50 Years University of Mining and Geology "St. Ivan Rilski"
Annual, vol. 46, part II, Mining and Mineral Processing, Sofia, 2003, pp.23-25

ORE MINING RESTORATION AT DIMOV DOL MINE

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ABSTRACT
Dimov Dol Mine has been in the process of liquidation for 30 months. Mining has been discontinued and personnel dismissed. No maintenance has been undertaken of work places, machines or equipment, exclusive of drainage.
The paper presents a technology for repair, restoration, organizational and technical activities aiming at creation of a profitable mining company in the condition of transition to market economy.

INTRODUCTION

Dimov Dol Mine is one of the three mines of Gorubso-Rudozem Company in the city of Rudozem. By virtue of order of the Minister for Finance № 148 / 02.04.99, the mine was declared in liquidation, and in May all activity was discontinued and the personnel dismissed. For more than 30 months only drainage has been maintained in the mine. No funds are allocated or actions undertaken for maintenance and preservation of mining equipment. Mining and geological conditions and mine micro-climate adversely affect mine roads, machines and electrical equipment. Faces are falling, electric motors and cables are wetted, all mechanical equipment is corroding. Part of the tools and equipment in mining blocks is buried by self-caving rock.

Under these conditions, on 08.11.2001 the mine was privatized by Rudmetal Company in Rudozem. They set the following objectives:

- To complete restoration works and the mine to resume ore extraction as fast and as efficiently as possible;
- To undertake actions ensuring mine viability, i.e. the mine to become profitable.

RESTORATION TECHNOLOGY

Immediately after execution of privatization contract, restoration work commenced in order to make operable the major machines and equipment as soon as possible and to prepare faces for ore mining.

The first issue to be resolved is the type of organization that has to be established so that, after completion of certain activity, safe condition swill be ensured for commencing several new ones. On the basis of this organization, the hiring schedule was developed.

The work started with restoring of shaft winding. Inspection, repair and adjustment of all major components and systems were carried out, namely: lacing of driving drum, brake system, pneumatic pack, electric drive, G-D group, tiristor transducer, and associated lock and guard systems, mechanized car exchange, shaft signaling. At Golyam Palas – North shaft, which had been out of operation for 6 months, main ropes were replaced and 400 m of steel guides.

After ensuring normal access to the mining section, road repair started in order to access the blocks themselves. Thanks to the good organization, in two months over 2500 m of horizontal and 300 m vertical roads were re-supported Restoration in blocks proceeded in stages depending on the time needed to access them, the amount of work and available materials and workforce. This is why ore mining did not commence simultaneously on all faces but in stages depending on completion of restoration work and ensuring of safe working conditions. Restoration works started with 72 workers and finished with 147.

Simultaneously, a time schedule was developed for mining equipment repair and commissioning of major facilities – compressors, capital ventilation facility (CVF), Machines that could be taken out of the mine, were repaired in mechanical and electrical shops (MS and ES). Mine battery locomotives, pulling stations, trolley net, power and lighting installations were repaired on site after providing access thereto and ensuring safe conditions.

The time schedule of repair works is shown in Table 1.

Table 1. Time schedule of repair and restoration works

Activity	I-st month	II-nd month	III-rd month	IV-th month
Shaft winding				
Horizontal roads				
Vertical workings				
Mining blocks				
Compressors				
Ventilation facility				
Mining equipment				
Ancillary shops and units				

Along with restoration works in the mine, all ancillary shops and service units were also commissioned in compliance with the new conditions for normal mine activity. Timber support shop was put into operation and the workers' canteen. The communal building was reconstructed in view of expected number of personnel. A model heating system was built, shower and laundry rooms.

This organization of work allowed the mine to resume operation of all mining blocks in four months.

HOW TO MAKE THE LOSING MINE PROFITABLE?

During the last 10 years, before declaring liquidation, the mine had been incurring losses. Efficiency increase is additionally impaired by the following circumstances:

- There in no ore processing factory at the mine and a much higher price has to be paid for processing;
- Mining conditions are extremely difficult and require employing of high labor consuming and low productivity mining system, namely "layer caving";
- Drainage is difficult because water collection area is very large and mining in concentrated in a small section.

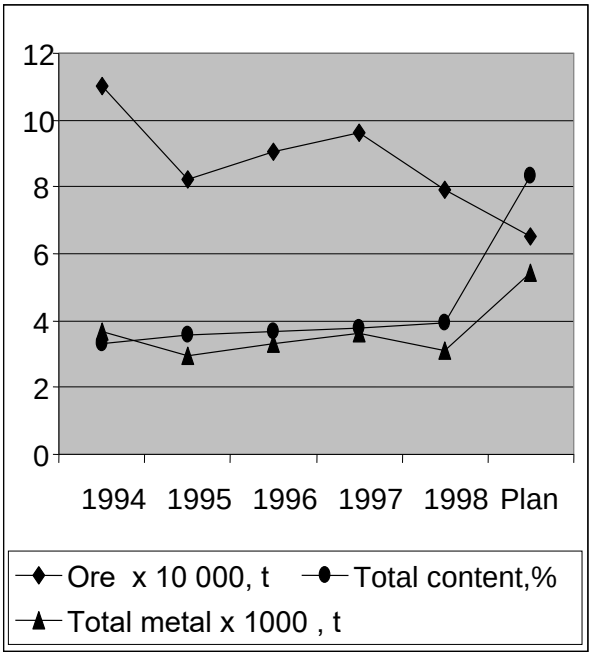
With these conditions, the planned measures have to radical. The paper focuses on the most important of those.

First: Complete change of extracted ore quality, mainly in terms of metal and moisture content. The main production (approximately 75) is meta-somatic ore with much higher metal content supplemented by one block in the thin ore section. Cumulative (lead + zinc) content exceeds 8 %, which is approximately 2.5 time higher than production in the last five years, prior to liquidation. This is shown in table 2.

Table 2. Production of lead-zinc ore

Year	Ore, thou t	Total content	Total metal
1994	110.2	3.33	3672
1995	82.3	3.56	2930
1996	90.5	3.65	3303
1997	96.2	3.76	3614
1998	79.2	3.93	3113
Plan	65.0	8.35	5427

Figure 1. Production of lead-zinc ore



Ore moisture content is also significantly less. Earlier ore was mine with moisture content from 10 to 14 %, now it is 4-5 %. This facilitates transport and reduces costs.

Second: Personnel optimization. Workforce is reduced by some 30 %, working on the lower limit. For the purpose of working time optimization, all ancillary workers were additionally qualified and assigned with minimum two professions.

Table 3. Production of t metal per man per year

Year	Total metal	Workforce	t metal/man
1994	3672	284	12.93
1995	2930	283	10.35
1996	3303	284	11.63
1997	3614	296	12.21
1998	3113	251	12.40
Plan	5427	171	31.74

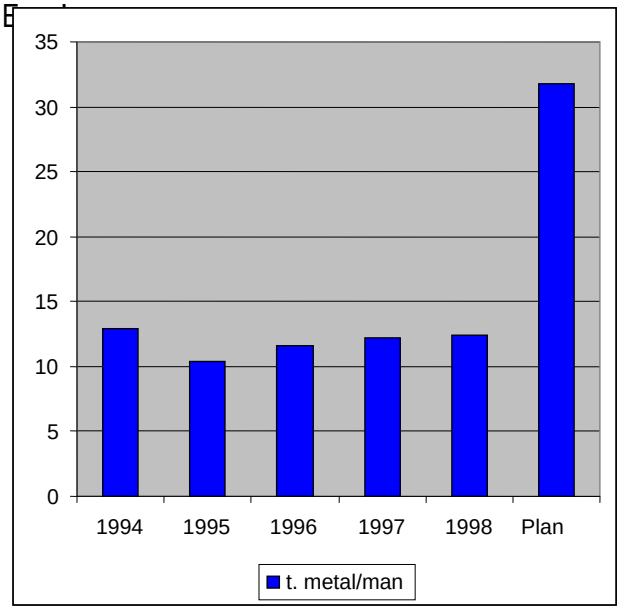


Figure 2. Production of t metal per man per year

As drainage costs are fixed, a continuous mining regime was introduced. Sunday is the only day off (first and second shifts) and then maintenance is carried out.

Third: New payment system. Salary is based on saleable production. Most volumetric indices were abandoned. The main index is total metal production.

The effect of these measures is seen in table 3 and on fig. 3. Earlier, 10 to 12 t metal was produced per man per year, not these are 31, i.e. nearly three times more.

Fourth: New technical solutions in all fields aiming at significant material cost reduction:

- Drainage. Reconstruction of old and useless mine workings into water collectors so that pumping could only proceed during night shifts when electricity price is the lowest;
- Compressors. Optimization of compressed air supply by eliminating one compressor facility and all excessive pipelines
- Ventilation. Efficiency increase of the main ventilation unit. Compaction of ventilation routes. Streamlining of ventilation flow by means of ventilation doors and barriers;
- Power consumption. Measures are undertaken ensuring reduction of both total power consumption and power redistribution in different zone in order to lower the average cost. Operation of big consumers is restricted in peak hours.

In addition to the above said, measure for increase of labor productivity are undertaken, for optimization of mining system, for reduction of all material costs, for transportation arrangement improvement, etc.

CONCLUSION

In the last ten years economic reforms are under way in our country for transition to market economy. Under these conditions, turning a losing mine into a profitable one is an extremely difficult task. On the one hand, economic conditions in the country are constantly changing, on the other hand – world economic trends have direct impact thereon. For example, non-ferrous metal price fall on London Metal Exchange has a direct impact on mining efficiency. Notwithstanding that, experience shows that where resources are put to maximum utilization and new solutions are employed, the objective can be reached.

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Recommended for publication by Department of Underground mining, Faculty of Mining Technology