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SECTION 10

CONCLUSION AND RECOMMENDATIONS

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

10.1.1 Physical Environment

General Site Development

The proposed Project will have minimal effect on the bedrock, groundwater, and surface drainage in the immediate area of the smelter since the area is disturbed and there are no sensitive features in the immediate area.

The preliminary geoenvironmental investigation indicates that the surficial soils are contaminated with heavy metals to varying degrees to depth range from 2-3 m of the surface. The final geoenvironmental report will more specifically map out the higher concentrations of contaminated soils. Where contaminated soils are required to be excavated or graded for the installation of foundations, the some of the material may be reprocessed with ore being fed through the floatation process. This will remove the higher concentrations of Cu, As and other metals would then be processed through to the tailings. In other areas, the installation of the foundations and floor slabs for the new facilities will encapsulate the underlying heavy metals. Given that there appears to be no shallow water table underlying the proposed facility area, the risk of contaminant migration of the heavy metals from the underlying soils is deemed to be low.

The modernization and reconstruction of the existing smelter site environment requires the demolition of portions of the existing smelter, acid plant and associated infrastructure facilities to accommodate the proposed improvements. During construction some infrastructure will require modification or relocation which will generate construction wastes requiring disposal.

During site demolition and the construction phases fugitive dust ladened with heavy metals (derived from either construction debris or excavated surficial soils) may present a health risk to workers involved in these activities. Development of a coordinated demolition and construction staging plan can minimize the exposure of workers to these potential health risks. It is also imperative that workers on the site be advised of the health risks and be provided with appropriate protective equipment.

Smelter Emissions

A key conclusion of the dispersion modelling is that:

- The application of BAT Technologies will significantly reduce air emissions for the smelter and acid plant;

- The local setting – considering the topographic conditions, the local climatological and meteorological characteristics, and nearby critical receptors will continue to present significant limitations to the operations of the modernized smelter from time to time;
- The local topographic setting and the proximity of sensitive receptors located with a few hundred metres of the new smelter presents a situation that requires a highly managed air quality monitoring system fully integrated with smelter production;
- The stack emissions sources produced following the construction of the new smelter and acid plant will generate ambient air SO₂ concentrations higher than the hourly and daily air quality standards. SO₂ concentrations above the hourly air quality standards can occur at specific sensitive receptors in the Town of Bor. In comparison to the historical scenarios, the emission sources of scenario 4, reconstructed plant condition, generate significantly lower SO₂ concentrations around the RTB complex. However, there is still the potential that hourly and daily concentrations above the pollutant standards might occur for that pollutant, especially with the contribution of periodical fugitive emissions or process upset. The activity level generated by the project will therefore have to be controlled to avoid or reduce emissions during periods when the dispersion potential is low. Accurate local meteorological data and process knowledge are needed in order to identify these periods;
- The emissions sources considered in project scenario generate ambient air TSP concentrations higher than the daily air quality standards. Daily concentrations above the corresponding air quality standards are likely to occur at some specific sensitive receptors in the town of Bor. In comparison to historical scenarios, project scenario generates lower TSP concentrations. However, there is still the potential that high daily concentrations might occur for that pollutant. The activity level described by scenario 4 should therefore be controlled to avoid or reduce emissions during periods when the dispersion potential is low;
- The existing air quality monitoring system established by RTB in conjunction with the Agency for Environmental Protection can be further adapted to meet the plant management requirements of the new smelter and acid plant.

10.1.2 Natural Environment

Natural Vegetation (on- site)

There is no vegetation (ground cover, shrubs, or trees, etc.) in the immediate area of the proposed new smelter, acid plant, or effluent treatment facility. There will, therefore, be no direct impact on terrestrial environment.

Natural Vegetation (off- site)

The modernization and reconstruction of the smelter and the associated reduction in SO₂ emissions will reduce the emission rates of SO₂ to the point where there should be no significant effects on off-site vegetation. Some fugitive emissions from smelter may cause some minor impact to local vegetation should generally be limited to within 1,000-1,500m of the facility.

The improvement in overall ambient air quality will have a positive effect on on off-site vegetation, and this will contribute to a general increase in biodiversity of the environment with 1-2 km of the area affected by elevated ground level concentrations of SO₂ as shown by the dispersion modeling of Scenario 4 in TSD # 8.

Birds and Wildlife

The proposed project will have no direct impact upon the local bird and wildlife populations in the short-term since the Bor Complex presently offers no suitable habitats for these species. Rehabilitation of portions of the Bor complex through other initiatives (beyond the scope of the smelter/acid plant project) could however serve to develop potential habitat in portions of the Bor Complex in the future.

Off-site Water Quality and Aquatic Habitats

Historically the operations of RTB Bor have served to significantly degrade the water quality and fisheries habitat of the Krivelj and Borska River systems. Downstream of their mine site(s) due to untreated mine or contaminated base flow from groundwater contaminant migration. These issues are matters that are being addressed through the RTB Bor and Bor LEAP initiatives, and are independent of this Project. The inclusion of the waste water treatment facility for the smelter and acid plant will, however, constructively assist in minimizing the contamination of both local ground and surface waters that, in turn, affects fish habitat and the associated fisheries resources.

Water from the effluent treatment plant will be discharged to the tailings pond or a specially designed polishing pond and will not be discharged directly to the local watercourse system. RTB Bor's principal goal is to recycle as much process related

waters as possible so that only a minimal amount of mine water is then discharged to the environment.

It should be noted that the issue of mine water handling and treatment are issues that are being dealt with through other LEAP funded activities and are not part of this Project.

10.1.3 Social Environment

Urban Land Uses

The construction and operation of the modernized smelter and acid plant could have an effect on land uses within the immediate proximity of the Bor Complex in terms of potential redevelopment considerations and long term land use plans. There are some residential units that are located within 400-500m of the emission stacks and are at a higher risk of exposure to SO₂ emissions than other areas of the Bor community. The modernized smelter and acid plant may foster the development of additional suppliers and secondary industries within Bor. Improved economic conditions resulting from the improvements at RTB Bor should promote additional growth and development within the community over the next 20 years

Rural Land Uses

The modernization of the smelter within the Bor Complex will not directly affect the existing areas associated with agricultural, rural residential, forestry, and open space uses. Improvement in air quality resulting from the new smelter will reduce the historical effects on certain land uses (e.g., crop damage, contamination of agricultural soils, forest productivity, etc.). This represents a positive benefit to the community over the long-term.

Local Population - Economy – Employment

The modernization of the smelter within the Bor Complex will require specific employment requirements that can be filled by RTB Bor personnel, new job hires, and specialized trades during the Site Demolition and Site Preparation, Construction Phase. RTB Bor will re-train staff to take on the operations/maintenance of the new smelter.

Increased employment in RTB Bor will contribute positively to local population growth within the Bor District over time. Revitalization of RTB Bor will have a significant positive impact on the community population.

Tourism and Recreation

The modernization of the smelter and construction of the new acid plant will not adversely affect local tourism or recreational activities. An improved local economy

created as a result of this project will potentially encourage spin-off growth for local tourism or recreational businesses or the establishment of new tourist facilities.

Cultural heritage and Historical / Archaeological Resources

The proposed smelter modernization will not have any effect of local cultural features or activities such as the Castle of Prince Alexander Karadjordjevic in Brestovacka Spa area.

The disturbed state of the proposed development site present no significant effect on local archaeological features.

Noise Affecting the Community

Noise will be a localized impact throughout the Site Demolition and Site Preparation, and Construction Phases of the Project. During operations certain vents, motors, and pressure valves will provide localized sources of noise.

Water Supply

Water supply obtained from existing RTB water supply system that comes from Bor Lake. The proposed Project will not change the existing supply source or significantly alter the requirements of the on-site water treatment facility.

Public Health

Improvements to the ambient air quality compared to the past and existing situation should contribute to an improvement in the health of individuals with existing respiratory problems. This will generally benefit the Residents of Bor, but it will particularly benefit the young children in the community or older residents.

Cumulative Environmental Effects

World Bank/Government of Serbia - Bor Regional Development Project

The most significant cumulative effects associated with this Project involves:

- 135 million EUR loan contribution towards the construction of the Proposed Smelter Acid Plant; and
- Funding of the improvements of the Bor Regional Development Project based on a World Bank 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.

The pooling of these funds creates allows for a number of complimentary environmental

improvements that significantly benefits the local and regional community. This represents the critical seed money needed to advance the most significant environmental improvements. By committing to these projects, RTB Bor will be in a position to undertake subsequent improvements on their own or in concert with the Government of Serbia as RTB Bor's production and economic position improves in the next few years.

10.2 Recommendations

10.2.1 Site Demolition

The Construction Site Environmental Management Plan in Section 8 identifies the estimated amount and type of wastes requiring disposal as a result of the required demolition works. Preliminary geo-environmental studies (detailed in TSD # 8) have also identified the extent of waste contamination associated with surficial soils. The final Geo-environmental Report will identify the extent of on-site contamination and provide recommendations on how it should be handled. RTB Bor and its' Demolition and Construction Contractors are to maintain spill control and clean-up equipment at designated construction site area. Demolition and Construction Staging Plans must be developed to allow for smelter operations to continue smoothly during the demolition and construction phases. This plan needs to address scheduling issues, and occupational health and safety matters.

10.2.2 Geoenvironmental Investigations

The final Geo-environmental Report will identify the extent of on-site contamination. and provide recommendations on how it should be handled. RTB Bor and its' Demolition and Construction Contractors are to maintain spill control and clean-up equipment at designated construction site area. Demolition and Construction Staging Plans must be developed to allow for smelter operations to continue smoothly during the demolition and construction phases. This plan needs to address scheduling issues, and occupational health and safety matters.

10.2.3 Health and Safety for Site Demolition, Construction, and Operations

Potential health and safety effects for workers associated with exposure to contaminants during all phases of site development and operations. Community Health risks associated with long-term air quality issues associated with SO₂ in ambient air through smelter operations during the modernization and subsequent future operations.

Material Data Safety Sheets should be used to advise workers of hazardous materials. Workers to be supplied with appropriate environmental and HSE training and supplied

with appropriate protective equipment for tasks to be undertaken. The modernization of the smelter using BAT and BMPs reduces the SO₂ emissions to the environment and reduces risk to community health. Detailed Health and Safety Plan(s) should be prepared appropriate for each of the Site Construction and Site Preparation, Construction, and Operations Phases

10.2.4 Air Quality - Smelter and Acid Plant Emissions

Upgrade of the Air Quality Monitoring Network

The existing air quality monitoring stations should be validated and a network of air quality monitoring stations should be deployed in the region of the RTB complex. The sites of each monitoring stations should be selected in order to have representativeness of:

- Areas directly affected by the RTB complex (downwind of RTB based on predominant winds)
- Areas not affected by RTB (upwind reference point)
- Areas potentially affected by RTB due to specific operating (such as fugitives or upsets) and/or meteorological conditions
- Point of maximum modeled concentrations (impingement point identified by modeling)

The final choice of the location of the stations must also consider local sources or obstacles, equipment and personnel safety as well as equipment-specific requirements.

The stations should be equipped with analysers and instruments to continuously monitor all of the pollutants subject to an air quality standard. For suspended particles, a specific continuous analyzer should monitor the concentrations of the PM₁₀ particles and regular samplings should be done to determine the size distribution of the particles as well as metal content regarding the metals subject to an air quality standard by the Serbian government and international standards.

The stations should be autonomous and be able to communicate with a central data-processing center.

Installation of an On-site Meteorological Station

A meteorological station, equipped with dispersion-grade instrumentation, is required to make site specific modeling as well as real-time modeling of the emissions. The EPA has established and detailed the minimum and preferred performance characteristics required from a meteorological sensor to be able to use its results in air dispersion modeling. The

EPA also established specific guidelines for the location of a meteorological station to guaranty representativeness of the region without interference from localized elements. The meteorological station should be integrated into the air quality monitoring network and the real-time dispersion model for industrial production adjustments based on dispersion potential.

Installation of a Continuously Emissions Monitoring System (CEMS)

To monitor the emissions of the main contaminants (particulate matter and SO₂) at the main stacks of the complex.

The use of CEMS in the main emitting stacks of RTB will allow the verification of the conformity of the emissions of the sources and permit real-time modeling of the dispersion of the emissions.

Development of a Real-time Air Dispersion Air Quality Modeling System

Using data coming from the meteorological stations, air quality monitoring stations and the various CEMS, a real-time air dispersion model should be used to indicate if the meteorological conditions of the moment provide adequate dispersion potential compared with the type and intensity of production. The production activities at RTB can therefore be controlled to avoid air quality problems in the surroundings.

Prior to commissioning the new smelter, the existing air quality monitoring system should add 1 or more additional monitoring stations to address extended SO₂ effects on villages such as Borska Slatina and the surrounding agricultural areas. This is important to document potential trans-boundary effects given the proximity of the Bulgarian border.

Capture of Dust and SO₂ Fugitive Emissions

The industrial process used at RTB generates substantial fugitive emissions of SO₂ and particulates matter. Since these emission sources are typically at ground level or building-roof heights, the dispersion potential of the emitted pollutants is low. In the case of the RTB complex, the low height release situation is amplified by the local topography and the fact that the majority of the specific sensitive receptors are very close to the site and on higher grounds. Captured emissions should be rerouted to a stack so that they can be released at a higher elevation.

Design Related Studies

During detailed design further air quality modeling needs to be undertaken to integrate information from the air quality monitoring stations that have been established. Further modeling will allow for refinement of the design and emission controls. During site operations the existing air quality monitoring station system

(described in TSD # 6) needs to be integrated with the air dispersion modeling (as described in TSD # 9) to develop an more comprehensive air quality management system.

Prior to commissioning the new smelter, the existing air quality monitoring system should add 1 or more additional monitoring stations to address extended SO₂ effects on villages such as Borska Slatina and the surrounding agricultural areas. This is important to document potential trans-boundary effects given the proximity of the Bulgarian border.

10.2.5 Social Considerations

Noise and Dust – Nuisance and Worker Health Related Effects

Best management practices will be employed to minimize the impacts of construction noise and dust. This includes the use respirators and other dust control measures where site conditions or activities require. The smelter and acid plant includes dust and noise controls as part of the facility design. For example, all noise generating equipment producing noise in excess of 85 dBA at 1 m from the source will be equipped with some form of noise control or shield and dust control wetting and the use of surfactants (calcium/magnesium chloride or suitable substitutes).

As part of the smelter modernization process, access roads in the area of the smelter and acid plant should be hard surfaced to control dust. Side panels on the concentrate storage shed should be repaired to minimize this area as a potential source of dust through the modernization upgrade process. Construction activities resulting in significant noise or vibration (e.g., pile driving) will be limited to the period 7am to 7 pm due to residential uses located within 500m of the construction area.

Noise Affecting the Community

Areas where noise levels exceed 82 dBA during Site Demolition and Site Preparation, Construction, and Operational Activities - workers must wear hearing protection. In areas where equipment noise exceeds 85 dBA at a distance of 1m from the source, some form of noise attenuation should be considered in site design.

The facilities will be designed in accordance with IFC Noise level Guidelines so that the maximum increase in background noise at the nearest receptor location off-site is no more than 3 dB. In addition, noise levels affecting the nearby residential, institutional, or educational receptors would not exceed 55 dB during daytime hours (07:00 – 22:00) and 45 dB during night-time (22:00 – 7:00).

Environmental Effects of Hazardous Substances

Potential releases of hazardous substances (e.g. fuels, chemicals, etc) into the physical environment may occur due to demolition activities, construction, operations, or maintenance activities or unplanned spills.

The Acid plant and smelter modernization and reconstruction design provides for spill control from key storage tanks of vessels during operations (e.g., bermed areas to contain 110% of largest tank or vessel). Spill prevention BMPs such as designated re-fuelling pads for construction and maintenance equipment, emergency spill kits, spill response plans will be employed.

Wastes

Solid Wastes

General industrial/commercial waste generated by the smelter/acid plant and other RTB Bor facilities will be sent to the Bor municipal landfill.

Liquid Wastes

Waste water from modernized smelter and acid plant directed to polishing pond/tailings pond with no direct discharge to local natural watercourse. Additional treatment may be required to address future consideration of discharge to a local natural watercourse. This issue is to be assessed during detailed design. The treatment of other mine water wastes are being addressed under separate RTB - LEAP based initiatives, independent of this EIA.

Employment Opportunities

RTB Bor has indicated that it, together with the local educational institutions, will promote participate in and contribute to the training and/or re-training of workers to suit the job requirements created by Project.

Community Engagement

As the project proceeds through design, site demolition, construction, and commissioning phases RTB Bor should provide its employees, and the community with regular updates on the progress of the works through articles in the Kolektiv, news on the RTB Bor Website, and press releases through the local media. A community meeting should be held annually or at specific milestone points.

RTB Bor should respond to any issues raised by government agencies or other interested stakeholders in a timely manner.

On-going consultation should be maintained with key NGOs such as:

- Ecological Movement in Bor;
- Young Researcher Organisation in Bor;
- Ekoagenda 7/1935;
- Association for Bor Development; and
- Resource Center Bor