

Table of Contents

1.0	INTRODUCTION	1
1.1	General Background	1
1.2	Project Objectives and Scope	1
1.2.1	RTB Bor Existing Operations	1
1.2.2	Overview of World Bank/Government of Serbia Regional Development Project	2
1.2.3	RTB Bor Copper Smelter – Acid Plant Modernization Project	5
1.3	Project Location and Access to Site	8
1.4	Background Information	11
1.4.1	Existing Documents	11
1.4.2	Information Assembled By Technical Team	11
1.5	Study Authors-Contributors	11
1.6	Contents of the Environmental Impact Assessment	12
1.6.1	Volume 1 – Main Report	12
1.6.2	Volume 2 – Technical Supporting Documents	13

List of Tables

Table 1.5.1	Contributing Authors for RTB BOR Smelter Moderization/Reconstruction Project Environmental Impact Assessment	12
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List of Figures

Figure 1.3.1	Locational Map of Serbia Showing Location of Town Bor, Close to Bulgarian Border	8
Figure 1.3.2	Transportation Access to Bor via the Black Sea and the Danube River	9
Figure 1.3.3	The Bor Community and the Bor Mining Complex	10

SECTION 1

INTRODUCTION

1.0 INTRODUCTION

1.1 General Background

RTB-Bor is proposing to undertake upgrades to its smelter operations located in Bor, Serbia which include a new flash smelter and sulphuric acid plant. The proposed project is based upon a comprehensive review of the environmental and social issues relating to RTB- Bor operations that were outlined in an UNEP Mission Report in 2002, and a World Bank Study Environmental Assessment Study completed in 2006. One of the key recommendations of the World Bank Study was to undertake a modernization of the smelter operations.

In 2005, RTB Bor retained the services of SNC-Lavalin (UK) to undertake an evaluation of the existing smelter. In 2009, RTB Bor (RTB) retained the SNC-Lavalin International Inc., (SNC-Lavalin) to carry out an Engineering Feasibility Study for the Modernization of the Existing Copper Smelter, New Sulphuric Acid and Effluent Treatment Plant Project (“The Project”).

RTB Bor has recently entered into an agreement with SNC-Lavalin to upgrade the smelter by adding a new flash furnace, sulphuric acid plant and auxiliary facilities. SNC-Lavalin will be the prime contractor for the engineering, procurement and construction for the project – which is expected to take 36 months to complete.

Export Development Canada (EDC) is providing financing to RTB-Bor for the project and such financing is guaranteed by the Government of Serbia.

This Environmental Impact Assessment (EIA) document is being prepared to meet the requirements of the Environmental Directive of EDC so their financing obligations are met.

RTB Bor has assembled the EIA Documentation through technical information developed in-house within RTB Bor, and through the assistance of technical experts from the University of Belgrade and SNC-Lavalin.

1.2 Project Objectives and Scope

1.2.1 RTB Bor Existing Operations

RTB Bor is an integrated copper mining complex, which is considered to be one of the most important producers of copper and precious metals in Central Eastern Europe, with active production dating back to 1903. As a significant contributor to the economy of Serbia, a modernization program of the mining and smelter complex has been initiated to increase capacity and operational efficiency while meeting environmental objectives.

1.2.2 Overview of World Bank/Government of Serbia Regional Development Project

In order to promote sustainable economic development in the project area, the Serbian Government, with RTB, founded the Bor Regional Development Project. This reconstruction project will act as a springboard for development and economic diversification in the Bor area and beyond.

The Bor Regional Development Project is based upon a number of background studies that have focused on the environmental problems that have arisen through almost 100 years of copper mining by RTB Bor and its predecessors.

The Bor regional development project is fully described in World Bank Report entitled,

"PROJECT APPRAISAL DOCUMENT ON A PROPOSED LOAN IN THE AMOUNT OF EUR 24.3 MILLION (US\$33.0 MILLION EQUIVALENT) AND A PROPOSED CREDIT IN THE AMOUNT OF SDR 6.6 MILLION (US\$10.0 MILLION EQUIVALENT) TO THE REPUBLIC OF SERBIA FOR A BOR REGIONAL DEVELOPMENT PROJECT May 25,2007"

The overall Bor Project will be financed through a combination of IDA Credit (\$10 million) and IBRD Loan (\$32.34 million). Credit proceeds will be used exclusively for remediation of the pressing environmental trouble spots (Component A.2). The Project will augment substantial resources allocated by the Government of Serbia (GOS) towards the development of Bor region under the National Investment Plan (NIP), with EUR 10.25 million earmarked for related activities in Bor and Majdanpek municipalities.

Project Development Objective (PDO)

The development objective of the Project is to support the GoS' efforts to revive the depressed Bor region through: (i) dealing with urgent environmental and social legacy issues arising from mining sector restructuring; and (ii) fostering new sources of economic growth and job creation in the region.

Key performance indicators are as follows:

- management of state environmental liabilities in a technically sound manner;
- progress in remediation of environmental trouble spots;
- number of beneficiaries from various employment and training incentives schemes, and placement of beneficiaries in jobs;
- number of loans, amount disbursed, and loan repayment rates in microfinance program;

- number of jobs created/supported by the Project.

Project Components

A. Environmental Management and Remediation Component (\$30.9 million)

- strengthening the capacity of the GoS to manage the past environmental liabilities remaining the responsibility of the state following the restructuring and privatization of RTB Bor assets;
- strengthening the capacity of the GoS to monitor the compliance of the new operator(s) of RTB Bor mining and smelting assets with Serbian environmental norms; and,
- remediation of the most pressing environmental problems remaining within state responsibility, as identified by the Environmental Assessment (EA) of RTB Bor operations (2006).

A1. Management of Environmental Liabilities (\$4.4 million equivalent from the Loan)

A.2. Remediation of urgent environmental hazards (\$16.5 million equivalent from the Loan/\$10 million equivalent from the Credit)

This sub-component will assist the GoS in mitigating the urgent environmental hazards that remain under the responsibility of the state following the restructuring of RTB Bor. In particular, financial resources will be provided for: (i) the design, construction, and maintenance contract to undertake the closure and remediation of at least two tailings disposal facilities (TDFs) at Bor; and (ii) containment and remediation measures to reduce wastewater discharge from waste disposal sites (mainly mine overburden material).

The most important elements of the tailings ponds remediation work include: (i) dam stability and stabilization works; (ii) water management (storm water, decanting water, seepage water, leakages, and silt wash run off); (iii) tailings pond closure and partial re-vegetation; and (iv) post-construction monitoring and maintenance. Special attention will be given to the rehabilitation the routing of the river bypass (collector) that currently runs underneath Veliki Krivelj TDF and has severe structural problems.

B. The Loan) is designed to serve two mutually reinforcing goals:

Socio-Economic Regeneration Component (\$10.56 million equivalent allocated from support the improved labor redeployment programs and employment services aimed at

RTB Bor redundant workers and unemployed population of the Bor region; and, promote the development of the private sector in the region.

B.1. Labor Redeployment and Employment Support (\$5.04 million equivalent)

This sub-component will support, through provision of consultants, training and goods, a labor redeployment program and improved employment services targeting both the workers displaced by the decline in mining activities and the general population in the region. Specifically, the sub-component will include the following activities, aiming at addressing structural unemployment and lack of demand for labor:

- (i) job search assistance programs, including vocational and social counseling; provision of labor market information; aptitude interest assessments; job club programs; conducting vacancy and job fairs; and strengthening labor exchange and placement services;
- (ii) off-the-job education and training services, including short-term vocational courses for unskilled and semiskilled workers; short-term technical courses for more skilled workers in high-demanded fields of study (e.g., computer training, language training, accounting, environmental monitoring and remediation); and short-term upgrading of current skills;
- (iii) on-the-job training services (employer incentive scheme), covering the costs of classroom training and/or apprenticeship in order to provide financial incentives to employers in the region to expand their businesses through the retraining and the hiring of unemployed workers;
- (iv) temporary employment programs (public works) to assist local communities with environmental cleanup, refurbishment of public infrastructure, provision of assistance and support to social agencies (e.g., schools, retirement homes, clinics); and,
- (v) strengthening the institutional capacity of the regional branches of the National Employment Service (NES) through provision of training, equipment, and technical advice.

Programs will be primarily demand-driven. This means they should be based, to the extent possible, on pro-active requests from unemployed workers and potential employers and matched against the current market needs. The contracts with service providers will be performance-based, meaning that the final payment will be in the form of a bonus conditional on the achievement of negotiated job placement rates. Qualified service providers will be recruited to develop appropriate public information strategy and dissemination materials.

Particular attention will be given to providing adequate redeployment services to women and youth. The gender-based activities will include specialized training and technical assistance to local women's groups, to assist them in developing leadership, advocacy and management skills, and to promote business clusters and home-based entrepreneurial activities. The youth population will benefit from the virtual enterprise training and other specifically designed training programs tailored to their needs. Outreach measures will be included to raise awareness among youth regarding the various training and counseling programs financed under the Project.

B.2. Private Sector Development (\$5.52 million equivalent)

This sub-component aims at fostering private sector based sources of economic growth and employment creation in the region in order to compensate for the relative decline of the mining industry.

C. Project Implementation and Evaluation Component (\$1.14 million equivalent allocated from the Loan) will support the following activities:

- (i) Project Management Unit. The Project will finance the salaries and operational costs of a qualified Project Management Unit (PMU) established at the Privatization Agency (PA).
- (ii) Impact Monitoring and Evaluation. Third-party assessments will be undertaken at a mid-term and at the end of the Project, focusing on the gross outcome of activities supported under the Socio-Economic Regeneration component.

1.2.3 RTB Bor Copper Smelter – Acid Plant Modernization Project

Technical Overview

The RTB mining operations consist of several mines and concentrators owned by and operating within the RTB Company. The concentrates are thus produced at various existing concentrators associated with these mines - some local to Bor and some distant but all are in the Bor region. Each mine and concentrator produces various tonnages and grades of concentrate and is subject to various upgrade programs as detailed in the RTB-Bor Business Plan (2009). The concentrate from each of the mines is fed to the RTB-Bor copper smelter.

The current smelter modernization project and planned investment relates solely to those areas within the Bor smelter and concentrator complex from receipt of the road and rail delivered concentrates up to the production of the copper primary product and sulfuric acid and steam by-products for export from the complex. Investment in or

changes to the existing anode plant and refinery facilities are not included in the current project.

In each of the RTB mines after ore concentration, flotation tailings are disposed of in facilities linked to each mine/concentrator and the copper bearing concentrates are then shipped by road or rail to the Bor smelter site. They are offloaded via a tippler for rail cars and grizzly dump facility for Lorries and are then conveyed into storage and /or blending facilities at the smelter site.

In the case of the Bor mine concentrator, which is local to the Bor smelter they also currently process, in parallel, both ore and a quantity of reverb slag reclaimed from an old slag dump nearby. This Bor concentrator alone thus produces both copper concentrates from ore and a "slag concentrate" of very low grade which is recycled to the smelter. Tailings from this Bor concentrator are combined and disposed via a pipeline to a local tailings dam. Infrastructure within this Bor smelter complex serves the smelter, acid plants and local Bor concentrator.

Currently smelting takes place in the existing plant which operates (at a much reduced capacity) using an older technology currently operating only one roaster and one Reverberatory furnace. Only the roaster gas and converter process gases collected and processed in existing old acid plants with reverb gases discharged to atmosphere via a stack. The original RTB Bor smelter operated two roasters and two Reverberatory furnaces and used 3 (hot) out of the 4 installed copper converters. Historical peak production nominally corresponded to the smelting of up to 600,000 to 700,000 t/y concentrates. Currently mining and local concentrate production capacity has been very limited and smelter feed has been periodically supplemented by a very small tonnage of concentrate imported (from Bulgaria).

The modernization will include a new Flash furnace smelting technology with a design capacity of been set at 400,000 t/y concentrates which are planned to be derived from a nominal 300,000t/y of locally produced RTB Bor concentrates plus up to 100,000t/y of potentially imported concentrates. The new smelter project will involve closure of the old roaster/Reverberatory furnace technologies and installation of new primary smelting by modern Flash furnace technology which will also only require one (hot) converter operating (2 installed) for the defined capacity. The upgraded metallurgical complex will produce about 80,000 tpa of fine copper. The proposed new primary smelting furnace technology will replace the existing traditional fluidized bed roasting and reverb smelting technologies. The selection of flash smelting enables efficient use of concentrate energy thereby reducing fossil fuel consumption, enables total collection of process off-gas for acid production, and will significantly improve overall copper recovery.

The modernization will also incorporate the installation of a new modern gas collection for the Flash furnace and the single operating converter, with process gases fixed to

sulphuric acid in a new modern sulphuric acid plant. Steam will be generated from waste heat recovery in the new smelter and acid plant and partly used to dry concentrates and heat refinery electrolyte with the balance exported for local district heating and/or power generation. A new oxygen plant will be required to deliver over-the-fence oxygen to the new smelting facilities.

Flash furnace and converter slags will be slow cooled, crushed, milled and then floated within an upgraded section of the existing Bor slag concentrator to produce a high grade slag concentrate for recycle to Flash smelting. This will enable a much higher overall smelter copper recovery than that of current operations. The slag tailings from the slag flotation will again be combined with the Bor concentrator ore tailings, as at present, for pumping to the local tailings dam disposal and storage. In an effort solve future waste disposal in the BOR area, the RTB proposed Project New Tailings disposal system for the Bor and Veliki Krivelj flotation plant allocated to resolving the most urgent environmental problems. The discharge of Reverberatory furnace gases via the existing stack will cease. Liquid effluent will be treated in a dedicated effluent treatment facility as part of the new project.

Emission Targets

Due to new Serbian directives, by 2013 / 2014, RTB's Bor operations will be required to operate within lower SO₂, particulate and metal emissions standards and limits. The capture rate for SO₂, in particular, is 98% as measured by incoming sulphur.

To meet these targets, a number of sources of emissions must be addressed. These range from large sources such as the process gases presently being released from the existing reverberatory furnace operation, to relatively small sources such as dust from material handling and ventilation. The abatement of potential pollutants is discussed in Sections 7, 8, and 9 of Volume 1 of this EIA document, and in Technical Supporting Documents (TSD) 6 and 9 in Volume 2.

The following production and productivity targets are also required to be met:

- Increase copper recovery to 98%;
- Increase anode copper production to 80,000 tons per annum (tpa) using concentrate feed from Serbian and / or neighbouring countries.

Funding

Funding for the project will be secured from the EDC subject to EDC's regular financing, insurance, environmental and Canadian benefits criteria.

1.3 Project Location and Access to Site

RTB's Bor operations are located in the Town of Bor in eastern Serbia, approximately 240 km south east of Belgrade. (See Figure 1.3-1).

Figure 1.3.1 Locational Map of Serbia Showing Location of Town Bor, Close to Bulgarian Border



Figure 1.3-2 indicates the principal access point for transporting equipment from the Port of Constanta on the Black Sea up the Danube to the Serbian port of Prahovo.

Figure 1.3.2 Transportation Access to Bor via the Black Sea and the Danube River



Figure 1.3-3 provides an aerial view of the Bor Smelter site, the Bor Mine Complex, surrounding Town of Bor and surrounding rural countryside.

Figure 1.3.3 The Bor Community and the Bor Mining Complex

1.4 Background Information

1.4.1 Existing Documents

This environmental assessment has made use of a number of environmental documents that have been assembled to address environmental issues in Bor dating back more than 12 years.

The UNEP document entitled, Clean-up of Environmental Hotspots, Assessment of Environmental Monitoring capacities in Bor provided a useful baseline document. This document, together with the Local Environmental Action Plan – Municipality of Bor (prepared in 2003) served to expand upon the baseline information base, and to identify how the local community have been actively involved in trying to solve some of the environmental problems of the area attributed to RTB Bor operations.

The World Bank Environmental Assessment of RTB Operations prepared in 2006 has served as another important baseline reference.

A series of unpublished and published information sources were consulted.

RTB Bor technical staff were asked to provide a variety of information from their files and records.

1.4.2 Information Assembled By Technical Team

The environmental assessment team has also undertaken visits to the site and surrounding areas to view the site and to ascertain the importance of environmental conditions or features. A detailed assessment of the existing smelter prepared in support of the Engineering Feasibility Study has also served to provide a good understand of the existing site and facility conditions.

Geoenvironmental investigations have been carried out to define the extent of potential contaminants on-site the need for be considered and handled appropriately during site demolition and constriction of the new facilities.

An air quality dispersion model has also provided information that will help to determine the extent of the environmental effects of the emissions from the upgraded smelter.

1.5 Study Authors-Contributors

Table 1.5-1 lists the key authors-contributors from RTB Bor, the University of Belgrade, and SNC-Lavalin who were responsible for the preparation of this Environmental Impact Assessment.

Table 1.5.1 Contributing Authors for RTB BOR Smelter Moderization/Reconstruction Project
Environmental Impact Assessment

Contributing Authors	Position
RTB Bor	
1. Mr Zvonimir Milijic, Mining Engineer, 2. Toplica Marjanovic, B.Sc. 3. Dragan Randjelovic, M.Sc MBA, 4. Boban Todorovic, Metallurgical Engineer.	Deputy director of RTB for Ecology Safety, Deputy Director of TIR for Ecology Human Resources Manager Technical Manager of Smelter
Faculty of Technology and Metallurgy, University of Belgrade	
1. Dr Zeljko Kamberovic, Metallurgical Engineer, 2. Dr Ivanka Popovic, Technology Engineer 3. Dr Marija Korac, Metallurgical Engineer. 4. Jasminka Serovic, Technology Engineer 5. Zoran Petrovic, Mechanical Engineer. 6. Dr. Dimitrios Panias, Metallurgical Engineer 7. Professor, Dr. Petar Papic, Geotechnical and Hydrogeologist	Associate Professor Full professor, Dean Senior Research Associate EIA specialist EIA specialist Associate Professor Special Advisor – geotechnical and geoenvironmental study investigations
SNC-Lavalin Environment	
1. Lloyd Torrens, MCIP, RPP, Environmental Planning and Impact Assessment Specialist 2. Edward Lloyd, M. Eng., Environmental Engineer 3. Sylvain Marcoux, 4. Adriana Lafleur, M. Sc. Environment 5. Rein Kargel, M. Eng., Environmental Engineer 6. James Harris, B.A.Sc., Biology	Principal Planner and Senior Project Manager – SNC-Lavalin Environment, Site Remediation Specialist Air Quality Specialist Environmental Geologist Water Treatment Specialist Environmental Biology and GIS Specialist

1.6 Contents of the Environmental Impact Assessment

For ease of presentation and referencing supporting documents the EIA has been presented in two (2) volumes. Volume 1 presents the Main Environmental Impact Assessment Report. Volume 2 provides a series of 12 Technical Supporting Documents (TSDs) that are crossed referenced in various sections of the Main Report.

1.6.1 Volume 1 – Main Report

The EIA for the Project starts with **Section 1.0**, presenting the study area, the project objectives and scope, an overview of exiting operations, the work attributed to the Bor Regional Development Project, a brief outline of the copper smelter modernization

scheme, key sources of background information, and the key contributing authors who prepared the EIA.

Section 2.0 - includes a description of the legal and Institutional framework ---

Section 3.0 - presents the current copper production ----.

Section 4.0 - provides a summary of the Project Justification --.

Section 5.0 - presents the Project Description

Section 6.0 - addresses the environmental baseline and the existing environmental conditions with the study area, including:

- the physical environment (landscape and topography, bedrock and surficial soils, surface and groundwater, and air quality);
- natural environment considering on-site and off-site terrestrial environment conditions, habitats, fish habitats;
- socio-economic/cultural environment considering population demographics, employment, land and resource uses, tourism and recreation features, and historical and archaeological resources

Section 7.0 - focuses on the environmental impact assessment considering the nature of potential environmental effects, the magnitude and significance of the impacts, and the mitigation measures that should be applied to eliminate or reduce adverse effects.

Section 8.0 - outlines a series of environmental commitments

Section 9.0 - addresses the public or community involvement in the support of the Bor Regional Development Project, the development of the Local Environmental Action Plan, and the new smelter and acid plant project

Section 10 – Deals with conclusion and Recommendations

Section 11 - **contains** the important references used in preparing the EIA.

1.6.2 Volume 2 – Technical Supporting Documents

Volume 2 contains 13 Technical Support Document (TSDs) that provide important supporting documentation:

TSD #1 – was prepared as a UNEP Mission Report that assessed the Environmental Monitoring Capacities in Bor in 2002. The objective of the Mission was to

assess the status of environmental monitoring in Bor, then identify and recommend priority assistance in support of environmental monitoring. Furthermore, the UNEP hoped the mission would encourage the relevant national and local environmental and health authorities to consider and act upon possible correlations between key environmental characteristics and local health concerns. Information contained within this document has assisted in gaining an understanding of the historical baseline conditions that need to be recognized, considered, and appropriately evaluated in preparing the EIA for the Bor Copper Smelter Modernization and Reconstruction Social and Environmental Impact Assessment.

- TSD # 2** - The Local Environment Action Plan (LEAP) for Bor was prepared in 2003 to address a number of problems created by a century of mining in the Bor area. The LEAP process was initialized by Ecological association of young researchers. This document has served as a useful point of reference for developing the EIA in terms of baseline information and the documentation of constructive public involvement related to various environmental initiatives over the last 10 years.
- TSD # 3** This TSD summarizes the public consultation efforts documented in the 2006 World Bank Report – prepared for the Environmental Assessment of RTB Bor Operations. This document was prepared in support of the process focused on the privatization of RTB Bor and its associated companies.
- TSD # 4** The following presents excerpts from a study prepared by SNC Lavalin UK Ltd (SNCL) entitled, “Smelter Modernization Study. This documentation provides a technical baseline assessment used in the development of the Feasibility Study and for the Environmental Impact Assessment.
- TSD # 5** This document provides a series of photographs the the smelter site and surrounding areas that helps to illustrate site conditions, and the land and resource use of surrounding areas.
- TSD # 6** This TSD includes information pertinent to the set up and operation of the existing air quality monitoring system. It includes:
- a technical paper outlining the implementation of the air monitoring system;
 - a technical paper dealing with monitoring of S02 amd PM10 in urban area around the copper smelter in Bor

- a summary of the equipment used in monitoring the Current SO₂ concentrations; and
 - details on the public access to air quality monitoring information in Bor.
- TSD # 7** Presents a summary water balance for the RBB/RTB Facilities in the Bor Area prepared by RTB Bor.
- TSD # 8** Provides a preliminary report on the geoenvironmental investigations that have been carried out in the area designated for the development reconstructed smelter and new sulfuric acid plant. This report has been prepared by a team of experts from the Faculty of Mining and Geology, University of Belgrade, in Belgrade, Serbia.
- Copies of the final report is currently in preparation and will be issued by mid-August. The final report will be issued as a replacement to this TSD # 8.
- TSD # 9** Presents a technical report prepared by SNC-Lavalin dealing with the air quality dispersion modeling undertaken for the new smelter. This study compares the estimated emission rates from the new smelter/acid plant to the existing and historical conditions.
- TSD # 10** Provides engineering and environmental design criteria application to the new facilities.
- TSD # 11** Presents RTB Bor's Environmental Action/Management Plan for the reduction of air pollution from the copper smelter and acid plant for the 2006-2009 period.
- TSD # 12** Provides RTB Bor's Environmental Protection Plan for addressing various environmental issues associated with their operations in the 2010-2015 period.
- TSD # 13** Summarizes various activities that involve the engagement of the local community, residents, and interest groups with respect to:
- environmental awareness of the problems created by the history of RTB Bor mining activities;
 - public opinion towards – improving environmental conditions;
 - support for the Bor Regional Development Project;
 - involvement of local specialists/Interest Groups;

- support for the Local Environmental Action Plan
- Support for the new smelter and acid plant; and
- Established communication channels – newspapers, and websites.