

The univariate statistics analysis was completed with de-clustered and clustered data and consisted of calculating basic statistics such as mean values and coefficient of variations (CVs). All CVs calculated for variables in limonite and saprolite are under 1.0, except for Mg that shows a CV of between 0.8 and 1.5 in limonite. CV values under 1 or 1.5 are good empirical indicators that linear interpolation methods, such as ordinary kriging and the inverse of the distance, may be appropriate to estimate grade values in the block model. Histograms were plotted for all variables in each domain. Histograms show low skew distributions, with Mg showing the highest asymmetry. Histograms did not show strong multimodality, except for Co and Mn in limonite in La delta and Santa Teresita.

Pearson correlations were calculated between pairs of elements. Strong linear correlations exist between Fe and SiO_2, Co and Mn, and Mg and SiO_2. It is known that there is a good correlation between other pairs of elements, for example, Fe and Mg, but these correlations are complex and not always captured by Pearson's coefficients calculated with samples from a single interpolation domain. However, robust regression techniques effectively highlight the correlation between Fe and Mg (Figure 20).

Capping was investigated using CDF analysis and observing the spatial distribution of extreme values. It was found that capping is not required for interpolation. Maximum grade values of composites are acceptable – for example, there are only four samples over or equal to 3% Ni in Camarioca Norte, and the maximum value is 3.16% Ni for this deposit.

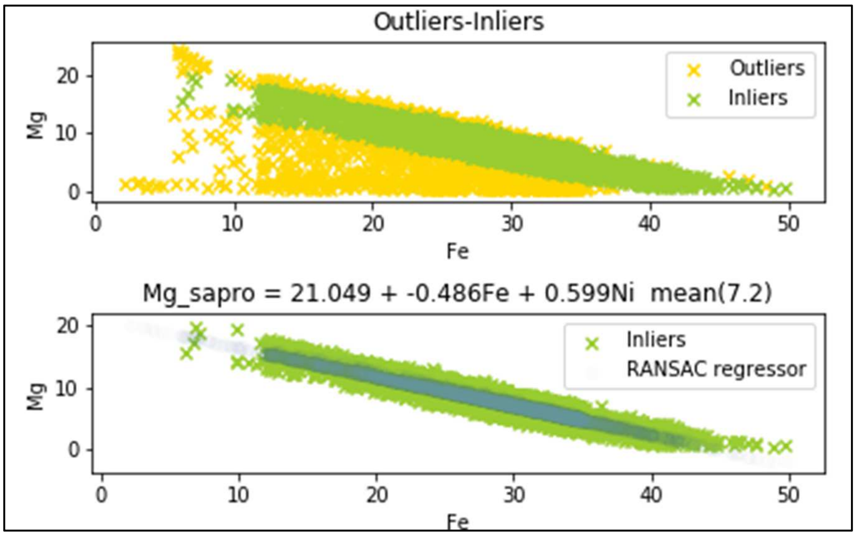

Figure 20: Robust regression of Fe and Mg in saprolite – Moa Oriental

14.7 Geostatistical Analysis

The aim of the geostatistical analysis is to identify directions of continuity of element grades and to obtain the variogram models required to interpolate grade in the block model using geostatistical techniques. Variograms are also required to complete model validations using a method known as global change of support (GCOS).

Directions of grade continuity and anisotropy were investigated using variogram maps and directional variograms calculated with the software, GSLIB for all the variables in each interpolation domain, using flattened data (Figure 21). No strong horizontal anisotropy direction was identified, but in the vertical direction the continuity decreases considerably, as usual in this type of deposit, and for this reason, a vertical bandwidth of 1 m was used to calculate horizontal variograms, in this way avoiding mixing samples from different levels of the lateritic profile. Variograms also show a strong zonal anisotropy in the vertical direction (Figure 21, right).

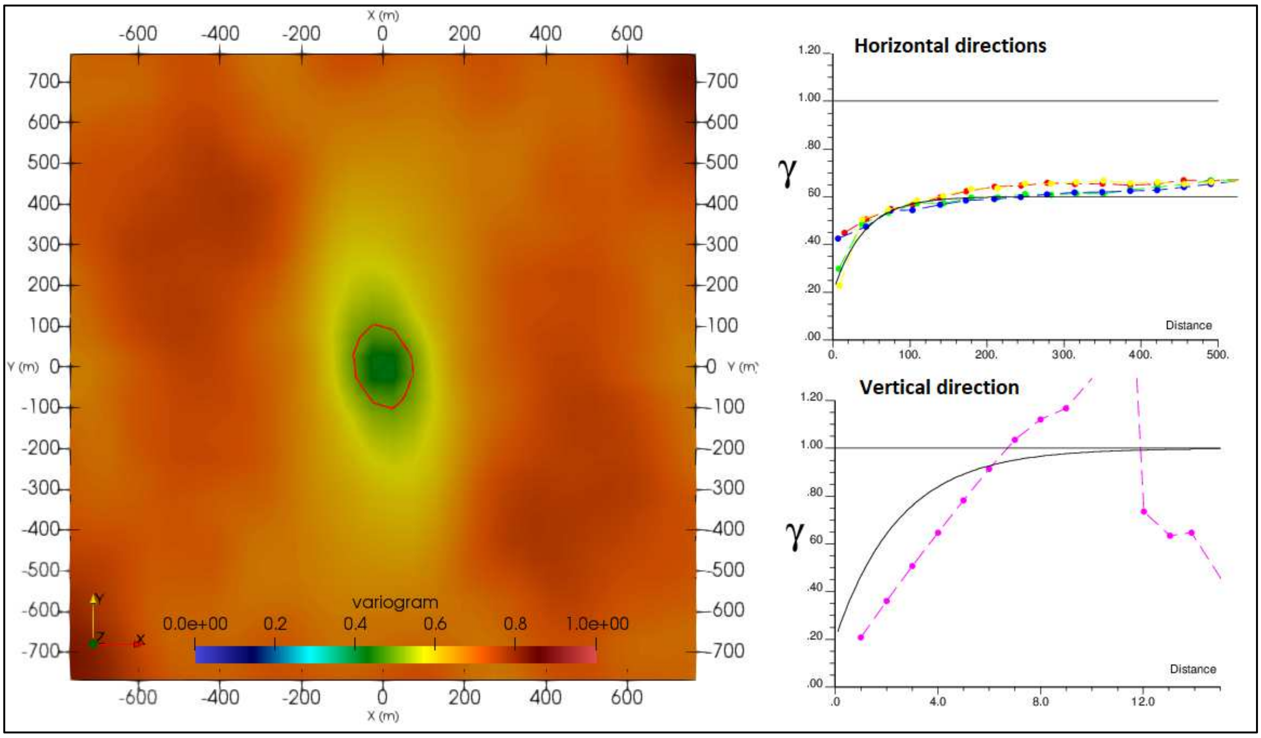

Figure 21: Horizontal section of the variogram map with contour around 50% of the sill in red (left) and directional variograms (right) of Ni grades in the Camarioca Sur concession

It was also found that the same variogram model properly fit the variograms of all the deposits (Figure 22) and fits relatively well the variograms of all the variables interpolated (Figure 23). Using the same variogram and estimation parameters for the variables allows, but does not guarantee, the preservation of the spatial correlations, especially where all the variables are available.

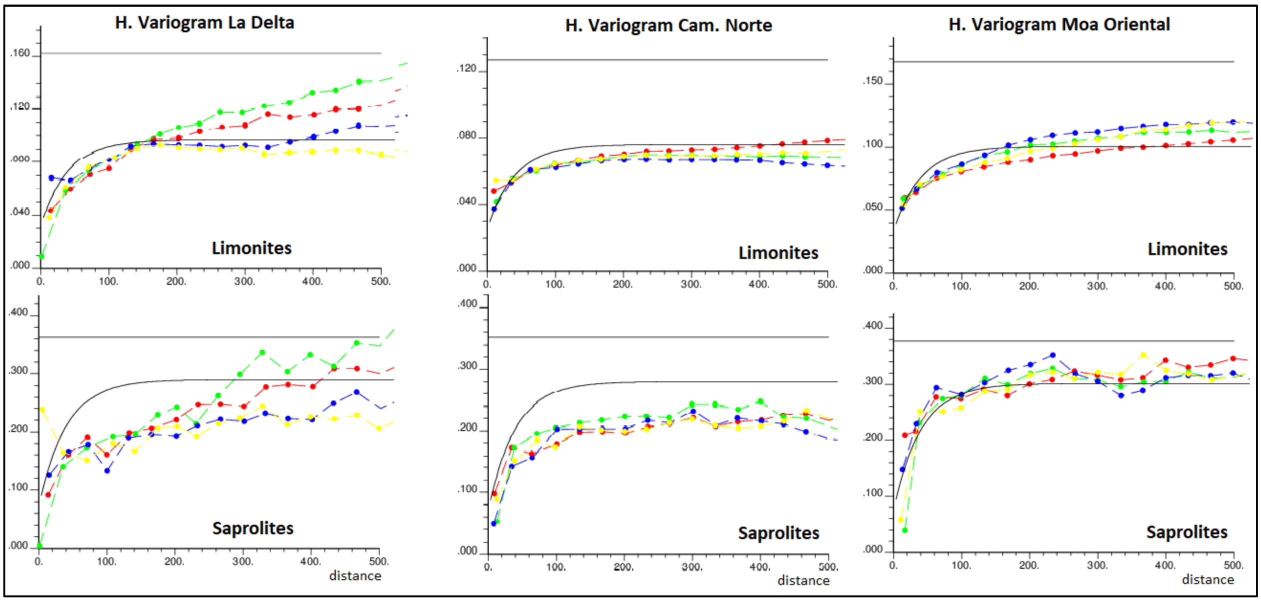

Figure 22: Horizontal Ni variograms of different concessions calculated along the azimuth 0 (red), 45 (green), 90 (blue), 135 (yellow) with the same variogram model overlapped (black)

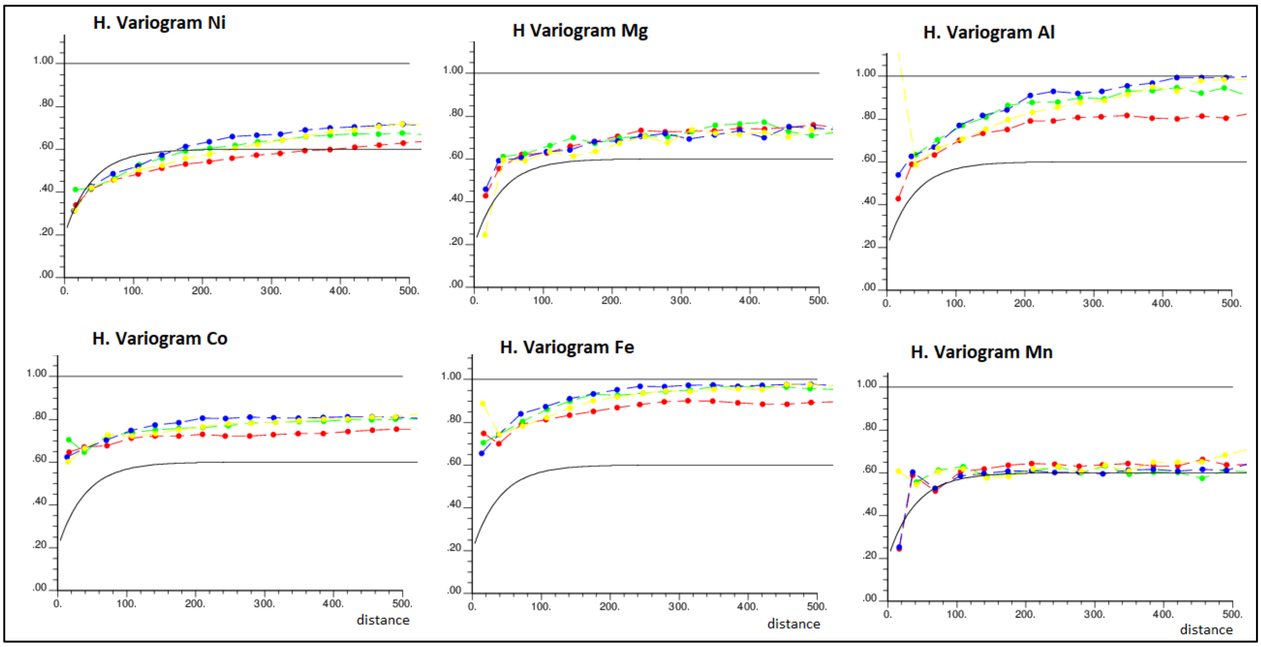

Figure 23: Horizontal variograms of different variables calculated for the Moa Oriental concession along the azimuth 0 (red), 45 (green), 90 (blue), 135 (yellow) with the same variogram model overlapped (black)

A normalised variogram model with nugget 0.12 and two exponential structures with ranges 120 m and infinite (∞) in the horizontal direction, and 7 m and 15 m in the vertical direction was used. The infinite range in the second exponential structure was used to account for the vertical zonal anisotropy. The sills used for the variogram structures were 0.47 and 0.41 in the limonite and 0.63 and 0.25 in the saprolite. This variogram model was used as described for interpolation. However, it was rescaled to the real variance of each variable to complete GCOS.

14.8 Block Models

Individual block models were generated for each one of the 11 estimation areas. Block models of 8.33 m x 8.33 m horizontal x 3 m high were created for Moa Oriental, Camarioca Norte, and Zona A, to maintain the block model definition currently used for these areas, which were under exploitation as of the Effective Date of this Report. Two-metre high blocks, with 8.33 m x 8.33 m horizontal section, were used for Yagrumaje, La Delta, Zona Central, and 11 Bloques. The change to 2 m high blocks was to better delineate the thinner and more variable lateritic horizons of these deposits. Two-metre high blocks with 12.5 m x 12.5 m horizontal section were used in the block models of Camarioca Sur, Santa Teresita, Cantarrana, Playa La Vaca and Zona Septentrional. The selection of the block size responded to current mining practices and the geological characteristics of the deposits. All block sizes were between two to four times smaller than the drillhole spacing in well drilled areas.

The proportion of limonite, saprolite and bedrock were calculated in the blocks. Each block was assigned to the material with the highest proportion (Figure 24). The proportion of the block above the undisturbed topography (before mining) was also calculated and assigned as air proportion (a value between 0 and 1). The proportion of the block above the topography after mining, but not including any infill material such as waste dumps or roads, was calculated as well and assigned as a mined proportion. All blocks in the air or 20 m below the surface of the bedrock were removed to reduce the size of the model but waste blocks required for pit optimisation and other mining studies were retained.

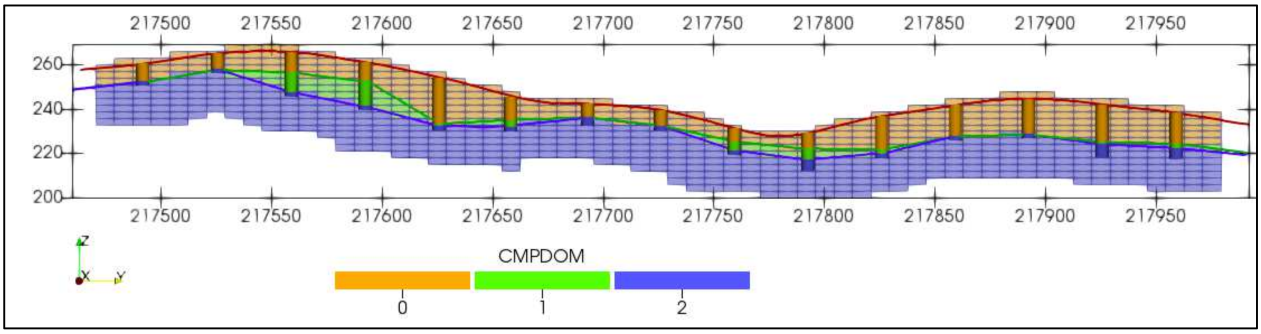

Figure 24: Moa Oriental, section along E 700465 showing estimation domains 2 (bedrock), 1 (saprolite), 0 (limonites) in drillholes, and block model, and contact surfaces

Blocks were unfolded to interpolate grade variable and then restored to its original coordinates.

14.9 Grade Estimation

Ni, Fe, Co, Mg, Al, Mn, SiO_2 and Cr were interpolated in the block models, per separate domains of the limonite and saprolite, using ordinary kriging with the variogram models presented in Section 14.7. The interpolation was completed with unfolded block models and drillholes, using composited data, a maximum of two or three samples per drillhole (depending on the block height), a maximum of eight or 12 samples, and a minimum of five samples. Search ellipses of 40 m x 40 m x 3 m, 80 m x 80 m x 6 m, and 120 m x 120 m x 20 m, without octants, were used in subsequent search passes. However, in all the cases the sample selection parameters tend to constrain the estimate to four drillholes around the blocks, and samples located at the same level of the blocks in the unfolded block model.

The search parameters were tested by plotting samples selected and weight used for interpolation.

14.10 Block Model Validation

Model validations consisted of visual comparison of drillholes and blocks in sections, comparison of average grades and statistical distributions, validation with swath plots, and GCOS. All validations were completed per separate estimation domain and did not consider non-estimated blocks.

Table 25 shows an example of mean comparison validation for Moa Oriental. This validation showed better results in areas where the drilling spacing is systematic. In all cases, the difference in mean obtained is acceptable.

Table 25: Mean comparison in Moa Oriental (without de-clustering)

Variable		Mean in composite (%)	Mean in model (%)	Difference in mean (%)	Number of composites	Number of blocks
Fe	Limonite	46.80	46.75	0%	99,798	428,397
Ni		1.03	0.95	8%	99,798	428,397
Co		0.12	0.11	8%	99,796	428,397
SiO_2		3.48	3.37	3%	46,124	370,239
Al		5.08	5.29	-4%	45,986	369,911
Mg		0.67	0.63	7%	46,120	370,239
Mn		0.73	0.69	6%	39,558	314,775
Cr		2.06	2.04	1%	43,516	340,452
Fe	Saprolite	25.52	25.12	2%	10,552	28,741
Ni		1.44	1.48	-3%	10,552	28,741
Co		0.07	0.06	4%	10,549	28,741
SiO_2		23.66	25.05	-6%	3,999	23,013
Al		4.00	3.70	8%	3,991	23,013
Mg		7.87	8.03	-2%	4,005	23,013
Mn		0.45	0.47	-3%	3,264	16,047
Cr		1.13	1.15	-1%	3,891	22,849

Visual validations consisted of a comparison of grade in drillholes and block model to ensure the local estimate and main trends were reproduced in the estimate. An example of these validations is shown in Figure 25.

The GCOS validation consists of comparing theoretical grade-tonnage curves with grade-tonnage curves calculated with block model estimates. The theoretical grade-tonnage curves were obtained by correcting the support effect of the statistical distributions calculated with composites, using the discrete Gaussian model. This validation allows verifying the grade and tonnage of the estimate in block model at different cut-off or thresholds, and the reproduction of the statistical distributions in the estimate. It also allows detecting over smoothing in estimations. Figure 26 shows an example of GCOS validation of Ni grades estimate for Camarioca Sur.

The author is of the opinion that all the model validations were satisfactory, and the estimates are appropriate for Mineral Resource reporting.

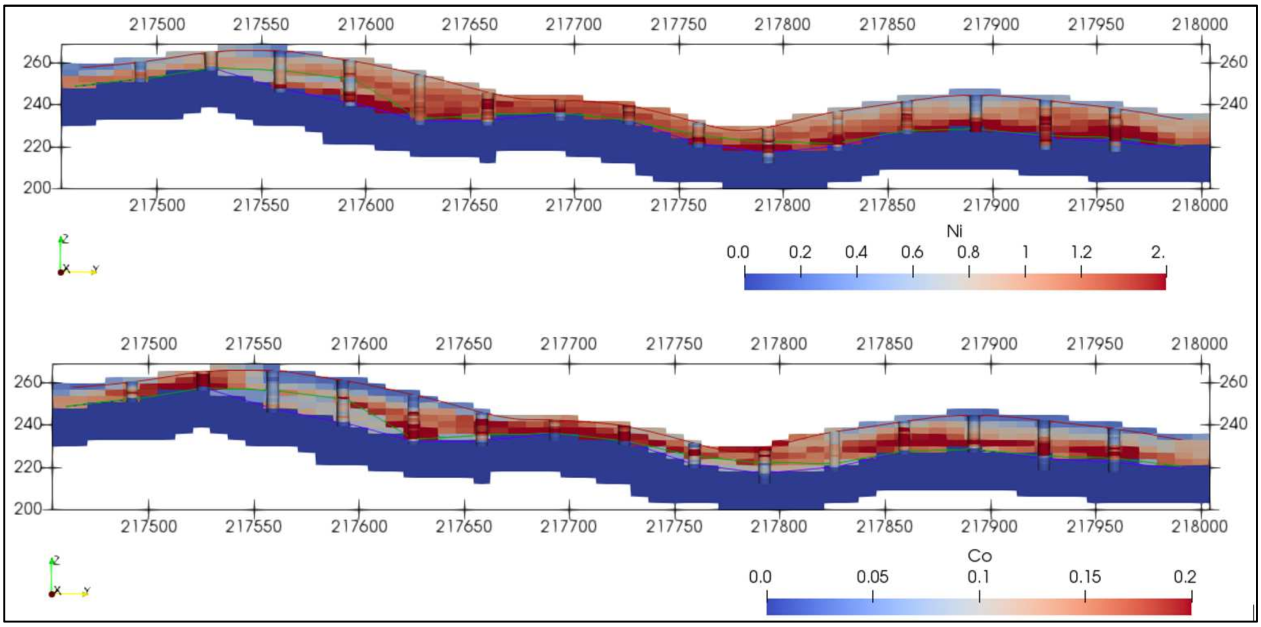

Figure 25: Moa Oriental, section along E 700465 showing Ni(%) (above) and Co(%) (below) in drillholes and in block model, and estimation domain surfaces bedrock (blue), saprolite (green), topography before mining (red).

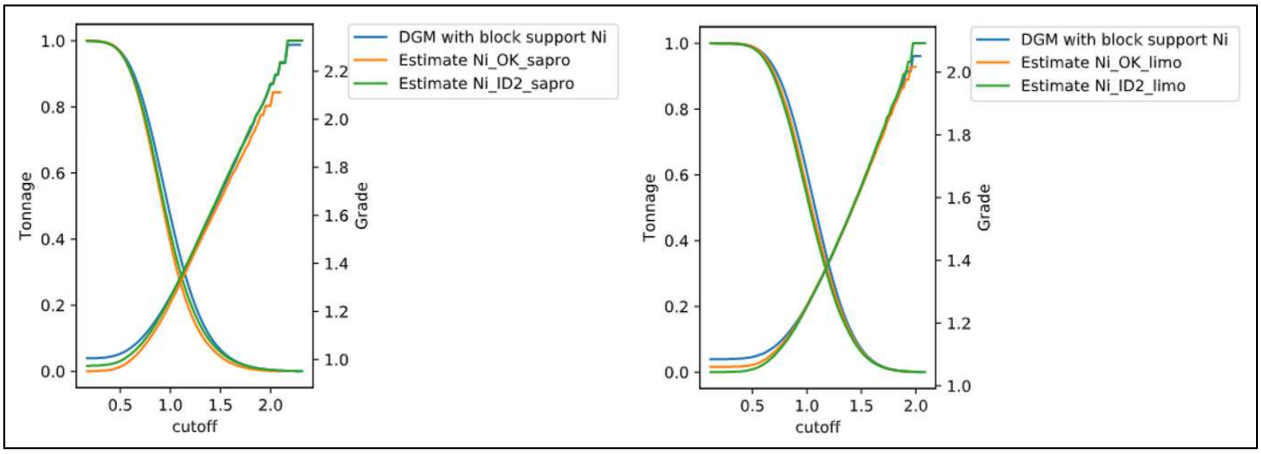

Figure 26: GCOS validation of the estimate of Ni grades in saprolite (left) and limonite (right) for Camarioca Sur

14.11 Resource Classification

Classification, or assigning a level of confidence to Mineral Resources, is undertaken in strict adherence to the "Definition Standards for Mineral Resources and Mineral Reserves" adopted by the CIM Council on 10 May 2014 (CIM Council, 2014). The classification of Mineral Resources into Measured, Indicated and Inferred categories was based on the confidence, quality and quantity of the informing data, the confidence in the geological interpretation of the deposit and the "reasonable prospects for economic extraction" of these resources.

14.12 Mineral Resource Classification and Reporting

14.12.1 Reasonable Prospects of Economic Extraction

The economic extraction of nickel and cobalt from lateritic deposits, using pressure acid leach technology (see Section 13) depends on the concentration of these two metals, a series of costs considered fixed, and extra cost associated to the concentration of the deleterious elements Al and Mg. Figure 27 shows the extra cost due to acid consumption as a function of Al and Mg and the distribution of these two elements in Moa Oriental. The plots for other areas are similar. The concentration of alumina plays a discrete role, and it is most important if laterites contain a component of weathered gabbro. Magnesium plays a discrete role in limonite but drives most of the extra cost in processing saprolite.

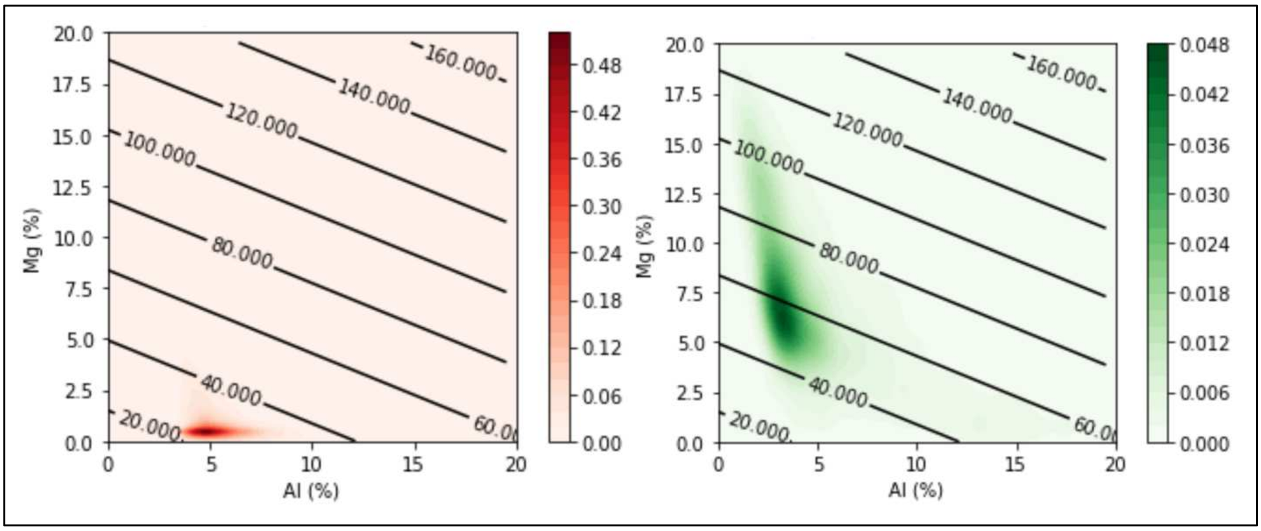

Figure 27: Bivariate density function of Al and Mg grades on limonite (left) and saprolite (right), and extra cost due to acid consumption (black isolines) to process one tonne of laterite

The reference prices of nickel and cobalt used to assess the eventual economic extraction of the laterites are US$6.82/lb and US$25.23/lb respectively. At these prices, Co represents approximately 35% of the value in limonite since Ni is usually nine times more concentrated than Co in this type of material. An equivalent nickel grade could be defined as NiEq = Ni + 3.7Co, where 3.7 is the ratio of Co and Ni prices, assuming a metallurgical recovery of 86% for both metals.

The fixed processing cost used to assess the economic extraction is US$47.12/t, plus a cost for hauling to the plant of US$5.13/t. An additional cost associated with extra acid and lime consumption was assumed to be US$40/t for limonite and US$65/t for saprolite. Under these assumptions, a marginal cut-off would be 0.7 NiEq (%) for limonite and 0.9 NiEq (%) for saprolite. However, this is an oversimplification and somewhat arbitrary, with potential economic impact for a large number of blocks. A better solution is using an economic cut-off, based on Net Value calculation, that considers both the positive economic contribution of Ni and Co grades, and the extra cost associated with Mg and Al grades.

Another aspect to consider is that the Moa HPAL processing plant is optimised to process limonite and its capability to process saprolite has not yet been tested in a detailed way. For this reason, only limonite resources are reported. Also, the Moa JV operation does not have mining permits for the exploitation of saprolite in some areas or deposits.

The economic cut-off used for reporting resources is defined as follows:

- Blocks with Net Value > 0 and Fe >= 35 % are considered economic;
- The net value formula is NetV = Revenue from Ni + Revenue from Co – Costs, where:
  - Revenue from Ni = Ni (%)/100 * Ni price ($/t) * Ni Recovery;
  - Revenue from Co = Co (%)/100 * Co price ($/t) * Co Recovery;
  - Cost = Processing cost + Ni selling cost + Mining cost, where:
    - Processing cost = Fixed cost + Extra acid consumption cost + Lime consumption cost, where:
      - Extra acid consumption cost = 0.09626 * (464 + 60.5 * Mg + 24.7 * Al + 0.124 * 41.9 * 41.9 – 13.5 * 41.9);
      - Lime consumption cost= 20.68 *(7.4 * Ni/100 * 0.865 + Co/100 * 0.921);
      - Fixed cost = $47.12/t;
      - Haulage = $5.13/t;
    - Mining cost = $5.15/t;
    - Ni Recovery = 0.85;
    - Co Recovery = 0.84;
    - Ni selling cost = 2.12 * $2,204.62/t * Ni produced (t);
    - Ni price = 6.82 * $2,204.62/t;
    - Co price = 25.23 * $2,204.62/t.

Note: the processing cost includes sustaining capital and the Ni selling cost includes royalties; credits for cobalt and ammonium sulphate are not included in the above costs. The above values represent reasonable estimates for costs and recoveries at Moa with an intent to be conservative. The objective of the economic cut-off study is only to demonstrate the areas of potential economic extraction and not to align directly with costs and recoveries used to define the mineral reserve.

14.12.2 Mineral Resources Classification and Reporting

The resource classification definitions used for this estimate are those prepared by the CIM in their document "CIM Definition Standards" and adopted by CIM Council on 10 May 2014.

Mineral Resources in areas with drillhole spacing of 40 m or less were classified as Measured Resources. The category of Indicated Mineral Resources was assigned to blocks informed by drillhole with spacing between 40 m and 80 m. Inferred Mineral Resources were informed by drillholes with a spacing of 80 m to 120 m. The classification was completed by selecting blocks within classification polygons created as squared buffer zones around drillhole locations. The classification polygons were manually edited to remove isolated drillholes and small islands before using them for classification. Blocks within environmental protection polygons along rivers were not classified as Mineral Resources.

Resources in Moa Oriental and Zona A, excluding Zona A Oeste, were depleted using data from the production model provided by Moa JV. Ni, Fe, and Co grades from this production model were reused for reporting in these two deposits. Classification of resources in Moa Oriental and Zona A with known encumbrances were adjusted (e.g. resources below waste piles or powerlines were downgraded to Inferred Resources).

Additional resources in the small concessions Sector 5 Bloques (Yamanigüey Ferronickel), Slurry Plant Road, and Zona Sur I and II (Yamanigüey Ferronickel) were also added in Table 26. These resources were completed by the Moa Nickel team and reviewed by the author. The additional resources were reported using the traditional cut-off grade of 1% Ni, 35% Fe. There are also 2.75 Mt of limonite in reject pounds that are regularly fed to the plant; this material does not classify as Mineral Resources but is included here for completeness.

Table 26: Moa JV (100% basis) Mineral Resources per concession and zone, with effective date of 31 December 2018

Deposit	Classification	Mt	Ni	Fe	Co	SiO_2	Al	Mg
Moa Oriental	Measured	3.96	1.13	46.79	0.15	4.28	4.67	0.97
	Indicated	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Inferred	3.76	1.16	46.33	0.15	4.90	4.78	1.17
Camarioca Norte	Measured	31.06	1.01	44.44	0.13	5.00	5.48	1.13
	Indicated	8.82	0.95	43.35	0.12	6.37	5.45	1.42
	Inferred	11.58	0.88	43.53	0.13	6.31	5.50	1.21
Camarioca Sur	Measured	21.37	1.15	43.13	0.12	7.96	5.02	1.87
	Indicated	13.35	0.99	41.60	0.11	9.92	4.83	2.45
	Inferred	3.85	1.05	40.88	0.11	11.22	4.57	2.71
Yagrumaje Oeste	Measured	11.98	0.88	47.44	0.14	3.10	4.83	0.61
	Indicated	2.50	0.84	47.01	0.14	3.90	4.86	0.87
	Inferred	0.57	0.90	47.09	0.16	3.90	4.72	0.94
Santa Teresita	Measured	-	-	-	-	-	-	-
	Indicated	7.49	1.00	45.67	0.13	3.83	5.64	0.96
	Inferred	7.42	0.75	45.42	0.14	4.34	5.78	0.98
La Delta	Measured	10.54	1.03	44.31	0.13	4.34	5.65	1.05
	Indicated	3.03	0.81	43.75	0.13	4.56	5.84	1.07
	Inferred	0.86	0.67	41.05	0.14	4.90	6.65	0.99
Cantarrana	Measured	16.01	0.94	46.90	0.15	3.54	4.97	0.92
	Indicated	1.70	0.83	46.65	0.15	3.87	5.00	1.06
	Inferred	0.09	0.75	43.59	0.14	4.81	6.38	1.14
Playa La Vaca y Zona Septentrional	Measured	9.09	1.15	45.43	0.11	7.18	4.71	1.04
	Indicated	2.51	1.18	45.01	0.11	7.60	4.62	1.11
	Inferred	1.71	0.98	45.02	0.12	7.21	5.03	0.82
Zona Central	Measured	4.47	0.88	44.09	0.11	8.24	4.78	0.62
	Indicated	6.02	0.81	43.22	0.10	9.21	4.92	0.69
	Inferred	2.41	0.74	43.13	0.10	7.90	5.43	0.77
Zona A and Zona A Oeste	Measured	1.90	1.06	43.27	0.11	9.59	4.37	0.77
	Indicated	0.43	0.93	43.68	0.11	9.20	4.62	0.62
	Inferred	0.34	0.96	43.93	0.12	8.73	4.57	0.67
Sector 11 Bloques (Yamanigüey Ferroniquel)	Measured	1.54	1.17	41.86	0.11	9.09	5.87	1.74
	Indicated	0.19	1.19	41.58	0.11	9.70	5.64	1.58
	Inferred	0.00	1.13	39.85	0.10	10.69	5.75	2.27
Total	**Measured**	**111.92**	**1.03**	**44.95**	**0.13**	**5.51**	**5.13**	**1.15**
Total	**Indicated**	**46.04**	**0.94**	**43.64**	**0.12**	**7.12**	**5.16**	**1.46**
Total	**Inferred**	**32.60**	**0.89**	**44.02**	**0.13**	**6.38**	**5.35**	**1.26**
Additional resources on small concessions[9]								
Sector 5 Bloques (Yamanigüey Ferroniquel)	Measured	0.58	1.33	41.7	0.13	-	-	-
Slurry Plant Road	Measured	0.09	1.26	47.2	0.14	-	-	-
Zona Sur FerroNi I and II	Measured	0.58	1.33	41.7	0.13	-	-	-

Notes:

1. *Sherritt and GNC are equal (50:50) partners in the Moa JV.*
2. *Numbers have been rounded to reflect the precision of a Mineral Resource estimate.*

3. *The reporting cut-off is calculated as a Net Value = Revenue from Ni + Revenue from Co – Costs >0. The costs are equal to the sum of processing cost, Ni selling cost of US$2.12/lb, and Mining cost of US$5.15/t. The processing cost has a fixed component of US$52.25/t and a variable cost related to Mg and Al content. Revenue was calculated at the market price of US$6.82/lb Ni and US$25.23/lb Co, with Ni and Co recovery of 85% and 84% respectively.*
4. *These are Mineral Resources and not Reserves and as such, do not have demonstrated economic viability.*
5. *The average grade estimates reflect nickel and cobalt resources in situ, and do not include factors such as external dilution, mining losses and process recovery losses.*
6. *Resource classification as defined by the Canadian Institute of Mining, Metallurgy and Petroleum in their document "CIM Definition Standards for Mineral Resources and Mineral Reserves" of 10 May 2014.*
7. *The Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Mineral Reserves (Section 15).*
8. *No stockpiled material is included in the Mineral Resources.*
9. *Additional resources existing in remnant or small concessions reported over traditional cut-off grade 1% Ni, 35% Fe.*

14.12.3 Factors that May Affect the Mineral Resource

As of the Effective Date, the Qualified Person responsible for this section, Dr Martínez Vargas, is not aware of any known current environmental, permitting, legal, title, taxation, socio-economic, marketing or political factors that might materially affect these Mineral Resource estimates.

14.13 Comparison with Previous Mineral Resource Estimates

Previous Mineral Resources were prepared by R. Mohan Srivastava and presented in two separate NI 43-101 technical reports. The report for the Satellite deposits has a date of 8 May 2009 and includes La Delta and Cantarrana but excluded Santa Teresita (Golightly *et al.,* 2009). These resources were reported with an effective date of 31 December 2008. The report for the Central Moa deposits has a date of 22 September 2011. It includes the deposits Moa Oriental, Camarioca Norte, Camarioca Sur, and the Moa Occidental zone (Beaton *et al.,* 2011). These resources were reported with an effective date of 31 December 2010. The Moa Occidental zone included the deposits (or concessions) Zona A, Zona A West, Zona Central, and two currently non-existing concessions Pronostico and Yamaniguey I, that were exploited and handed back to the ONRM. These resources estimates were completed based on resource models completed by Moa JV and its subcontractors. The models were reviewed and endorsed by Mohan Srivastava. The resource models were completed using different techniques, including inverse squared distance, ordinary kriging, and polygonal method. Resources were reported into variants V0 and V2, V2 is a form of mineable resource that excludes material in isolated patches or impacted by encumbrances, such as environmentally protected areas, power lines, buildings, among others. V2 resources were used as the basis to report reserve, after applying modifying factors. These reserves have been updated since the publication of these two technical reports and updated in the Annual Information Forms published by Sherritt. Most resources were reported for limonites, at a cut-off Ni >= 1%, and Fe >= 35%, with the exception of Moa Oriental where a nickel equivalent grade (NiEq), defined as Ni + 2.5Co, was used, with cut-off NiEq >1.25, Ni >0.9, and Fe >35.

Apart for extensive infill drilling in concession such as Camarioca Sur, and different in block sizes of some resource models, and topography updates, the main differences with the previous estimate are:

- The current estimate uses an economic cut-off based on the net value of the blocks calculated at current nickel and cobalt values, but also considers deleterious element content, and update processing and mining costs;
- Only environmental protection areas are considered as encumbrances in the current resources, since past mining practices show that resources affected by buildings and powerlines are mined when conditions are allowed. Resources in environmental protection areas, mostly representing buffer along rivers and

water reservoirs, were not classified as resources, since these restrictions are not likely to change. The protection buffer along water bodies were updated for this resource estimate, following Cuban Normative. In general, the new water bodies buffer zones are wider now, impacting slightly more resources;

- The previous classification of Indicated Resources allowed up to 100 m drillhole spacing. In the current resource, this condition was reduced to 80 m maximum for Indicated Resources and extended to 40 m for Measured. These distances account for incomplete or displaced drillhole grid patterns, without impacting areas with drillholes not perfectly aligned to regular drilling grids. Other considerations were taken into account to classify resources – for example, the north of the Camarioca Sur deposit was downgraded to Indicated due to its incomplete grid density, uncertainty of the shape of the environmental protection zone along water bodies and higher complexity of the lateral continuity of the mineralisation.

A detailed comparison of the previous and the current Mineral Resource estimate was completed by comparing block models visually (Figure 28) and by tabulating resources at similar cut-offs. Previous and current block models are similar in grade, volume and tonnage.

Different in cut-off grades used in the previous and current resource estimates does not permit a direct comparison with previous estimate resource tables. However, at current prices, mining and processing costs a large proportion of limonite previously considered waste material have been converted to resources. In other words, the main reason for the change in resources is mainly due to a change in cut-off.

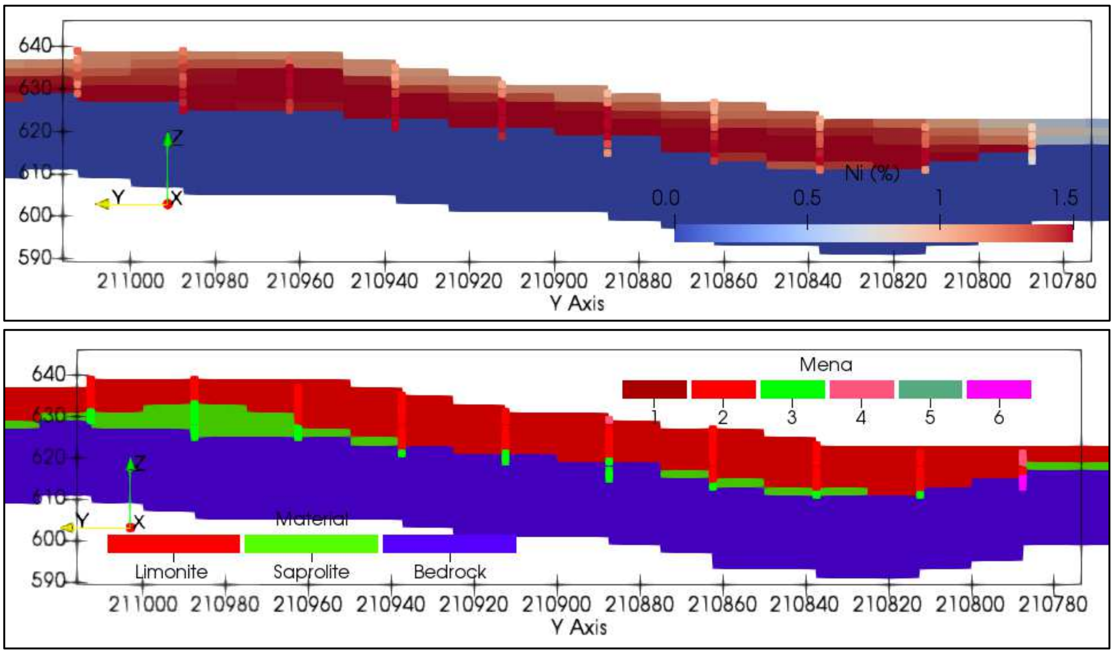

Figure 28: Sectional view comparison between the current model (blocks) and the previous model centroids (squared points) in Camarioca Sur onsection N-S along E 697113. Above Ni grades in the current model. Below is the material type and Moa JV ore type code "mena" (limonite [mena 1, 2, 4], saprolite [mena 3, 6], bedrock [mena 5, 7])

15 Mineral Reserve Estimates

15.1 Introduction

In this Technical Report, the Mineral Reserve estimate for the Moa Project contains forward-looking information. The extent to which these forward-looking statements will be achieved is not certain and will be affected by such aspects as actual metal pricing, mining practices, adverse weather events or other adverse events such as political instability.

The Mineral Reserves have been reported in accordance with the concepts and guidelines presented in the CIM Definition Standards – For Mineral Resources and Mineral Reserves and the NI 43-101 document.

The Moa mining project is a mature mining operation having operated since the early 1960s. In Cuba, mineral rights are the property of the state and as such they have significant influence in how they are mined. For example, the Mineral Reserve is based on fixed cut-off grades that have been prescribed by ONRM (the ONRM is a Cuban Government Agency that regulates mining activity). Only the ONRM can allow mineral exploration to occur within Cuba and it grants mining rights under special decrees or resolutions in the form of an "Exploitation" permit.

The modifying factors, or assumptions, that were applied in drawing the conclusions, forecasts and projections set forth in this section are summarised in this Technical Report. For this reason, readers should read this section in the context of the full report, and after reading all other sections of this Report.

The Mineral Reserve estimate is based on the LOM scheduled material quantities. The LOM schedule that underpins the Mineral Reserve has been based on Measured and Indicated Resources for plant feed with appropriate modifying factors applied.

A map depicting the Moa deposit concessions and their respective locations in relation to the Moa plant can be seen below in Figure 29.

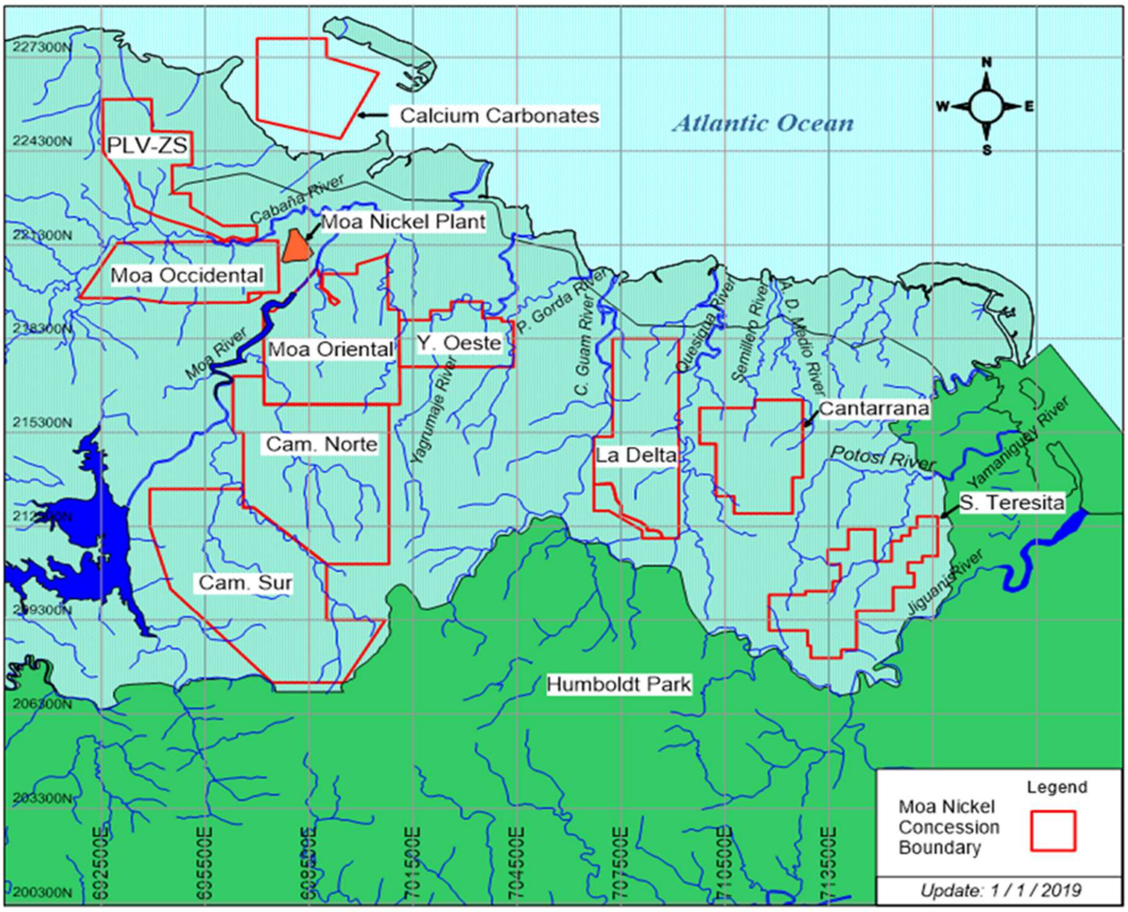

Figure 29: Moa location map for all deposit concessions

15.2 Modifying Factors

The Mineral Reserves presented in this Technical Report are underpinned by the updated 2018 Mineral Resource models – as these models are materially different to the previous 2008 and 2010 resource models, new modifying factors had to be generated.

Modifying factors are special considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not limited to:

- Mining;
- Processing;
- Metallurgical;
- Infrastructure;
- Economic;
- Marketing;
- Legal;
- Environmental;
- Governmental.

The modifying factors are the adjustments to the material that has been defined as potential ore within the Mineral Resource model required to estimate the plant feed for the SPP in terms of tonnes and grade.

15.2.1 Concession Types

The Moa JV is operated on a 50:50 agreement by Sherritt and the Cuban Government (GNC). The Moa JV received its original mining concessions in November 1994 (known as the "1994 Decree"). Since this time, there have been several additions and further granting of concessions to increase the landholding of the Moa JV. The current concessions granted along with the concession type, landholding area, several notes and expiry dates as at 31 December 2018 are shown in Table 4.

Based on the stated concessions in Table 4, the following deposits have been left out of the Mineral Reserve calculations:

- Playa La Vaca-Zona Septentrional;
- Santa Teresita.

These two deposits have an "Exploration" concession which means they last for two years. A request can be made for another extension of two years. After the second extension, an exploitation permit can be applied for that can last up to 25 years. At this point in time, an exploitation permit has not been granted for these two deposits. The decision was made by the Qualified Person to exclude these two deposits until an exploitation permit has been granted. It should be noted that material that could be considered Mineral Reserves exist inside these Mineral Resource areas but have not been considered solely on the grounds of the nature of the tenure.

15.2.2 Moa Deposits

There are nine deposits at Moa that are deemed suitable to be prepared for conversion to Mineral Reserves. The deposits considered for inclusion into Mineral Reserves are as follows:

- Moa Oriental;
- Camarioca Norte;
- Camarioca Sur;
- Yagrumaje Oeste;
- La Delta;
- Cantarrana;
- Zona Central;
- Zona A (includes "Zona A Oeste");
- Yamaniguey Cuerpo I (also known as "11 Bloques").

Each deposit was checked for exploitation permit approval, associated lease boundaries and any related encumbrances that may impact on the operational mining. There were limitations to accurate topography surfaces provided from the Moa site, especially for Moa Oriental and Zona A which have had many years of mining upon these deposits.

In consultation with operational staff, several areas within Moa Oriental and Zona A were excluded due to the following reasons:

- Waste dumps, stockpiles and roads lying on top of resource zones;

- Power lines running over resource zones;
- Pipelines running over resource zones;
- Mined out sections that were not picked up by surveying;
- Within a buffer zone that is based on environmental permits.

These two deposits had blocks excluded from the resource to allow for the lack of detail in the surface topography. The blocks that were impacted by encumbrances were re-allocated to Inferred within the Mineral Resource models.

15.2.3 Fixed Cut-off Grades

The Moa JV is operated on a 50:50 basis by Sherritt and the Cuban Government. The Cuban Government has always decreed that the defining of Mineral Reserves at Moa shall be done by the imposition of fixed cut-off grades applied on various deposits. The normal manner of estimating Mineral Reserves is done by economic means where effectively each mining block within the Mining Model (the converted Mineral Resource Model) is determined whether it creates a positive cash flow based on the following criteria:

- Metal prices and the revenue stream provided;
- Operating costs, inclusive of mining, processing, transport and royalty costs;
- Plant recoveries to go from in situ to final product;
- Geotechnical considerations;
- Application of mine dilution and mine recovery (ore losses).

There were several unconstrained pit optimisation runs completed on the deposits. These runs demonstrated that the economic cut-off grades were significantly below the regulatory fixed cut-off grades.

The ONRM has historically defined the limonite zone within the mineral deposits at Moa as processable where the nickel grade exceeds 1.0% and the iron grade exceeds 35.0%. This is the basis on how the Mineral Reserves were estimated for the period ending 31 December 2018. There were two exceptions to the above fixed cut-off grade rule; whereby the nickel grade exceeds 0.9% and the iron grade exceeds 35.0% and these two deposits are Moa Oriental and Zona A. The nickel and iron grades within the block need to work together in unison. In other words, if a block has a nickel grade of 1.15% and an iron grade of 32.4%, then it is not deemed as processable and therefore cannot form part of the Mineral Reserve.

There has been previous discussion based on nickel equivalent grades whereby the nickel and cobalt grades along with the metal prices and plant recoveries are combined into a “NiEq formula. One formula used NiEq >= 1.25% at Moa Oriental and NiEq >= 1.35% at Zona A. The author has determined that it is currently more prudent to remain with the historical tradition of combining nickel and iron grades for the estimation of Mineral Reserves for this report.

The alternative to using the fixed cut-off grade would be to apply an economic cut-off grade in allocating plant feed. This approach would allow for a “block-by-block” determination of whether the material from the block is processable, stockpiling is required or waste dump bound. CSA Global has found from its experience of lateritic nickel deposits, that a fixed cut-off grade will always be higher than an economic cut-off grade. The fixed grade approach is simpler and easier to implement but has the impact of sending valuable material to the waste dumps and therefore is difficult to reclaim at a later stage.

Table 27 below shows the fixed cut-off grades used for each of the deposits.

Table 27: Moa fixed cut-off grades

Deposit		Fixed cut-offs		
Number	**Name**	**Ni %**	**Fe %**	**Saprolite availability**
1	Moa Oriental	0.9	35.0	Yes
2	Camarioca Norte	1.0	35.0	Yes (Ni>1, 25<=Fe<=35)
3	Camarioca Sur	1.0	35.0	Yes (Ni>1, 25<=Fe<=35)
4	Yagrumaje Oeste	1.0	35.0	Yes
5	Santa Teresita	1.0	35.0	tbd
6	La Delta	1.0	35.0	Yes
7	Cantarrana	1.0	35.0	Yes
8	Playa Vaca Zona	1.0	35.0	tbd
9	Zona Central	1.0	35.0	Yes
10	Zona A	0.9	35.0	Yes
11	Bloques	1.0	35.0	Yes (Ni>1, 30<=Fe<=35)

15.2.4 Selection Based on Resource Classification

The definition of Mineral Reserves has been based on only allocating Measured and Indicated Mineral Resources. There are no Inferred blocks allowed to be presented as processable. Inferred blocks can be used to help guide future drill programs, but they cannot be converted into Mineral Reserves under the "CIM Definition Standards – For Mineral Resources and Mineral Reserves". It is a reasonable assumption to expect that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with a well planned and executed drilling program.

The ultimate pit limit for each deposit is based on either the economic limit provided by Whittle 4D™ optimisation exports (the "pit shell"), or by environmental/lease boundaries. In the majority of deposits, the tenement boundary has already been taken into account within the Resource Model and therefore the resultant pit shell cannot be outside of this constraining limit. All material that is economic and above the fixed cut-off grades is assumed to be mined to the base of the pit shell and sent to the processing plant.

In the LOM plan which underpins this Technical Report, the Inferred Resources that are within the pit shell have not been included in the scheduled quantities.

Due to the rules and guidelines of the CIM Definition Standards and NI 43-101, no value can be assigned to these Inferred Mineral Resources in the reporting of Mineral Reserves.

15.2.5 Stockpiling Methodology

The stockpiling strategy is normally a key economic driver for most mining operations. Moa Nickel uses a "limited approach" with respect to its stockpiling strategy. That is, it tends to feed material direct from the mining operation to the plant with minimal stockpiling occurring. Feeding material directly to the plant, the value of the project is reduced significantly and opportunities to enhance grade and cashflow are lost.

A minimum ore cut-off grade and a variable cut-off grade (i.e. between stockpiled and direct feed ore) is recommended to be a part of the mining strategy at Moa.

The stockpiling strategy should be structured in such a way that the following conditions are met:

- The plant is kept at its optimum throughput level;
- The nickel and cobalt grades should be maximised where possible (ideally to economic criteria);

- The impact of magnesium and aluminium on acid consumption is reduced;
- The stockpile grade ranges are closely linked to appropriate tonnage limits;

The negligible size of the current stockpiles at Moa means they are not included in the reported Mineral Reserve.

15.2.6 Moisture

The moisture content has been assumed to be of minimal impact at Moa. Unlike other lateritic nickel deposits, there is no requirement for road construction material (generally known as "sheeting"). The material targeted for plant feed is known as "limonite" which has much lower moisture content than saprolite or smectite ores found at other lateritic nickel operations. The imposition of an iron grade greater than 35% means the material is less prone to issues with moisture.

It should be noted that all grade and resource estimation is based on dry tonnes (i.e. dry bulk densities used in Resource Models), moisture is only of relevance for mining cost estimates.

15.3 Optimisation

CSA Global utilised Geovia pit optimisation software, Whittle 4D™, to determine the economic extents of the orebody – this was achieved by the exporting of a pit shell. The economic pit shell was constrained by the application of fixed cut-off grades on nickel and iron. These fixed grade constraints by deposit can be seen in Table 27. The pit shells chosen were based on a revenue factor (RF) of 1.00. A RF of 1.00 translates to the maximum undiscounted cash flow. The Qualified Person believes this to be a suitable pit shell selection based on the mine life of Moa and the fixed cut-off grade applied on site.

The pit shell defined the final pit limits. There was no pit designing done for any of the deposits based on the following reasons:

- The pit shells produced were of a very patchy and non-contiguous nature;
- The pit shells provided are an accurate outline of the material that needs to be mined;
- The pits are all shallow and require limited design input;
- The cost benefit of producing detailed designs for all economic pits is not practical when considering the current mining strategy and methods;
- Application of a suitable mining recovery and grade dilution helps approximate the formation of pit design strings.

Based on historical reconciliation and for the purposes of allowances for the pit shell "conversion factor", a mining dilution of 5% and a mining recovery of 85% was applied. This means in effect, a 5% reduction in grade was applied across all deposits whilst an ore loss of 15% (combined with a 5% dilution impact) was applied to the plant feed tonnages. In summary, this meant that an in-situ mining parcel of 500,000 tonnes with nickel grade of 1.15% and cobalt grade of 0.012% would become 446,250 tonnes with nickel grade of 1.10% and cobalt grade of 0.011% following the application of dilution and recovery factors. The Mineral Reserve has been reported with the inclusion of these factors.

The inputs to the pit optimisation are summarised below in Table 28.

Table 28: Pit optimisation inputs

Input	Unit	Value
Nickel price	US$/t	15,036
	US$/lb	6.82
Cobalt price	US$/t	55,623
	US$/lb	25.23
Mining fixed cost	US$/t mined	5.15
Plant haulage costs	US$/t feed	See notes
Processing fixed cost	US$/t feed	47.12
Processing variable cost	US$/t feed	See notes
Nickel recovery (SPP to product)	%	85.2
Cobalt recovery (SPP to product)	%	84.2
Nickel selling cost	US$/t US$/lb	4,233 1.92
Cobalt selling cost	US$/t	See notes
Mining recovery	%	85 (0.85)
Mine dilution	%	5 (1.05)
Fixed cut-off grade Ni	%	0.9 / 1.0
Fixed cut-off grade Fe	%	35.0
Wall slope	degrees	40

Notes:

- *The plant haulage costs are variable for each deposit based on distance from the plant. See Table 29 for a breakdown.*
- *The processing variable costs involve acid consumption and lime consumption. See Table 30 for a breakdown.*
- *The cobalt related selling costs have been totally included within the nickel selling costs and are thus zero.*
- *"MSP to Product" means the plant recovery of the metal from the mixed sulphides plant to the final refined product.*
- *All units in tonnes are considered to be in dry metric tonnes (dmt).*
- *The "selling costs" include Moa Port and loading, freight and insurance, Corefco refining and Royalties.*

The plant haulage costs allow for the movement of plant feed from the top of each deposit to the delivery at the MSP. Operational costs for Moa Oriental were used to derive the ore haulage costs on US$/t/km basis. Using an estimated haulage cost of US$0.55/t/km for Moa Oriental, a scaling factor based on distance from the plant was applied to estimate the remaining haulage costs for the other deposits. The summary of plant haulage costs is presented in Table 29.

Table 29: Plant haulage costs

Deposit	Distance to plant (km)	Haulage cost (US$/t ore)
Moa Oriental	9.3	5.13
Camarioca Norte	14.1	7.76
Camarioca Sur	21.3	11.79
Yagrumaje Oeste	12.4	6.85
La Delta	24.4	13.47
Cantarrana	25.8	14.24
Zona Central	4.0	2.23
Zona A	3.8	2.10
Yamaniguey Cuerpo	6.5	3.59

Note: The plant haulage costs are all scaled off an estimated US$0.55/t/km for Moa Oriental.

The variable costs for processing are primarily based around the consumption of sulphuric acid and limestone within the mixed sulphides process. An "Acid Consumption Formula" (ACF) and a "Limestone Consumption Formula" (LCF) were derived based on inputs from Sherritt. These formulas (especially the ACF) helped guide the scheduling process by attaching greater value to blocks with lower grade magnesium and aluminium. The resultant scheduling of these high value blocks enables higher cash flow to be derived at the front end of the mine schedule.

The formulas and values contained within the variable costs are depicted in Table 30.

Table 30: Processing variable costs

Description	Unit	Formula/Value
Acid Consumption Formula (ACF)	kg acid/t ore	[464 + 60.5*Mg + 24.7*Al + 0.124*(Solids)^2 – 13.5*Solids]
Sulphuric acid price	US$/t acid	96.26
Lime Consumption Formula (LCF)	US$/t ore	[7.4*LPrice*((Ni%*Ni_MS_Recov) + (Co%*Co_MS_Recov))]
Limestone price (LPrice)	US$/t limestone	20.68
Ni_MS_Recov	%	86.7
Co_MS_Recov	%	92.1
Solids	%	41.9

Notes:
- *"Mg" and "Al" represent the grades for magnesium and aluminium in percentage form (i.e. 4.2 for Al).*
- *"Ni_MS_Recov" and "Co_MS_Recov" represent the mixed sulphides recovery for nickel and cobalt respectively.*
- *"Solids" represent the solids content of the thickeners overflow in percentage form.*
- *"Ni%" and "Co%" represent the grades of nickel and cobalt in decimal proportion form (i.e. 0.013 for Ni%)*

Several of the pit shells are large and cover significant distances (kilometres). Based on judgement and using smaller pit shells, several of the larger deposits were broken down into pit stages. This was done for practical purposes, enhancement of cash flow and mine scheduling reasons. The positioning of the pit stages was based on information relating to higher value pit shells (lower revenue factors). This enabled blocks with a mixture of higher grades, lower strip ratios and lower acid consumption to be put forward as part of Stage 1 whilst deferring the higher cost and lower grade blocks to the back end of the schedule.

A breakdown of the pit stages by deposit is shown in Table 31.

Table 31: Pit shell stages

Deposit	Pit stages
Moa Oriental	2
Camarioca Norte	3
Camarioca Sur	3
Yagrumaje Oeste	1
La Delta	2
Cantarrana	2
Zona Central	1
Zona A	1
Yamaniguey Cuerpo	1

Below are three examples of the larger pit shells after being exported from the pit optimisation software (Whittle 4D™) into the mine planning software package (Surpac™). Respectively, the pit stages and mining blocks within the pit shell for deposits Moa Oriental, Camarioca Norte and Camarioca Sur are shown in Figure 30, Figure 31 and Figure 32. Red outlines are stage 1 and blue outlines are stage 2.

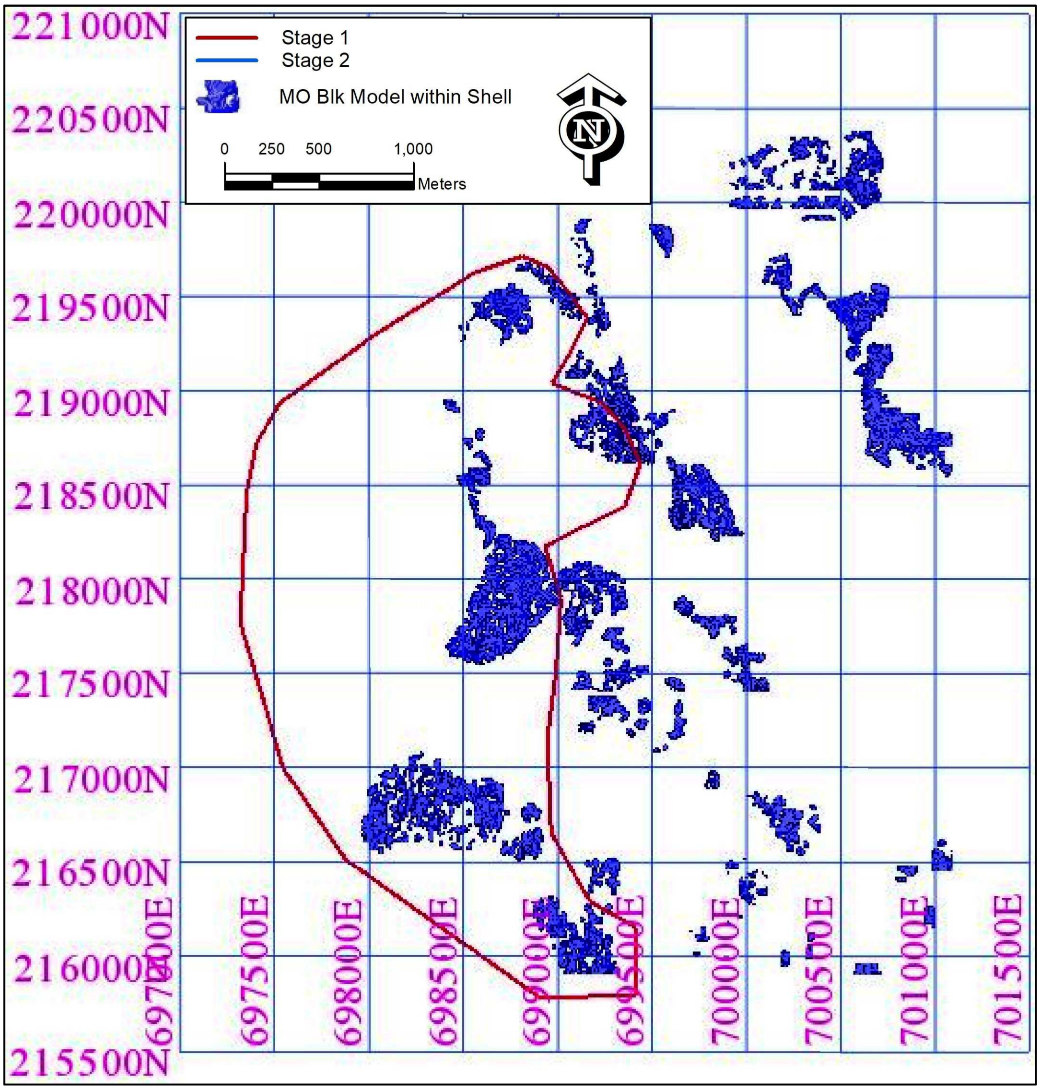

Figure 30: Moa Oriental pit shell and staging

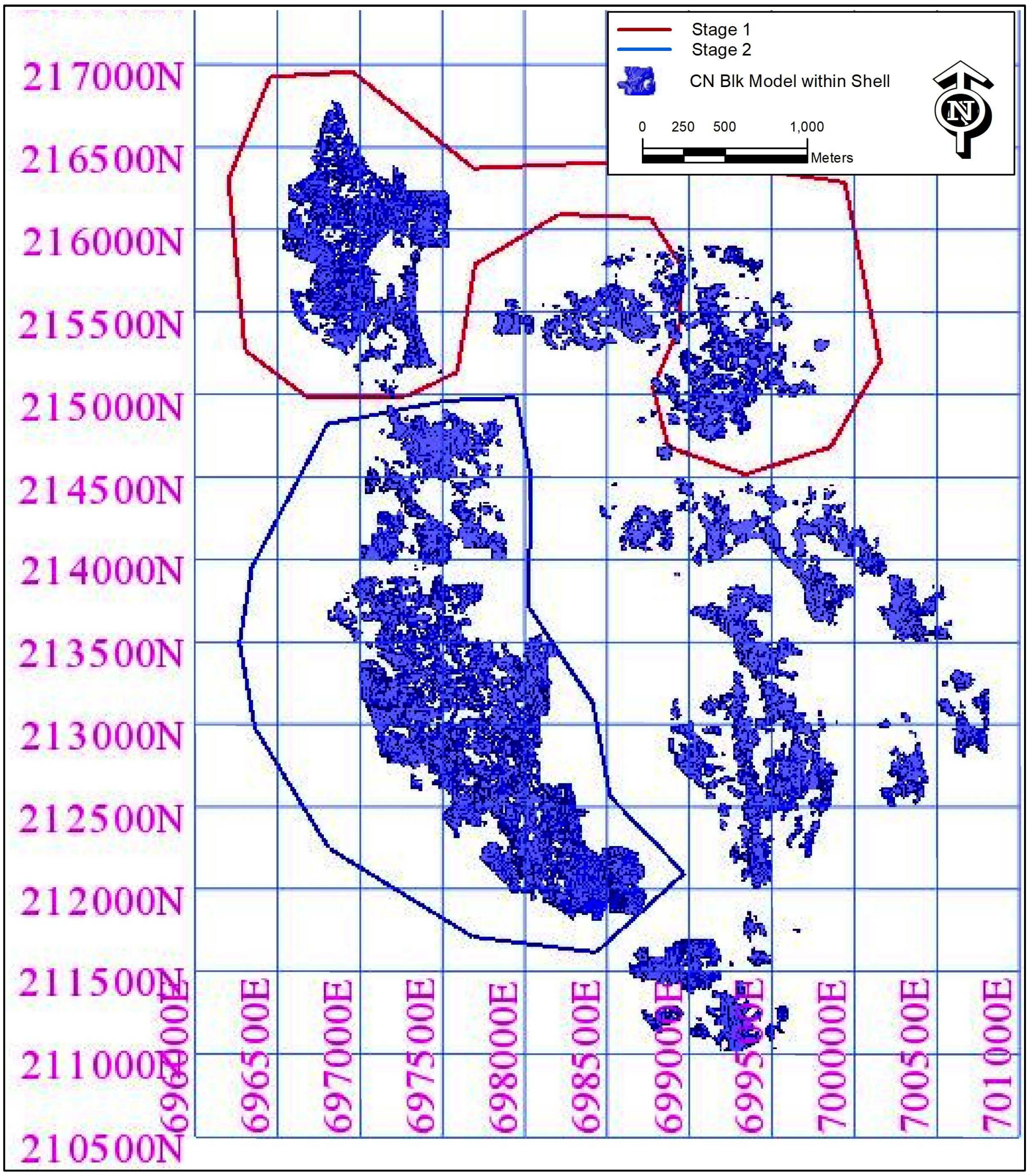

Figure 31: Camarioca Norte pit shell and staging

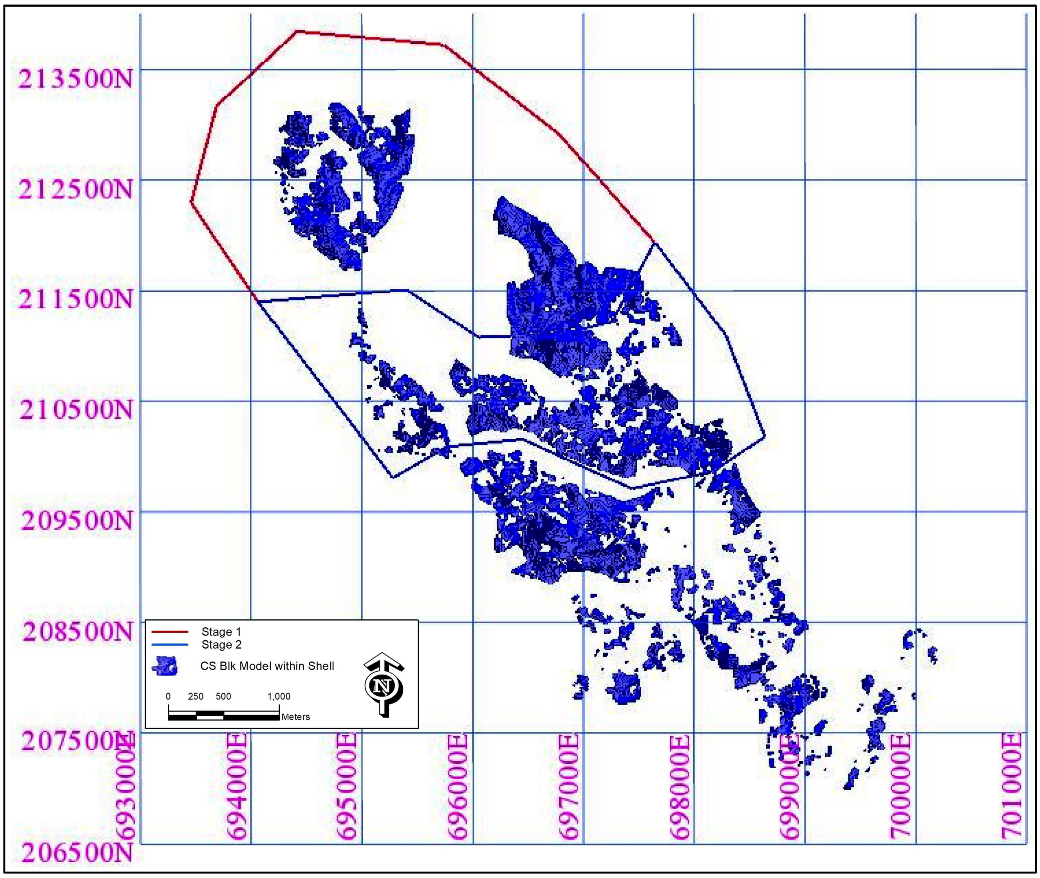

Figure 32: Camarioca Sur pit shell and staging

15.4 Mineral Reserve Estimate

The Mineral Reserve estimate contains nine deposits at Moa that have had a constrained pit shell exported from Whittle 4D™ and modified by several factors as outlined in Section 15.2. The material that has been included in the LOM schedule has been based on mining the portion of the Measured and Indicated Mineral Resources that fall within the pit shell and are above the fixed cut-off grades that have been regulated by the Cuban Government.

Within the final pit shell, there are Inferred Mineral Resources which have been labelled as waste within the scheduled LOM quantities. These Inferred Resources are not included in the Mineral Reserve.

The in-situ tonnes have been adjusted by the application of mine recovery of 85% (0.85) and mine dilution of 5% (1.05). The in-situ grade has been adjusted by mine dilution of 5% at zero grade (1.05).

The mining recovery accounts for the following:

- Mining practises with dozers and excavators whereby part of the limonite resource is lost when overburden is removed;
- Mixing of the ore with the waste, especially where overburden remains and saprolite is mixed in with the limonite;
- Delivery of the ore and waste to incorrect destinations;
- Allowances for the “hard” pit shell boundary.

The mining dilution accounts for limonite being mixed with other material, such as overburden or saprolite and being sent to the SPP for processing. This impacts on the grade and thus a reduction in grade of 5% (1.05) is applied to nickel and cobalt. The in-situ nickel and cobalt grade is divided by 1.05 to account for this dilution.

The LOM schedule, on which the Mineral Reserve estimate has been based, has incorporated information on mining, processing, metallurgical, transportation costs and other relevant factors to demonstrate, at the time of this work, that economic extraction can be justified.

The CIM Definition Standards (as at 10 May 2014) defines Mineral Reserves as:

"… those parts of Mineral Resources which, after the application of all mining factors, result in an estimated tonnage and grade which, in the opinion of the Qualified Person(s) making the estimates, is the basis of an economically viable project after taking account of all relevant Modifying Factors. Mineral Reserves are inclusive of diluting material that will be mined in conjunction with the Mineral Reserves and delivered to the treatment plant or equivalent facility."

All Measured Mineral Resources within the appropriate pit shell have been converted to a Proven Mineral Reserve. Likewise, all Indicated Mineral Resource have been converted to a Probable Mineral Reserve. This is in line with "CIM Definition Standards" as their base guidelines for the reporting of Mineral Resources and Mineral Reserves.

The Mineral Reserve is summarised by deposit and reported in Table 32.

Table 32: Moa JV (100% basis) Mineral Reserve as at 31 December 2018

Deposit	Classification	Tonnage (Mt)	Ni (%)	Co (%)	Fe (%)	Ni metal (kt)	Co metal (kt)
Moa Oriental	Proven	3.5	1.08	0.14	44.56	38.0	5.0
	Probable	-	-	-	-	-	-
	Proven + Probable	**3.5**	**1.08**	**0.14**	**44.56**	**38.0**	**5.0**
Camarioca Norte	Proven	12.9	1.17	0.13	41.91	150.6	16.3
	Probable	2.9	1.13	0.12	40.62	32.5	3.5
	Proven + Probable	**15.7**	**1.16**	**0.13**	**41.67**	**183.1**	**19.8**
Camarioca Sur	Proven	13.2	1.21	0.12	41.16	160.6	15.9
	Probable	5.0	1.14	0.12	39.72	57.5	5.9
	Proven + Probable	**18.3**	**1.19**	**0.12**	**40.76**	**218.1**	**21.7**
Yagrumaje Oeste	Proven	2.2	1.05	0.14	45.00	23.2	3.1
	Probable	0.4	1.12	0.13	44.14	4.3	0.5
	Proven + Probable	**2.6**	**1.06**	**0.14**	**44.87**	**27.5**	**3.6**
La Delta	Proven	4.6	1.20	0.14	42.68	54.4	6.3
	Probable	0.5	1.16	0.13	42.29	6.2	0.7
	Proven + Probable	**5.1**	**1.19**	**0.14**	**42.64**	**60.6**	**7.0**
Cantarrana	Proven	4.5	1.15	0.16	44.29	51.2	7.1
	Probable	0.3	1.14	0.13	44.22	2.8	0.3
	Proven + Probable	**4.7**	**1.15**	**0.16**	**44.28**	**54.1**	**7.4**
Zona Central	Proven	0.8	1.04	0.12	41.36	8.2	1.0
	Probable	0.5	1.03	0.12	40.16	5.1	0.6
	Proven + Probable	**1.3**	**1.03**	**0.12**	**40.90**	**13.3**	**1.6**
Zona A	Proven	1.1	1.17	0.11	40.69	12.8	1.2
	Probable	0.2	1.10	0.13	41.17	1.9	0.2
	Proven + Probable	**1.3**	**1.16**	**0.11**	**40.76**	**14.6**	**1.4**
Yamaniguey Cuerpo	Proven	0.8	1.32	0.12	39.43	11.0	1.0
	Probable	0.1	1.40	0.13	39.52	1.4	0.1
	Proven + Probable	**0.9**	**1.33**	**0.12**	**39.44**	**12.4**	**1.1**
All Deposits	**Proven**	**43.6**	**1.17**	**0.13**	**42.29**	**510.0**	**56.8**
	Probable	**9.8**	**1.14**	**0.12**	**40.45**	**111.7**	**11.8**
TOTAL MINERAL RESERVE	**Proven + Probable**	**53.4**	**1.16**	**0.13**	**41.95**	**621.7**	**68.6**

Note: Sherritt and GNC are equal (50:50) partners in the Moa JV.

15.5 Mineral Reserve Statement

The Mineral Reserves for Moa are a subset of the Mineral Resource (i.e. the Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Mineral Reserves).

The Mineral Reserve has been estimated to be 53.4 Mt at a nickel grade of 1.16% and a cobalt grade of 0.13%. The modifying factors applied to the Mineral Resource have been summarised in Section 15.2.

There has been no stockpiled material included in the Mineral Reserve.

The Mineral Reserve has been depleted for mining as at 31 December 2018.

16 Mining Methods

16.1 Introduction

Moa has been in production since the early 1960s. The last update to the Mineral Reserves was reported in December 2008 (La Delta and Cantarrana – Golightly *et al.,* 2009) and December 2010 (Central Moa – Beaton *et al.,* 2011). Over the following eight-year period, increased drilling and further knowledge of the deposits has allowed this declaration of Mineral Reserves to take place.

Moa employs conventional open cut mining techniques using a various assortment of backhoe hydraulic Liebherr excavators (up to 7 m^3 bucket) and articulated Volvo and Bell haul trucks (40–55 t). Due to the shallow nature of the orebody and the composition of the limonite, there is no requirement for blasting on site.

16.2 Geotechnical and Hydrological Considerations

The mining of the Moa deposits generally involves a very shallow layer of material. The final pit wall slopes and other geotechnical considerations are not considered a significant issue during the mining process. The bench face angle is close to vertical, often between 80° and 90°. A 2 m bench width is typical giving a lower overall slope of approximately 65°. Haul roads are designed based on the respective trucks to be used in that section of the deposit and vary between 16 m and 20 m in width.

Hydrological issues at Moa are negligible. With the mineralised zone being shallow across most deposits, minimal dewatering is required to allow mining to progress. All major water courses have been excised from the resources and reserves (one of the constraints within the Mineral Resource models).

16.3 Pit Shell/Pit Stages

The pit limits are well defined by the pit shell constraints. The pit shells have not been converted into pit designs due to reasons discussed in Section 15.3 of this Report. Further details on the formation of the pit shell and the associated parameters are also covered in Section 15.3.

The larger deposits at Moa have been divided into stages for reasons described in Section 15.3. The number of proposed pit stages for each deposit are shown in Table 31. It is understood that Moa site planning requirements require the formation of much smaller mining areas to allow a detailed short-term plan to drive plant feed requirements.

16.3.1 Mining Methodology

Mining commences through the clearing and stripping of local vegetation (small trees and brush) via the usage of bulldozers. The dozers push the vegetation into a series of piles that are removed by backhoe excavators and trucks to various dump sites where rehabilitation takes place.

Following the removal of vegetation and topsoil, overburden or waste material is removed in either two metre or three metres benches. Overburden is removed through the usage of backhoe excavators and articulated trucks and transported to mined out areas or established dumps outside of the main deposit. The overburden is removed in conjunction with the short-term mining plan to maintain an annual average of at least three months of exposed material for plant feed.

Mining of the plant feed is done in a very similar fashion to the removal of the overburden. In lower grade zones, mining is often carried in terraces, taking the ore out to its full depth maintaining full extraction of the orebody. The plant feed is chosen based on fixed cut-off grades for nickel and iron and is hauled direct to the SPP where it is dumped over a set of grizzly bars for further processing. If direct dumping on the grizzly is not available, the feed will be dumped in an open area close to the SPP so that rehandling equipment can access it when material is required. This is especially important during the wet season where closely located stockpiles need to be accessed.

16.3.2 Waste Dumping

Waste or overburden material is hauled to defined locations outside of the orebody. The distance to haul is reduced as much as practically possible in order to lower costs and reduce tyre wear. When the waste dumps have been completed, they are dozed down to create a flat enough slope for vegetation to be placed on and grow.

Historical waste dumping has caused some material to be dumped on sections of the orebody in Moa Oriental and Zona A. This has excluded some material from being included within the Mineral Reserve estimate reported herein. It is anticipated that the bulk of this waste material can be rehandled and relocated to allow the material underneath to be assessed as economic and again be included within Reserves. This aspect should be investigated as it would likely yield an increase in reserves.

16.3.3 Stockpile Strategy

The stockpiling strategy at Moa is based around maintaining sufficient feed to the SPP. Any excess of plant feed at the SPP is dumped in a stockpile located a suitable distance from the SPP and available for rehandle.

Any mining operation with multiple deposits, pit stages and multiple commodities requires stockpiling in order to maximise the grade and therefore the cashflow of the operation. Moa is no different to this stockpiling strategy plus it also has the extra constraint of acid availability. Magnesium (Mg) and aluminium (Al) are the big drivers in the acid consumption formula which estimate the cost per tonne of plant feed. There is a limit to how much acid can be produced on site, so this acts as a constraint on the plant and how much Mg and Al can be fed into the process. The scheduling software (explained later in Section 16.5) takes this into account using a block-by-block approach. This effectively means that a lower-grade Ni block with low Mg grade is often more beneficial than a higher-grade Ni block with high Mg grade. The stockpiling strategy needs to incorporate this, any other processing constraints as well as allowing for several grade bins that allow cashflow to be enhanced. Stockpile limits need to be set that will help guide site personnel to keep to a set of practical rules and guidelines that can be followed. Further to this, the limits can enhance what material needs to be fed directly into the SPP and what material needs to be stockpiled.

16.4 Mining Fleet

The mining fleet at Moa is crucial to the delivery of plant feed to the SPP so that it can be maintained at full capacity. This will become increasingly important as the haulage distance increases at Moa, especially with the inclusion of the Eastern Satellites Project (ESP) – hosting La Delta, Cantarrana and Santa Teresita. Despite mining representing around 10% of total operating costs at Moa, the requirement on the mining fleet is of paramount importance to the mining schedule.

16.4.1 Load, Haul and Excavate

The Moa mining site operates on conventional truck and shovel operations within the pits for the movement of vegetation, ore and waste. No drill and blast is required due to the fragmented nature of the limonite.

A mixed fleet of trucks and excavators is employed at Moa, comprising several Liebherr and Volvo backhoe excavators (up to 7 m^3 bucket capacity) and a large fleet of Volvo and Bell haul trucks (ranging from 39-t to 55-t payload) to move all the ore and waste material.

As mining progresses to the ESP, different types of haulage trucks may need to be looked at with distances of up to 40 km from some deposits back to the SPP. Road trains, which have multiple trailers can haul more plant feed, have generally lower costs and have superior tyre life compared to their off-road haul truck counterparts when measured over longer distances.

A list of the load and haul fleet at the Moa mine site is shown below in Table 33, items 1 to 2. Please note that this list includes some equipment not yet available due to purchasing approvals.

Table 33: Mining fleet list

Item no.	Description	Quantity
1	Backhoe Excavators – Liebherr R-984/R-976/Volvo EC700	15
2	Articulated Haul Trucks – Volvo A40E/A40F/A45F/Bell B50D/B60D	83
3	Bulldozer – Komatsu D-85/D-375/Liebherr PR764	16
4	Front End Loader – Cat WA-600/WA-700/Volvo L350F	9
5	Motor Grader – Volvo	4
6	Compactor	4
7	Water Truck	3
8	Highway Truck	1
9	Backhoe Excavators – Komatsu PC 200 (cleaning out mine truck bases)	2
10	Float – to relocate mine equipment	1
11	Mini Bus – miner transportation	2
12	Rubber Tyre Backhoe – with hammer	1
13	UNIMOG Trucks	5
14	Drilling Machine	1
15	Service Truck – water and lubricant and oil	1
16	Forklift – 4.5-t	1
17	Light Vehicles	30

16.4.2 Ancillary and Support Fleet

A significant mining cost at nickel laterite operations is the ancillary and support fleet. This fleet includes front-end loaders, dozers, graders, wheel loaders, water trucks and service trucks.

The ancillary fleet is required to construct roads, specialised containment structures, strip and clear vegetation and topsoil, complete rehabilitation works, carry out general clean-up operations around mining faces and provide support to the primary excavation equipment.

Front-end loaders are required for SPP feed blending, removal of oversized boulders, road construction and rehabilitation works. A list of the ancillary and support fleet at the Moa mine site is shown above in Table 33, items 3 to 17.

16.5 Mine Schedule

The mining schedule in this report is a LOM schedule that is based on mining depletions to 31 December 2018. The Moa LOM schedule is based on annual mining and processing constraints and has been performed using the mine scheduling software Minemax™. Minemax™ is a strategic, long term scheduling software that maximises the net present value (NPV) of the operation whilst meeting all production, processing, equipment and blending constraints.

The scheduling runs were based on a series of constraints that are found in Table 34. These constraints are the core drivers of the LOM schedule and were based on feedback from Sherritt management and operational requirements.

Table 34: Mine schedule constraints

Parameter	Unit	Value
SPP (maximum)	Mtpa	3.6
MSP (maximum)	Mtpa	3.1
Total mined (maximum)	Mtpa	7.5
Ni and Co metal recovered (maximum)	tpa	35,000
Low Grade Stockpile (capacity)	Mt	1.0
Medium Grade Stockpile (capacity)	Mt	0.5

Notes:

- *"Mtpa" stands for million tonnes per annum.*
- *"tpa" stands for tonnes per annum.*
- *"SPP" and "MSP" have been defined previously.*

The LOM schedule runs from 2019 until 2033 (full calendar years), giving a 15-year mine life. The main constraint for the schedule is to ensure that the SPP is operated at its maximum capacity of 3.6 Mtpa. The schedule is based on the nine available deposits at Moa and produces the same Mineral Reserve estimate of 53.4 Mt delivered to the SPP. All ore losses and grade dilution have been accounted for within the schedule. There is no Inferred material included in plant feed within the schedule.

The mining sequence of the Moa deposits is as follows (remembering that on several occasions there are multiple deposits mined within the same year):

- Moa Oriental;
- Yamaniguey Cuerpo (The Bloques);
- Zona A;
- Camarioca Norte;
- Camarioca Sur;
- Yagrumaje Oeste;
- Zona Central;
- La Delta;
- Cantarrana.

16.5.1 Stockpiling and Reclaiming

The schedule required the creation of stockpiles to enable reclaiming and blending to take place and to maximise cash flow as much as possible. The software works by reclaiming from the highest possible grade stockpile until tonnes are depleted and then moves to the next grade band stockpile. The stockpile categories (also known as "grade binning") were created as follows:

- Low Grade (LG) stockpile – Ni grade of 0.9% to 1.2%;
- Medium Grade (MG) stockpile – Ni grade of 1.2% to 1.4%;

- High Grade (HG) stockpile – Ni grade of greater than 1.4%.

The stockpiles created are of a "global type" whereby the material flowing to them are from multiple deposits. More detailed stockpile tracking is carried out in short term scheduling.

Figure 33 shows the stockpiling levels by category and by year. LG stockpiles are close to full capacity in the last five to six years which enables higher grade plant feed to be prioritised. Where the MG stockpiles are close to full capacity (2027 and 2028), it is most likely that there is an excess of MG produced in those years meaning the MG stockpile must be utilised in order to maximise grade to the SPP.

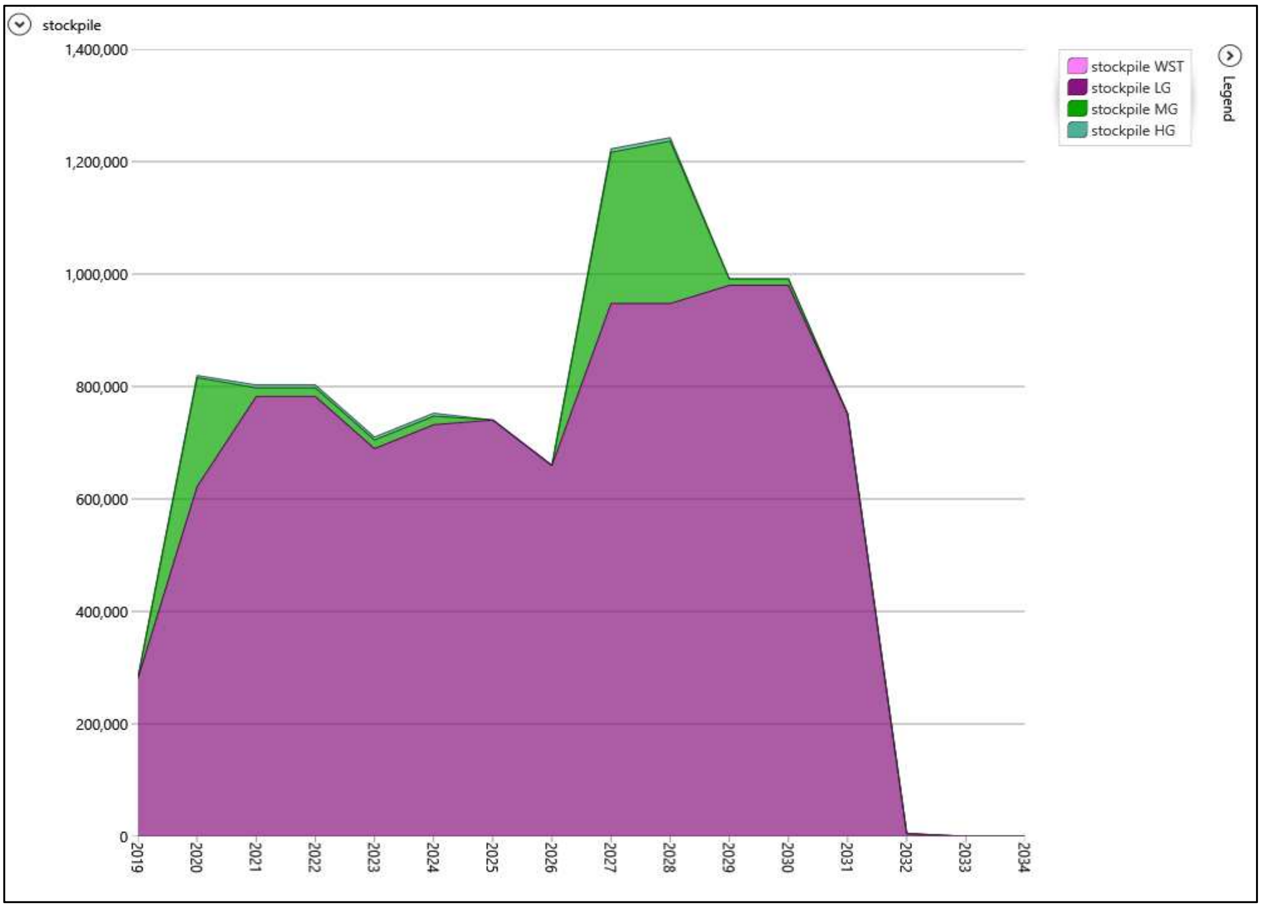

Figure 33: Moa stockpiling by year

16.5.2 Schedule Results

The LOM schedule summary results are represented in Table 35 showing the flow of movement from 2019 through to 2033 and the associated tonnes, grade and metal (contained and recovered) from the mine to the SPP and MSP.

Figure 34, Figure 35 and Figure 36 show respectively the nickel grade to the plant by year, the cobalt grade to the plant by year and total material movement (TMM) by year. Figure 37 demonstrates how the maximum constraint of 35,000 tonnes of recovered nickel and cobalt metal (combined) works per year.

Overall the LOM schedule produces a very solid result maintaining a minimum nickel grade of 1.14% (inclusive of dilution) and a minimum cobalt grade of 0.11% throughout the mine life.

Table 35: LOM schedule summary

Description	Unit	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Total from pit	Mt	7.365	6.680	5.669	4.946	4.469	6.305	6.842	6.099	7.670	7.522	6.409	5.347	6.207	5.502	6.442	**93,471**
Stockpile to SPP	Mt	-	-	0.194	-	0.287	-	0.021	0.081	-	-	0.283	-	0.240	0.747	0.005	**1.857**
TMM	Mt	7.365	6.680	5.863	4.946	4.756	6.305	6.863	6.179	7.670	7.522	6.693	5.347	6.447	6.249	6.447	**95.330**
To waste	Mt	3.513	2.601	2.084	1.346	1.002	2.667	3.259	2.571	3.567	3.918	3.033	1.747	2.821	2.618	3.321	**40.068**
To stockpile	Mt	0.217	0.412	0.136	-	0.149	0.033	0.007	-	0.433	0.015	0.025	-	-	-	-	**1.427**
To SPP	Mt	3.600	3.600	3.600	3.600	3.550	3.600	3.594	3.600	3.600	3.585	3.600	3.600	3.600	3.550	3.125	**53.405**
	0.8611																
To MSP	Mt	3.100	3.100	3.100	3.100	3.057	3.100	3.095	3.100	3.100	3.087	3.100	3.100	3.100	3.057	2.691	**45.987**
Ni	%	1.14	1.19	1.19	1.20	1.23	1.16	1.14	1.14	1.14	1.17	1.14	1.15	1.16	1.14	1.17	**1.16**
Co	%	0.14	0.13	0.12	0.12	0.12	0.13	0.13	0.14	0.13	0.11	0.11	0.12	0.15	0.14	0.14	**0.13**
Fe	%	42.80	43.29	40.62	41.16	40.85	42.02	42.72	44.08	41.59	39.99	40.19	40.75	43.88	42.95	42.41	**41.95**
Al	%	4.48	4.41	4.91	5.09	4.50	4.83	4.83	4.43	4.51	4.38	4.30	4.26	4.55	4.40	4.73	**4.57**
Mg	%	1.12	0.97	1.58	1.51	1.85	1.30	1.04	1.03	1.60	1.86	2.06	2.18	1.02	1.23	1.22	**1.44**
Ni metal contained	t	35,340	36,906	36,968	37,163	37,511	35,843	35,282	35,369	35,411	35,984	35,340	35,733	36,088	34,995	31,483	**535,416**
Co metal contained	t	4,281	4,072	3,661	3,754	3,607	4,101	4,049	4,193	3,994	3,540	3,514	3,599	4,774	4,224	3,766	**59,127**
Total metal contained	t	39,621	40,978	40,629	40,917	41,118	39,944	39,331	39,563	39,404	39,524	38,854	39,332	40,862	39,218	35,248	**594,544**
Ni metal recovery	t	30,110	31,444	31,497	31,663	31,960	30,538	30,060	30,135	30,170	30,658	30,110	30,444	30,747	29,815	26,823	**456,175**
Co metal recovery	t	3,609	3,433	3,086	3,164	3,040	3,457	3,413	3,535	3,367	2,984	2,962	3,034	4,025	3,560	3,174	**49,844**
Total metal recovery	t	33,719	34,877	34,583	34,827	35,000	33,995	33,474	33,670	33,537	33,643	33,072	33,478	34,772	33,376	29,998	**506,019**

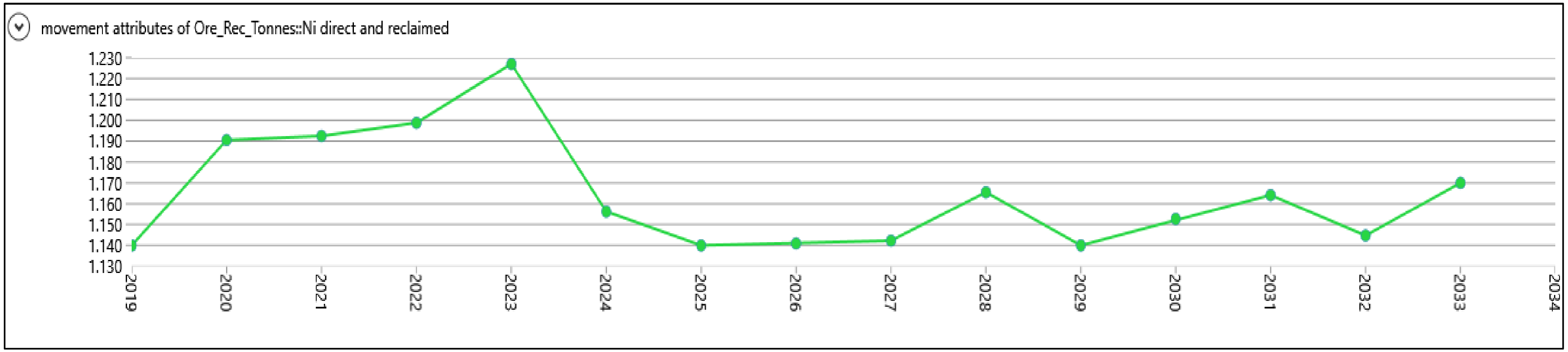

Figure 34: Ni SPP grade by year

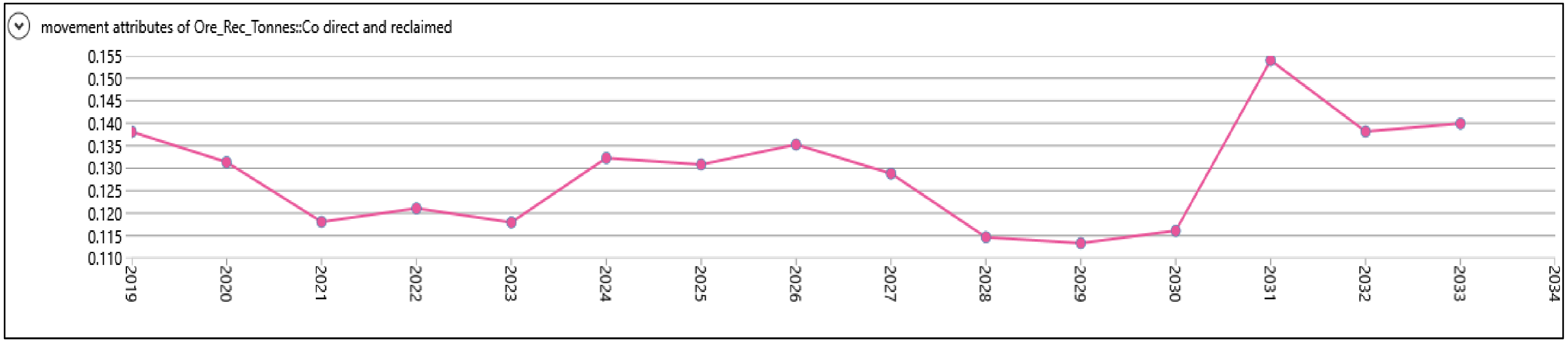

Figure 35: Co SPP grade by year

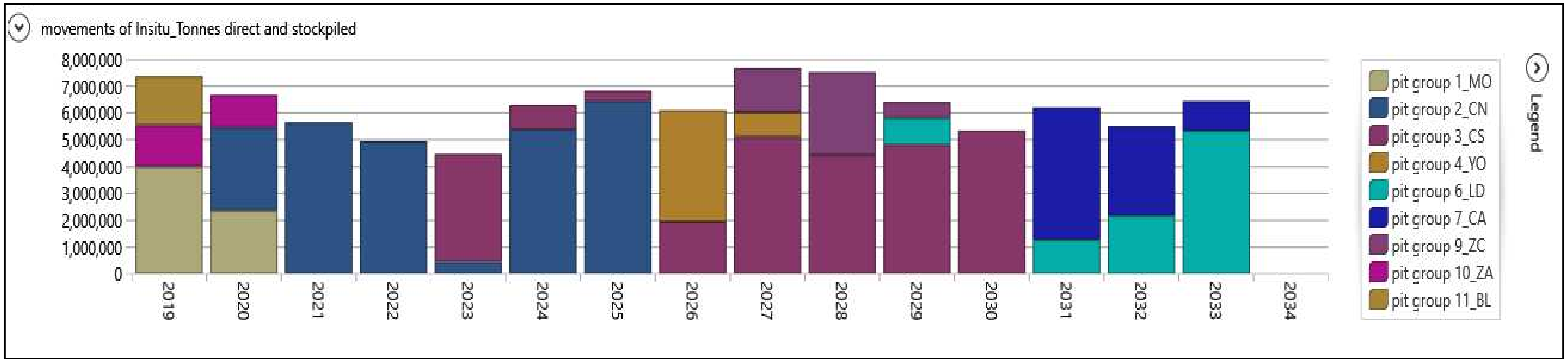

Figure 36: TMM by year by deposit

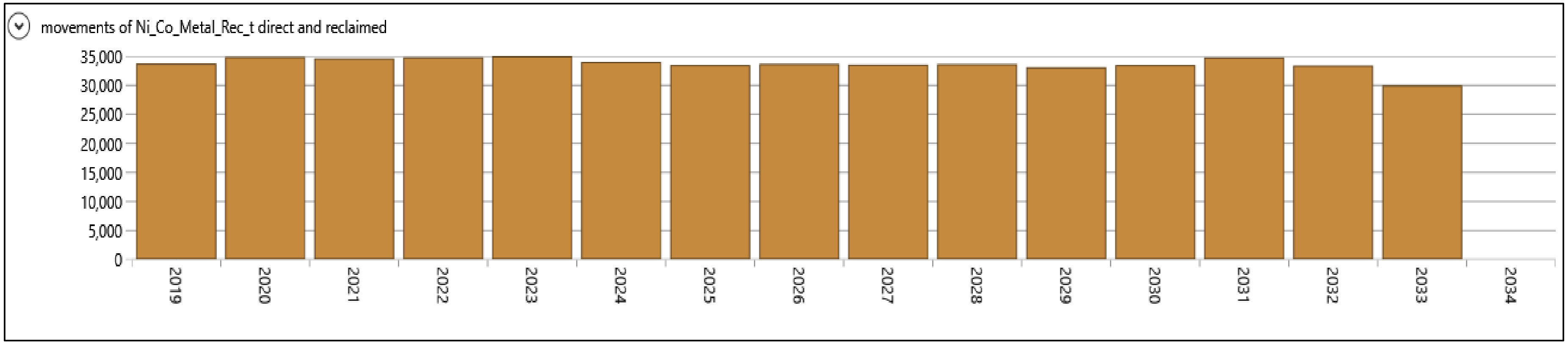

Figure 37: Ni and Co metal recovered by year

17 Recovery Methods

17.1 Moa Process Plant

Moa Nickel utilises the HPAL process to recover nickel and cobalt from the limonitic ore to an intermediate mixed sulphide product. A schematic flowsheet of the Moa Nickel process plant is shown in Figure 38.

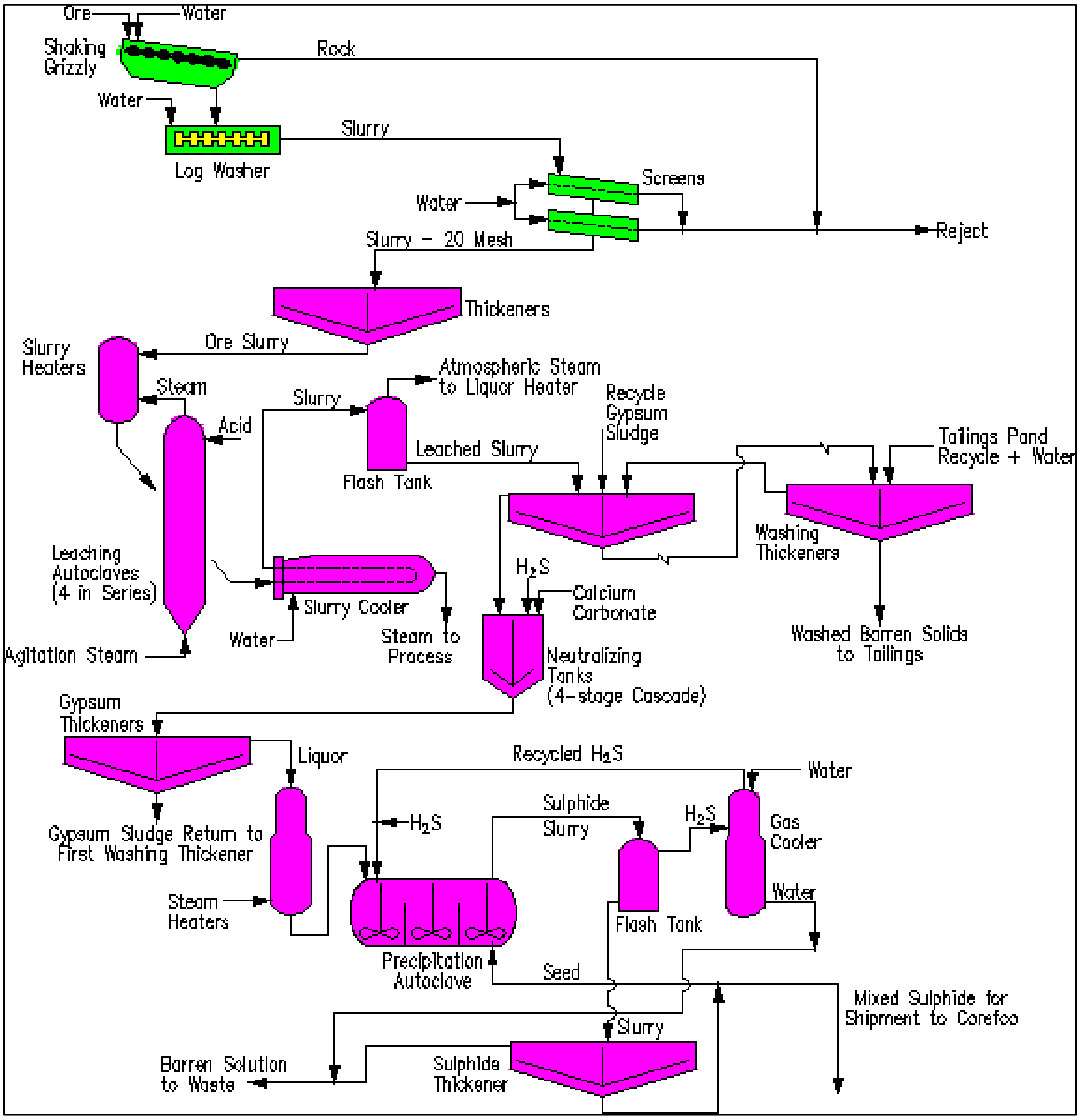

Figure 38: Schematic flowsheet of the HPAL process used by the Moa Nickel process plant
Source: Sherritt Technologies

17.1.1 Slurry Preparation Plant

The run-of-mine ore is fed to the SPP where the +0.8 mm size fraction is recovered as a slurry of ore and water in log-washers, a size separation occurs using a series of vibrating screens and a cylindrical scrubber to yield an overall limonite recovery in excess of 98%. The product slurry at approximately 25% solids is transported by gravity through a pipeline to the Ore Thickener Plant.

17.1.2 Ore Thickening

The Ore Thickener Plant thickens the slurry in the underflow to about 45% and returns the water from the overflow to the SPP. The Ore Thickener Plant utilises five conventional thickeners and one high rate thickener. The conventional thickeners have rake drives that can handle high loading, which allows for significant inventory of ore in the thickener beds. Typically, the ore slurry inventory in the thickener beds in is the range of six to 10 days of plant feed.

17.1.3 Pressure Acid Leaching

The underflow slurry is preheated with 15 psig steam to 82°C, and then pumped through a direct contact steam heater to increase the temperature to 245°C. The heated slurry flows into the high pressure, vertical, Pachuca-type reactors where it is contacted with 98% sulphuric acid to extract the nickel and cobalt into solution.

The leached slurry from the reactors is cooled through indirect slurry coolers, to recover 15 psig steam, and then is sent to a flash tank. Leach extraction of nickel and cobalt is now around 94% which is controlled by acid addition to maximise financial performance rather than metal extraction. The relative prices of nickel and cobalt, and plant throughput and input costs are used to optimise the acid addition rate.

17.1.4 Wash Circuit and Neutralisation

The cooled leached slurry, now consisting of residue and raw liquor, flows by gravity to a CCD wash circuit to separate the raw liquor from the residue. The leach residue is sent to a tailings pond with a water recovery circuit to return water to the CCD plant to act as wash water. The raw liquor is then treated with hydrogen sulphide in a pipeline reactor to reduce Cr^{+6} to Cr^{+3}, Fe^{+3} to Fe^{+2} and precipitate copper and then neutralised with limestone mud to reduce the free acid concentration and increase the solution pH to about 2.3, in mechanically stirred atmospheric reactors.

The reaction of the limestone mud and sulphuric acid forms gypsum solids which are removed from the product liquor in thickeners. A portion of the gypsum underflow is recycled back to the neutralisation stage to act as seed while the remaining underflow is pumped to the CCD circuit to recover the valuable metal solution and impound the solids in the tailings pond.

17.1.5 Sulphide Precipitation

The product liquor is preheated with the flashed steam from the Leach Plant flash tanks and then pumped to the Sulphide Precipitation Plant. The preheated product liquor is heated to 125°C using 15 psig steam, recovered by the slurry coolers in the Leach Plant, and then pumped into mechanically agitated autoclaves. Nickel and cobalt are precipitated as a mixed sulphide product using hydrogen sulphide. The mixed sulphide slurry is cooled through a flash tank and thickened in a thickener. The thickened mixed sulphide slurry is washed, filtered and bagged for shipment to the Cobalt Refinery Company Inc. (CRC) in Canada.

17.1.6 Utilities

Auxiliary plants to support the process include a Powerhouse, featuring fuel oil fired boilers for steam production, and turbine-generators for power generation. Three sulphur burning Acid Plants, a Hydrogen and a Hydrogen Sulphide Plant are also on site to provide sulphuric acid and hydrogen sulphide respectfully for the process plant's consumption. A third acid plant was commissioned in 2018, which eliminated the need to purchase sulphuric acid. LPG is steam reformed to produce hydrogen.

17.1.7 Plant Capacity

Through a series of debottlenecking stages coupled with a better understanding of all of the process steps, particularly with respect to the effect of ore quality on the ore thickening, leach and CCD wash unit operations, production has increased to over 37,000 tonnes of nickel and cobalt per year.

17.2 Corefco Refinery

Mixed sulphides produced at the Moa process plant are received in at the Corefco Refinery in Fort Saskatchewan, where commercially pure nickel and cobalt metal products are produced.

17.2.1 Leaching

The mixed sulphide material is combined with ammonium sulphate liquor and leached under relatively mild oxidising conditions. The majority of the nickel, cobalt and copper dissolves in the leach step. Following the leach step the metal-containing leach solution is separated from the residue. The residue is washed, and the leach solution is directed to a nickel-cobalt separation step.

17.2.2 Nickel Cobalt Separation

The cobalt is separated from the leach solution as a cobalt salt. The solution is then directed to copper removal, then ultimately nickel is recovered as a metal product. The cobalt salt is directed to cobalt recovery.

17.2.3 Copper Removal

The dissolved copper is removed by lowering the solution pH and copper is precipitated as a copper sulphide. The copper sulphide is separated from solution, washed and shipped to a custom smelter for the recovery of a pure copper product.

17.2.4 Nickel Recovery

The copper-free solution is now sent to an adjustment step, oxydrolysis. Following oxydrolysis, nickel metal is precipitated in autoclaves using hydrogen as the reducing agent. In the hydrogen reduction step nickel powder is precipitated batch-wise in repeated cycles until the nickel particles grow to sufficient size. The nickel powder is washed and dried and then either packaged as a powder or compacted into briquettes.

17.2.5 Cobalt Recovery

The cobalt salt is purified and then redissolved in cobalt reduction end solution. This solution is then sent to a conversion step to convert the dissolved cobalt to cobaltous form. Following the conversion step, cobalt metal is precipitated in autoclaves using hydrogen as the reducing agent. The cobalt powder is precipitated batch-wise in repeated cycles until the cobalt particles grow to sufficient size. The cobalt powder is washed and dried, and then either packaged as a powder or compacted into briquettes.

18 Project Infrastructure

18.1 Mine

18.1.1 Roads

The Moa Nickel process plant lies on the outskirts of the city of Moa and is accessed by a paved road which runs past the plant to the SPP. Moa Nickel employees arrive at the plant by a bus service, or company supplied vehicles using this road.

The mining production areas are accessed by dirt roads that are capped with serpentine material from an area close to the SPP. The roads are maintained by the road construction group on a regular basis.

18.1.2 Workshop

The mine workshop is located proximal to the SPP and is where the mobile fleet is serviced and maintained. The mine shop includes multiple bays for routine servicing, troubleshooting and tire servicing. Located within the workshop is a warehouse for parts and servicing consumables.

18.1.3 Slurry Preparation Plant

The SPP, located south of the Mine shop, processes the mined ore. The plant uses a system of log washers and vibrating screens to slurry the mineral and classify to the required particle size.

The mining face and SPP samples are analysed at the main processing laboratory and results are uploaded to a central control system for mine planning control.

18.1.4 Stockpiles

The run of mine stockpiles are located in various locations proximal to mining faces with a common stockpile close to the SPP. The stockpiles are continuously blended and can be fed to the process when required.

18.1.5 Sedimentation Ponds

Sedimentation ponds are constructed to efficiently control water run-off and allow solids to settle and be captured. There are multiple ponds, that vary in size at various locations in the mining areas. Regular maintenance is conducted on all sedimentation ponds.

18.1.6 Power Supply

The power supply to the SPP is by overhead lines that are connected to the National Grid power supply.

18.1.7 Pipeline

The slurry pipeline is a concrete line that transports the product from SPP to the processing plant via gravity. The water supply to SPP is via a steel line from the Ore Thickener Plant.

18.2 Processing Plant Site

18.2.1 Steam and Power

The steam that is required by the processing plant is supplied by fuel oil fired boilers and sulphuric acid plants. The majority of the high-pressure steam is used in the HPAL process and power generation. The majority of power for the plant is generated by steam driven turbine-generators within the plant's powerhouse. However, the plant is also connected to the National Grid through a 110 kV substation. Approximately 6 MW is imported from the National Grid.

Emergency power is available at the powerhouse to restart operations and other critical equipment have dedicated diesel generators.

18.2.2 Water

Water supply for the processing plant comes from a man-made reservoir which is supplied by the Moa River. The reservoir is adjacent to the plant.

18.2.3 Petroleum Products, Supply and Storage

The processing plant requires fuel oil, liquefied petroleum gas (LPG) and diesel. The fuel oil is delivered to site via a pipeline which is owned and operated by a third party. The diesel fuel is delivered to the plant site and mine on a daily basis. The fuel is distributed from the storage tanks by fuel trucks to the equipment. LPG storage is located at the Port facilities and is pumped to the processing plant.

18.3 Port

The port facilities are located approximately 5 km from the plant and access is by paved road. The port facilities handle commodities for the plant such as fuel oil, LPG and sulphur. These commodities arrive via boat and are offloaded for storage. There are storage areas for sulphur, acid and LPG at the Port. The Port also handles commodities for the neighbouring Punta Gorda operation, a state-operated nickel plant.

All commercial purchases including spare parts, and capital assets purchased abroad are also received at the Port of Moa and unloaded. Depending on the source, the Port of Santiago de Cuba and the Port of Havana have been used to unload commercial items. These would then be transported by truck to the Plant.

The Port also loads and ships the mixed sulphide product to CRC in Canada.

Finally, the Port operation supplies the limestone mud. The limestone mud is stored in two thickeners close to the Port and is pumped to the processing plant.

19 Market Studies and Contracts

19.1 Market Overview

19.1.1 Nickel

Nickel is a heavy silver-coloured metal whose principal economic value lies in its resistance to corrosion and oxidation and excellent strength and toughness at high temperatures. Nickel is used in the production of stainless steel, which accounts for approximately two thirds of worldwide nickel consumption. After stainless steel, the lithium ion rechargeable battery market will be an important driver of nickel demand. Nickel is also used in the production of industrial materials, including non-ferrous steels, alloy steels, plated goods, catalysts and chemicals. In 2018, China was responsible for over 50% of world consumption of primary nickel production. Nickel demand is strongly influenced by world macro-economic conditions, which in turn influence the state of the world stainless steel industry, the single largest consumer of nickel.

Since 2016, the worldwide nickel market price has trended upward based on a growing supply deficit due to strong demand from the stainless steel industry and new demand for the production of lithium ion batteries for electric vehicles. In 2018, nickel prices increased for the first half of the year, peaking in June; and then declining for the remainder of the year based in part on concerns surrounding US China trade policy and announcements related to new, large hydrometallurgical project proposals in Indonesia. Nickel prices on the London Metals Exchange (LME) were higher in 2018 than in 2017. The LME average cash settlement price for 2018 was US$5.95/lb, a 26% increase from the 2017 average of US$4.72/lb. Nickel opened 2018 at US$5.76/lb and closed the year at US$4.81/lb, and traded in the range of US$4.81/lb and US$7.14/lb.

The Moa JV's 2018 production totalled 30,707.5 tonnes or approximately 1.4% of 2018 annual world refined nickel production. Current world production of refined nickel is estimated to be approximately 2.15 Mtpa. World nickel supply is broadly classified into primary and secondary nickel. Primary nickel is further subdivided into refined nickel (Class I) having a minimum nickel content of 99%, and charge nickel (Class II) having a nickel content of less than 99%. The main physical forms of Class I nickel are electrolytic nickel (cathode and rondelles), pellets, briquettes, granules and powder. Class II nickel includes ferronickel, nickel oxide sinter and utility nickel. Secondary nickel is the nickel contained in scrap metal, principally stainless steel scrap. World nickel supply has also been impacted by the growth of nickel pig iron (NPI) in China. NPI is the lowest purity of what is considered refined nickel (as low as 2% Ni content) and is primarily used in China to make stainless steel. CRU Group (CRU), a leading UK-based research provider, estimates that NPI production in China was approximately 474,000 tonnes of nickel equivalent in 2018 while an additional 259,000 tonnes was produced in Indonesia. Total NPI production has been reported to have increased by approximately 142,000 tonnes in 2018, making 2018 a new record year for world NPI production.

Most major refined nickel producers supply nickel at grades ranging from 98.4% to 99.9% in purity. The Moa JV's sintered nickel briquettes, produced at a minimum of 99.8% purity, are well suited for stainless steel, alloy steel production and battery chemical applications, and are expected to continue to be sold to such industries. The Moa JV's "steel grade" (unsintered) nickel briquettes having a typical purity of 99.4% Ni are well suited for stainless steel production and foundry use. In 2017, the Moa JV introduced a "dissolving grade" nickel powder having a typical purity of 99.8% Ni, suitable for battery chemical applications.

19.1.2 Cobalt

Cobalt is a hard, lustrous, grey metal that is used in the production of high temperature, wear resistant super alloys, catalysts, paint dryers, cemented carbides, magnetic alloys, pigments, rechargeable batteries and chemicals. The cobalt market is much smaller and more specialised than the nickel market.

The cobalt market has been subject to significant price volatility due to the lack of a liquid terminal market. The LME introduced a 99.3% cobalt contract in February 2010 and in January 2017 announced that it was increasing the minimum purity to 99.8% to assist in contract adoption. Cobalt contract trading volumes were down 9.3% in 2018 over 2017 reflecting decreased interest in the LME cobalt contract. The LME reported that 12,932 tonnes of cobalt traded on the LME in 2018 compared to the 14,261 tonnes of cobalt contracts traded on the LME in 2017. Due to continued illiquidity, the LME cobalt contract remains a secondary pricing mechanism to the more widely accepted Metal Bulletin, as discussed below.

Cobalt supply has evolved over the years from a reliance on unstable output associated with copper production in central Africa, to more diverse supply sources with material coming from a wider geographic area. Refined mainly as a by-product of nickel and copper mining, approximately 64% of cobalt global production is processed through copper refining and 35% through nickel refining. The “copper belt” located in the Democratic Republic of the Congo contains close to half of the world’s cobalt reserves. Australia, Cuba, Zambia, Madagascar, New Caledonia, Canada, Russia, and Brazil hold most of the remainder. Cobalt production has not historically responded to cobalt demand. In the longer term, significant increases in supply are planned to be brought on stream from new large-scale international projects targeting copper production.

The Moa JV produces finished cobalt (briquettes and powder) at 99.9% purity, which exceed the current LME specification. Based on data from CRU, worldwide supply of primary cobalt for 2019 is estimated to be approximately 136,696 tonnes, an increase of approximately 10.9% from 123,309 tonnes of primary cobalt produced in 2018. In 2018, cobalt was produced by 10 Cobalt Development Institute (CDI) member companies, with additional supplies coming from a variety of other companies. The non-CDI sources included individual companies such as Nornickel in Russia, as well as production from multiple refiners in China. The Moa JV supplied 3,234 tonnes or 2.6% of the world’s primary cobalt in 2018.

The relative importance of the different uses of cobalt has changed over the years, with demand for older, more established uses, such as pigment, magnets and carbides showing only modest, if any, growth over the last decade, or so. Many of these traditional uses are strongly reliant on industrial growth for demand increases, so demand for these uses tends to rise and fall with global economic performance. Over the last decade growth in the chemical sector, primarily in battery chemicals, has increased the demand for cobalt. The world’s reliance on global communications in the form of mobile phones and tablet technology has been a driving force for increased cobalt consumption. Strong recovery from the superalloy sector has also helped the market remain in relative balance. Over the long term, positive growth is expected in the rechargeable battery sector (hybrid and electric vehicle applications) and gas to liquid catalyst sectors.

The Metal Bulletin Low Grade average cobalt price peaked in April 2018, starting the year at US$36.00/lb and closing the year at US$27.25/lb. In 2018, the Low Grade average cobalt price was quoted by the Metal Bulletin in a range between US$26.50/lb and US$44.45/lb, averaging US$37.35/lb (Low Grade high/low year average), 41% higher than the average price for 2017 of US$26.53/lb. In 2018, the LME daily cash settlement price averaged US$33.00/lb with a low of US$20.41/lb and a high of US$43.32/lb.

In October 2018, Metal Bulletin Group, the price reporting agency within Euromoney Institutional Investor PLC announced the rebranding of the business to Fastmarkets MB. In January 2019, Fastmarkets MB changed the names of its cobalt benchmark in warehouse Rotterdam assessments. From January 2019, the name "standard grade" replaced the name "low grade" and the name "alloy grade" replaced the name "high grade". Henceforth, the Metal Bulletin Low Grade average price as quoted herein will be called the Fastmarkets MB Standard Grade price.

19.2 Contracts

CRC refines the nickel-cobalt mixed sulphide product produced by Moa Nickel. CRC owns and operates the metals refinery located at Fort Saskatchewan, Alberta, and is one of the three companies belonging to the Moa JV.

The third Moa JV company, the International Cobalt Company Inc. (ICCI), acquires mixed sulphide from Moa Nickel and third parties, contracts with CRC for the refining of such purchased materials and then markets finished nickel and cobalt products worldwide.

In addition to the contracts described above, the Moa JV has entered into several contracts on arm's length terms with third parties in relation to transportation, handling, sales, materials and other services of this nature in accordance with industry norms.

20 Environmental Studies, Permitting, and Social or Community Impact

20.1 Environment and Permitting

Moa Nickel's mining operations are subject to three sets of Cuban legislation with respect to environmental requirements: Decree Law 194 monitored by the Oficina Nacional de Recursos Minerales (ONRM), Environmental Law 81 monitored by the Centro de Inspección y Control Ambiental (CICA), and the Operating Standard which was granted by Resolution 192/2018 from the Ministerio Ciencia, Tecnología y Medio Ambiente (CITMA). The Operating Standard "regulates the conditions and environmental requirements for the performance of the activity of Moa Nickel S.A." and became effective on 12 September 2018 which is also monitored by CICA. Representatives of ONRM and CICA conduct inspections to monitor compliance with regulatory requirements.

Under Decree Law 194, Moa Nickel has agreed to establish an environmental monetary reserve fund for mine reclamation and reforestation consistent with their asset retirement obligations. By the AGREEMENT 7694 from 16 February 2015 of the Executive Committee of the Council of Ministers, the way to estimate the reserve fund for mine reclamation and reforestation was changed. Moa Nickel is not responsible for the reforestation of areas mined prior to 30 November 1994.

20.1.1 Erosion and Sedimentation Control

In 2001, with the help of an international geotechnical consulting firm, Moa Nickel developed an Erosion and Sedimentation Control Plan that deals with environmental protection in mining areas. This plan is updated, as required, during mine development.

When mineable resources and reserves are calculated, none of the material in environmentally sensitive areas is included in the planned production. These environmentally sensitive areas include buffer zones around streams and rivers, with the width of the zone determined from the crest of the ravine through which the stream or river runs. Avoiding mining in these buffer zones limits the sediment load into rivers, preserving water quality for aquatic species and maintaining its usability as a source of drinking water.

Sediment catchment basins are also used to minimize the effect of erosion by surface runoff from the mines into nearby streams.

20.1.2 Reclamation and Rehabilitation

Areas exploited by Moa Nickel in the first years of the Joint Venture were left unrehabilitated if the exposed underlying saprolite was deemed by ONRM to be a resource whose mining rights might be granted to other companies. In all other areas, overburden is deposited in mined-out areas, groomed, sloped and contoured by bulldozers for drainage. Topsoil and manure, if available, is spread on the final surface and the surface is planted with local species of vegetation. Moa Nickel has rehabilitated 655.5 ha since the start of the Joint Venture as compared to 878.6 ha disturbed from mining activities. It should be highlighted that the equilibrium between exhausted areas and rehabilitation has been reached. That is, specific mining areas can only be rehabilitated upon completion of mining activities. It is anticipated that as areas become mined out they will be rehabilitated reducing the requirement for large capital works to remediate the site at the time of closure.

20.1.3 Tailings

Tailings are currently deposited in an on-land pond with surface water reclaimed for the process. Moa Nickel has regularly engaged an independent international geotechnical consulting firm to provide ongoing tailings pond stability assessments and berm construction guidance. The current tailings pond has a capacity for roughly another 3 years of production, with potential to extend it for an additional two years.

Over the last 15 years, Moa Nickel has had independent geotechnical consulting firms evaluate a number of options for tailings disposal, including both deep sea disposal and land impoundment. At the time of writing, the preferred option is to make use of an area to be mined out, has a certain degree of natural containment and is expected to result in minimal environmental impact.

The most suitable option is sited on an adjacent property under the control of the government of Cuba and will require this land be made available to the Joint Venture before construction can commence. A prefeasibility-level study has been completed on the preferred tailings disposal option and there is capital allocated for construction in the five year plan.

20.2 Social and Community Initiatives

Creating a beneficial social impact in the community is important for Moa Nickel. The company and its partners consistently allocate financial resources to local community initiatives that align with local and regional government priorities. Some recent examples include the refurbishment of two teaching medical clinics, the provision of road-side lights, the provision of roofing and accessories following hurricane Irma, and the provision of air conditioning units and lab equipment for the local hospital. For more information, the reader is referred to Sherritt's Corporate Social Responsibility report.

21 Capital and Operating Costs

21.1 Capital Costs

CSA Global was provided predicted annual capital expenditure by Sherritt. These expenditures are for items such as the new slurry preparation plant, future tailings storage and expansion, mining fleet replacement and upgrades, and sustaining equipment costs in both the processing plant in Moa and the refinery in Fort Saskatchewan.

The capital costs allowed for over the next five years (2019 to 2023), in Canadian dollars are $93.0 million, $95.8 million, $96.8 million, $89.0 million and $89.1 million, respectively. These budget values are subject to annual adjustment as economic conditions allow.

Based on current site costs for road construction the estimated capital cost is US$330,000 per kilometre of road construction for access roads that will be required to exploit Camarioca Norte and Camarioca Sur.

21.2 Operating Costs

The operating costs of the Moa Project, used for Mineral Reserve estimation, were derived from the 2016 and 2017 operational performance as provided by Sherritt. The values were selected to be conservative relative to the performance over the last 3 years to allow for future fluctuations over the life of mine. The values were used (along with other parameters) to create the pit shells for the Mineral Reserve estimate.

The operating costs had no allowance for inflation or an escalating cost index, therefore they are nominal.

21.2.1 Mining Costs

Mining costs have been taken direct from Moa site operating costs supplied by Sherritt. They include the following mining cost allowances:

- Removal of topsoil and vegetation (development costs);
- Removal of overburden and waste (to relevant dumps);
- All mining equipment and related costs (wages, fuel, maintenance);
- Rehabilitation of mined out areas and completed waste dumps.

The haulage costs of the ore from the mine site to the SPP have been included as processing costs. Whilst these costs are in the mining budget, they are “ore specific” costs and thus are included with processing.

The average mining cost used for this report is US$5.15 per total mined tonne. The total mined tonnes includes waste tonnes and plant feed tonnes.

21.2.2 Processing Costs

Processing costs can be easily divided into two main categories, namely fixed and variable. The fixed costs are further broken down into the following headings:

- Ore Haulage (deposit to SPP);
- General and Administration (G&A);
- Power;
- Fuel Oil;

- LPG;
- Diesel;
- Maintenance;
- Sustaining Capital.

These costs were derived from the last two full year of operations (2016 and 2017) and the corresponding production. The plant ore haulage costs have already been described and captured in Table 29. The unit rates attached to the fixed processing costs can be seen below in Table 36. Please note that the value for sustaining capital in the fixed processing costs listed in Table 36, is also included in the capital costs outlined in Section 21.1.

Table 36: Processing costs – fixed

Processing fixed costs	Unit rate (US$/t)
G&A	9.32
Power	5.25
Fuel Oil	9.14
LPG	0.88
Diesel	3.05
Maintenance	12.10
Sustaining Capital	7.38

Sulphuric acid and limestone have the greatest impact on the plant site variable costs. The consumption of both sulphur and limestone are driven mainly by the impurities within the ore (Mg and Al), and to a lesser extent by Ni and Co grades and the MSP recovery. The acid consumption formula and limestone consumption formula can be seen in Table 30.

The variable costs are based upon projected consumption multiplied by the following prices:

Table 37: Commodity price assumptions

Commodity	Price (US$/t)
Sulphuric acid	96.26
Limestone	20.68

Table 38 shows an estimation of the variable ACF unit rate and the LCF unit rate based on two separate examples of varying input grades for Ni, Co, Mg and Al.

Table 38: Processing costs – variable

Processing variable costs (estimated)	Ni (%)	Co (%)	Mg (%)	Al (%)	Unit rate (US$/t)
ACF Cost - #1			1.30	4.50	29.44
ACF Cost - #2			2.80	5.50	40.55
LCF Cost - #1	1.00	0.11			1.48
LCF Cost - #2	1.20	0.13			1.78

21.2.3 Transportation and Refining Costs

The transportation and refining costs allow for all operating costs once the mixed sulphide product is ready to leave the MSP. They are broken down into the following categories:

- Moa Port and loading;

- Freight and insurance;
- Refining;
- Royalties.

These costs were supplied by Sherritt and have been based on operating data over three years (2016 to 2018). All of the transportation, refining and royalty cost unit rates are based on total expenditure over the three years divided by the nickel recovered. No credit for ammonium sulphate production, nor cobalt production is included in the transportation and refining costs.

Table 39: Transportation and refining costs

Transportation and refining costs	Unit rate (US$/Ni lb recovered)
Moa Port and loading	0.02
Freight and insurance	0.19
Refining	1.40
Royalties	0.31

22 Economic Analysis

As Sherritt is a "producing issuer", as defined in NI 43-101, the Moa Project is in production and this Technical Report does not include a material expansion of current production, an economic analysis for the Moa Project is not a requirement for this Technical Report.

23 Adjacent Properties

The Che Guevara Plant lies east of the city of Moa and is operated by a company with the same name, completely owned by the Cuban State. The Punta Gorda deposit that has provided ore for this plant borders the east side of the north part of the Moa Oriental Concession. The Che Guevara Plant also owns the mining rights to Camarioca Este, immediately to the east of Moa Oriental and Camarioca Norte. The Cuban Government discloses the location and limits of Che Guevara Concessions on la *Gaceta Oficial de la República de Cuba*, but not its Mineral Resources and Mineral Reserves. The geology of Che Guevara's concessions has been documented in many papers and academic thesis memoires, and it is very similar to the geology of the deposits described in the Report.

The Che Guevara plant uses the Caron process and the compositional constraints on its ore are different from Moa Nickel's HPAL process. The process uses ores with a slightly higher percentage of saprolite than does Moa Nickel's HPAL process.

Moa Nickel concessions returned to ONRM usually have saprolite available for mining by other companies. These areas are currently being explored in detail by Ferroníquel Minera S.A. This company actually holds the saprolite of Moa Occidental III, including its sector Yamaniguey Cuerpo I (also known as 11 Bloques), that is overlayed by the limonite of the Company's concession that has the same name.

The Cuban State holds other nickel and cobalt laterites in the island that are currently promoted by the Cuban Ministry of external commerce and foreign investment (MINCEX). The two larger deposits are Pinares de Mayarí, located approximately 80 km to the west of Moa; and San Felipe, located 20 km to the north of the city of Camaguey and 400 km to the west of Moa. The Cuban State also holds and promotes the tailings of Che Guevara and Moa Nickel processing plants.

24 Other Relevant Data and Information

The United States of America maintains a general embargo on trade and economic relations with Cuba. It has also enacted legislation (the Cuban Liberty and Democratic Solidarity (Libertad) Act of 1996, usually referred to colloquially as the “Helms-Burton Act”) that authorizes sanctions on individuals or entities deemed to be “trafficking” in Cuban property that was confiscated from US nationals or from persons who have become US nationals. The Helms-Burton Act also authorizes damage lawsuits to be brought in U.S. courts by U.S. claimants against those ‘‘trafficking’’ in the claimants’ confiscated property. The Corporation has received letters in the past from U.S. nationals claiming ownership of certain Cuban properties or rights in which the Corporation has an indirect interest, including in relation to the processing facilities used to process the ore from the Camarioca deposits.

The U.S. embargo, the Helms-Burton Act and their implications for Sherritt and the Moa Nickel Project are discussed in the 2018 Annual Information Form of Sherritt dated February 13,2019.

25 Interpretation and Conclusions

25.1 General

Based on the current identified Mineral Resources and Mineral Reserves and the assumed prices and parameters, the authors of this Technical Report have concluded that profitable operations can be sustained until 2033 or for approximately 15 years at the Moa Project.

Mining activities commenced in Moa in the early 1960s. The mixed sulphides product is shipped, then railed to get to the refinery. The finished products; class 1 nickel and high-grade cobalt briquettes are now produced from the Moa JV's refinery in Fort Saskatchewan (Alberta, Canada).

This update to Mineral Reserve for Moa as at 31 December 2018 reflects a change in the understanding of the Mineral Resources, the mining strategies and the process drivers.

The Mineral Resource model and the Mineral Reserve model will continue to develop and change as the knowledge base expands on how to get the best benefit (both production and economic wise) out of a complex mining and processing environment.

The opinion of CSA Global is that the Mineral Resource and Mineral Reserve presented in this Technical Report is a reasonable estimate on the basis of information available at the time of reporting.

25.2 Upside Potential

CSA Global considers the following points to represent upside potential to the Moa JV:

- Conversion of Inferred Resources to higher classifications (through increased drilling) and subsequent inclusion in mine planning;
- Inclusion of the two Resources; Santa Teresita and Playa La Vaca-Zona Septentrional from Exploration to Exploitation to potentially move into Mineral Reserves;
- Improved stockpiling techniques to enable greater flexibility for SPP feed which in turn will enhance cash flow;
- Usage of advanced mine scheduling techniques to enable "higher value" deposits to come online sooner than otherwise planned based on economic parameters and site constraints;
- Movement towards "economic" based cut-off grades for Mineral Reserves as opposed to the current regulatory cut-off grades.

Recommended actions and opportunities for improving project value are outlined in Section 26.

25.3 Downside Risk

As with most mining ventures, there are risks that can affect the outcome of the Moa Project. The major risk areas identified in this study are:

- Lack of control over external drivers such as nickel and cobalt prices and exchange rates;
- Poor control of mining dilution and loss during excavation activities;
- Not achieving the operating costs, productivities and other assumptions made in this study;
- Regulatory changes to site operating practices and fixed cut-off grades;
- Not following specific mining practises such as stockpiling and reclaiming according to a mining schedule;

- Tailings storage facilities to support this reserve out until 2033 (current capacity of three years of production) are not currently in place and need to be constructed. Capital has been allocated but the construction has not yet commenced.

26 Recommendations

The following recommendations are intended to represent future work and studies that will help streamline and improve planning, execution and financial benefits. The recommendations are separate by nature, but some are linked together dependent on the body of work.

Costing is not presented as it is considered that the recommendations could be completed as part of the ongoing site improvements, some of which are already in place.

26.1 Sampling Methodology

Quality assurance and quality control blank and standard samples are not currently introduced by Moa Nickel into the sample preparation and analysis chain. These samples are required to assess bias and contamination in chemical assay results and are recommended in CIM Best Practices for Estimation of Mineral Resources and Mineral Reserves. The author recommends inserting blind QAQC standard and blank samples into the sample preparation and analysis chain and updating sampling and assaying written protocol documents (SOP) clearly stating actions required when QAQC samples show irregularities and required documentation of any actions that are taken. A regular review of QAQC results is also recommended.

26.2 Geometallurgical Study

Geometallurgy is the process of combining geology with metallurgy to create a geologically based predictive model for mineral processing plants. A study of this type at Moa would enable greater analysis of the material being sampled and how it relates to being slurried and leached. This is especially crucial in understanding the impacts of magnesium, aluminum and iron within the plant feed. This enables improved communications between geology, processing and mine planning staff allowing more informed decisions to be made. This work will help inform and support economic cut-off grade studies.

Additional sampling and analyses will be required to better define mineralogical domains that could be processed. This could be saprolite material or a considerable quantity of resource material that is of lower grade than the stipulated cut-off grade for limonite ore. This will also require additional metallurgical testwork to test and understand how these materials will perform through the processing facilties.

26.3 Tenement Conversions

There are two deposits that require tenement conversion from Exploration to Exploitation – they are as follows:

- Playa la Vaca-Zona Septentrional;
- Santa Teresita.

An exploitation permit needs to be applied for that can last up to 25 years. These deposits would then most likely satisfy the criteria that they can be put forward for inclusion into the Mineral Reserves.

26.4 Economic Cut-Off Grades

It is CSA Global's belief that a move to the usage of "economic cut-off grades" would have a very positive impact at Moa, both on mine life and enhanced cash flow. Currently, the Cuban regulations stipulate that any mining block within the Resource Model that is less than 1.0% Ni (and less than 0.9% Ni for two deposits) is not considered as "ore" and therefore cannot be considered as part of the Mineral Reserve.

The Mineral Resource body of work (using an economic cut-off grade) has demonstrated a substantial increase in tonnes over previous estimates using fixed cut-off grades. This will flow onto the Mineral Reserve work once the modifying factors are applied. It will demonstrate that the value of a single mining block is not just reliant on nickel and cobalt grades, but on other grades within the same block and how it performs within the HPAL. This will be further enhanced by the work from Section 26.2.

26.5 Detailed Mine Scheduling

The mining scheduling work completed for this Technical Report has already demonstrated the value in using a powerful "cash flow based" mine scheduling software system known as Minemax™. It enables several deposits to be mined together whilst utilising detailed stockpiling and reclaiming techniques to ensure the plant is being fed the best possible grade. If acid consumption needs to be constrained, then certain deposits can be targeted that will allow this criteria to be satisfied.

The next stage of the mine scheduling is to understand and utilise the information from Section 26.2, Section 26.4 and Section 26.6 (if available) and incorporate them into the LOM plan. The LOM then needs to be broken down into five year tactical plans that can be utilised by Moa mine planning staff.

26.6 Stockpiling and Reclaiming Study

Whilst stockpiling and reclaiming was utilised in the LOM schedule for this report, it was understood that the stockpiling methodology on site at Moa needs a considerable amount of refining and direction. With an increased emphasis on geometallurgy comes more focus on what is going into stockpiles and what should not be going into stockpiles. It also means a greater emphasis on location and size of stockpiles and what types of grade ranges they should be divided into. All this forms the basis for a study to be perfomed on optimising stockpiling and reclaiming at Moa.

26.7 LiDAR Survey

LiDAR (which stands for "Light Detection and Ranging") is a remote surveying method that measures distance to a target by illuminating the target (i.e. the deposit surface) with pulsed laser light and measuring the reflected pulses with a sensor. This helps make highly accurate digital three-dimensional (3D) representations of the surface it is projecting against. By giving a highly accurate 3D surface image, it allows greater transparency in mining movements (volumes and tonnages) from old mining areas to new areas where volume movements need to be as accurate as possible. At Moa, it would also enhance greater volume knowledge of old stockpiles, waste dumps and mined out zones allowing more accurate calculations on Mineral Resources, especially at Moa Oriental and Zona A.

26.8 Metallurgical Testwork

An investigation should be undertaken to assist in greater knowledge of lower-grade material (e.g. nickel in the range of 0.5% to 1.0%). This would assist with the knowledge and recovery of material that is not currently included in Mineral Reserves, but through the application of economic cut-off grades should become a reality. This would also be tied in with the work being done in Section 26.2.

26.9 Slurry Preparation Plant Sampling

An investigation should be undertaken that will enable a greater understanding of the reject slurry grade leaving the SPP. This material is understood to be +0.8 cm and up to approximately 2 cm and is rejected out to a nearby containment pond. It would be interesting to know the grade and properties of this reject material and whether it could be crushed and recirculated back into the SPP.

Also it would be useful information to know the grade and properties of the "oversized boulders" that are rejected at the grizzly section of the SPP. It would be interesting to know if these boulders can be crushed down in a separate plant to produce economic material for the SPP.

26.10 Tailings Storage Facilities

The current tailings pond has a capacity for approximately another 3 years of production, with potential to extend it for an additional two years. Options for tailings impoundment beyond this time should be actively being considered by the Company. It is noted that over the last 15 years, Moa Nickel has had independent geotechnical consulting firms evaluate a number of options for tailings disposal.

A preferred option could be to make use of an existing area that has been mined out and has a certain degree of natural containment which is expected to result in minimal environmental impact.

We note that prefeasibility-level studies have been completed on the preferred tailings disposal options.

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Appendix 1: Abbreviations and Units of Measurement

%	percent
°	degrees
°	degrees Celsius
3D	three-dimensional
AAS	atomic absorption spectroscopy
ACF	Acid Consumption Formula
Al	aluminium
CCD	counter-current decantation
CDF	cumulative distribution function
CDI	Cobalt Development Institute
CICA	Centro de Inspección y Control Ambiental
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIPIMM	Centro de Investigaciones para la Industria Minero Metalúrgica
CITMA	Ministerio Ciencia, Tecnología y Medio Ambiente
cm	centimetre(s)
Co	cobalt
CRC	Cobalt Refinery Company Inc.
CRU	CRU Group
CSA Global	CSA Global Pty Ltd
CV	coefficient of variation
dmt	dry metric tonne(s)
ESP	Eastern Satellites Project
Fe	iron
g	gram(s)
G&A	General and Administration
GCOS	global change of support
Geominera	Empresa Geominera Oriente of Santiago de Cuba
GNC	General Nickel Company S.A.
GPR	ground penetrating radar
ha	hectare(s)
HPAL	high pressure acid leach
ICCI	International Cobalt Company Inc.
ICGC	Instituto Cubano de Geodesia y Cartografía
ICP-AES	inductively coupled plasma-atomic emission spectroscopy
ICP-OES	inductively coupled plasma-optical emission spectrometry
ISO	International Standards Organization
km	kilometre(s)
km^2	square kilometre(s)
LACEMI	Laboratorio Central de Minerales "José Isaac del Corral"
lb	pound(s)

LCF	Limestone Consumption Formula
LG	Low Grade (Stockpile)
LME	London Metals Exchange
LOM	life of mine
LOS	loss on ignition
LPG	liquefied petroleum gas
m	metre(s)
Mg	magnesium
MG	Medium Grade (Stockpile)
MINCEX	Cuban Ministry of external commerce and foreign investment
mm	millimetre(s)
Mn	manganese
Moa JV	Moa Joint Venture
Moa Nickel	Moa Nickel S.A.
MSP	Mixed Sulphide Plant
Mt	million tonne(s)
Mtpa	million tonnes per annum
Ni	nickel
NiEq	nickel equivalent
NPI	nickel pig iron
NPV	net present value
ONRM	Oficina Nacional de Recursos Minerales
QAQC	quality assurance/quality control
RF	revenue factor
SEDAR	System for Electronic Document Analysis and Retrieval
SGS	SGS Minerals Services
Sherritt	Sherritt International Corporation
SiO_2	silicon dioxide
SOP	standard operating procedure
SPP	Slurry Preparation Plant
t	tonne(s)
TMF	tailings management facility
TMM	total material movement
tpa	tonnes per annum
US$	United States dollars