



TERMS OF REFERENCE

- A. Job Title:** Consultant to provide recommendations for a pilot treatment system for acid mine drainage (AMD) for the Brskovo and Zuta Prla mines, Mojkovac Municipality, Montenegro
- B. Post Reference:** MNE/10/025
- C. Type of position:** International, Short-Term
- D. Duty station:** Podgorica and Mojkovac, Montenegro
- E. Duration of Appointment:** up to 2 months, in the period May 2010 – end of June 2010
- F. Contract Type:** Special Service Agreement
- G. Deadline for Application:** Friday, 7th May 2010

i. Background

Montenegro has reaffirmed its commitment to environmental protection within its Constitution through designation of an Ecological State. This marks not the end but the beginning of the journey toward recreating and implementing innovative sustainable development principles that will focus on fostering economic growth while preserving the country's unique eco system. One hurdle on this journey is the remnant of the Lead and Zinc Mines 'Brskovo' and 'Zeta Prla' and its infrastructure which was essentially abandoned with the cessation of mining in the early 90s. This includes a small open pit, extensive underground workings, a mineral processing plant and a tailings mine impoundment (TMI)- both the open pit and the tailing mine impoundment (TMI) located in the northern municipality of Mojkovac. The TMI was identified nationally as a severe industrial hotspot and a significant barrier to investment in the municipality's many development potentials.

The Lead and Zinc Mine 'Brskovo' and 'Zeta Prla' operated intensively from 1976 to 1991. Though historically mining operations are executed in this area for centuries, extraction of silver since ca. 1270. As a result of these operations and management focused on efficient mineral extraction rather than adequate environmental safeguards the area was left as an environmental hot spot. The negative impacts can be divided in two parts.

The first problem concerns tailing mine impoundment (TMI) formed in the area between right river bank of Tara and western side of urban zones of Mojkovac. The TMI occupies an area of 19 ha and approximately 2 million m³ of disposed tailing impounded materials. From the beginning to the end of the technological processes in the mine, all of flotation tailings were placed in this impoundment. According to data on total production in "Brskovo" mine, approximately 2.600.000 t of tailings is produced. Taking in consideration vicinity of TMI to urban area and extremely negative influence on human health, permanent threat to river Tara problem concerning TMI was identified as priority environmental hot spot and in 2003, based on decision made on Government session, Government committed resources and prepared the full Technical Design Project named Remediation and recultivation of the Mojkovac lead and zinc tailings

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mine impoundment. Essentially this involves stabilisation of the tailings with lime, capping and containment. This project was prepared by faculty of Civil Engineering Podgorica and associated institutions in 2004. Project implementation started in 2005 and UNDP CO Montenegro is supporting this project through UNDP regional Western Balkans Environmental programme financed by Netherlands government.

The second problem, and focus of this project, concerns mining works and area where mining operations and mineral processing took place. Since the focus of governmental and donor organization has been on the tailing mine impoundment the other 'mine impacted' areas and their potential negative impacts on human and environmental health were neglected. Modern lead and zinc mining operations were conducted in two separate but closely associated areas Brskovo and Žuta Prla. The total area covered by a small open pit and underground mining is approximately 8 km², mostly forest and smaller pastures. This area was subject to intensive mining operation until 1990. Lead and Zinc Mine 'Brskovo' represented one of main employment resources for this area. Since Lead and Zinc Mine 'Brskovo' was no longer profitable this mine was closed in 1991, but there was no requirement prescribed by law formally close the mine.

To assess the environment impact on the operational mine areas and former processing plant UNDP Montenegro and the Czech Trust fund sponsored an environmental investigation, which amongst other things, found significant concentrations of heavy metals and AMD being generated and released into the environment for the mine adits from the Brskovo and Zeta Prla mines that do present a risk to human health and the environment. Some preliminary recommendations were given for each of the adits from which lactates were being generated.

ii. Duties and Responsibilities

The primary task is to follow on from this initial investigation and identify a pilot treatment system/demonstration plant for the AMD emanating from the former lead and zinc mines of Brskovo and Zuta Prla mines. This will include the options for both active and passive treatment systems, include reference to the benefits and negatives of each treatment type, indicative costings, indicative design and recommendations for the most cost effective treatment system (with a preference for a passive system). In addition to reducing the concentration of heavy metals, AMD and particulate form entering the environment the intent is to use this pilot/demonstration plant as part of a capacity building exercise in relation to the treatment options for acid mine drainage in the region. In undertaking this project as a starting point due consideration should be given to analyzing findings from the previous studies, best practices and international standard and summarizing possible options for AMD treatment in Brskovo and Zuta Prla area considering the pH values, conductivity and average water flow of AMDs, evaluating and providing recommendations for the most efficient and cost effective AMD treatment system for this area in the Final Report. During the preliminary visits to this site some characteristics of the current condition were identified including the following:

- the geological background of the area causes a natural acidification of the waters
 - the outflow of the adits show high level of heavy metals combined with high conductivity
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- mine waters containing heavy metals (Pb, Zn, As, Cu) freely flowing out to the Rudnica River and then to the Tara River (increased concentration of heavy metals in the Rudnica River surface water and their accumulation in bottom sediments was identified)

The engaged consultant will be responsible:

- to investigate both through a desk review and on site field investigation and sampling the most efficient and cost effective AMD treatment system for a pilot treatment system at Brskovo and Zuta Prla mines;
- to provide a clear expert analysis, recommendations, indicative costings (operational and construction), overall performance over time (ie removal efficiencies) and general design for pilot treatment systems with a preference for passive;
- to prepare/ develop a preliminary report after stage 1, and a final report which will form the basis for development of a detailed technical design, for 1 passive and 1 active system, to treat the AMD in the area.

The engaged consultant is expected to conduct and prepare the required reports in two stages:

Stage I:

- review of existing studies conducted in the area of Brskovo and Zuta Prla mines;
- site visit to the area, with focus on the topography and terrain (in relation to how they affect treatment system selection) as well as surface showings of mining activity, (see pages and out flowing mine waters to the Rudnica and Tara Rivers);
- conducting appropriate water chemical testing and flow measurements;
- review of national and international laws and regulations addressing AMD treatment;
- review of international standards and best practices addressing AMD treatment;
- review of different AMD treatment systems corresponding to the characteristics of AMD present at Brskovo and Zuta Prla mines (active and passive), indicate pros and cons for each AMD treatment system separately, and provide indicative costings and indicative desing for the treatment systems.

The outputs of Stage I will be a preliminary Report including an overview of national and international laws and regulations, international standards and best practices addressing AMD treatment, and an overview of most efficient AMD treatment systems

Stage II:

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- the elaboration of current situation in the area of Brskovo and Zuta Prla mines in relation to AMD (locations of AMD outflows, pH values, conductivity, annual average AMD outflow,);
- recommendation of the most cost effective systems for AMD treatment in Brskovo and Zuta Prla area with indicative costings, both operational and construction, indicative design and estimate in percentage of contaminant removal efficiency

The outputs of Stage II will be the Final Report including outcomes of the preliminary report.

Special Considerations:

Requirements

- Demonstrated international expertise in the area of the full range of AMD treatment systems including both a sound theoretical and practical understanding, field applications, assessment, design;
- Minimum of 10 years experience conducting feasibility studies in relation to AMD treatment systems and providing accurate information and assessments in a wide range of field situations;
- Demonstrated ability and experience to apply theoretical knowledge to a field situation;
- Expertise in the preparation and presentation of technical information, feasibility studies, reports and recommendation to a wide range of audiences;
- Excellent experience/knowledge in the field application of environmental monitoring and field surveillance for a range of industrial, mining and contaminated sites and purposes;
- Expertise in conducting sampling plans, the collection of samples and analysis in accordance with international best practice for data quality objectives, quality control and quality assurance
- Familiarity with International and European Environmental Protection legislation and standards and their implementation in all participating countries/territories.

Timing of the work: The International consultant will be engaged under short special service agreement immediately after the completion of the recruitment procedure. The tentative date of engagement will be in the period between 10th May 2010 and 30th June 2010. The consultant will be required to undertake two missions (5 working days per mission) to Podgorica, Montenegro during the above mentioned period.

iii. Competencies:

- Demonstrates integrity by modelling the UN's values and ethical standards
- Promotes the vision, mission, and strategic goals of UNDP Displays cultural, gender, religion, race, nationality and age sensitivity and adaptability
- Focuses on result for the client and responds positively to feedback
- Consistently approaches work with energy and a positive, constructive attitude Demonstrates openness to change and ability to manage complexities

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- Perform any other duty as may be assigned by the Programme Manager

iv. Qualifications and experience

Educational Background

- Postgraduate qualifications in an environmental, engineering or science field relevant to the AMD treatment technologies, environmental monitoring and site assessment for mining and contaminated sites..

Level of Experience

- 10+ years of experience working in the field of AMD treatment systems, environmental protection, environmental management or other relevant field associated with the objectives of this assignment;
- Extensive experience in the application of AMD treatment systems, assessment of site conditions and selection of suitable approaches and systems in treating AMD;
- Extensive experience in undertaking environmental monitoring and site assessment using a range of tools and approaches and monitoring a variety of media;
- Excellent understanding of the principles, tools, techniques required to assess mining and contaminated sites and expertise in their application to human and environmental health.

General skills

- Good writing skills, clear and persuasive and experienced to prepare valuable materials that will serve as points of reference;
- Excellent interpersonal skills and cultural sensitivity to effectively interact with all participating countries/territories;
- Experience working in a post conflict/transitional, multi-cultural work environment;
- Familiarity with the UNDP work in the environmental field will be an asset;
- Ability to operate under strict time limits;
- Proficient knowledge of written and spoken English.

iv. Application Process

Interested applicants are requested to submit their applications to UNDP Office in Podgorica by e-mail to consultancy.me@undp.org by Friday, 7th May 2010 2010, CoB.

The application should contain:

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1. Duly completed **Personal History Form (P11)** can be downloaded from <http://www.undp.org.me/files/jobs/index.html>
2. *Cover/Motivation Letter*

*The short-listed candidates only would be requested to submit a **letter of interest including a price quotation** indicating the lump sum (in EUR) requested for the work and travel envisaged in the section "Duties and Responsibilities".*

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