

NR 2018-08

For Immediate Release

# Chvaletice Manganese Project Mineral Resource Update, 2018 Metallurgical Testwork Program Update and Preliminary 2019 Plans

#### **HIGHLIGHTS:**

- Successful 2018 Drilling Program results in updated Mineral Resource Estimate with 98.3% of Resource classified in Measured Category.
- Drilling Program confirmed outstanding consistency of manganese grade and mineralogy.
- Successful Metallurgical Testwork Program and Pilot Plant Test runs, indicating manganese can be extracted from Chvaletice tailings using a combination of proven commercial technologies.
- Testwork Program confirmed the proposed hydrometallurgical process can produce Ultra-High-Purity Manganese Products meeting or exceeding customer specifications.
- Plan to build and commission a Demonstration Plant in 2019 to produce multi-tonne, Ultra-High-Purity Manganese Product samples for customer testing and qualification.
- Project timeline remains on track, with Preliminary Economic Assessment targeted for release in early 2019.
- Targeting production of both electrolytic manganese metal and manganese sulphate monohydrate, focusing principally on Europe's rapidly emerging electric vehicle industry.

Vancouver, Canada (December 12, 2018) – Euro Manganese Inc. (TSX-V/ASX: EMN) (the "Company" or "EMN") is pleased to announce an updated resource estimate ("Resource Estimate") for its Chvaletice Manganese Project in the Czech Republic and to provide an overview of its 2018 metallurgical testwork program ("Metallurgical Testwork Program Update") and its development plans for 2019 ("2019 Plans").

Marco Romero, President and CEO of EMN, noted:

"We are extremely pleased with the outcome of the 2018 drilling program and the resulting updated Resource Estimate for the Chvaletice Manganese Project, where 98.3% of the Resource was confirmed as Measured Resources. This milestone will provide a solid foundation for detailed planning of the tailings extraction and processing schemes, and drive the project economics in our upcoming Preliminary Economic Assessment, which we currently expect to release in early 2019.

During our extensive 2018 Metallurgical Testwork Program and pilot plant tests, our in-house team made significant progress in advancing its understanding of the Chvaletice deposit and in the planning and design of a technically-viable process flowsheet. By recycling the Chvaletice waste, we are targeting

production of some of the highest purity electrolytic manganese metal and manganese sulphate monohydrate available in the world today, while setting the stage for compliance with very high health, safety and environmental standards.

In 2018 we have seen a continuous stream of announcements and reports of important new developments and investments in the lithium battery industry in Europe, North America and Asia. The Chvaletice Manganese Project is strategically located in the Czech Republic, amidst a major emerging cluster of electric vehicle plants that have started to serve local and export markets. This transformation of the entire European auto industry is giving birth to an entire ecosystem of battery factories, precursor and cathode makers, recyclers, and related battery raw materials supply chains."

# **Updated Chyaletice Manganese Project Resource**

During the summer of 2018, EMN conducted a second campaign of drilling at the Chvaletice Manganese Project (the "**Project**") with a total of 80 holes, totalling 1,509.5 m. The program included completion of 35 vertical and 19 inclined 100 mm diameter Sonic holes, totalling 1,409.5 m, to supplement 80 holes, totalling 1,679.3 m completed in 2017. An additional 26 mobile percussion drill holes, totalling 100 m, were completed around the perimeter embankments of the tailings piles in areas which were not previously accessed for sampling. The tailings material observed, sampled and analysed was generally consistent in terms of total and soluble manganese grades, and mineralogy. The combined sampling and analytical data set from the 2017 and 2018 drill programs total 3,188.8 m of drilling, which was utilized to develop the updated Resource Estimate.

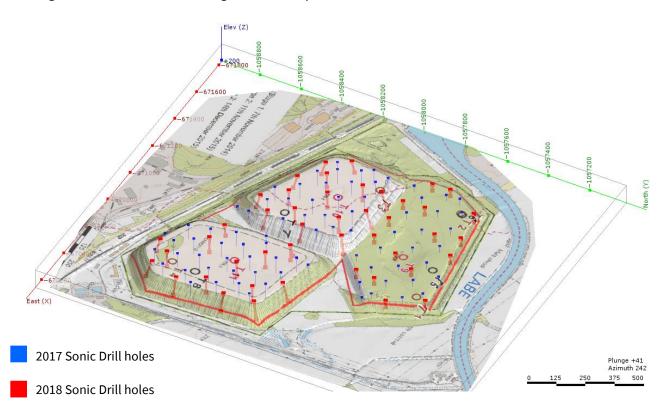
The updated NI 43-101 Mineral Resource Estimate has resulted in a reclassification of all tailings contained in the three Chvaletice Tailings piles to Measured and Indicated Categories. The Project's total Measured and Indicated Resources now amount to 26,960,000 tonnes, grading 7.33% total manganese and 5.86% soluble manganese, as detailed in Table 1 below:

Chvaletice Mineral Resource Statement, Effective December 8, 2018						
Tailings Cell #	Classification	Dry In - situ Bulk Density (t/m³)	Volume (m³)	Tonnage (metric tonnes)	Total Mn (%)	Soluble Mn (%)
#1	MEASURED	1.52	6,577,000	10,029,000	7.95	6.49
	INDICATED	1.47	160,000	236,000	8.35	6.67
#2	MEASURED	1.53	7,990,000	12,201,000	6.79	5.42
	INDICATED	1.55	123,000	189,000	7.22	5.30
#3	MEASURED	1.45	2,942,000	4,265,000	7.35	5.63
	INDICATED	1.45	27,000	39,000	7.90	5.89
TOTAL	MEASURED	1.51	17,509,000	26,496,000	7.32	5.86
	INDICATED	1.50	309,000	464,000	7.85	6.05
COMBINED	M&I	1.51	17,818,000	26,960,000	7.33	5.86

#### **NOTES:**

- Estimated in accordance with the Canadian Institution of Mining, Metallurgy and Petroleum ("CIM") Definition
  Standards on Mineral Resources and Mineral Reserves adopted by CIM council, as amended, which are
  materially identical to the Joint Ore Reserves Committee Australasian Code for Reporting of Exploration Results,
  Mineral Resources and Ore Reserves 2012 Edition ("JORC Code").
- The Chvaletice Mineral Resource has a reasonable prospect for eventual economic extraction. Mineral Resources do not have demonstrated economic viability, and no Mineral Reserves have been defined for the Project.
- 3. Indicated Resources have lower confidence that Measured Resources.
- 4. A cut-off grade has not been applied; the estimated break-even cut-off grade falls below the minimum grade of the block model.
- 5. Grade capping has not been applied.
- 6. Numbers may not add exactly due to rounding.

Image 2: 2017 and 2018 Drill Programs Hole Layout.



Tetra Tech Inc. ("**Tetra Tech**"), located in Vancouver, British Columbia, Canada, a leading provider of consulting, engineering, program management, construction management and technical services worldwide, were engaged to oversee the planning and execution of sampling and assaying, to prepare the updated Resource Estimate for EMN's Chvaletice Manganese Project, to prepare the Technical Report in accordance with National Instrument 43-101 - *Standards and Disclosures for Mineral Projects*, and to prepare the independent JORC Code technical report in accordance with the JORC Code, 2012 Edition.

## 2018 Metallurgical Testwork Program Update

From 2015 to 2018, EMN undertook a series of sampling, resource estimation and manganese recovery test programs, including semi-continuous, locked-cycle processing of tailings in a pilot plant. In parallel with the process studies, EMN conducted extensive environmental baseline and mine planning studies. The main objectives of these test programs and studies were to verify the findings of previous work, to confirm the amount of recoverable manganese contained in the Chvaletice manganese tailings deposit, to characterize its mineralogy and grade distribution, and to establish an economically-competitive process flowsheet. This process requires bringing together proven, commercial technology that can be used for the manufacture of high-purity, electrolytic manganese metal ("EMM" or "HPEMM") and high-purity manganese sulphate monohydrate ("MSM" or "HPMSM"), while meeting EMN's very high health, safety and environmental standards, as well as those of the Czech Republic and the European Union.

Metallurgical test work on field samples taken prior to the 2017 drill program for mineral resource definition has been reported in the Technical Report on Mineral Resource Estimate for the Chvaletice Manganese Project with an effective date of April 27, 2018, filed on SEDAR on June 26, 2018.

A total of 25 composite samples, totalling 14.8 dry tonnes of tailings, were prepared from Sonic drill-core samples taken in 2017 and resulting metallurgical testwork results will be published in the technical report being prepared in connection with the 2018 updated Resource Estimate. Detailed chemical and physical analysis were conducted on a master blend sample. The mineralogical characterization study included mineral component determination by optical microscope, x-ray diffraction analysis, scanning electron microscopy and mineral chemical phase analysis. Also, spatial variation studies of particle size, chemical composition, total and soluble manganese and various impurities were conducted. The study verified the previous findings indicating that approximately 80% manganese occurs in the form of leachable manganese carbonate minerals and approximately 19% of the manganese occurs as refractory manganese silicates. It was found that total manganese contents varied between 5.71 to 8.77% Mn, out of which 75%-85% of manganese is acid soluble.

The Changsha Research Institute for Mining and Metallurgy ("**CRIMM**"), a division of China Minmetals, and one of China's leading metallurgical research and development organizations, with extensive experience in the design, development and operation of EMM and MSM plants, was retained to conduct a multitude of qualitative and quantitative studies on behalf of EMN and to advise on technology selection and adaptation, and to test these on Chvaletice tailings.

CINF Engineering ("CINF"), a division of Aluminum Company of China, one of China's leading design institutes and a highly-experienced designer and builder of EMM and MSM plants were tasked with the oversight of the metallurgical testwork program and vendor equipment tests, design and evaluation of alternative HPEMM and HPMSM process flowsheets, as well as the development of pre-feasibility level engineering, including 3-D site layouts, equipment selection, as well as the development of capital and operating cost estimates.

Tetra Tech has been engaged since 2016 to oversee and evaluate the drilling, bulk sampling and resource estimation, as well as all metallurgical testwork programs, engineering and cost estimation. The results of this work are currently targeted for publication during Q1 2019 in a NI 43-101 compliant Preliminary Economic Assessment ("PEA").

The test work included bench-scale optimization test work that established parameters for the operation of pilot scale magnetic separation and manganese electrowinning plants operating in semi continuous locked cycle mode. The pilot scale test work results were used by CRIMM and CINF to verify process plant design parameters that have been used to calibrate metallurgical simulation models of different manganese recovery flow sheets.

The following process steps were tested on Chvaletice tailings material, principally at CRIMM's major R&D center In Changsha, China, and at its manganese research laboratory in Tongren, China, a highly-specialized working industrial facility on the site of two adjacent HPEMM and HPMSM commercial production plants:

- Pre-concentration of raw tailings using different high-intensity magnetic separators to obtain a manganese concentrate;
- Leaching of the manganese concentrate using sulfuric acid to obtain manganese sulfate solution;
- Purification of manganese sulfate solution using multiple stages of purification for the removal of iron, phosphorus, heavy metals and other impurities to obtain a refined pregnant solution;
- Selenium-free electrowinning followed by chromium-free passivation to obtain ultra-highpurity, low-sulfur HPEMM flakes;
- HPEMM metal flake dissolution in dilute acid and secondary deep purification, followed by crystallization and drying to obtain HPMSM crystals;
- Production of HPMSM directly from magnetic separation concentrate, in parallel with the above described process, and
- Various process waste dewatering, washing, geotechnical and environmental characterization studies.

Magnetic separation tests were conducted using two types of high-intensity magnetic separation machines, a vertical ring type separator and a horizontal ring type separator. These test results indicated:

- Manganese recoveries vary from 76.7 to 94.3% of total Mn, averaging 87.7% Mn; and
- That magnetic separation can increase manganese content in the feed from 7.2% to approximately 14% of total Mn, ranging from 12.0 to 15.4% of Mn.

Leaching tests were conducted to determine the optimal leaching conditions taking into account the subsequent iron, phosphorus, heavy metals and other impurity removal steps. Optimal leaching conditions were determined on the basis of dissolution temperature, retention time and acid-to-feed mass ratio. On average, it was determined that approximately 75% of the manganese can be optimally extracted by sulfuric acid leaching, with results ranging from 71.9 to 82.8% of total Mn. CRIMM also confirmed that no crushing or milling is required prior to leaching.

The leach-solution was purified in two steps, with the removal of iron, phosphorus, heavy metals and other impurities using purification reagents. The efficiency of these processes was confirmed, resulting in a refined manganese-bearing solution suitable for the electrowinning step.

Laboratory and pilot plant size electrodes were used for the electrowinning tests. The purpose of these tests was to verify operating conditions that will result in good quality manganese metal

and low power consumption. After a series of tests, manganese metal with a purity over 99.9% was produced with power consumption of 6200-6400kWh/tonne of metallic Mn, without requiring the use of undesirable selenium dioxide, which is used to reduce the power consumption of manganese electrowinning. The HPEMM that was produced met or exceeded all known customer specifications.

The production of HPMSM from HPEMM derived from the previous steps was also tested, including manganese dissolution in dilute acid, followed by a two-step purification procedure, produced manganese sulfate monohydrate with a purity of over 99.9%. The HPMSM produced met or exceeded all known customer specifications.

Targets for next testing steps include further verification of the main process components, definition of design parameters for full-scale equipment and detailed investigation of side-processes, some of which could result in further process optimization.

# **Preliminary 2019 Plans**

EMN is targeting the completion and release of a NI 43-101 compliant PEA for the Chvaletice Manganese Project in early 2019 and, subject to its acceptance by EMN's Board of Directors, to subsequently initiate a feasibility study. Planning is underway to design, build and commission a demonstration plant in the Czech Republic to provide bulk, multi-tonne finished product samples for customer tests and qualification. The Demonstration Plant is also expected to serve as a testing and training facility for future operations. Once the PEA is complete, EMN also expects to file a formal project description and notification with Czech regulatory agencies and local communities. Following a consultative and statutory comment period, EMN plans to file its Environmental Impact Assessment and related permit applications.

# Resource Estimation Methodology, Sampling and Quality Assurance

### **Mineral Resource Estimation Methodology**

The Mineral Resource Update for the three above ground deposits of historical tailings material was completed using Leapfrog Geo v 4.4.2. The database used for the estimate was comprised of 3,188.8 m of drilling, of which 3,088.8 m were completed using a Sonic drill and 100 m completed around the perimeter embankments using a mobile percussion drill. A total of 1,484 samples were collected on 2 m continuous intervals from drill core within the tailings material; non-manganiferous material in the upper topsoil and lower subsoil were not sampled and are excluded from the resource tonnage estimates. Contact surfaces were created as hard boundaries from these outer material intersections which form fully enclosed volumes of tailings, within which the resource was contained. The data was assessed for outliers which determined that sample capping was not required.

All samples were composited to two metres, to ensure equally weighted input to the model. Manganese concentrations measured from lithium borate fusion and XRF were used to report total Manganese, and concentrations measured from aqua regia and ICP/MS and AAS were used to report as proxy for soluble manganese. Interpolation of these manganese grades was performed using inverse distance weighted (exponent of three) methodology, using a horizontal search ellipse with major and semi-major axes of 150 m, and minor axis of 8 m. The search was limited to a maximum of two samples per drill hole and required a minimum of two to a maximum of six samples in order to populate a block. The block model was established as a sub-block model with parent blocks of 50 m by 50 m by 4 m and minimum subblocks of 12.5 m by 12.5 m by 2 m.

An *in situ* dry bulk density value was calculated for each sample based on the sample volume measured in the field, mass of sample received at SGS Laboratories in Bor, Serbia ("SGS Bor"), and the loss of moisture measured during sample preparation and drying. The mineral resource estimate tonnage is reported using the *in situ* dry bulk density.

The block model was validated and classified using CIM Definition Standards on Mineral Resources and Mineral Reserves. A variance analysis on the block model determined that blocks supported from five or more samples, within an average distance of 100 m and with the closest sample within 75 metres be classified as Measured Resources, and blocks with greater than three samples within average distance of 150 m be classified as Indicated Resources. No blocks were classified as Inferred Resource.

### **Sampling Collection, Handling and Analysis**

The drilling program was designed in collaboration between EMN and Tetra Tech to provide a robust and evenly distributed sample of the tailings deposits. All Sonic drill core was logged, weighed, sampled and recovery estimated in the field by GET S.r.o of Prague, Czech Republic. Samples were collected to represent two-metre drill core intervals, except where lengths were adjusted to accommodate upper topsoil or lower subsoil intersections, which were not included in the sample.

Drill core was split in the field longitudinally along the core axis with one quarter collected for geochemical sampling, one quarter collected for testwork in Czech Republic, and the remaining half core was collected and stored for further metallurgical testwork. All samples were clearly labelled and stored in vacuum-packed and sealed plastic bags to preserve original moisture content and prevent sample deterioration. Geochemical samples were contained in plastic buckets, inventoried and stored in a locked facility in Prelouc, Czech Republic, prior to being shipped to SGS Bor.

Upon receipt of the samples, the SGS Bor facility weighed the samples and manually homogenized the wet sample using a slab cake method to collect a 500 g split for use in laser diffraction (LD-PSA) particle size analysis. The remaining sample was then recombined, weighed again and dried at 105°C. The dried samples were homogenized using a riffle splitter, crushed and homogenized. A second 500 g split was collected and pulverized to 95% passing a 75µm. SGS Bor conducted the first stage of analytical testing from the pulp which included partial digestion using aqua regia with ICP/MS or AAS, and near total digestion using four acids (nitric, perchloric, hydrofluoric and hydrochloric) with ICP/MS or AAS from 0.5g aliquots, to measure concentration of 48 trace elements including soluble manganese and total manganese, respectively. The remaining pulp was packaged and shipped to SGS Laboratories located in Lakefield, Ontario, Canada, for the second stage of geochemical analysis. Upon receipt of the pulp samples, SGS Lakefield proceeded to analyze the material using lithium borate fusion and x-ray diffraction (XRF) for major concentration of major cation oxide, concentration of in organic sulphur and carbon using LECO furnace, measurement of specific gravity by pycnometer, and for particle size analysis by LD-PSA.

SGS Bor also prepared a second pulp split for every tenth sample which was shipped to Activation Laboratories ("Actlabs") located in Ancaster, Ontario, Canada, an independent umpire laboratory, as discussed below. Actlabs completed trace element analysis by partial and near-total digestion using ICP/MS and AAS, and major cation oxide analysis using lithium borate fusion and XRF.

### **Quality Assurance and Quality Control**

EMN has designed and implemented Quality Control (QC) protocols to identify potential for improper sample handling, analytical error and sample contamination. The protocol included insertion of field duplicates, blank and certified reference samples in all drill holes, collection of sample preparation

duplicate samples from coarse rejects and pulp splits, and completion of an independent umpire laboratory analysis program. Additionally, three holes were drilled in 2018 to twin holes completed in 2017.

All analytical certificates were delivered directly to both EMN and to Tetra Tech allowing Quality Assurance (QA) assessments to be conducted by Tetra Tech. A database was compiled, and various checks and measures were performed by Tetra Tech. No significant QA concerns were identified by Tetra Tech; however, high variability was identified in manganese concentrations reported from the partial and near-total digestion methods. This result prompted the determination that manganese reported by lithium borate fusion and XRF was more reliable and was selected as the basis for total manganese grades for development of the Mineral Resource Estimate. The compiled database was validated for use in Mineral Resource Estimation.

#### **Qualified Person/Data Verification**

The scientific and technical information included in this press release is based upon information prepared and approved by Mr. James Barr, P. Geo, Senior Geologist, and Mr. Jianhui (John) Huang, Ph.D., P. Eng., Senior Metallurgical Engineer, both with Tetra Tech. Messrs. Barr and Huang are consultants to and independent of EMN within the meaning of NI 43-101, and have sufficient experience in the field of activity being reported to qualify as Competent Persons as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resource and Ore Reserves, and are qualified persons, as defined in NI 43-101 - 'Standards of Disclosure for Mineral Projects'. Messrs. Barr and Huang have also undertaken reviews of the quality and suitability of the underlying information used to generate the resource estimation. Mr. Barr visited the property during the 2017 drilling program and again during the 2018 drilling campaign, on July 30-31<sup>st</sup>, 2018, during which time he observed the drilling, sample collection and preparation, sample logging and sample storage facilities.

In addition, technical information concerning the Chvaletice Manganese Project is reviewed by Mr. Gary Nordin, a consultant to EMN and its Chief Geologist, and a Qualified Person under NI 43-101.

A Technical Report prepared under the guidelines of NI 43-101 standards describing the updated Resource Estimate will be filed on SEDAR within 45 days of this release.

#### **Forward-Looking Statements**

Certain statements in this news release constitute "forward-looking statements" or "forward-looking information" within the meaning of applicable securities laws. Such statements and information involve known and unknown risks, uncertainties and other factors that may cause the actual results, performance or achievements of the company, its projects, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements or information. Such statements can be identified by the use of words such as "may", "would", "could", "will", "intend", "expect", "believe", "plan", "anticipate", "estimate", "scheduled", "forecast", "predict" and other similar terminology, or state that certain actions, events or results "may", "could", "would", "might" or "will" be taken, occur or be achieved.

Such statements include, without limitation, statements regarding the continued evaluation and development of the Project, the timing and completion of the PEA for the Chvaletice Manganese Project, initiating of a feasibility study, building of the demonstration plant in the Czech Republic, filing of a environmental impact assessment, related permit applications and a formal project description with the Czech regulatory agencies and local communities, the growth and development of the high purity

manganese products market and any other matters relating to the exploration and development of Chvaletice Manganese Project.

Readers are cautioned not to place undue reliance on forward-looking information or statements. Forward-looking statements and information involve significant risks and uncertainties, should not be read as guarantees of future performance or results and will not necessarily be accurate indicators of whether or not such results will be achieved. A number of factors could cause actual results to differ materially from the results discussed in the forward-looking statements or information, including, but not limited to, the factors discussed under "Risks Notice" and elsewhere in the company's MD&A, as well as the inability to obtain regulatory approvals in a timely manner; the potential for unknown or unexpected events to cause contractual conditions to not be satisfied; unexpected changes in laws, rules or regulations, or their enforcement by applicable authorities; the failure of parties to contracts with the company to perform as agreed; social or labour unrest; changes in commodity prices; and the failure of exploration programs or studies to deliver anticipated results or results that would justify and support continued exploration, studies, development or operations.

This news release also contains references to estimates of Mineral Resources. The estimation of Mineral Resources is inherently uncertain and involves subjective judgments about many relevant factors. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The accuracy of any such estimates is a function of the quantity and quality of available data, and of the assumptions made and judgments used in engineering and geological interpretation, which may prove to be unreliable and depend, to a certain extent, upon the analysis of drilling results and statistical inferences that may ultimately prove to be inaccurate. Mineral Resource estimates may have to be re-estimated based on, among other things: (i) fluctuations in manganese or other mineral prices; (ii) results of drilling; (iii) results of metallurgical testing and other studies; (iv) changes to proposed mining operations, including dilution; (v) the evaluation of mine plans subsequent to the date of any estimates; and (vi) the possible failure to receive required permits, approvals and licences.

Although the forward-looking statements contained in this news release are based upon what management of the Company believes are reasonable assumptions, the Company cannot assure investors that actual results will be consistent with these forward-looking statements. These forward-looking statements are made as of the date of this news release and are expressly qualified in their entirety by this cautionary statement. Subject to applicable securities laws, the Company does not assume any obligation to update or revise the forward-looking statements contained herein to reflect events or circumstances occurring after the date of this news release.

The Company's actual results could differ materially from those anticipated in these forward-looking statements as a result of the factors set forth in the "Risks Notice" section and elsewhere in the company's MD&A for the year ended September 30, 2018 and its Annual Information Form.

#### About Euro Manganese Inc. (EMN).

Euro Manganese Inc. is a Canadian mineral resource company, whose principal focus is advancing the evaluation and development of the Chvaletice Manganese Project, in which it holds a 100% interest. The proposed Project entails re-processing a significant manganese deposit hosted in historic mine tailings, strategically-located in the Czech Republic. EMN's goal is to become a leading, competitive and environmentally-superior supplier of Ultra-High-Purity Manganese Products, serving both the lithium-ion battery industry, as well as producers of specialty steel and aluminum alloys.

Neither TSX Venture Exchange nor its Regulation Services Provider (as that term is defined in the policies of the TSX Venture Exchange) accepts responsibility for the adequacy or accuracy of this release.

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