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Secretariat of Geology, Mining and Mineral Transformation – SGM

**META PROJECT**  
Technical Assistance Project for the Energy and Mining Sectors

**WORLD BANK**  
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Loan: 9074 – BR

**Term of Reference No. 27**  
Study for the Technological Insertion and Development of the Gemstone Sector in Brazil

**August 2022**



## TERM OF REFERENCE – TOR

“Study for the Technological Insertion and Development of the Gemstone Sector in Brazil”

### 1. **BACKGROUND AND CONTEXT**

This Term of Reference is proposed within the scope of the Technical Assistance Project for the Energy and Mining Sectors (META) of the International Bank for Reconstruction and Development (IBRD), which is linked to the World Bank.

According to Article 29 of Decree 9,675/2019, the Secretariat of Geology, Mining and Mineral Transformation (*Secretaria de Geologia, Mineração e Transformação Mineral – SGM*) of the Ministry of Mines and Energy (MME) is responsible for promoting and coordinating preventive and corrective actions and measures that aim to ensure rationality, good performance, technological updating, and the compatibility of activities developed by the mining industry.

In this context, one of the major challenges of the Brazilian Federal Government, through the MME, is the promotion of sectoral policies for the sustainable development of the mining industry, reaching all productive segments, from large corporations to small mining companies.

In Brazil, Artisanal and Small-Scale Mining (ASM), an internationally recognized classification that covers individual workers, micro and small enterprises in the mining sector, is known for its labor-intensive nature and its extensive distribution across the Brazilian territory, in addition to being responsible for a large portion of the jobs generated and being more involved with the community surrounding the project, as well as medium-sized enterprises.

Nevertheless, many of these companies develop their mineral research, mining and processing activities based on local tradition or the personal experience of their employees. Part of the problems faced by these enterprises, whether they are of a technical, managerial or social and environmental nature, stems from the lack of activity planning, the use of inadequate techniques in mining or processing, an inefficient work model, the use of unsustainable technologies, and even resistance to change and to new legislation.



Furthermore, at the national level, there is great heterogeneity in the application and use of technology in the production system by companies in the mining sector. In addition to this complexity, the growing competition in the mining market imposes not only the mastery of technologies, but also their adaptation to social and environmental standards governed by international models.

The difficulties are great. In order to achieve sustainability in mining, production and consumption methods should be reviewed, including greater efficiency in production management, the use of more sustainable and efficient technologies, conscientious consumption and use of inputs and energy sources, appropriate disposal of waste, and alternative uses, among others.

In this sense, the Brazilian Mining Sector Technological Development Program<sup>1</sup> (PD Tec Mineral, 2019) materializes the SGM/MME proposal to improve the use of technologies in the production system of mining companies. The program proposes three main lines of action: i) support for small-scale mining; ii) mineral research, development and innovation and processes that leverage Brazilian sustainable development; and iii) collaborative R&D projects.

Nevertheless, for the Government to act efficiently and to support, in particular, small and medium-sized mining enterprises, knowledge is necessary regarding the potential, limitations and specificities of the mining sector, based on quality data and information, consolidated statistics, and specific studies on the chain of mineral goods.

In this context, the “Study for the Technological Insertion and Development of the gemstone sector in Brazil” is proposed, aiming to characterize the techniques, work model, and technologies used in the mineral extraction and processing process of Brazilian gems.

Additionally, it aims to promote the diagnosis of technological and development deficiencies in the selected extractive chain, as well as to identify its bottlenecks, deficiencies, and other limiting aspects, in addition to its strengths and opportunities, proposing actions and guidelines that support public policies that focus on this key segment of the mining sector.

It is understood that incentives and public policies aimed at the mining sector should guide companies towards the best use of the mineral good, the improvement of management,

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<sup>1</sup> Brazilian Mineral Sector Technological Development Program (*Programa de Desenvolvimento Tecnológico do Setor Mineral Brasileiro – PD Tec Mineral*, 2019). Available at: <http://www.mme.gov.br/documents/20182/8a01175a-c22a-b3e4-8166-8cddfec9bcbf>.



technological development, reduction of the environmental impacts of the activity, promotion of workers' health and safety, and the development of municipalities, aiming at the well-being of local populations.

It is important that these changes take place within the mining sector over the next twenty years, so that activities, in particular those relating to small and medium-sized enterprises, are able to survive in an increasingly competitive, demanding and globalized market. This should guarantee the sustainability of enterprises' activities and the generation of income and employment for workers, stimulating the fight against poverty in the municipalities, reducing environmental impacts, and valuing social well-being. These, among others, are some of the elements that should guide the "Study for the Technological Insertion and Development of the gemstone sector in Brazil," which with knowledge, reflection, critical analysis and justified recommendation may contribute to Brazilian society and for the better development of the gemstone sector.

The proposal is also aligned with national development programs, such as PDTec Mineral and the Mining and Development Program (PMD 2020-2023), as well as environmental policies, such as Agenda 2030 in Brazil, in order to encourage the search for more sustainable technologies and processes and best practices in mining. As established by the United Nations (UN), the Agenda 2030 is composed of 17 ambitious and interconnected goals that address the main development challenges faced by Brazilian and world society.

Thus, the Sustainable Development Goals (SDGs) comprise a global call to action to end poverty, protect the environment and climate, and ensure that people everywhere is able to enjoy peace and prosperity. In this context, this project could contribute to the Sustainable Development Goals (SDGs), particularly SDG 1 "No Poverty," SDG 8 "Decent Work and Economic Growth," SDG 9 "Industry, Innovation and Infrastructure," SDG 10 "Reduced Inequality," and SDG 12 "Responsible Consumption and Production."

## **2. JUSTIFICATION**

Mining and its mineral transformation chain are crucial activities for the social and economic development of a country. In Brazil, the mining sector is responsible for



approximately 749,700 direct jobs (2020), having accounted, as of 2019, for 2.4% of GDP, reaching 80.9 billion in exports in 2021 (excluding oil and gas), according to information from the Mining Sector Bulletin (SGM/MME). The activity, when properly managed, creates jobs, stimulates and strengthens the economy and innovation, bringing greater investment and revenue to the municipality where it is located, as well as infrastructure in the medium and long term. When the opposite occurs, it may have adverse effects on local communities and the territory.

In this universe, Artisanal and Small-Scale Mining (ASM) stands out for its wide distribution across the territory, large amount of labor used and high level of involvement with the local community, while reporting the highest rates of informality, low professional qualification, and use of methods with lower technology in mining and processing. Such activities often present satisfactory operational standards, which are mainly related to the use of the mineral good, environmental protection, and worker health and safety, in spite of the great advances in recent years in this segment, with the adoption of new technologies.

Thus, the mining sector shows its heterogeneity, and only based on the diagnosis of technological deficiencies will it be possible to propose measures and policies to encourage improvements in the use of the mineral good, reduction of the adverse impacts of the activity, and promotion of social well-being, among others relevant aspects.

Naturally, a number of production chains need, more than others, government actions that positively influence them, which has led to adoption of a strategy involving indicating a more complex chain, in which the Brazilian State has difficulties in carrying out its mapping and monitoring, sometimes with a high degree of informality: the chain of Brazilian gems, from extraction to processing.

The gem chain is characterized by a number of challenges, similar to other chains, such as the gold mining sector. Such challenges are particularly associated with techniques, work methods and technologies used in the mining operation, including inadequate, outdated or inefficient ones, as well as others related to difficulties in technical support and access to new technologies.

With regard to the gemstone sector and its production chain, information from the Brazilian Institute of Gems and Precious Metals (IBGM) highlight that Brazil ranks among the main global producers of emeralds, being the only one that produces imperial topaz and paraíba



tourmaline (pink, green, and blue), and provides, on a large scale, citrine, agate, amethyst, tourmaline, aquamarine, topaz, and quartz crystal, as well as standing out for its production of other colored stones. The country produces more than a third of all the gems traded in the world, with the exception of diamonds, rubies, and sapphires.

The gems and jewelry sector, according to the Brazilian Service of Support for Micro and Small Enterprises (*Serviço Brasileiro de Apoio às Micro e Pequenas Empresas – SEBRAE*) (2017)<sup>2</sup>, involves everything from mineral extraction activities in the deposits to the production and sale of the final product – raw precious stones, polished gems, artifacts with precious stones, jewels, veneers, and costume jewelry.

According to SEBRAE, studies indicate that the gemstone sector is a labor-intensive industry and generates approximately 350,000 direct jobs along its production chain. The internal market consumes 1-5% of gem production, 8% of jewelry production, and nearly the entire production of costume jewelry.

According to the Brazilian Institute of Gems and Precious Metals (*Instituto Brasileiro de Gemas e Metais Preciosos – IBGM*) , in 2018 the sector employed 76,542 workers, with commerce accounting for 58% of jobs. The gem and metal extraction industry, as well as the jewelry manufacturing industry, had a positive balance in terms of hiring compared to the previous year. The number of establishments remained virtually stable, close to 14,000, according to data from the Annual Social Information List (*Relação Anual de Informações Sociais – RAIS*) (2018).

According to IBGM<sup>3</sup>, Brazil has the capacity and competitiveness to cut medium- and high-quality stones. Furthermore, the export potential of the jewelry industry of processed products (cut gems, jewels, and veneers) from Brazil is growing.

Data from ComexStat<sup>4</sup>, a Ministry of Economy (ME) system, indicate that, in 2016, around \$31.7 million in jewelry artifacts were exported, plus \$112.3 million of goldsmith artifacts.

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<sup>2</sup> *Indústria da Moda: Gemas e Joias.* Available at: <https://m.sebrae.com.br/Sebrae/Portal%20Sebrae/UFs/BA/Anexos/Gemas%20e%20joias%20na%20Bahia.pdf>.

<sup>3</sup> *O Setor em Grandes Números 2018.* Available at: <https://ibgm.com.br/wp-content/uploads/2019/09/O-Setor-em-Grande-N%C3%BAmeros-2018.pdf>.

<sup>4</sup> Available at: <http://comexstat.mdic.gov.br/pt/home>.



Most companies that make up this sector are small and medium-sized and are concentrated in the states of Minas Gerais, Rio Grande do Sul, Bahia, Goiás, Pará, Tocantins, São Paulo, and Rio de Janeiro.

Also, according to the document “*Projeto Diagnóstico Socioeconômico e Ambiental da Mineração em Pequena Escala no Brasil*” (“Socioeconomic and Environmental Diagnosis of Small-Scale Mining in Brazil”) (MME/IBRD, 2018)<sup>5</sup>, the gemology sector requires technological insertion to add value in cutting and the development of new design concepts, so as to expand sales capacity, including the conquest of new markets.

To this end, the document recommends verifying the potential of this segment by assessing the local market and gem exports, to subsequently enable the development of actions and partnerships with the “S” system, technical schools, universities, and other interested parties, to ensure technological development, training of professionals for cutting, and jewelry design, among others.

In this way, the need for the “Study for the Technological Insertion and Development of the gemstone sector in Brazil” is justified, in order to investigate the technological deficiencies and identify the structuring limitations in the selected production chain, covering all links in the gem segments, whose contribution can be extended to other sectors, in addition to providing subsidies for the Public Authorities to support this segment, aiming at technological innovation and the modernization of processes that leverage the sustainable development of the Brazilian mining sector.

### **3. PURPOSE**

This Term of Reference meets the need to propose actions and policies for the sustainable development of the mining sector with an emphasis on technological improvement, aiming at improving the production process, especially for small and medium-sized mining enterprises, while maximizing their economic potential and reducing the social and environmental impacts of the activity, in particular, in the gemstone segment and its chain.

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<sup>5</sup> *Projeto Diagnóstico Socioeconômico e Ambiental da Mineração em Pequena Escala no Brasil*. Available at: <http://www.mme.gov.br/web/guest/secretaria-executiva/projeto-meta/documentacao/dados-abertos>.



In this sense, the general purpose, considering the environmental and social aspects, is to hire a specialized consulting firm to carry out a nationwide study on technological insertion, mainly in small and medium-sized mining companies in the gemstone sector, with a view to diagnosing technological deficiencies in production and throughout the chain, with a view to the sustainable development of the sector.

The specific purposes of this project are to:

- i) Present the main areas of gemstone extraction and gemstone processing centers or hubs in Brazil, including cutting and treatment;
- ii) Better understand the production chain of gemstones in the Brazilian regions, their specificities and the techniques and technologies employed: from the extraction of the mineral to the processed product, whether in the form of a gemstone, artifact or jewel, including products derived from or originating from reuse of the mineral goods;
- iii) Characterize and compare, within the scope of the productive segment for gemstones, in the Brazilian regions, the main techniques and technologies employed, including the structures, machines, equipment and tools used or involved in the productive processes of extraction and processing, as well as the predominant forms of cutting in the national territory, applied to Brazilian gemstones and the various forms of treatments such as thermal, dyeing, impregnation, diffusion, filling of fractures, removal of inclusions, bleaching, and high pressure high temperature (HPHT), among others;
- iv) Evaluate and propose changes in the production model aimed at the technological modernization of the gem chain, sustainability, and improvement in business management, as well as considering the economic and social and environmental impacts arising from this proposal;
- v) Systematically identify the main shortcomings, bottlenecks, and deficiencies, among other aspects that limit technological advancement to increase sustainability in the gemstone production chain, in the regions of Brazil, as well as the strengths and opportunities for technological innovation in this production chain: from the extraction of the mineral good, through its processing, to its marketing.





- vi) Propose actions or mechanisms for: a) fostering the application of knowledge and technologies among agents in the production chain; b) encouragement for technical and managerial training to improve the business and technology model in the production chain; c) incentive lines for the technological modernization of the selected production chain; and d) approximation of research centers and universities to the reality of the mining sector with a focus on the promotion and support of research activities and the technological development of the production chain for gems;
- vii) Study models, techniques and technologies for the best use of mineral goods, byproducts, coproducts or discards, adding value and increasing quality and productivity with sustainability;
- viii) Evaluate the certifications applicable to the gemstone sector of an economic and environmental nature;
- ix) Study and evaluate, from an economic point of view, the application of Geographical Indication (GI) through mechanisms such as Denomination of Origin (DO) or Indication of Origin (IO), in the chain of Brazilian gemstones;
- x) Evaluate, from an economic point of view, the creation of mineral-based production, technical, specialized or technological centers or hubs aimed at the production, trade, addition of value, or export of gems and derivative products, including the use of the mineral good with non-gemological characteristics;
- xi) Propose objective and clear actions, initiatives or guidelines to subsidize medium to long-term public policies aimed at the technological development and sustainability of the gemological sector; and
- xii) Apply the precepts of circular economy in the gemstone sector by updating and developing new technologies used in mining so that there is an optimization of gemstone processing, thereby reducing the generation of waste, in addition to technological innovations to minimize the use of waste that may be generated.

The study should include field stages that allow the visitation of enterprises, preferably small to medium-sized production, within the gemstone production chain, as detailed in Chapter 6 (ACTIVITIES).



Considering the need to protect any rights and commercial, industrial or even intellectual properties of the companies, and given that the lack of information comprises a risk for the execution of this project, the Ministry of Mines and Energy (MME) has chosen, in advance, to inform the Contractor that field data on products should be presented in a consolidated manner, guaranteeing, to establishments that expose themselves in good faith, the security of their information. It is acknowledged, however, that not all information falls within these restrictions.

Furthermore, the Contractor is authorized not to promote the identification of the mines or companies visited directly in the products of this project, using, preferably, fictitious or alphanumeric nomenclature to refer to the visited projects. Nevertheless, in separate digital files (organized worksheets), the alphanumeric reference associated with the name of origin of the company; the mine, if named; the mining process number; and the National Register of Legal Entities (*Cadastro Nacional de Pessoa Jurídica – CNPJ*) number.

These worksheets and information only be available will to the members of the Technical Supervisory Committee (*Comitê Técnico Supervisor – CTS*) and the Secretariat of Geology, Mining and Mineral Transformation (SGM), as well as the control bodies (Comptroller General of Brazil (*Controladoria Geral da União – CGU*) and the Federal Court of Auditors (*Tribunal de Contas da União – TCU*)) and the Judiciary Branch, upon request. The organized digital worksheets and their information will be treated as confidential (classified), in accordance with Act 12,527/2011 or until they are revised by the Minister of Mines and Energy.

Thus, the project is limited, to a considerable extent, to the interests of companies in exposing their processes, techniques and technologies to specialists, including the presentation of structures, machines, equipment and tools used or involved in the main production processes of extraction and processing, or even resistance to proposals for changes to the production model aimed at technological modernization, sustainability, and improvement in business management.

#### **4. SCOPE**



The target audience of this Term of Reference is composed of public policy makers for the mining and mineral transformation sector; micro to medium-sized enterprises that extract and process mineral goods and other companies involved along the selected production chain up to the trade of the products; bodies and entities that promote and finance programs aimed at the technological or sustainable development of companies; research and technology centers; and the universities and academy of sciences, among other actors in society.

The study and its recommendations should be capable of favoring the construction of government instruments, such as actions, plans and programs for the promotion of public policies, in the medium and long term, applicable to the theme of modernization and more sustainable technological development throughout the supply chain. selected production, in addition to incorporating environmental and social issues.

## **5. RESULTS AND EXPECTED PRODUCTS**

The expected results of this study are to:

- a) Provide greater visibility for the gemstone sector, for the diversity of Brazilian gemstones, and for the use of production techniques and technologies that improve the mining and processing processes of mineral goods, which improve health and safety conditions in the mines, among other related work environments, and which promote the sustainability of small and medium-sized mining companies and throughout the gem chain;
- b) Systematically understand the sector's production chain and the technological level involved, in the Brazilian regions, including the production method, production processes, technologies used, and the main structures, machines, equipment and tools used or involved in the productive processes, as well as aspects that limit the technological advancement and sustainability of the sector, strengths, and opportunities;
- c) Contribute to the promotion of the best sustainable practices in mining and in the production chain, mainly with regard to the reduction of environmental impacts and changes in the production method;



- d) Contribute to the Sustainable Development Goals (SDGs) in mining;
- e) Expand technical knowledge to propose and/or apply certification models with an economic or environmental target for products of mineral origin, considering the needs of producers and domestic and international markets;
- f) Expand the technical base to support the analysis of proposals for the creation of productive, technical, specialized or technological centers or hubs, considering the needs of producers and the domestic and international market;
- g) Strengthen the gemstone production chain;
- h) Contribute to improving the image and reputation of mining; and
- i) Provide subsidies for the construction of government instruments, such as plans, programs, and actions, for the promotion of public policies.

Below are the products to be prepared during the contracting period, with the provisions of Chapter 6 (ACTIVITIES) also being observed.

It should be noted that the Work Plan, contained in Product 1, and conditioned to the approval of the CTS, is fundamental for the execution of Products 2 and 3. These two products, however, do not depend on each other. Product 4 is dependent on all previous products.

### ***5.1. Product 1: Work Plan and Technical Report – “Overview of the Gemstone Sector in Brazil and Worldwide”***

Product 1 should contain at least:

- 1) Methodology developed for the project and for the specific product (technical report), including a description of the activities and work steps defined by the contractor as necessary to achieve the goals proposed in the TOR, the expectations for achieving the results and the limitations encountered. It should include the details of the field steps, considering each Brazilian region or the selected states, criteria for selecting the mines and projects to be visited, and the sources for searching for secondary data. It should also include an assessment of the environmental and social aspects related to the methodologies adopted. The Work Plan and its methodology should be directly related to the products and aligned with the schedules defined in this Term of Reference (TOR),



- including the specific goals, activities, deadlines, responsible parties, and possible partners, as well as the commitment to the expected results;
- 2) Overview of the gemstone market in Brazil and in the world, sectoral characteristics, including producing states, up-to-date data and information on foreign trade, production, consumption, types of products, trade routes, number of workers, exporting countries, competitors, and buyers, among other relevant aspects. It should also include the context of the topic, including an introduction, data and statistics related to the gemstone sector and Brazil's relevance at the regional (Mercosur) and international levels;
  - 3) Analysis of the impact of the pandemic on the extractive sector, processing and trade in the gemstone sector, as of 2020, in Brazil and worldwide
  - 4) Analysis of data and information systems or ways of recording the production and export of gemstones, at the federal level, considering the systems of the National Mining Agency (*Agência Nacional de Mineração – ANM*) and the Ministry of Economy (ME) (former Ministry of Development, Industry and Foreign Trade (*Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC*)), with a view to giving greater transparency and visibility to the diversity of Brazilian gemstones. It should also present and analyze the Mercosur Common Nomenclatures (*Nomenclaturas Comuns do Mercosul – NCM*) related to the sector, including those for jewelry and similar products.
  - 5) Analysis on the collection information of the Financial Compensation for Mineral Exploration (*Compensação Financeira pela Exploração Mineral – CFEM*) for the gemological segment, from the year 2000; and
  - 6) Results, propositions and conclusions arising from this product.

**5.2. Product 2: Product 2: Technical Report – “Diagnosis of technologies applied by mining in the gemstone extraction sector and for its sustainability”**

Product 2 should contain at least:



- 1) Methodology developed for this product, including methods for selecting mines for the study, expected results, limitations encountered, and related environmental and social aspects. It should include the details of the field stages, in each Brazilian region, criteria for selecting companies, cooperatives or associations to be visited and the sources for searching for secondary data
- 2) Identification and characterization of the main gemstone extraction areas in the country: synthesis of regional geology and identification of the main and secondary gemological minerals, where applicable;
- 3) Characterization of the extractive chain considering the advances in the technological development of the gems segment, at least, in the last twenty (20) years, as well as challenges, and opportunities. It should include an analysis of studies on technological advances and best environmental practices in the gem mining sector, Brazilian or international, or other similar ones that prove to be relevant to the development of the topic, as well as presenting the main results, conclusions and recommendations of these studies;
- 4) Diagnosis of the main processes, technologies and technological routes developed, in a consolidated and comparative way, for the Brazilian regions, considering the mines visited and secondary material. It should include outstanding cases, positive or negative, individually or grouped by technological degree, among other ways, highlighting their specificities and discrepancies;
- 5) Characterization, with photographic records, of the main structures, machines, equipment, and tools used or involved in the production processes;
- 6) Identification of local goods and services contracted by mining companies in the enterprises visited. It should include a discussion on local content in the gemstone extraction segment, based on benchmark studies on the subject, Brazilian or international, highlighting the conclusions, weaknesses, opportunities and success stories found;
- 7) Characterization and analysis of the main mining methods in the mines visited and processing, if it occurs in the mine area.



- 8) The units to be visited should be distributed across the five Brazilian regions, encompassing the following minerals (gemstones): agate and chalcedony; beryl, aquamarine and emerald; topaz and imperial topaz; tourmaline and paraíba tourmaline; quartz, citrine and amethyst; ruby and sapphire; opal; diamonds; and exceptionally, other Brazilian gemstones. A number of visits ranging from one hundred (100) to (two hundred) 200 mines in production is recommended;
- 9) Evaluation and proposition of changes in the production model aimed at the technological modernization of the gem chain, sustainability, and improvement in business management, as well as considering the economic and social and environmental impacts arising from this proposal;
- 10) Identification of the main products and coproducts, if any, and a preliminary assessment of the economic and environmental viability of solid waste from the mining segment studied or the use of discarded or underused material;
- 11) Systematic identification of the main shortcomings, bottlenecks, and deficiencies, among other aspects that limit the technological advancement of extractive activities in the mines visited;
- 12) Systematic identification of strengths and opportunities for technological innovation in the gemstone extraction segment. It should include the use of tools for analysis and strategic planning such as the SWOT matrix or similar ones;
- 13) Evaluation of the gemstone extraction segment regarding its technological degree and market;
- 14) Analysis regarding the implementation of lean management in gemstone mining, based on an applied integrated management model (transaction process system (TPS) applied in mining);
- 15) Proposals for the inclusion of more sustainable techniques and technologies in the extraction or processing process, where applicable;
- 16) Preliminary analysis of the economic, social and environmental impacts arising from proposals for technological changes in mineral extraction or processing, where applicable;



- 17) Analysis and proposition of alternatives in the management of the extraction of the mineral goods, the mining operation, and the process or technologies to reduce the environmental impact;
- 18) Actions or mechanisms for: i) fostering the transfer of knowledge and technologies among agents in the production chain; ii) encouragement for technical and managerial training to improve the business and technology model in the production chain; iii) incentive lines for the technological modernization of the selected production chain; and iv) approximation of research centers and universities to the reality of the mining sector with a focus on the promotion and support of research activities and the technological development of the production chain;
- 19) Grounded discussions and critical analysis throughout the product;
- 20) Comparative analysis between production units (mines) or their groupings and between Brazilian regions or states, where applicable. This form of analysis is mandatory, fundamental, and cross-sectional, permeating almost all product items, even if not specified in the product description; and
- 21) Results, propositions and conclusions arising from this product.

**5.3. *Product 3: Technical Report – “Diagnosis of the technologies used in the cutting, treatment and improvement of national gemstones”.***

Product 3 should contain at least:

- 1) Methodology developed for this product, including methods for selecting companies for the study, expected results, limitations encountered and related environmental and social aspects. It should include the details of the field stages, in each Brazilian region, criteria for selecting companies to be visited and the sources for searching for secondary data;
- 2) Identification of the main cutting, treatment and processing centers or hubs in the country;
- 3) Diagnosis of the main processes, technologies and technological routes developed, in a consolidated and comparative way, in the Brazilian regions,





considering the companies visited and secondary material. It should include outstanding cases, positive or negative, individually or grouped by technological degree, among other ways, highlighting their specificities and discrepancies;

- 4) The field visits should consider companies, cooperatives or associations, irrespective of size, which promote the cutting of gemstones, treatment or other known forms of processing (mainly, the gemstones indicated in the first product should be considered). The dispersion of technical visits should take place in at least five states, distributed across at least three Brazilian regions. A number of visits ranging from fifty (50) to one hundred and fifty (150) enterprises is recommended;
- 5) Characterization, with photographic records, of the main structures, machines, equipment, and tools used or involved in the production processes;
- 6) Identification of local goods and services contracted by the visited enterprises. It should include a discussion on local content in the segment of gemstone cutting and processing, based on benchmark studies on the subject, Brazilian or international, highlighting the conclusions, weaknesses, opportunities and success stories found;
- 7) Diagnosis and analysis of the main cutting and treatment methods applied to Brazilian gemstones, Brazilian or international, as applicable, among other processing methods. Approach the regionality of cutting and processing;
- 8) Identification of the main products and coproducts, if any, and a preliminary assessment of the economic and environmental viability of solid waste from the studied chain or the use of discarded or underutilized material;
- 9) Systematic identification of the main shortcomings, bottlenecks, and deficiencies, among other aspects that limit the technological advancement of the cutting and processing activities visited;
- 10) Systematic identification of strengths and opportunities for technological innovation in the cutting and processing sectors visited. It should include the use of tools for analysis and strategic planning such as the SWOT matrix or similar ones;



- 11) Evaluation of the cutting and processing sectors visited regarding their technological level;
- 12) Proposals for the inclusion of more sustainable techniques and technologies in the cutting and processing process visited;
- 13) Analysis of socioeconomic or environmental impacts arising from proposals for technological changes in the cutting and processing of gemstones;
- 14) Analysis of the Kimberley certification regarding its transparency and effectiveness, as well as application of other certification models with an economic or environmental goal for products of mineral origin, considering the needs of producers and domestic and international markets;
- 15) Analysis on the topic of Geographical Indication (GI) through mechanisms such as Denomination of Origin (DO) or Indication of Origin (IO) applied to the gemstone chain;
- 16) Analysis regarding the creation of technical (for stonecutters, among others), specialized (cutting, gemstone treatment, etc.) or technological (machinery, equipment, etc.) production hubs or centers, considering the needs of producers and the domestic and international market. Success and failure cases in Brazil up to the present moment should be considered, as well as the market need and the local or national conditions for promoting or rejecting proposals of this nature. The technical and economic feasibility should be discussed, based on field visits and secondary material, highlighting bottlenecks, and deficiencies, among other limiting aspects;
- 17) Actions or mechanisms for: i) fostering the transfer of knowledge and technologies among agents in the production chain; ii) encouragement for technical and managerial training to improve the business and technology model in the production chain; iii) incentive lines for the technological modernization of the selected production chain; and iv) approximation of research centers and universities to the reality of the mining sector with a focus on the promotion and support of research activities and the technological development of the production chain;
- 18) Grounded discussions and critical analysis throughout the product;



- 19) Comparative analysis between production units (premises) or their groupings and between Brazilian regions or states, where applicable. This form of analysis is mandatory, fundamental, and cross-sectional, permeating almost all product items, even if not specified in the product description; and
- 20) Results, propositions and conclusions arising from this product.

#### **5.4. Product 4: Final Report and Results Dissemination Seminar**

Product 4 should consolidate previous products and provide subsidies for the construction of government instruments, such as actions, plans and programs for more sustainable modernization and technological development along the gemstone chain, with an emphasis on social and environmental aspects.

The Final Report should contain at least:

- 1) Systematization, integration and consolidation of data and other information from previous products;
- 2) Summary of the methodology applied to the project, including for Product 4;
- 3) A summary of the main assessments and discussions that took place in the previous products, including the positive points, opportunities, challenges and limiting components or restrictions for the technological insertion in the selected production chain or for its sustainability;
- 4) Assessment of opportunities for improvement and suggestions for management practices in mining to strengthen the mining sector, promote sustainability, ensure technological development, encourage the use of mining waste, promote local content, diversification of new products or improved quality, and include technologies or better management and social and environmental conduct of excellence in the sector;
- 5) Recommendations for building new values of reputation and public image in the mining sector, based on sustainable development, by improving performance in the areas of socioeconomic and environmental responsibility of the mining companies, in the effective management of the main risks of the mining activity and in the transparency with communities;



- 6) Recommendations, conclusions and general or specific propositions applied to the promotion of governmental actions and guidelines, based on the assessments and discussions presented in the products, as support for public policies aimed at the construction of governmental instruments, such as actions, plans and programs for modernization and development of more sustainable technologies along the selected production chain; and
- 7) Preliminary analysis on meeting the expected results of the project, according to item 5 (EXPECTED RESULTS AND PRODUCTS), that is, whether the expected results were achieved or could be achieved based on the studies, surveys, analyses, discussions, proposals and recommendations presented in the products.

Additionally, Product 4 should include a seminar to present the project's results (see item 6, Table 1, sub-item 4.2). The summary of the results of the seminar contributions should be edited and inserted as an annex to the Final Report.

## 6. *ACTIVITIES*

For the preparation of products, specific activities will be carried out, as detailed in the chart below:

*Chart 1 – Activities related to the Products*

<b>Product</b>	<b>Activity</b>
<b>Product 1: Work Plan and Technical – “Overview of the Gemstone Sector in Brazil and Worldwide”</b>	a) Preparing the Work Plan with the indication of activities, project planning, applied methodologies, forecast regarding meetings and product deliveries, details on the field stages, selection of mines in the municipalities to be visited, as well as companies or cooperatives, considering the environmental and social aspects, the schedule and deadlines set out in this Term of Reference (TOR). The Draft Work Plan should be sent by email in advance to the Technical Manager of the Project within five working days before the first working meeting at the MME. The Work Plan should be detailed and presented according to this TOR, to be



	<p>discussed with the Technical Supervisory Committee (CTS);</p> <ul style="list-style-type: none"><li>b) Holding a working meeting at the MME (Brasília, Federal District (DF)), within ten (10) business days from the issuance of the Service Order (SO), or exceptionally by video-conference, for the presentation of the team, provision of details and improvement of the methodology and the Work Plan, directing technical field visits and leveling the expectations of the CTS with the contracted team, among other relevant aspects. The participation of the General Coordinator and the Fully Authorized Consultants in the meeting is considered appropriate, the duration of which may be of up to 4 periods of four (4) hours each, as agreed between the parties;</li><li>c) Presenting recommendations for field visits to mines, preferably in small to medium-sized production in the gemstone segment, distributed in the five Brazilian regions, and considering following the minerals (gemstones): agate and chalcedony; beryl, aquamarine and emerald; topaz and imperial topaz; tourmaline and paraíba tourmaline; quartz, citrine and amethyst; ruby and sapphire; opal; diamonds; and exceptionally, other Brazilian gemstones. A number of visits ranging from one hundred (100) to (two hundred) 200 mines in production is recommended; The choice of municipalities for mine occurrences should be ratified by the CTS and included in the Work Plan;</li><li>d) Presenting recommendations for field visits to the companies, cooperatives or associations, irrespective of size, which promote the cutting of gemstones, treatment or other known forms of processing (mainly, the gemstones indicated in the first product should be considered). The dispersion of technical visits should take place in at least five states, distributed across at least three Brazilian regions. A number of visits ranging from fifty (50) to one hundred and fifty (150) enterprises is recommended; The establishments visited may be considered in the first product as long as the processing mentioned above for the gemstones is included. The choice of municipalities for the enterprises should be ratified by the CTS and included in the Work Plan;</li><li>e) Resubmitting the project's Work Plan, in its final version, after the contributions and debates held with the CTS. The Work Plan should be ratified by the CTS;</li></ul>
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	<ul style="list-style-type: none"><li>f) Developing a visual identity for the products, including reports, graphs, figures, and presentations, among others. The visual identity should be validated by the CTS;</li><li>g) Compliance with item 5 (EXPECTED AND RESULTS PRODUCTS), in particular sub-item 5.1 (Product 1), in its fullness and complexity, or, exceptionally, providing a justification with arguments and facts, presenting proof, when compliance cannot be ensured;</li><li>h) Presenting the methodology developed for the product, in a specific chapter, including the methods for selecting data and information for the study, expected results, and limitations encountered;</li><li>i) Preparing an overview of the gemstone market in Brazil and in the world, sectoral characteristics, including producing states, up-to-date data and information on foreign trade, production, consumption, types of products, trade routes, number of workers, exporting countries, competitors, and buyers, among other relevant aspects. It should also include the context of the topic, including an introduction, data and statistics related to the gemstone sector and Brazil's relevance at the regional (Mercosur) and international levels; In the case of data analysis and historical information on the gemstone market, the current century, in particular, should be considered;</li><li>j) Analysis of the impact of the pandemic on the extractive sector, processing and trade in the gemstone sector, as of 2020: Brazil and worldwide;</li><li>k) Analysis of data and information systems or ways of recording the production and export of gemstones, at the federal level, considering the systems of the National Mining Agency (<i>Agência Nacional de Mineração – ANM</i>) and the Ministry of Economy (ME) (former Ministry of Development, Industry and Foreign Trade (<i>Ministério do Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC</i>)), with a view to giving greater transparency and visibility to the diversity of national gemstones. It should also present and analyze the Mercosur Common Nomenclatures (<i>Nomenclaturas Comuns do Mercosul – NCM</i>) related to the sector, including those for jewelry and similar products, in order to contribute to improving the NCM;</li><li>l) Analysis on the collection information of the Financial Compensation for Mineral Exploration (<i>Compensação</i></li></ul>
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	<p><i>Financeira pela Exploração Mineral – CFEM</i>) for the gemological segment, from the year 2000. Considering the groups of gemstones described in this TOR;</p> <p>m) Listing sources of secondary information. Identifying and recording the focal points of the main public agencies, entities, associations, cooperatives or companies that are the sources of data and information presented in the product, as well as the address, website, institutional emails, telephone or contacts of those responsible for the information, in the form of annexes (organized worksheets).</p> <p>n) Holding planned face-to-face or video-conference meetings, throughout the execution of the product, whenever necessary, in order to verify compliance, scheduled content, and limitations, as well as proposing alignments with the expectations of achieving the study results;</p> <p>o) Holding a face-to-face meeting at the MME (Brasília, DF) or by video-conference, after the first technical evaluation of the CTS in relation to the first product report, to ensure adequacy and discussion of relevant topics. The duration of the meeting may be up to two (2) periods of four (4) hours each. The presence of the General Coordinator and the Fully Authorized Consultants responsible for the product is required, in addition to the Brazilian Portuguese Consultant, when requested;</p> <p>p) Providing all documents used or prepared by the consulting firm (reports, database, and bibliography, among others), including maps (mxd project, layers, shapefiles, and legends), which may be considered relevant for a better understanding and monitoring of the project by the CTS;</p> <p>q) Presenting photographs, illustrations, schematics diagrams, or other forms of visual records throughout the product;</p> <p>r) Presenting the results and conclusions arising from this product, in a specific chapter;</p> <p>s) Presenting the bibliographic references in a specific chapter, according to ABNT standards; and</p> <p>t) Promoting grounded discussions and critical analysis throughout the product.</p>
<p><b>Product 2: Product 2: Technical Report – “Diagnosis of technologies applied by mining in the gemstone</b></p>	<p>a) Compliance with item 5 (EXPECTED AND RESULTS PRODUCTS), in particular sub-item 5.2 (Product 2), in its fullness and complexity, or, exceptionally, providing</p>



extraction sector and for its sustainability”

- a justification with arguments and facts, presenting proof, when compliance cannot be ensured;
- b) Presenting the methodology developed for the product, in a specific chapter, including the methods for selecting the mines and companies for the study, expected results, and limitations encountered;
  - c) Identification and characterization of the main gemstone extraction areas in the country: synthesis of regional geology and identification of the main and secondary gemological minerals, where applicable;
  - d) Including, within the general context, at least ten Brazilian and/or international studies, published from the year 2000, on the technological development in the mineral sector, modernization of production processes, or best environmental practices for the gemstone sector, among other similar subjects;
  - e) Carrying out scheduled technical visits for the gemstone segment, according to the Work Plan, considering the schedule, guidelines and deadlines set forth in this TOR;
  - f) Ensuring the submission of photographic records of the field visits, including the main structures, machines, equipment and tools used or involved in the production processes;
  - g) Using the alphanumeric nomenclature on the product, identifying and recording in the organized worksheets, as provided in these Terms, the alphanumeric reference associated with the name of origin of the company, cooperative, or association; the mine, if named; the mining process number; and the National Register of Legal Entities (*Cadastro Nacional de Pessoa Jurídica* – CNPJ) number. Exceptionally, the georeferenced location (UTM coordinates) of the mine should be included in cases where it is not possible to identify the mining documents;
  - h) Conducting a SWOT analysis or a similar procedure, to ensure the systematic identification of strengths and opportunities for technological innovation in the gemstone extraction;
  - i) Assessing the application of the TPS system in mining;
  - j) Listing sources of secondary information. Identifying and recording the focal points of the main public agencies, entities, associations, cooperatives or companies that are the sources of data and information presented in the product, as well as the address, website, institutional emails, telephone or contacts of





	<p>those responsible for the information, in the form of annexes (organized worksheets);</p> <ul style="list-style-type: none"><li>k) Holding planned face-to-face or video-conference meetings, throughout the execution of the product, whenever necessary, in order to verify compliance, scheduled content, and limitations, as well as proposing alignments with the expectations of achieving the study results;</li><li>l) Holding a face-to-face meeting at the MME (Brasília, DF) or by video-conference, after the first technical evaluation of the CTS in relation to the first product report, to ensure adequacy and discussion of relevant topics. The duration of the meeting may be up to two (2) periods of four (4) hours each. The presence of the General Coordinator and the Fully Authorized Consultants responsible for the product is required, in addition to the Brazilian Portuguese Consultant, when requested;</li><li>m) Providing all documents used or prepared by the consulting firm (reports, database, and bibliography, among others), including maps (mxd project, layers, shapefiles, and legends), which may be considered relevant for a better understanding and monitoring of the project by the CTS;</li><li>n) Presenting photographs, illustrations, schematics diagrams, or other forms of visual records throughout the product;</li><li>o) Presenting the results and conclusions arising from this product, in a specific chapter;</li><li>p) Presenting the bibliographic references in a specific chapter, according to ABNT standards; and</li><li>q) Promoting grounded discussions and critical analysis throughout the product.</li><li>r) Comparatively assessing the Brazilian states or regions, where applicable, where the visited developments are located, from the standpoint of specificities, differences, or similarities. This kind of analytical vision should permeate all product items.</li></ul>
<p><b>Product 3: Technical Report – “Diagnosis of the technologies used in the cutting, treatment and improvement of Brazilian gemstones”</b></p>	<ul style="list-style-type: none"><li>a) Compliance with item 5 (EXPECTED AND RESULTS PRODUCTS), in particular sub-item 5.3 (Product 3), in its fullness and complexity, or, exceptionally, providing a justification with arguments and facts, presenting proof, when compliance cannot be ensured;</li><li>b) Presenting the methodology developed for Product 3, in a specific chapter, including methods for selecting</li></ul>



	<p>companies for the study, expected results, limitations encountered, and related environmental and social aspects;</p> <ul style="list-style-type: none"><li>c) Identifying the main cutting, treatment and processing centers or hubs of the gemstone sector in Brazil;</li><li>d) Including, within the general context, at least ten Brazilian and/or international studies, published from the year 2000, on the technological development in the mineral sector, modernization of production processes, or best environmental practices for the gemstone sector, among other similar subjects;</li><li>e) Carrying out technical visits to companies that promote the cutting of gemstones or other forms of processing, according to the Work Plan, considering the schedule, guidelines and deadlines set forth in this TOR;</li><li>f) Using the alphanumeric nomenclature on the product, identifying and recording in the organized worksheets, as provided in these Terms, the alphanumeric reference associated with the name of origin of the company, cooperative, or association; and the National Register of Legal Entities (<i>Cadastro Nacional de Pessoa Jurídica</i> – CNPJ) number. Exceptionally, the georeferenced location (UTM coordinates) of the enterprise should be included in cases where it is not possible to identify the company;</li><li>g) Ensuring the submission of photographic records of the field visits, including the main structures, machines, equipment and tools used or involved in the production processes;</li><li>h) Conducting a SWOT analysis or a similar procedure to ensure the systematic identification of strengths and opportunities for technological innovation in the cutting and processing sectors visited;</li><li>i) Conducting a survey of success and failure cases in Brazil regarding the creation of production hubs or centers, considering the market need and the local or national conditions for promoting or rejecting proposals of this nature;</li><li>j) Presenting sources of secondary information. The contractor should identify and record the focal points of the main public agencies, entities, associations, cooperatives or companies that are the sources of data and information presented in the product, as well as the address, website, institutional emails, telephone or contacts of those responsible for the information, in the form of annexes (organized worksheets);</li></ul>
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	<ul style="list-style-type: none"><li>k) Holding planned face-to-face or video-conference meetings, throughout the execution of the product, whenever necessary, in order to verify compliance, scheduled content, and limitations, as well as proposing alignments with the expectations of achieving the study results;</li><li>l) Holding a face-to-face meeting at the MME (Brasília, DF) or by video-conference, after the first technical evaluation of the CTS in relation to the first product report, to ensure adequacy and discussion of relevant topics. The duration of the meeting may be up to two (2) periods of four (4) hours each. The presence of the General Coordinator and the Fully Authorized Consultants responsible for the product is required, in addition to the Brazilian Portuguese Consultant, when requested;</li><li>m) Providing all documents used or prepared by the consulting firm (reports, database, and bibliography, among others), including maps (mxd project, layers, shapefiles, and legends), which may be considered relevant for a better understanding and monitoring of the project by the CTS;</li><li>n) Presenting photographs, illustrations, schematics diagrams, or other forms of visual records throughout the product;</li><li>o) Presenting the results and conclusions arising from this product, in a specific chapter;</li><li>p) Presenting the bibliographic references in a specific chapter, according to ABNT standards; and</li><li>q) Promoting grounded discussions and critical analysis throughout the product.</li><li>r) Comparatively assessing the Brazilian states or regions, where applicable, where the visited developments are located, from the standpoint of specificities, differences, or similarities. This kind of analytical vision should permeate all product items.</li></ul>
<p><b>Product 4</b> <b>4.1 – “Proposal for the Technological Insertion and Development of the Gemstone Sector in Brazil”</b></p>	<ul style="list-style-type: none"><li>a) Compliance with item 5 (EXPECTED AND RESULTS PRODUCTS), in particular sub-item 5.4 (Product 4), in its fullness and complexity, or, exceptionally, providing a justification with arguments and facts, presenting proof, when compliance cannot be ensured;</li><li>b) Systematizing, integrating and consolidating data and other information from previous products;</li><li>c) Presenting a summary of the project methodology, including Product 4;</li></ul>



	<ul style="list-style-type: none"><li>d) Conducting a preliminary analysis on meeting the expected results of the project, according to item 5 (EXPECTED RESULTS AND PRODUCTS), that is, whether the expected results were achieved or could be achieved based on the studies, surveys, analyses, discussions, proposals and recommendations presented in the four products;</li><li>e) Listing sources of secondary information. Identifying and recording the focal points of the main public agencies, entities, associations, cooperatives or companies that are the sources of data and information presented in the product, as well as the address, website, institutional emails, telephone or contacts of those responsible for the information, in the form of annexes (organized worksheets);</li><li>f) Holding planned face-to-face or video-conference meetings, throughout the execution of the product, whenever necessary, in order to verify compliance, scheduled content, and limitations, as well as proposing alignments with the expectations of achieving the study results;</li><li>g) Holding a face-to-face meeting at the MME (Brasília, DF) or by video-conference, after the first technical evaluation of the CTS in relation to the first version of the Final Report, to ensure adequacy and discussion of relevant topics. The duration of the meeting may be up to two (2) periods of four (4) hours each. The presence of the General Coordinator and the Consultants responsible for the product is required, in addition to the Brazilian Portuguese Consultant, when requested;</li><li>h) Providing all documents used or prepared by the consulting firm (reports, database, and bibliography, among others), including maps (mxd project, layers, shapefiles, and legends), which may be considered relevant for a better understanding and monitoring of the project by the CTS;</li><li>i) Presenting photographs, illustrations, schematics diagrams, or other forms of visual records throughout the product;</li><li>j) Presenting the bibliographic references in a specific chapter, according to ABNT standards; and</li><li>k) Promoting grounded discussions and reasoned critical analysis throughout the product, considering the social and environmental impacts in the proposals for methodological changes presented in this study.</li></ul>
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	<ul style="list-style-type: none"> <li>l) Comparatively assessing the Brazilian states or regions, where applicable, where the visited developments are located, from the standpoint of specificities, differences, or similarities. This kind of analytical vision should permeate all product items.</li> <li>m) Presenting the consolidated results, propositions, recommendations and final conclusions of the project, in a specific chapter, considering the previous products.</li> </ul>
<p><b>4.2 – Study Results Presentation Seminar</b></p>	<ul style="list-style-type: none"> <li>a) Preparing a presentation for the planned seminar, summarizing the applied methodologies, main points of the studies, premises, results, and conclusions obtained. The presentation should have a maximum duration of thirty minutes;</li> <li>b) Including photographs, illustrations, schematics diagrams, or other forms of visual records throughout the presentation;</li> <li>c) Forwarding a preliminary version of the presentation for conformity assessment, in two languages (Portuguese and English versions), according to the schedule defined in the Work Plan;</li> <li>d) Submitting the presentation of the seminar (final version), with the summary of the specific chapter of the previous product (item 4.1, item “m”) on a website, including a channel to receive suggestions, for a specified period of time, prior to the formal presentation of the seminar in Brasília, DF;</li> <li>e) Holding a seminar to present the results and conclusion of the Project, both face-to-face at the MME headquarters in Brasília, DF and online. This event should cover the applied methodology, main points of the studies, assumptions adopted, results, conclusions obtained, and recommendations, among other relevant aspects. The seminar should have a maximum duration of four (4) hours and be held, preferably, in the morning, with the presence of up to one hundred and fifty (150) participants, in person, plus online participation. The Contractor should provide an auditorium, as well as audiovisual equipment. The participation of the General Coordinator and the Fully Authorized Consultants in the seminar is advisable. The Contractor will be responsible for its dissemination via electronic means and for keeping records of the event, as well as confirming participation. The list of the target audience of the event may be provided, in advance, by the Technical Manager of the project. During the event,</li> </ul>



	<p>interaction with participants and discussions should be allowed;</p> <p>f) The list of the target audience of the event may be indicated, in advance, by the Technical Manager of the project. The consulting firm should consider including, on the list of guests for the seminar, representatives of civil society organizations active in the sector, Fourth and Sixth Technical Chambers of the Federal Public Prosecutor’s Office, the Ministry of Indigenous Peoples, the National Indigenous People Foundation, the Public Ministry of Labor, Ministry of Environment and Climate Change, and their affiliates, in addition to representatives of other institutions of interest in the subject;</p> <p>g) Providing all documents used or prepared by the consulting firm, including presentation, high-resolution figures, records, and attendance list of the event; and</p> <p>h) Preparing and including, as an annex to the Final Report, a summary of the results of the seminar's contributions.</p>
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**7. DEADLINES/SCHEDULE**

The validity and term of execution of the contract will be up to five hundred and forty (540) days, and the deadlines for the delivery of the products will be counted from the date of issue of the Service Order (SO) by the MME, to allow the contracted consulting firm to start the jobs. The terms and percentages corresponding to the products are established as follows:

Type	Order	Quantity	Description	Deadline	Value (percentage)
Work Plan and Technical Report	1	2	Work plan*	Up to 120 days after the issuance of the SO	20%
			Overview of the Gemstone Sector in Brazil and Worldwide		
Technical Report	2	1	Diagnosis of technologies applied by mining in the gemstone extraction sector and for its sustainability	Up to 240 days after the issuance of the SO	25%
Technical Report	3	1	Diagnosis of the technologies used in the	Up to 360 days after	25%



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			cutting, treatment and improvement of Brazilian gemstones	the issuance of the SO	
Technical Report and Seminar	4	2	Final Report	Up to 480 days after the issuance of the SO	30%
			Results Release Seminar	Up to 540 days after the issuance of the SO	

\* The Work Plan will be previously presented and readjusted within the scope of the Technical Supervisory Committee (CTS) alongside the Contractor, before its formal delivery and ratification by the collegiate board, as provided in this TOR.

## **8. KEY TEAM QUALIFICATION AND SPECIFICATION**

### **8.1. Team Profile**

The contracted consulting firm should have a technical team of consultants composed of experienced, multidisciplinary professionals, who will be responsible for carrying out tasks specified in the Work Plan, including those that may be reviewed by the Technical Supervisory Committee (CTS), as well as for preparing all the products provided in this Term of Reference, according to the minimum structure provided in item 8.2.

It should be noted that the entire technical staff of the Contractor should be aware that the CTS guidelines for the preparation of products, as well as any criticisms thereof, are of a technical and impersonal nature, aiming solely at improving the products according to the interpretation and knowledge of the CTS of that TOR. In this way, it is convenient that the professionals of the consulting firm, in addition to technical capacity and qualification, have emotional intelligence skills to receive and accept criticism, as well as different pressures or sources of stress arising from the development of products, while being able to promote a constructive dialogue with the CTS and the MME.

In the reports, priority is given to the assessments, justifications and conclusions based on secondary sources or observations during the field stages. In some cases, the opinion



manifestation based on knowledge and experiences of the consultants themselves will be accepted, provided that there is no secondary material support.

Although exclusive dedication to this project is not explicitly required, it is expected that the consulting firm's team will be available to perform, in addition to the minimum activities provided in this TOR, those necessary for the fulfillment of the purpose of the Contract, such as holding face-to-face meetings and reviewing products whenever requested by the CTS.

## 8.2. Required Consultant Qualifications

Technical Team	Qualification	Activities
One (1) – General Coordinator (Project Manager or Special Consultant)	The general coordinator of the project must be a professional with a Doctorate degree (in any area) and a minimum of ten (10) years of experience in project management or a Doctorate and a minimum of fifteen (15) years of experience in the area of Administration, with knowledge in the following areas being recommended: Science, Technology and Innovation (ST&I); Research, Development and Innovation (RD&I); or Environment and Environmental Sustainability.	<ul style="list-style-type: none"> <li>a) being the link or focal point of the consulting firm contracted with the supervisory team, the technical manager of the project, and the contract manager;</li> <li>b) preparing a work plan for the consulting firm and being responsible for its appropriate execution;</li> <li>c) supervising, coordinating and guiding the activities of consultants and the preparation of all products, monitoring the execution of work in the field, laboratory, and office, as well as their results, while ensuring compliance with the Term of Reference (TOR) and the supervisory team's guidelines, within the established deadlines;</li> <li>d) implementing improvements, where necessary for the smooth running of the works;</li> <li>e) holding periodic meetings, in person or via video-conference, with the project supervisory team, to show the steps taken, address any questions, and to monitor and direct the work by the supervisory team;</li> <li>f) ensuring the quality of the information collected, its analysis, and its results, as well as guaranteeing the visual, textual and content quality of the products;</li> <li>g) informing the supervisory team, the technical manager of the project, and the contract manager, in advance, of any</li> </ul>





		<p>internal problems and conflicts in the team that may compromise the consulting work;</p> <p>h) establishing several dialogue channels with the supervisory team, the project's technical manager, and the contract manager;</p> <p>i) coordinating the development of the visual identity for the project and all its products, in line with the guidelines of the supervisory team and MME standards; and</p> <p>j) assistance in the preparation and execution of the products.</p>
One (1) – Consultant (Special Consultant)	<p>Production Engineer. Minimum experience of five (5) years in the mining or processing area. Doctorate degree in the field.</p>	<p>a) integrated view of the project and role of sub-coordinator;</p> <p>b) describing and characterizing, in detail, the production methods in mining and processing, in the mines and companies visited, as well as the associated technologies, during field visits;</p> <p>c) identifying the products, coproducts and byproducts of the mines and companies visited;</p> <p>d) assessing the gemstone production chain;</p> <p>e) assessing the operational and technological alternatives for reducing the environmental impact;</p> <p>f) participating in the periodic, face-to-face or video-conference meetings with the project supervisory team; and</p> <p>g) critical analysis and assistance in the preparation of products.</p>
One (1) – Consultant (Fully Authorized Consultant)	<p>Professional with training in Portuguese (from Brazil) and mastery of the contracted language and English (mastery of writing, speaking, and reading), specializing in proofreading, translation, and writing, with experience in public agencies and private companies in proofreading academic papers and scientific texts. Minimum experience of four (4) years. Specialization or Master's degree in the area of Literature or acting.</p>	<p>a) acting in the preparation and grammar and spelling revision of all consulting texts;</p> <p>b) ensuring correct grammar, spelling, punctuation and verb-nominal agreement of all versions of reports, documents and invoices produced by the consulting firm, in accordance with ABNT standards;</p> <p>c) ensuring clarity, conciseness and objectivity in the drafting of the documents presented by the consulting firm;</p> <p>d) analyzing and correcting contextual errors, language defects, contradictions, and, in particular, errors in the translations of the texts involved;</p> <p>e) checking the layout and final presentation of the products according to the standard stipulated for the project;</p>



		<ul style="list-style-type: none"> <li>f) reviewing the content and providing references and context for graphs, figures, maps, tables, or any other visual content of the products;</li> <li>g) participating in the periodic, face-to-face or video-conference meetings with the project supervisory team; and</li> <li>h) assistance in the preparation of products.</li> </ul>
One (1) – Consultant (Fully Authorized Consultant)	Professional Geologist. Minimum experience of four (4) years in gemology. Specialization or Master’s degree in the area of expertise.	<ul style="list-style-type: none"> <li>a) geological and gemological description of the mining products in the field;</li> <li>b) identification of products, coproducts and byproducts of the mines and companies visited;</li> <li>c) analysis of the gemstone production chain;</li> <li>d) assessing the operational and technological alternatives for reducing the environmental impact;</li> <li>e) participating in the periodic, face-to-face or video-conference meetings with the project supervisory team; and</li> <li>f) critical analysis and assistance in the preparation of products.</li> </ul>
One (1) – Consultant (Fully Authorized Consultant)	Professional Mining Engineer. Minimum experience of four (4) years in mineral processing. Specialization or Master’s degree in the area of expertise.	<ul style="list-style-type: none"> <li>a) detailed description and characterization of production methods in mining and processing in the mines and companies visited and their associated technologies in the field visits;</li> <li>b) identification of products, coproducts and byproducts of the mines and companies visited;</li> <li>c) analysis of the gemstone production chain;</li> <li>d) participating in the periodic, face-to-face or video-conference meetings with the project supervisory team;</li> <li>e) assessing the operational and technological alternatives for reducing the environmental impact; and</li> <li>f) critical analysis and assistance in the preparation of products.</li> </ul>
One (1) – Consultant (Fully Authorized Consultant)	Professional with background in environmental sciences, environmental engineering, or related areas, with a minimum experience of four (4) years in production and sustainable development or more	<ul style="list-style-type: none"> <li>a) assessments and evaluations on the items present in the products, related to the topic of sustainability, including processes and technologies that promote the reduction of environmental impacts;</li> <li>b) participating in the periodic, face-to-face or video-conference meetings with the project supervisory team; and</li> </ul>



	environmentally appropriate technologies for mining. Specialization or Master's degree in the area of expertise.	c) critical analysis and assistance in the preparation of products.
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## 9. **PRODUCT PRESENTATION METHOD**

The products, in general, should be presented in the form of reports in Brazilian Portuguese, with standardization of tables, graphs, maps, charts and flowcharts, layout, and visual identity of the project. All documents, irrespective of the version, should be written in a clear and concise manner, in direct and objective language, in accordance with the rules of the Brazilian Association of Technical Standards (*Associação Brasileira de Normas Técnicas – ABNT*) and applying, where appropriate, the provisions of the Manual Editorial Board of the President of the Republic (2018 version or the most up-to-date version)<sup>6</sup>.

Reports should be structured in chapters, on A4 paper, duly formatted, numbered and hardcover bound (for the color printed version, where necessary), according to the following format:

- Texts: MS Word, version 2010 or later, and PDF format, compatible with the version used in the MME. Times New Roman font, size 12;
- Worksheets, Graphs, and Tables: MS Excel, version 2010 or later, compatible with the version used in the MME;
- Figures in general: JPG, GIF or BMP, with a minimum quality of 300 dpi;
- Presentations: MS PowerPoint, version 2010 or later, compatible with the version used in MME, and PDF format.
- Maps: Project in MXD format, layers in shapefile or geodatabase format, SIRGAS2000 Datum and metadata duly filled out in accordance with the Government's interoperability standards, delivered on electronic media (USB flash drive), alongside the respective report.

<sup>6</sup> *Manual de Redação da Presidência da República* (2018). Available at: <http://www4.planalto.gov.br/centrodeestudos/assuntos/manual-de-redacao-da-presidencia-da-republica/manual-de-redacao.pdf>.



The products (reports), as well as the presentations, should contain the appropriate logos, to be inserted in the following order:

- Internal co-executor (MME bodies): META Project, World Bank, and MME/Federal Government;
- External Coexecutor: logo of the Coexecutor; World Bank, META Project, and MME/Federal Government

In the products (reports), in addition to the aforementioned logos, the following information should be recorded:

- Product executed with funds from the Loan Agreement (loan name and number), formalized between the Federative Republic of Brazil and the International Bank for Reconstruction and Development (IBRD), on (Loan date);
- Liability Statement: This document was prepared for the Ministry of Mines and Energy (MME), financed by the World Bank/IBRD, through the loan agreement (name and loan number), Technical Assistance Project for the Energy and Mineral Sectors (META), and prepared by external consultants. The opinions expressed in this document are the sole responsibility of the authors and do not necessarily reflect the views of the MME. Its partial or total reproduction is authorized, provided that the reference source is mentioned.
- Delivery (or electronic submission) date and (draft) version number.

The preliminary versions of the products (reports), to be analyzed by the supervisory team, should be forwarded only in digital format and should include a letter dated and signed by the representative of the consulting firm, alongside the corresponding invoice and statement from the consultant or consultants that certify the execution of the respective product. Invoices should follow the standard established by the Executive Secretariat of the MME, alongside the International Bank for Reconstruction and Development (IBRD), linked to the World Bank.

The MME will not be responsible for technical problems and failures in the submission of documents, which result in delays in receiving the products, considering the deadlines established in this TOR. Exceptional situations will preferably be evaluated by the Technical Supervisory Committee (CTS).



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The number of printed copies of the products (reports) should not exceed three for each final product. The MME may also, at its discretion and at any time, propose a reduction in the number of printed copies provided in this TOR for each product.

The final products and presentations, in digital versions, will be available on the MME website for an indefinite period, for public consultation and public access, in accordance with current legislation.

## **10. PAYMENT METHODS**

Payments should follow the schedule of the table presented in item 7 (DEADLINES/SCHEDULE) of this Term of Reference (TOR) with the respective percentage of the Overall Contract Price per product. Payments should be made by the MME within twenty (20) days, after approval of the respective final products and invoices by the Technical Supervisory Committee (CTS) and submission of a certificate from the Secretariat of the respective unit.

The Executive Secretariat of the MME will direct the payment process for the products, including the guidelines for the contracted consulting firm, relevant to the standard form and completion of invoices, among other questions regarding the subject.

## **11. SUPERVISION**

The Technical Supervisory Committee (CTS) of the Contract will be composed by, at least, three members of the Secretariat of Geology, Mining and Mineral Transformation (SGM), all linked to the Ministry of Mines and Energy (MME) and responsible for the coordination, general supervision and certification of the documents produced by the consulting firm. The CTS will have technical and administrative support from the SGM/MME, in particular for the analysis of invoices and associated documentation.

The consulting firm should submit the methodology to be used to carry out the studies for the approval of the Contract manager, who will define in detail the stages of development



of the studies. The CTS will review the Work Plan and later validate it, including the methodology presented, adapting the document to the needs of the products, the Term of Reference (TOR), and the Contract.

Prior to the preparation of the products, a face-to-face or, on exceptional cases, a virtual meeting should be held between the contracted consulting firm and the CTS to discuss and direct the studies, address doubts and questions, and define the challenges, technical and logistical problems that require a greater focus by the consulting firm, in addition to adapting the Work Plan. The CTS will consider the contributions presented by the consulting firm and will determine the direction of the studies to be undertaken. Meetings that take place with the consulting firm will be recorded as meeting minutes.

The studies, assessments and results undertaken within the scope of each product should be consolidated in the form of a report to be presented to the CTS, in digital format, accompanied by a letter signed by the consulting firm's representative and a certificate from the consultants who participated in each product and the respective invoices, requiring compliance with all standard requirements set forth in this Term of Reference (TOR). The Supervisory Technical Committee (CTS) will evaluate these products and the documentation sent and will manifest itself after an exclusive and restricted meeting.

In the event that the product is not approved in its first version, after the CTS manifests its opinion, not following the TOR, the CTS may arrange face-to-face or virtual meetings with the consulting firm to discuss the product, its content, and other adjustments to the Term of Reference, as well as other relevant points deemed necessary.

Technical products can be considered accepted or attested (approved) by the CTS only when they are adapted to the specifications of the Term of Reference and to the guidelines previously established by the Committee, with the possibility of evaluating the due justifications of the consulting firm, in the event that it fails to ensure full compliance with the TOR.

The CTS may request a revision of products as many times as necessary for each technical product to meet the minimum standards set forth in this TOR. It is considered that, based on the second review, any product that is not yet adequate to the Term has the potential to harm subsequent products, as long as there is any dependency between them. From the third



revision not adequate to the TOR, the CTS may consider this fact as an element of justification that represents the breach of Contract by the contracted consulting firm.

Invoices will be considered accepted or attested (approved) by the CTS only when they are evaluated by a specific area of the Secretariat of Geology, Mining and Mineral Transformation (SGM/MME), which will advise the CTS on financial and budgetary issues.

It should be noted that the payment of each product depends on the approval of the respective technical report by the Committee and its invoice by the Contract Manager, with the Executive Secretariat of the MME being solely responsible for making the payment to the contacted company.

Meetings held between CTS members will be restricted, deliberative and recorded in the form of Minutes, including any consensus and dissent among its members. The approval of the products will be given by vote and simple majority, with the President of the CTS having the deciding vote, in case of a tie.

For the purpose of calculating consulting costs, at least one face-to-face meeting should be considered at the MME to discuss each product, with a duration of up to eight hours per day and in up to two days, where applicable. In these meetings, the contracted company should participate with a technical team capable of providing all the information requested by the CTS regarding the topics for discussion.

The development of the studies will be continuously monitored by the Technical Supervisory Committee (CTS), which should receive periodic updates regarding the progress of the activities within the scope of this contract and may request at any time information regarding the stage of the studies and their preliminary content.

Whenever requested, the contracted consulting firm should present additional information, input data used in models, calculations, and other details necessary for the adequate use of the studies by the MME.

## ***12. AVAILABLE INPUTS AND ELEMENTS***

The Ministry of Mines and Energy (MME) may provide the consulting firm with any public information it has to meet the purpose of the Contract, intermediating its access to the



agencies linked to the Ministry. In this sense, the document “*Diagnóstico Socioeconômico e Ambiental da Mineração em Pequena Escala no Brasil*” (“Socioeconomic and Environmental Diagnosis of Small-Scale Mining in Brazil”) is available on the MME website<sup>7</sup>, which may be one of the references for this project.

Regardless of this MME initiative, the contracted consulting firm is responsible for acquiring all data and information necessary for the preparation of this project, undertaking to comply with this Term of Reference (TOR) and the signed Contract, particularly for the execution and construction of the products provided, for the communication and fulfillment of technical requests coming from the Technical Supervisory Committee (CTS), the Technical Manager, the Project Manager, or another area in charge of supporting the project in the MME.

The contracted consulting firm should be independent and proactive, being in direct contact with municipalities, companies, cooperatives, associations, agencies, and entities, including for scheduling and carrying out activities related to technical visits, trips, and meetings for this project, among other aspects, such as searching for and accessing information and documents from reliable secondary sources. In some cases, the contracted consulting firm should use the mechanisms provided in the Access to Information Act (Act 12,527/2011) to comply with the purpose of this project.

### **13. FRAMEWORK OF EXPENSES**

Expenses arising from contracting the consulting services addressed in this Term of Reference will fall within Work Programs No. 10.32.101.25.572. 0032.13E4.0001.

### **14. TRAINING REQUIREMENTS**

Not applicable.

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<sup>7</sup> TOR-30. *Diagnóstico Socioeconômico e Ambiental da Mineração em Pequena Escala no Brasil* (2018). Available at: <http://antigo.mme.gov.br/web/guest/secretaria-executiva/projeto-meta/documentacao/dados-abertos>.





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## **15. ENVIRONMENTAL AND SOCIAL STANDARDS**

*All activities supported by the project, including studies to propose policies and regulations, should be assessed in accordance with the World Bank's Environmental and Social Standards, which establish guidelines for identifying, assessing, mitigating and managing potential risks and impacts associated with projects financed by the Bank.*

*The adoption of the Environmental and Social Standards aims to support borrowers in adopting international best practices related to environmental and social sustainability, complying with their national and international environmental and social obligations, as well as increasing non-discrimination, transparency, participation, provision accountability, governance and improvement of the projects' sustainable development outcomes through ongoing stakeholder engagement. In addition to the World Bank Environmental and Social Framework, the World Bank Group Health, Safety, and Environment Guidelines (IFC-EHSGs) should be observed, including specific guidelines for the mining, power and oil & gas sectors.*

*The preparation of the work should consider the Environmental and Social Framework (Environmental and Social Framework) and the Environmental and Social Standards of the World Bank, which came into force on October 1, 2018, assessing the potential social and environmental impacts of sub-projects, where necessary.*

*The Environmental and Social Standards establish the requirements to be met by Borrowers with regard to the identification and assessment of social and environmental risks and impacts associated with the projects supported by the Bank. The ten Environmental and Social Standards (ESS) that define the requirements to be met by the Borrower and the project throughout the project life cycle are as follows:*

*Environmental and Social Standard 1 – Assessment and Management of Social and Environmental Risks and Impacts;*

*Environmental and Social Standard 2 – Working Conditions and Labor;*

*Environmental and Social Standard 3 – Resource Effectiveness and Pollution Prevention and Management;*

*Environmental and Social Standard 4 – Community Health and Safety;*

*Environmental and Social Standard 5 – Land Acquisition, Land Use Restrictions, and Involuntary Resettlement;*

*Environmental and Social Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources;*

*Environmental and Social Standard 7 – Historically Disadvantaged Indigenous Peoples / Traditional Local Communities;*

*Environmental and Social Standard 8 – Cultural Heritage;*

*Environmental and Social Standard 9 – Financial Intermediaries; and*

*Environmental and Social Standard 10 – Stakeholder Engagement and Information Disclosure.*

## **16. LEGAL PROHIBITION**



It is forbidden to hire, in any capacity, active officers of the Federal, State, Federal District or Municipal Public Administration, directly or indirectly, as well as employees of their subsidiaries and controlled companies, within the scope of international technical cooperation projects (Article 7 of Decree 5,151, of July 22, 2004).

**Technical Manager**

**Name:** To be defined

**Agency:** Ministry of Mines and Energy – MME

**Signature:**

**Approval**

**Name:** To be defined

**Title:** Secretary of Geology, Mining and Mineral Transformation

**Signature:**