



**NUSH "F E R R O N I K E L I"**  
**GLLOGOVCI/DRENAS**  
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## **Program of Recovery and Production in NUSH "FERRONIKELI"**

economic  
initiative  
for kosova



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## 1. INTRODUCTION

Ferronikeli is an industrial object of special importance for the economy of Kosova. It is built in the Drenas (Glllogovc) municipality where its headquarters are. It belongs to the mining-metallurgical enterprise with two bearing units:

- Mines (Çikatova, Gllavica and geological research)
- Metallurgy

The mine of “Çikatova” is located 1.5 km from the smelter complex whereas the “Gllavica” mine is located 25 km from it. Both of the mines are exploiting with surface extraction method (open pit). The ore from Çikatova is transported to the smelter complex by dumpers that of Gllavica by railway. The following picture presents the ore exploitation process in the Ferronikeli mines. The equipment used at the mines consists of bulldozers, graders, dampers and excavators.



Fig. 1: Exploitation process in the Ferronikeli mines

The decision for building the Ferronikeli plant was taken by the Parliament of Kosova in 1978. Its construction began in 1979. In 1984 the object was inaugurated for experimental work. Prior geological researches gave the proof of geological reserves of the oxide mineral of nickel amounting to 17.500.000 tons with an average content of usable metals of nickel cobalt of 1.32%. Perspective reserves are on more locations in and around Kosova.

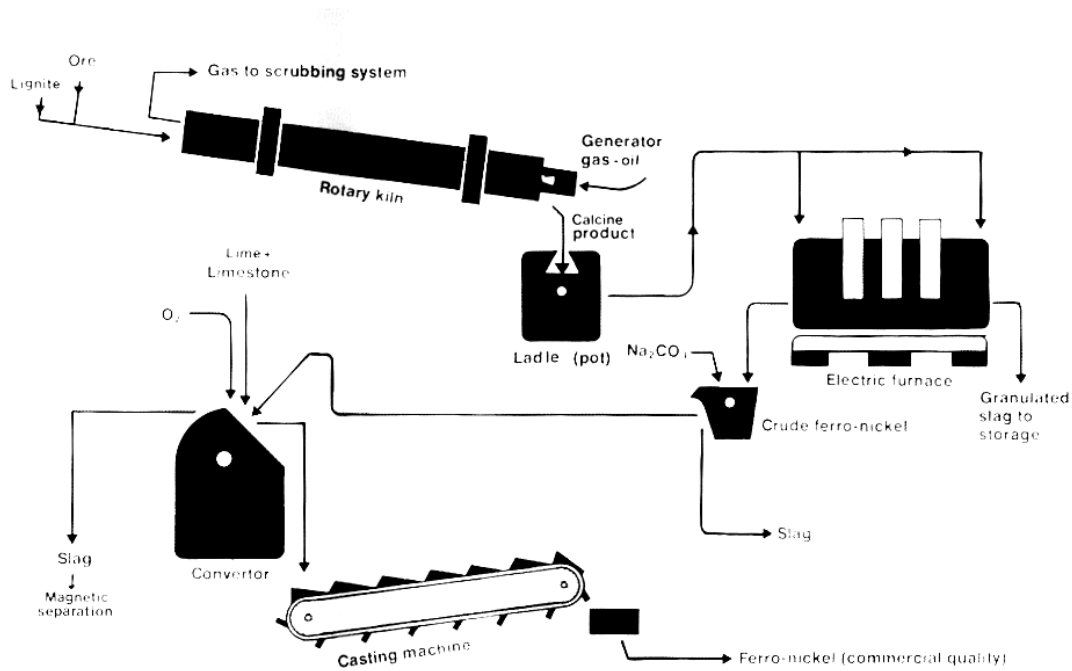
The metallurgical process is based on a small advance preparation of the mineral (its physical homogenization and partial calculation is done in rotary furnaces), direct melting in electrifying furnaces and refining, then the melting to FeNi into a ready made product. Such a technology has conditioned low production costs per unit of the final product (ferronickel in ingots). The greatest production cost participation is the electric power and fluid energy such as gas or generator gas.

The object sees modern technology based on equipment obtained from famous producers as in the following:

- ELKEM technology (furnace etc), Norway
- KRUPP, DEMAG, Germany
- SMIDTH, (rotary kiln), Denmark
- PERLINI, (mine machinery ), Italy
- CATERPILLAR, USA, (mine machinery)
- DEMAG, Germany

The financial construction of Ferronikeli was completed with an overall investment of USD 580 million. In the structure of financial assets of construction the largest proportion comes from foreign sources (75%).

During the construction of the object a permanent professional training of staff at industrial objects of equipment supplying firms was done, as well as at similar plants in the world. The following figure shows the technological scheme and technological way of production in Ferronikeli



FERRO-NICKEL PROCESS FLOW SHEET

Fig.2. Ferronickel Process Flow Sheet

## 2. PRODUCTION AND EMPLOYMENT IN FERRONIKELI FROM 1984 – 1998

The production work of Ferronikeli began in 1984. The maximum production capacity was reached in 1989 and continued to 1991 until the Serbian Parliament introduced arbitrary emergency measures for an enforced administration of the enterprise. The yearly production in Ferronikeli for the above mentioned period is given in the following table and diagram.

Table 1: Yearly Production of Ferronikeli

Year	Production t/Ni	Year	Production t/Ni
1985	2.066	1992	1.807
1986	3.107	1993	313
1987	3.830	1994	610
1988	5.913	1995	780
1989	6.801	1996	2.574
1990	4.932	1997	1.638
1991	2.357	1998	production stop

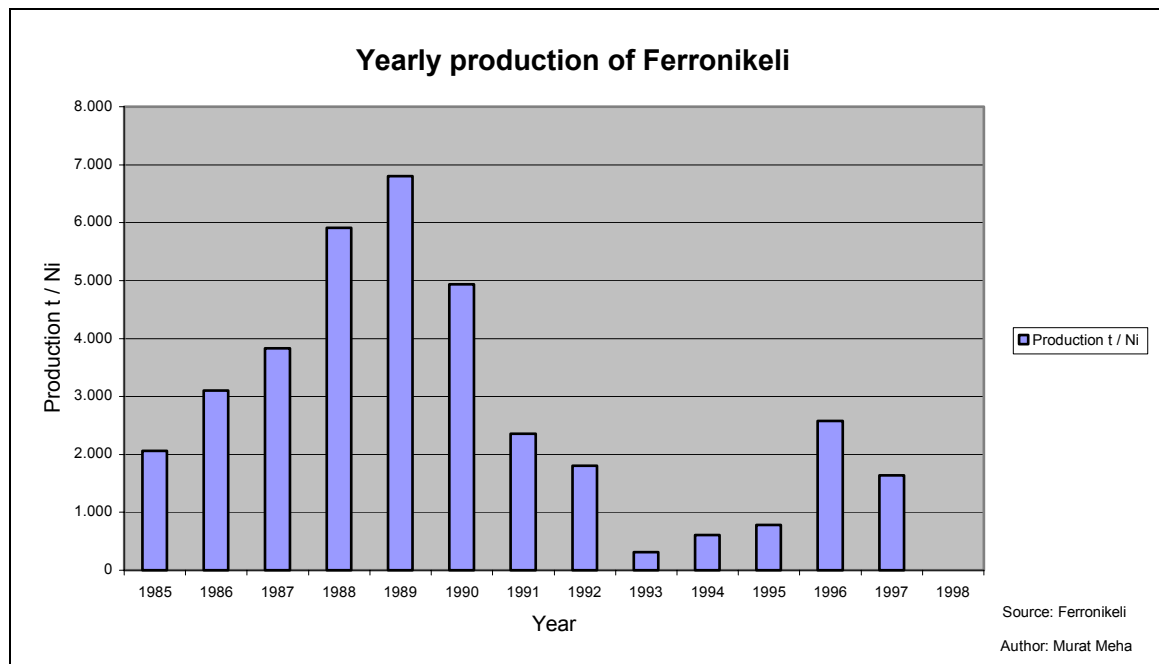


Diagram 1: Yearly production of Ferronikeli

The attained products from the melting of the ore consist from the following average components:

Ni %	Co %	C %	S %	Si %	Cr %	P %	Cu %	Mn %
30-50	1.50	0.01	0.09	0.01	0.01	0.01	0.07	0.001

The production of ferronickel is in ingots of about 25-35 kg after strapped on pallets and this kind of production can be guaranteed also in the future.

Table 2: A comparison of the number of employees in Ferronikeli in 1991 and 1997

Qualification	No. of emp (Aug.`91)	No. of emp. (Aug.`97)
Superior	173	143
High	66	59
Middle	635	575
Various quality	1.122	935
<b>Total</b>	<b>1996</b>	<b>1712</b>

This number of employees will be reduced continually in the coming years, together with a reduction of production and aggravation of business results.

### 3. WAR DAMAGES AT FERRONIKELI

Following the arrival of NATO forces into Kosova conditions were created for our experts to start a visual registration and inception of the object. As a result of this registration a recapitulation of damages caused by the non-professional management of the object during the time of the imposed administration was issued. Now we have registered damages for every position and equipment in tabular form.

These damages consist in a non-professional use of the mineral in the melting plant to continue in the most brutal forms of equipment plundering and alienation of mining mechanisms, and misuse of various funds in violation of legal norms.

Considerable damage was caused after the bombing of some parts of the melting plant and other auxiliary objects by NATO, as the object was turned into a Serb military base.

#### 3.1 Damages:

I. Caused by the non-professional management, abuse and destruction according to units:

- Mines and geological research	USD	7,800,000.00
- Transport	USD	366,050.00
- Metallurgy	USD	7,176,970.00

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<b>Total</b>	<b>USD</b>	<b>15,343,020.00</b>
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II.	Caused by NATO bombing:		
	- Melting plant and auxiliary objects	USD	6,558,646.00
	- Auxiliary infrastructure	USD	398,334.00
	<b>Total</b>	<b>USD</b>	<b>6,956,980.00</b>

Total damage at the Ferronikeli plant are estimated at:

I.		USD	15,343,020.00
II.		USD	6,956,980.00
	<b>Total</b>	<b>USD</b>	<b>22,300,000.00</b>

#### 4. DEVELOPMENT AND PERSPECTIVES OF FERRONIKELI

The estimates for the perspectives of Ferronikeli are very promising, because with a relatively small amount of investment capital, great possibilities are given. Not only the manufacturing of the final products but also the impact on the different economical areas, such as agriculture, building material etc will be influenced from the so called “multiplier effect” as in the following:

1. The installation of new additional capacity on the electricity furnace with a power of 20MVA for sheet-iron production and different armory profiles
2. The production of about 100,000 m<sup>3</sup>/year thermo isolation materials from electricity furnace
3. The production of thermo concrete from old refractory material after the maintenance work on the electrical furnaces

4. The granulation of ferronickel which is very requested in the world market
5. The using of the industrial hot water and the building of a greenhouse with a surface of about 6000 m<sup>2</sup> for the cultivation of vegetables

## **5. CONCLUSIONS**

- Ferronikeli is an industrial object of special importance for the economy of Kosova
- Annual production of Ferronikeli realized in normal conditions (years 1989-91) was about 6 000 t of nickel in ferronickel
- Production is oriented mainly to the western market with an average annual export of USD 40 to 50 million
- Import of production resources amounts 3 - 4 % of the export value, were refractory material, petrol and mazut (black oil) are imported
- Annual accumulation (NETINCOME) is over USD 10 million
- Full projected production may be realized with 1350 – 1450 workers

The production process can be restarted in two phases:

### **5.1 The first phase**

One of the both technological lines with a monthly capacity of 300 tons of nickel in ferronickel can be reactivated in a time limit of 5 – 6 months from the moment of ensuring initial assets amounting to USD 14,668,514.50.

## **5.2 The second phase**

An activation of the second technological line should be possible in a time limit of 5 – 6 months in continuation after ensuring circulating real assets amounting to USD 8,207,578.50.

Nickel's marketing is elaborated in particular for the main partners of the market such as Germany, Italy, Austria, and other countries of Europe.

## **5.3 The strategic schedule for future developments**

- Project contracts or strategic contracts with other similar foreign companies
- Recruitment of foreign capital and the import of new management and technology
- Revitalization of the production of ferronickel

## **5.4 The success of Ferronikeli is based on three fundamental parameters:**

1. The geological reserves are verified
2. The technological production lines are ready to operate
3. The professional staff with over 10 years experience in Ferronikeli is available

Thereby concluded the production process in Ferronikeli should be at a very high and professional level.

<b>Necessary investments on one of the technological lines</b>	<b>Costs in USD</b>
Technological equipment	7,631,680.50
Construction works and linkage	1,657,340.00
Engineering work and measurements	932,194.00
Workers transport, food, wages etc.	447,300.00
Other additional needs on restarting the production	4,000,000.00
<b>Total amount</b>	<b>14,668,514.50</b>

## **6. CALCULATION OF THE COSTS EFFECTIVENESS AND EFFICIENCY FOR PRODUCTION OF 6,000 t / Ni p.a.**

### 1. Mine:

Production costs in exploitation of 827,348.8 t / ore      USD      1,241,023.20

### 2. Production costs in metallurgy:

○ Electric energy	USD	12,001,483.20
○ Fuel oil - Mazut	USD	4,602,060.80
○ Wages	USD	6,408,000.00
○ Taxes	USD	3,379,114.60
○ Cr-Mg bricks	USD	2,303,479.60
○ Refectory costs	USD	704,880.00
○ Lignite	USD	1,040,000.00
○ Limestone for converter	USD	599,760.00
○ Mass of electrode	USD	504,067.50

○ Oil	USD	202,400.00
○ Technical oxygen	USD	783,000.00
○ Sheet iron for electrode covering	USD	263,970.00
○ Workers transport	USD	528,660.00
○ Shamot bricks	USD	51,300.00
○ Tubes of 02	USD	10,000.00
○ Aluminium	USD	8,999.90
○ Ankermix NS 60	USD	9,899.90
○ Ankerfix NSO <sub>2</sub>	USD	6,000.00
○ Na <sub>2</sub> CO <sub>3</sub>	USD	64,227.00
○ Technological water	USD	181,800.00
○ MP + MKZ	USD	406,908.00
○ Other expenses	USD	1,108,910.80
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Total costs in metallurgy	USD	36,409,941.50
Sales price 6,000 t / Ni x USD 7,800.00	USD	46,800,000.00
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<b>Profit / Year</b>	<b>USD</b>	<b>+ 10,390,058.50</b>
Profit Tax 20 %	USD	- 2,078,011.60
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<b>Profit after Taxes</b>	<b>USD</b>	<b>+ 8,312,046.90</b>
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## **7. ACTUAL SITUATION**

Since 1<sup>st</sup> July 1999 in Ferronikeli almost 300 workers and experts are working on preparation and repair of the damaged maintenance. More than a dozen of these workers are hired on guarding the production plant, mines and other appertaining objects. After a detailed study of the war damages by our experts, all defects on power energy and water supply, roofs of the object and some mining machines have been repaired by our specialized teams. Presently big efforts are made on checking and repairing the rotary kilns and furnaces.