#### THE MINERAL INDUSTRY OF

## **BOSNIA AND HERZEGOVINA**

By Walter G. Steblez<sup>1</sup>

In 1994, Bosnia and Herzegovina remained under extreme duress from the ongoing the civil war. Before the outbreak of the civil war, the country was a major producer of minerals and heavy industrial products in the former Yugoslavia. However, the operational status of many of these industries in 1994 remained uncertain because of the continuous fighting that reportedly occurred in close proximity to these facilities. In addition, the damage incurred by the country's industry and infrastructure had been severe. According to information supplied by sources in Serbia and Montenegro, the Serbian-controlled areas of Bosnia and Herzegovina (about 70% of the country's total territory), known as the "Srpska republic," controlled substantial proportions of Bosnia and Herzegovina's mineral resources. According to the Bosnian-Serb Chamber of Commerce, the share of mineral resources within Serbian-dominated areas of Bosnia and Herzegovina were as follows: bauxite, 12%; brown coal, 37%; gypsum, 88%; iron ore, 68%; lead and zinc ore, 35%; lignite, 12%; and quartz, 89%.<sup>2</sup>

The production table for Bosnia and Herzegovina was compiled from data presented in a variety of statistical publications of the former Yugoslavia through 1991. The major portion of the country's production statistics, however, was obtained from "Industrijska Proizvodnja," an annual statistical compendium published in Belgrade through 1990 that presented production data by constituent Federal republics, as well as by total output for the former Yugoslavia. Statistical information on the country's mineral production for 1992-93 was not available because of the war. Presumably, when and where possible, the Government provided assistance to industries, including those in the minerals sector, that could help maintain employment and assist in the country's defense. Estimates were based on known capacities and available press reports concerning the status of industrial operations in the country. (See table 1.) Moreover, detailed official information concerning foreign trade for 1994 also was unavailable. Table 2, which lists the apparent administrative bodies as well as subordinate production units of the main branches of the country's mineral industry for 1994, was based on known industrial capacities prior to the outbreak of the civil war. (See table 2.)

Before the dissolution of the Federal Republic of Yugoslavia and the subsequent civil war, Bosnia and Herzegovina was a major center for metallurgical industries in the former Yugoslavia. The country's total output of steel,

in recent years, ranged between 38% and 39% of total steel production for Yugoslavia during the same periods. The Rudarsko Metalurški Kombinat plant at Zenica, with a combined production capacity in excess of 2 million metric tons per year, in 1990, accounted for 53% of the former Yugoslavia's output of steel produced in oxygen converters and 62% produced by the open-hearth method.

Bosnia and Herzegovina also was a major producer of bauxite, alumina, and aluminum in the former Yugoslavia, respectively accounting for about 58%, 68%, and 26% of total output of these commodities in 1990. Production of bauxite, alumina, and aluminum was administered by Energoinvest. Bauxite was produced at mines in Vlasenica, Jajce, and Bosansksa Krupa, among others. Alumina refineries were operated at Birac-Zvornik and Mostar; the aluminum smelter also was at Mostar, the center of the aluminum fabricating and aircraft industries in the former Yugoslavia. The production of other nonferrous metals included only a relatively small amount of lead and zinc ore mined and milled at Srebrenica, the focal point of major battles during the year. Bosnia and Herzegovina was a major producer of asbestos, barite, gypsum, and salt, accounting respectively for about 81%, 92%, 63%, and 100% of the total output of these commodities in the former Yugoslavia The country also produced cement, clays, dimension stone, dolomite, sand and gravel, as well as other industrial minerals that met most of its industrial needs.

Bosnia and Herzegovina's SOUR Titovi Rudnici Uglja Tuzla, the country's dominant coal producer, mined brown coal and lignite that were consumed primarily by the country's thermal electric power stations. Bosnia and Herzegovina's refineries, operated by Energoinvest at Bosanski Brod, were entirely dependent on deliveries of natural gas and petroleum from outside the country. Reportedly, the Bosanski Brod refineries were extensively damaged in April 1993 during local fighting. Petroleum pipelines were 174 km in length; however, data for natural gas pipelines were not available.

The eventual transformation of Bosnia and Herzegovina's economy to a market-based system will require a reevaluation of the country's mineral resources from a market perspective. For a detailed explanation of the system that was used to determine reserves in the former Yugoslavia, see the reserve section in "The Mineral Industry of Russia" report in this publication series.

Most of Bosnia and Herzegovina's heavy industrial

facilities, including those in the minerals sector, reportedly had been heavily damaged during the year. Although the extent of the damage was not clear, general information released from the areas of conflict showed significant destruction of the country's infrastructure and massive dislocations of regional populations. The process of reconstruction that should follow the resolution of the country's conflicts should be extensive and would call for maximum use of the country's domestic sources of metals, industrial minerals, and fuels.

#### **Major Sources of Information**

Energoinvest, SP Sarajevo 71000 Tvornicka 3, vidi str. 74. Bosnia and Herzegovina

#### **Major Publication**

Privredni Adresar SFRJ, 27/1991 (Trade Directory of Yugoslavia) Belgrade, 1991.

<sup>&</sup>lt;sup>1</sup>Text prepared in Mar.1995.

<sup>&</sup>lt;sup>2</sup>Foreign Broadcast Information Service (FBIS). EEU-94-071, Apr. 13, 1994, p. 40, from Politika (Belgrade) Mar. 15, 1994, p. 14.

### ${\bf TABLE~1}\\ {\bf BOSNIA~AND~HERZEGOVINA:~ESTIMATED~PRODUCTION~OF~MINERAL~COMMODITIES~1/}$

(Metric tons unless otherwise specified)

Commodity 2/	1990	1991	1992	1993	1994
METALS					
Aluminum:					
Bauxite	1,700,000	900,000	200,000	100,000	75,000
Alumina	735,000	500,000	100,000	50,000	50,000
Metal, ingot; primary and secondary	89,000	84,000	30,000	15,000	15,000
on and steel:					
Ore and concentrate:					
Ore, gross weight	4,090,000	2,500,000	500,000	250,000	200,000
Ore, Fe content	1,580,000	800,000	150,000	70,000	70,000
Agglomerate	1,890,000	1,000,000	200,000	50,000	50,000
Metal:					
Ferroalloys:					
Ferrosilicon	34,000	17,000	5,000	1,000	1,000
Silicon	12,000	7,000	2,000	200	200
Pig iron	1,280,000	1,000,000	150,000	100,000	100,000
Crude steel:					
From oxygen converters	907,000	600,000	100,000	90,000	90,000
From Siemens-martin furnaces	490,000	150,000	30,000	20,000	20,000
From electric furnaces	251,000	18,000	5,000	5,000	5,000
Total	1,648,000	768,000	135,000	115,000	100,000
Semimanufactures	1,100,000	800,000	200,000	150,000	100,000
ead:					
Mineral concentrator output:					
Ore, gross weight (Pb Zn ore)	608,000	300,000	50,000	10,000	10,000
Pb content of ores	11,100	5,000	800	200	200
Pb concentrate	15,000	7,000	2,000	400	400
Metal, smelter, primary and secondary	260	400	250	100	100
Anganese ore:					
Gross weight	50,900	40,000	10,000	2,000	2,000
Mn content	17,800	14,000	3,500	600	600
inc:	,	,	,		
Zinc content of Pb-Zn ore	15,200	10,000	2,000	350	300
Concentrate output, gross weight	25,000	13,000	3,000	600	600
INDUSTRIAL MINERALS					
Asbestos, all kinds	3,970	4,400	500	500	500
Barite concentrate	23,600	17,000	3,000	2,000	2,000
Cement thousand tons	797	750	150	150	150
Clays: 3/					
Bentonite		6,000	1,000	800	800
Ceramic clay, crude	140,000	100,000	20,000	20,000	20,000
Caolin:		,	,	,	
Crude	31,000	19,000	3,000	3,000	3,000
Calcined	12,000	10,000	1,500	1,500	1,500
Sypsum:					
Crude	370,000	230,000	50,000	30,000	30,000
Calcined	47,000	21,000	4,000	3,000	3,000
ime thousand tons	520	350	50	50	50
Magnesite, crude	16,000	10,000	2,000	2,000	2,000
Vitrogen: N content of ammonia	25,000	20,000	5,000	2,000	2,000
Ouartz, quartzite, glass sand:	-,	.,	- ,	,	_,
Glass sand	324,000	400,000	50,000	50,000	50,000
alt, all sources	303,000	300,000	70,000	50,000	50,000
and and gravel, excluding glass sand thousand cubic meters	2,500	2,500	500	500	500
odium compounds:	2,300	2,500	300	300	500
Soda ash	173,000	140,000	25,000	20,000	20,000
Caustic soda	95,000	70,000	20,000	10,000	10,000
Sodium bicarbonate	15,000	10,000	2,000	1,000	1,000
tone, excluding quartz and quartzite:	15,000	10,000	2,000	1,000	1,000
Dimension: Crude:					
Ornamental square meters	3,000,000	250,000	50,000	20,000	20,000
Other cubic meters	16,000	15,000	5,000	2,000	2,000
					500
	thousand cubic meters 3,000 3,000 500 500 9 8 2 1		500 1		
ulfur: Byproduct of metallurgy  MINERAL FUELS AND RELATED MATERIALS	9	δ	2	1	1
oal:	0.620	0.500	2.500	1 000	1 000
Brown coal thousand tons	9,630	9,500	2,500	1,000	1,000
Lignite do.	8,530	8,000	2,000	1,500	1,500
Coke	1,750	850	150	100	100
Refinery products thousand 42-gallon barrels	23,000	18,000	2,000		

<sup>1/</sup> Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits.

<sup>2/</sup> Table includes data available through Mar. 1995.

<sup>3/</sup> In addition to commodities listed, common clay was also produced, but available information is inadequate to make reliable estimates of output levels.

# TABLE 2 BOSNIA AND HERZEGOVINA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Alumina Energoinvest Plants at Birac-Zvornik Do. do. Plant at Mostar Aluminum do. Smelter at Mostar Bauxite do. Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations.  Coal:  Brown SOUR Titovi Rudnici Uglja, Tuzla Mines in BiH Lignite do. do.  Cement Gik Hidrogradnja, Tvornica Cementa BiH Ferroalloys Elktrobosna, Elektrohemijska i Eletrotermijska Industrija Iron ore Rudarsko Metalurski Kombinat Zenica Radovan Lead-zinc ore Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Refinerija Nafte Bosanski Brod Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Lead-citlica do. Lead-citlica	Annual capacity	Location of main facilities	Major operating companies	Commodity	
Aluminum do. Smelter at Mostar Bauxite do. Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations.  Coal:  Brown SOUR Titovi Rudnici Uglja, Tuzla Mines in BiH Lignite do. do. Cement Gik Hidrogradnja, Tvornica Cementa BiH  Ferroalloys Elktrobennijska i Eletrotermijska Industrija Iron ore Rudarsko Metalurski Kombinat Zenica Radovan Lead-zinc ore Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and mill at Srebrenica Manganese, ore Energoinvest Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) 2 blast furnaces at Zenica Lead-zinc ore Rudarsko metalurski Kombinat Refined thousand barrels per day Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) 2 blast furnaces at Vares Lectric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	600	Plants at Birac-Zvornik	Energoinvest		Alumina
Bauxite do. Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations.  Coal:  Brown SOUR Titovi Rudnici Uglja, Tuzla Mines in BiH Lignite do. do. Cement Gik Hidrogradnja, Tvornica Cementa BiH Ferroalloys Elktrobosna, Elektrohemijska i Plant at Kakanj  Iron ore Rudarsko Metalurski Kombinat Zenica Radovan  Lead-zinc ore Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and mill at Srebrenica Manganese, ore Energoinvest Mine and concentrator at Buzim  Petroleum: Refined thousand barrels per day Bosanski Brod  Pig iron Rudarsko metalurski Kombinat A blast furnaces at Zenica Zenica (RMK Zenica) 2 blast furnaces at Vares Do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	280	Plant at Mostar	do.		Do.
Bosanska Krupa, Posusje, Listica, Citluk, and other locations.   Coal:   Brown	92	Smelter at Mostar	do.		Aluminum
Coal:  Brown SOUR Titovi Rudnici Uglja, Tuzla Mines in BiH Lignite do. do. Cement BiH Ferroalloys Elktrobesna, Elektrohemijska i Eletrotermijska Industrija Iron ore Rudarsko Metalurski Kombinat Zenica Radovan Lead-zinc ore Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and concentrator at Buzim Petroleum: Refined thousand barrels per day Ferroalloys: Rudarsko metalurski Kombinat Ablast furnaces at Zenica 2 Senica (RMK Zenica) Do. Rudarsko metalurski Kombinat Ablast furnaces at Jljias Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:		Mines at Vlasenica, Jajce,	do.		Bauxite
Sour Fitovi Rudnici Uglja, Tuzla   Mines in BiH		Bosanska Krupa, Posusje, Listica,			
Brown SOUR Titovi Rudnici Uglja, Tuzla Mines in BiH Lignite do. do.  Cement Gik Hidrogradnja, Tvornica Cementa BiH  Ferroalloys Elktrobosna, Elektrohemijska i Eletrotermijska Industrija  Iron ore Rudarsko Metalurski Kombinat Zenica Radovan  Lead-zinc ore Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and concentrator at Buzim  Petroleum:  Refined thousand barrels per day Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Ablast furnaces at Zenica Zenica (RMK Zenica) Ablast furnaces at Vares  Bleetric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	2,000	Citluk, and other locations.			
Lignite do. do. Cement Gik Hidrogradnja, Tvornica Cementa BiH  Ferroalloys Elktrobosna, Elektrohemijska i Eletrotermijska Industrija  Iron ore Rudarsko Metalurski Kombinat Zenica Binergoinvest Manganese, ore Manganese, ore Manganese, ore Petroleum:  Refined Thousand barrels per day Petroleum  Energoinvest: Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Asfinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Asfinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Aslast furnaces at Vares Belectric reduction furnaces at Iljas  Salt Cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:					Coal:
Cement BiH Ferroalloys Elktrobosna, Elektrohemijska i Eletrotermijska Industrija Iron ore Rudarsko Metalurski Kombinat Zenica Manganese, ore Mangan-Energoinvest Mine and concentrator at Buzim Petroleum: Refined Thousand barrels per day Pig iron Rudarsko metalurski Kombinat Refined Refinerija Nafte Bosanski Brod Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) do. Electric reduction furnaces at Iljas Salt Cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	12,000	Mines in BiH	SOUR Titovi Rudnici Uglja, Tuzla		Brown
Ferroalloys Elktrobosna, Elektrohemijska i Eletrotermijska Industrija  Iron ore Rudarsko Metalurski Kombinat Zenica Radovan  Lead-zinc ore Manganese, ore Manganese, ore Mefined Refined Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica Radovan  Energoinvest Mine and mill at Srebrenica Mine and concentrator at Buzim  Energoinvest Refinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) A blast furnaces at Zenica Zenica (RMK Zenica) A blast furnaces at Vares Belectric reduction furnaces at Iljas  Salt Cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	7,000	do.			Lignite
Ferroalloys  Elktrobosna, Elektrohemijska i Eletrotermijska Industrija  Iron ore  Rudarsko Metalurski Kombinat Zenica  Energoinvest Mine and mill at Srebrenica Manganese, ore Mangan-Energoinvest Mine and concentrator at Buzim  Petroleum:  Refined thousand barrels per day Bosanski Brod  Pig iron  Rudarsko metalurski Kombinat Zenica (RMK Zenica)  do. Electric reduction furnaces at Iljas  Salt  cubic meters per year  Hemijski Kombinat "Sodaso,"  Rock salt:		Plant at Kakanj	Gik Hidrogradnja, Tvornica Cementa		Cement
Eletrotermijska Industrija     Iron ore	650				
Iron ore Rudarsko Metalurski Kombinat Zenica Radovan  Lead-zinc ore Energoinvest Mine and mill at Srebrenica  Manganese, ore Petroleum:  Refined Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) A blast furnaces at Zenica Zenica (RMK Zenica) Cubic meters per year  Hemijski Kombinat "Sodaso," Rock salt:		Plant at Jajce	Elktrobosna, Elektrohemijska i		Ferroalloys
ZenicaRadovanLead-zinc oreEnergoinvestMine and mill at SrebrenicaManganese, oreMangan-EnergoinvestMine and concentrator at BuzimPetroleum:Refinedthousand barrels per dayEnergoinvest: Rafinerija Nafte Bosanski BrodRefinery at Bosanski BrodPig ironRudarsko metalurski Kombinat Zenica (RMK Zenica)4 blast furnaces at ZenicaDo.do.Electric reduction furnaces at IljasSaltcubic meters per yearHemijski Kombinat "Sodaso,"Rock salt:	80		<u> </u>		
Lead-zinc ore  Manganese, ore Petroleum:  Refined thousand barrels per day Energoinvest: Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Do.  do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rine and mill at Srebrenica Mine and concentrator at Buzin			Rudarsko Metalurski Kombinat		Iron ore
Manganese, ore Petroleum:  Refined thousand barrels per day Energoinvest: Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica)  Do.  do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	5,000				
Petroleum:  Refined thousand barrels per day Energoinvest: Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat Zenica (RMK Zenica) Do. do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	300	Mine and mill at Srebrenica	Energoinvest		Lead-zinc ore
Refined thousand barrels per day Energoinvest: Rafinerija Nafte Bosanski Brod  Pig iron Rudarsko metalurski Kombinat 4 blast furnaces at Zenica Zenica (RMK Zenica) 2 blast furnaces at Vares Do. do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	100	Mine and concentrator at Buzim	Mangan-Energoinvest		Manganese, ore
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Do.  Zenica (RMK Zenica)  do.  Electric reduction furnaces at  Iljas  Salt  cubic meters per year  Hemijski Kombinat "Sodaso,"  Rock salt:	100	Refinery at Bosanski Brod	č j	thousand barrels per day	Refined
Do. do. Electric reduction furnaces at Iljas  Salt cubic meters per year Hemijski Kombinat "Sodaso," Rock salt:	2,250	4 blast furnaces at Zenica	Rudarsko metalurski Kombinat		Pig iron
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	100	Iljas			
D 1 '1 O 1' O 1 ' D ' M' M' M'		Rock salt:	Hemijski Kombinat "Sodaso,"	cubic meters per year	Salt
Rudnik Soli i Solni Bunari Mines at Tusanj	120,000	Mines at Tusanj	Rudnik Soli i Solni Bunari		
Do. do do. Production from brine at Tuzla,		Production from brine at Tuzla,	do.	do	Do.
BiH 2	2,000,000	ВіН			
Steel, crude Rudarsko Metalurski Kombinat Plant at Zenica		Plant at Zenica	Rudarsko Metalurski Kombinat		Steel, crude
Zenica	2,060		Zenica		