

**MINERAL RESOURCE AND RESERVE VALUATION
CJSC North-Western Phosphorous Company
Partomchorr Deposit**

KIROVSK, MURMANSK REGION, RUSSIAN FEDERATION



Effective valuation date: January 1, 2011

FINAL REPORT (SUMMARY)

**Prepared for
CJSC North-Western Phosphorous Company
by
International Economic and Energy Consulting / OOO IEEC**

August 2011



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1 INTRODUCTION

1.1 Preface

This report was prepared by International Economic & Energy Consulting (IEEC) incorporated into IMC Montan, at the request of CJSC North-Western Phosphorous Company (hereinafter referred to as NWPC) with a view of valuation of JORC resources and reserves at Partomchorr deposit.

1.2 Capability Statement

IMC Montan is a group of international independent mining consultancies. The group includes IMC Group Consulting Limited (UK), DMT GmbH (Germany), WYG International (UK), International Economic and Energy Consulting and OOO IEEC (UK, Russia).

IMC Montan expertise covers the following: Competent Person Reports; resource audits and evaluation of reserves for mining companies in compliance with international systems of classification; technical, economic and environmental expertise of projects; bankable feasibility study; project development with relation to a wide range of engineering and scientific studies.

More detailed information about IMC Montan is available on www.imcmontan.ru and the websites of the group's other companies.

Project Team and Site Visit

IEEC carried out the valuation with involvement of a group of international and Russian experts. Each expert is a staff member or an experienced associate partner of the company. A list of experts is given below.

John Bacharach	Project Director
Aleksey Zhura	Project Manager
Rakhimbek Kuzembaev	Mining Engineer
Neil Scott/Alexander Pokusaev	Geologists
Andrey Postolatiev	Processing specialist
Galina Vasilieva	Environment specialist

IMC Montan team that visited the site included the following specialists: Rakhimbek Kuzembaev, Alexander Pokusaev, Neil Scott, Aleksey Zhura, Andrey Postolatiev, and Galina Vasilieva.

IMC Montan would like to thank NWPC specialists, especially S.G. Zerschikov, Technical Director, N.A. Kozhevnikov, Head of Technical Department, E.A. Semushina, Chief Geologist, for their effective cooperation and assistance in the preparation of this report.

1.3 Location of Deposit

Partomchorr apatite-nepheline ore deposit is located in Kirovsk district, Murmansk region, 30 km to the east of the railway station of Imandra and 30 km to the north of the town of Kirovsk, in the north-west of the Khibiny mountains.



Figure 1-1 Location Map of Kirovsk district, Murmansk region

1.4 Geology, Resources and Reserves

NWPC has a mining license for extraction of apatite-nepheline ores at Partomchorr deposit registered on November 7, 2006, in the Federal Agency for Subsoil Use at the Russian Ministry of Natural Resources under No. 4742/MUR 13823 TE. The expiration date is November 1, 2026.

Geological exploration of the deposit was carried out thoroughly and in detail in 1972-1978 in compliance with standard procedure established in the Soviet period.

The ore zone is 6 km long at an average thickness of 50-70 m. It is traced to the dip by boreholes down to 150 m. On the plan it has a shape of a stretched triangle. The ore zone structure has gently and steeply dipping elements. Commercial mineralization is confined to the gently dipping element.

Reserves of apatite-nepheline ores estimated as of October 1, 1978, are approved by the USSR GKZ and make up:

Table 1-1 GKZ Apatite-Nepheline Ore Reserves of Partomchorr Deposit as of 01.10.1978

Category	Reserves, '000t				Grade, %		
	Ore	P ₂ O ₅	Al ₂ O ₃	Al ₂ O ₃ acid soluble	P ₂ O ₅	Al ₂ O ₃	Al ₂ O ₃ acid soluble
Balance Reserves							
A	64,660	4,999	10,146	9,407	7.77	15.69	14.44
B	140,491	10,090	22,730	21,279	7.18	16.18	15.15
C ₁	543,198	41,054	90,680	85,096	7.56	16.69	15.67
C ₂	129,098	9,576	22,022	20,719	7.42	17.06	16.05

Category	Reserves, '000t				Grade, %		
	Ore	P ₂ O ₅	Al ₂ O ₃	Al ₂ O ₃ acid soluble	P ₂ O ₅	Al ₂ O ₃	Al ₂ O ₃ acid soluble
Off-Balance Reserves							
A	12,296	345	2,124	1,915	2.81	17.27	15.57
B	35,478	1,013	6,123	5,582	2.86	17.26	15.73
C₁	191,112	5,352	34,658	32,253	2.8	18.13	16.88

Partomchorr deposit has not been mined since 1978. There were no changes of reserves related either to further exploration or reserve re-approval. Therefore reserves listed in 5-gr form reporting changes of reserves to GKZ as of 01.01.2011, fully correspond to the below reserves.

Table 1-2 Partomchorr Reserves as of 01.01.2011 (5-gr form)

Category of Reserves	P ₂ O ₅ , %	Balance Reserves, tonnes	Off-Balance Reserves, tonnes
A	7.77	64,660,000	12,296,000
B	7.18	140,491,000	35,478,000
C ₁	7.56	543,198,000	191,112,000
A+B+C₁	7.50	748,349,000	238,886,000
C ₂	7.42	129,098,000	

Having reviewed the materials presented by NWPC, IMC Montan believes that 1972-1978 exploration of Partomchorr apatite-nepheline ore deposit was carried out at a professional level, findings of the work done are reliable and thanks to that the exploration data are suitable for use in the resource estimate.

IMC Montan has not carried out formal conversion of the site reserves into western classification systems, since this work is time-consuming and requires detailed analysis of exploration data, methodology of estimation and technical and economic factors used for the deposit reserve estimate. However reserves of A, B and C₁ categories within the design boundaries may approximately be equivalent to **Measured** and **Indicated Resources** of the JORC Code classification system.

In the Russian system of classification estimation blocks intersected by numerous exploration boreholes and sampled by means of logged boreholes that are spaced closely are believed to be explored at a sufficient confidence level and represent categories A and B reserves. With reference to the international standards these reserves are equivalent to **Measured Resources**.

Balance reserves of category C₁ may be classified as **Indicated Resources**. Spacing between boreholes in this category is not sufficient to classify resources as **Measured Resources**.

Inferred Resources include category C₂ reserves.

Conversion of GKZ balance reserves to JORC resources carried out by IMC Montan implies that A+B category reserves are equivalent to the **Measured Resources** and reserves of category C₁ are equivalent to the **Indicated Resources**.

1.5 Mining

Partomchorr apatite-nepheline ores are planned to be mined by means of developing an ore mine at a design capacity of 2 Mtpa ore. At the time of the audit the design institute JSC Giproruda was completing the design that in April 2011 was submitted for the state expert's approval.

When necessary, the deposit material base allows building-up the mine production up to 7 Mtpa ore.

1.6 Infrastructure

Infrastructure for operating an ore mine with production of 2 Mtpa will be built at the deposit.

Partomchorr ore is planned to be processed at an additional unit of the Oleniy Ruchey mine processing facility (NWPC has a mining license for this apatite-nepheline ore deposit). Provisionally it is planned to deliver Partomchorr ore from the deposit to the Oleniy Ruchey mine by means of an

overhead ropeway 18 km long. Alternative options considered are use of cable-belt conveyor or construction of a railway line.

1.7 Ore Processing

Technological investigations of Partomchorr ores carried out by Mining Institute KNC RAN support the option of processing the ores to produce apatite and nepheline concentrates of the following quality:

- Apatite concentrate at 39.09% P_2O_5 and recovery of 92.1% P_2O_5 to the concentrate, with the concentrate yield of 15.29%
- Nepheline concentrate at 28.5% Al_2O_3 and recovery of 80.1% Al_2O_3 to the concentrate, with the concentrate yield of 47.47%

Processing 2 Mtpa ore at 6.49% P_2O_5 and 16.89% Al_2O_3 may produce 305.8 and 949.4 kt per year of the apatite and nepheline concentrates respectively with the above quality and quantity parameter values.

There is an option of processing Partomchorr ores directly at the deposit without constructing a processing facility that may be implemented at the Oleniy Ruchey deposit industrial site in two ways:

- a) Construction of an additional unit at the Oleniy Ruchey mine processing facility and its incorporation into the general infrastructure (communications, tailings dam etc)
- b) Combined processing of both deposit ores using processing facilities of the Oleniy Ruchey mine

This report reviews the option of constructing the additional unit at the Oleniy Ruchey mine processing facility to process Partomchorr ores.

1.8 Human Resources

Partomchorr deposit is located in the same area as Oleniy Ruchey mine but somewhat further from residential areas. Extraction and processing of apatite-nepheline ores in the area of the town of Apatity has a history of several decades. Significant part of the population has mastered the required trade and has work experience at similar production facilities.

The towns of Apatity and Kirovsk and nearby communities are sources of workforce for the ore mine.

The number of Partomchorr mine employees is estimated at minimum 500-600 people. And the number of employees at the Oleniy Ruchey mine processing facility unit that will process Partomchorr mine ore will have to be increased by 70-80 people.

1.9 Environment and Restoration

Construction of the ore mine will take account of design solutions and environmental measures aimed at reduction of soil and water body pollution, reduction of flora impact, reduction of the land area withdrawn.

The main targets under the impact of the planned operations are subsoil, surface and underground water, land.

Land rented by NWPC is not for agricultural use. Public health will be the main focus of restoration at all construction sites, with vegetation layer created under a polymeric cover without application of top soil.

Current restoration of the surface changed is planned to start in the process of the deposit exploitation.

Restoration costs for the ore mine industrial site will be estimated after state expert's approval of Partomchorr mining project.

account of the modifiers, especially mining and economic they are upgraded to reserves. There are rigorous principles of quality assessment and data accounting for different commodities produced in mining sector.

International practice is increasingly using the Australasian JORC Code as an industry standard for reporting reserves.

The JORC Code defines **Measured, Indicated** and **Inferred Resources** as follows - in all three cases, they must have reasonable prospects of eventual economic extraction.

Measured Resources

A Measured Mineral Resource is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence.

Indicated Resources

An Indicated Mineral Resource is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence.

Inferred Resources

An Inferred Mineral Resource is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence.

Proved and Probable Reserves

Proved Reserve is the economically mineable part of a Measured Mineral Resource, while a Probable Reserve is the economically mineable part of an Indicated Mineral Resource. JORC Proved and Probable reserves should include allowance for dilution and loss.

Financial Section

Classification of mineral resources under the JORC Code mainly depends on reliability of the geological exploration of the deposit. Further mineral resources are upgraded to reserves based on a number of modifying factors, including mining (proposed realistic mining methods), metallurgical, economic, marketing, legal, environmental, social and governmental factors.

2.3 Comparison of Resource/Reserve Reporting Systems

An international committee, CRIRSCO (Committee for Mineral Reserves Reporting Standards), and representatives of GKZ, approved a uniform procedure for interpreting reserves statements under the Russian system in the framework of international reporting in September 2010. The GRIRSCO classification system is very similar to JORC Code.

Deposit complexity group on geological structure		Russian Reserve and Prognostic Resource Categories					
		← Extent of Geological Exploration Details →					
		A	B	C ₁	C ₂	P ₁	P ₂
Increase of deposit complexity ↓	I	Measured	Measured	Measured	Indicated	Inferred	
	II		Measured	Measured	Indicated	Inferred	
	III			Measured	Indicated	Inferred	
	IV			Indicated	Indicated	Inferred	Unclassified

2.4 Resource Estimate

In this work below IMC Montan reviews methodology that was used for resource estimate of Partomchorr deposit in compliance with the JORC Code (edition of 2004).

IMC Montan experts did not re-estimate the apatite-nepheline ore resources, but verified the GKZ reserves and converted them into JORC resources and reserves (based on NWPC data).

According to the construction project of the ore mine 1st phase developed by JSC Giproruda Partomchorr deposit is planned to be developed using underground mining. The designed ore mine capacity is 2 Mtpa ore. The mine take boundaries are limited by the ore body hanging wall and footwall and by the temporary safety pillar of the Shchuchye Lake to the strike. Mineable reserves were estimated subject to losses and dilution. Losses of 20.03% and dilution of 17.8% were assumed for sublevel mining methods. Mining depth is down to level +90.

Based on the ore body depth and dip angle and small number of waste partings it is planned to use two main mining methods:

- Sub-level caving and trench ore drawing
- Block caving with ore and waste drawing onto the trench bottom

The deposit will be mined leaving 4 pillars of the river and the Shchuchye Lake. Balance ore reserves in pillars are shown in the table below.

Table 2-1 Partomchorr Balance Ore Reserves in Pillars

Reserve Category	Ore, tonnes	P ₂ O ₅ , %	Al ₂ O ₃ total, %	Al ₂ O ₃ acid soluble, %
Pillar 1 (A+B+C ₁)	23,334,800	9.14	15.45	13.98
Pillar 2 (A+B+C ₁)	44,541,300	7.92	16.38	15.21
Pillar 3 (A+B+C ₁ +C ₂)	216,360,700	7.45	17.37	16.38
Pillar 4 (A+B+C ₁)	16,425,100	6.74	15.40	14.44
Pillars total	300,661,900	7.62	16.93	15.91
Category A	25,978,251	7.85	16.09	14.96
Category B	56,444,642	7.29	16.59	15.58
Category C ₁	214,575,807	7.68	17.12	16.11
Total A+B+C₁	296,998,700	7.62	16.93	15.91
Pillar 3 category C ₂	3,663,200	7.36	18.30	17.10

Table 2-2 Partomchorr Mineable Balance Reserves Net of Pillars

Reserve Category	Ore, tonnes	P ₂ O ₅ , %	Al ₂ O ₃ total, %	Al ₂ O ₃ acid soluble, %
A	38,681,749	7.72	15.42	14.09
B	84,046,358	7.11	15.90	14.86
C ₁	328,622,193	7.48	16.41	15.38
Total A+B+C₁	451,350,300	7.43	16.23	15.17
C ₂	125,434,800	7.42	17.02	16.02

JORC Partomchorr resources may be assessed based on NWPC official data of in-situ deposit reserves within the mining delineation broken down into mining levels.

Within the assignment framework IMC Montan reviewed geological plans and cross-sections along survey lines and spacing between exploration boreholes in the presented drilling database, which enabled more accurate ideas on reserve equivalence to different JORC categories.

Based on the above assumptions IMC Montan assessed JORC-equivalent resources as of January 1, 2011.

Table 2-3 JORC Resources within Mine Take Boundaries as of January 01, 2011 Net of Reserves in Pillars

Resource Category	Ore, tonnes	P ₂ O ₅ , %	Al ₂ O ₃ total, %	Al ₂ O ₃ acid soluble, %
Measured	122,728,107	7.30	15.75	14.62
Indicated	328,622,193	7.48	16.41	15.38
Total Measured and Indicated	451,350,300	7.43	16.23	15.17
Inferred	125,434,800	7.42	17.02	16.02

In addition, 300.66 Mt are left in the safety pillars of the river and the Shchuchye Lake. An option of their mining in the long term is being considered.

IMC Montan based JORC reserve assessment on the following considerations:

- According to the international reserve estimation criteria, only **Measured** and **Indicated resources** may be upgraded to reserves
- Reserves are classified only for mineral property having the required detail mine plan level
- Since Partomchorr mine design is at the stage of state expert's approval, currently the deposit resources cannot be upgraded to reserves.