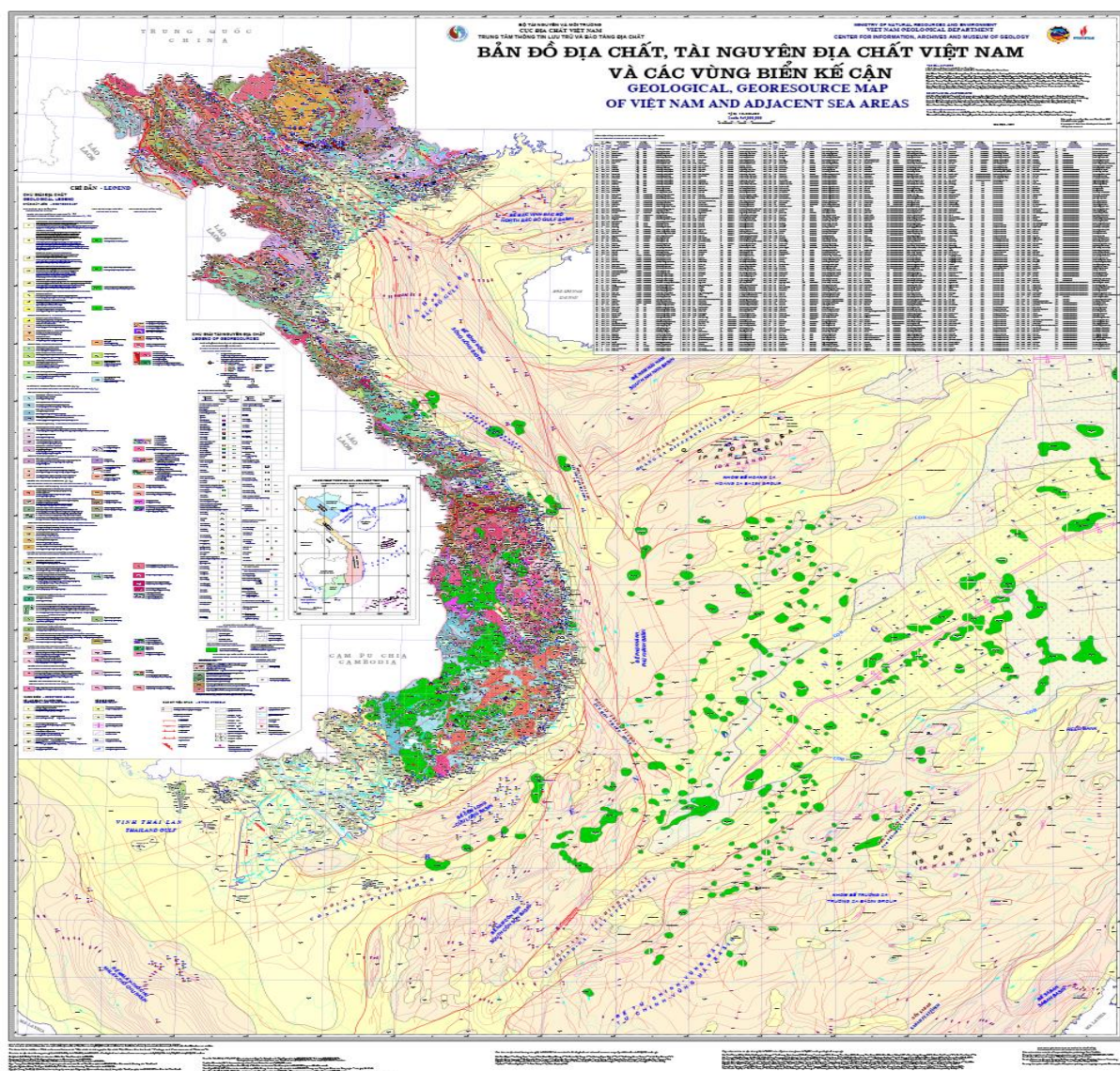


VIETNAM GEOLOGICAL DEPARTMENT



2024 ANNUAL GEOLOGICAL REPORT



In 2024, the development of legal normative documents and regulations on geological sector management; the development of technical-economic norms, standards, and regulations has been prioritized, promoted, and focused on completion in the geology sector, specifically as follows:

I. DEVELOPMENT OF LEGAL NORMATIVE DOCUMENTS

1. Development of the Law on Geology and Minerals

The Law on Geology and Minerals was passed by the National Assembly on November 29, 2024, at the 8th session of the 15th National Assembly with 93.11% of delegates in agreement. The law received attention and feedback from voters and the public, addressing many policy obstacles that no longer aligned with reality.



Image: The Law on Geology and Minerals passed by the National Assembly at the 8th session, 15th National Assembly.

The Law on Geology and Minerals was enacted to supplement and amend the unsuitable points of the 2010 Law on Minerals, with several new features as follows:

1.1. Scope of regulation

The Law supplements the scope of regulation for mineral processing activities and excludes mineral processing activities not associated with mineral mining investment projects from the scope of regulation of the Law on Geology and Minerals (Point b, Clause 2, Article 1).

This new regulation on processing aims to prevent waste in investing in processing facilities/plants when the project's raw material sources are unclear and to limit speculation or holding of mines to exploit the state's preferential policies such as “The State encourages mineral mining investment projects associated with processing and using minerals to produce metals, alloys, or other valuable and socio-economically efficient products” according to the 2010 Law on Minerals. Moreover, it minimizes disputes over mineral resource areas for processing projects.

1.2. Decentralization of management, reduction of procedures and administrative processes

1.2.1. On management decentralization to provincial People's Committees, including:

- Managing and issuing licenses for mineral exploration and mining of natural mineral water and hot natural water, instead of the Ministry of Natural Resources and Environment as per current regulations, to synchronize authority in investment policy decisions for urban area and resort development projects using mineral and hot water for bathing, healthcare... This significantly contributes to the socio-economic development of localities.

- Approving projects and reports of basic geological investigations funded by local budgets so that localities can proactively assess geological conditions for underground space planning, construction of permanent works...

- Assessing the potential of group III (especially sand and gravel) and group IV minerals funded by the budget to organize auctions for mineral mining rights, enhancing the effectiveness and efficiency of mineral licensing.

- Deciding to allow the recovery of group I, II minerals when implementing investment projects in areas of national mineral reserves to prevent waste in mineral management and usage.

- Controlling and supervising all mineral activities and mineral recovery within the locality.

1.2.2. Elimination and simplification of certain administrative procedures compared to the current Law

- In parallel with the decentralization to local authorities, compared to the 2010 Law on Minerals, the draft Law on Geology and Minerals promotes procedural simplification by mineral group, specifically:

- Elimination of the procedure for registering field surveys to prepare mineral exploration projects. In this case, organizations or individuals only need to send a notification to the provincial People's Committee where the exploration area is located before conducting the survey.

- Elimination of administrative procedures for exploration licensing and reserve recognition for group IV minerals; accordingly, the licensing for mining group IV minerals does not require mineral planning references. For national key projects, urgent public investment projects, national target programs, disaster prevention construction projects, it also removes the need to prepare investment projects, environmental impact assessment reports, and environmental licenses, thereby removing policy bottlenecks and unlocking mineral resources for infrastructure construction such as transportation and irrigation.

- Allowing mineral mining without being subject to mineral planning (for scattered and small-scale mining; mineral recovery; salvage mining).

- In cases of additional exploration volume or deeper-than-approved exploration, additional technology sampling, adjustment of volume or method of exploration, organizations or individuals only need to send a written request to the competent authority for approval, instead of applying for a revised or reissued exploration license. This minimizes administrative procedures, time, and cost for exploration entities.

- In cases of mineral recovery within an investment project, specifically outside the licensed mining boundary, a written report to the competent authority is sufficient for approval. If approved, it is not necessary to revise the mining license, which reduces procedures, compliance costs, and project duration, while ensuring effective use of mineral resources, preventing waste, increasing state revenue and project efficiency.

- In cases of mineral recovery during the implementation of investment projects or construction works in areas of national mineral reserves; recovery in project items approved or licensed by competent authorities, including minerals in prohibited, temporarily banned, or reserved zones for mineral activities, and recovery of mineral products from port waters, fishing harbors, storm shelters, inland waterways, riverbeds, lakebeds, or other wetland areas under approved plans; recovery of group

III, IV minerals from site clearance or infrastructure construction on residential or agricultural land.

- Regarding mine closure, the draft law stipulates several cases where mine closure is not required, or only requires a mine closure plan instead of a mine closure project.

1.3. Recognition of exploration results: Previously, the 2010 Law on Minerals stipulated the approval of mineral reserves in exploration reports, while the 2024 Law on Geology and Minerals now provides for recognition of mineral exploration results.

1.4. State-funded mineral exploration: The State uses budget funds to organize exploration for: (i) strategic and important minerals; (ii) minerals with high economic value and large usage demand.

1.5. Separation of mineral recovery and mining activities:

The Law clarifies that mineral recovery activities are integrated operations to extract minerals during the execution of construction investment projects or other activities as approved or accepted by competent state authorities. Mineral recovery is implemented under a different mechanism than mineral mining.

1.6. Settlement of mining rights payment based on actual extraction output to address discrepancies (confidence levels) in mineral reserve estimation during exploration and mining.

1.7. Priority for legal mining entities: Legal entities currently mining minerals are given priority for deeper exploration and expansion without having to participate in mineral mining rights auctions, ensuring full evaluation and control of the mineral body for the licensed type.

1.8. Mine Director: The law clearly defines cases where a mine director is required (expanding criteria to suit current practice); and mine management personnel.

2. Development of Circulars

In 2024, the Vietnam Geological Department was assigned to draft 08 circulars, all of which have been signed and promulgated by the Ministry, specifically:

- Circular No. 02/2024/TT-BTNMT dated April 22, 2024 amending and supplementing Circular No. 01/2016/TT-BTNMT dated January 13, 2016 by the Minister of Natural Resources and Environment on technical regulations for sand, gravel, and soil-rock exploration used for landfilling.

- Circular No. 14/2024/TT-BTNMT dated August 30, 2024 issuing technical regulations on sea sand exploration and reserve classification.

- Circular No. 18/2024/TT-BTNMT dated October 1, 2024 issuing technical-economic norms for determining the content of certain chemical elements by chemical analysis, fire assay, and ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometry) methods.

- Circular No. 21/2024/TT-BTNMT dated November 21, 2024 on technical regulations for investigation, resource assessment, and rare earth mineral exploration.

- Circular No. 30/2024/TT-BTNMT dated December 12, 2024 amending and supplementing Circular No. 06/2015/TT-BTNMT dated February 25, 2015 by the Minister of Natural Resources and Environment on technical regulations for environmental geological investigation and assessment in areas with hazardous minerals.

- Circular No. 32/2024/TT-BTNMT dated December 13, 2024 on technical regulations for investigation and assessment of marine sand mineral resources.

- Circular No. 39/2024/TT-BTNMT dated December 27, 2024 issuing technical-economic norms for excavation and sampling works in basic geological and mineral exploration.

- Circular No. 40/2024/TT-BTNMT dated December 27, 2024 issuing technical-economic norms for specific tasks in the investigation and assessment of marine sand resources used for landfilling.

3. Development of National Technical Standards and Regulations

In 2024, the Vietnam Geological Department initiated the development of 23 new National Technical Standards, covering technical requirements in geophysics, laboratory analysis, hydrogeology – engineering geology fields, specifically as follows:

- The field of Engineering Geology – Hydrogeology (including 08 Standards): (1) Engineering geological mapping at 1:50,000 (1:25,000) scale; (2) Hydrogeological mapping at 1:50,000 (1:25,000) scale; (3) Hydrogeological mapping at 1:50,000 (1:25,000) scale; (4) Shallow coastal marine geological investigation (0–30m depth) at 1:100,000 – 1:50,000 scale; (5) Shallow coastal marine zone geological investigation (0–30m depth) at 1:100,000 – 1:50,000 scale; (6) Shallow coastal marine zone geological investigation (0–30m depth) at 1:100,000 – 1:50,000 scale; (7) Hydrogeological mapping – Requirements for mineral exploration activities; (8) Engineering geological mapping – Requirements for mineral exploration activities.

- The field of Geophysics (including 10 Standards): (1) Investigation, assessment, and exploration of minerals – Marine magnetic survey by ship - Part 1: General requirements and magnetic measurement techniques at sea; (2) Investigation, assessment, and exploration of minerals – Marine magnetic survey by ship - Part 2: Methods for measurement and Dviaxia deviation correction; (3) Investigation, assessment, and exploration of minerals – Marine magnetic survey by ship - Part 3: Data processing and calculation methods for marine magnetic measurements; (4) Investigation, assessment, and exploration of minerals – Marine magnetic survey by ship - Part 4: Mapping methods and geological interpretation of magnetic survey results; (5) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry - Part 2: Measurement methods; (6) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry - Part 3: Data processing methods and calculation of U, Th, K concentrations in seabed sediments; (7) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry - Part 4: Methods for mapping seabed U, Th, K concentrations; (8) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry - Part 5: Methods for processing and geological interpretation of gamma spectrometry data; (9) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry - Part 6: Methods for mapping external exposure dose equivalents in the seabed; (10) Investigation, assessment, and exploration of minerals – Marine gamma spectrometry – Part 1: General requirements.

- The field of laboratory analysis (including 05 Standards): (1) Soil and fluorite ore rocks - Part 1: Determination of CaF_2 content - Extraction method using aluminum chloride; (2) Soil and fluorite ore rocks – Part 2: Determination of total iron content - Volumetric titration method; (3) Soil and fluorite ore rocks – Part 3: Determination of total rare earth oxide content - Gravimetric method; (4) Soil and fluorite ore rocks - Part 4: Determination of calcium carbonate content - Titration method; (5) Soil and fluorite ore rocks - Part 5: Determination of barium content - Gravimetric method.

The development of technical standards has established norms and parameters for data calculation related to different ore types in the fundamental geological survey of mineral resources.

II. STATE MANAGEMENT OF GEOLOGY

In 2024, the Department actively directed the implementation of fundamental geological surveys of mineral resources in accordance with schedule and efficiency. Specific results are as follows:

1. Results of implementing government-level schemes and projects

1.1. Scheme: "Comprehensive investigation of mineral resources and completion of 1:50,000-scale geological mapping in the Northwest region to serve sustainable socio-economic development planning": Completed submission to the Ministry for appraisal and approval of 26 sub-projects under the Northwest Scheme and submitted the final report of the overall scheme.

Results: The scheme has fulfilled the objectives and tasks set forth in the Prime Minister's approved Decision. In particular, the goal of discovering new mines was exceeded by 200%. A total of 110 new mines (classified as resource level 333) were discovered and evaluated (target was 35 new mines). The implementation met technical and safety requirements; the data system collected and compiled was extensive, high-quality, and reliable per regulations. Key outcomes include:

(i) Completed investigation and 1:50,000-scale geological and mineral mapping for a total area of 13,081 km², substantially contributing to the full coverage of 1:50,000 geological base maps for the Northwest region. (ii) Assessed the current status of investigation, exploration, exploitation, and remaining resource reserves for 1,305 mines across 26 mineral types in the Northwest, supporting management by ministries and localities. (iii) Identified, investigated, and evaluated level 333 resources for 110 mines involving 25 types of minerals, including energy and fuel

minerals, metals, industrial minerals, and construction materials. Among these were 17 large, 43 medium, and 50 small mines. (iv) Delineated 95 mines and mining areas (171 plots) for proposed follow-up exploration. Of these, 62 plots have been transferred into the Mineral Planning for 2021–2030, with a vision to 2050.

Additionally, the scheme discovered and preliminarily investigated 46 mineral occurrences and identified 30 prospective areas for further resource potential assessment¹.

Completed the collection of 14 geological and mineral specimen sets from 14 provinces in the Northwest, along with geological-mineral maps and specimen documentation. These products have been handed over to the provinces for use. Throughout the project implementation, there have been many new geological and mineral discoveries. Some of these findings not only carry great economic value but also significant scientific importance, helping to clarify the geological structure of the Northwest region.

¹ From the investigation results, 30 areas with potential conditions and promising signs have been delineated across 10 types of minerals for continued exploration and discovery of new mines, including: coal (01 area); rare earth elements (15 areas); copper (3); tin - wolfram (2); gold (4); feldspar - kaolin (01); ornamental stone (01); quartzite (2); dolomite (1); decorative limestone (1).



Photo: The Inspection Team of the Vietnam Geological Department inspecting a coal site in Tuong Tien - Tuong Phong commune, Phu Yen district, Son La province.

1.2. Project “Comprehensive assessment of mineral potential in the Central Central Region to serve socio-economic development.” The main outcomes of the project are summarized as follows:

Component project on metal mineral assessment: A comprehensive survey was conducted on 32 gold ore areas, including the evaluation of remaining resources in 01 mine, which was handed over to the local authority for management and exploration planning. Preliminary assessment at a scale of 1:25,000 was carried out at 12 gold ore areas, with forecasted resources of 10,093.9 kg Au and 16,423.8 kg

Ag. 11 large-scale prospective areas were delineated for further detailed evaluation. Two large-scale prospective copper ore areas (Kon Nhan and Kon Long) were discovered and delineated for detailed assessment. The forecasted resource to date at levels 333+334a is 154,379.2 tons of metallic copper, including: level 333: 102,530.2 tons, level 334a: 51,849.0 tons. With this result, along with the previously assessed Kon Ra area, a large-scale copper ore resource has been confirmed, showing concentrated distribution and potential deep reserves. This is considered one of Vietnam's new and important copper ore mining regions. These three areas have been included in the Exploration, Mining, Processing, and Utilization Planning for Mineral Resources for the period 2021–2030, vision to 2050 (Decision No. 866/QĐ-TTg dated July 18, 2023).



Photo: Drilling works at Kon Nhan area

Component project on industrial mineral assessment: Detailed evaluations were conducted in 07 areas containing industrial minerals. The results confirmed resources and delineated large-scale industrial mineral areas eligible for exploration and exploitation. The total identified resources are as follows: Quartz (levels 333+334a): 11.2 million tons; Fluorite (level 333): 93,926 tons of ore (45,705 tons CaF_2); Quartzite (levels 333+334a): 30 million tons; Graphite (levels 334a+334b): 5,980,248 tons. A total of 06 areas were delineated and proposed for exploration and exploitation planning.

Component project on assessment of decorative and dimension stone: Assessment was conducted in 17 areas, focusing on high-quality stone types with attractive colors and veins such as: granite, gabbro, gabbrodiorite, gneiss, columnar basalt, and others with industrial mineral content. As a result, 03 areas with a total of 360 hectares and total resource of 43.5 million m³ were delineated and handed over for Exploration, Mining, Processing, and Utilization Planning for Construction Materials for the period 2021–2030, vision to 2050 (Decision No. 1626/QĐ-TTg dated December 15, 2023). 14 additional areas are eligible for exploration and exploitation.

1.3. Project “Investigation and comprehensive assessment of strategic mineral potential (rare earth) on Vietnam’s territory (mainland) and exploration of some promising areas”: The project was approved in principle by the Politburo, with implementation direction granted by the Government and approved in detail by the Ministry. The Department has established the Project Steering Committee, issued regulations (Phase 1), and completed procedures for assigning implementation units by December. Several units have already begun field deployment.



Photo: Deputy Minister Tran Quy Kien receives project implementation updates from the Vietnam Geological Department

With the support of the Ministry of Natural Resources and Environment, the Vietnam Geological Department officially started implementation in December 2024.



Photo: Technical staff executing the project in Phu Tho

1.4. Project “Comprehensive mineral survey and completion of the 1:50,000 geological map for the North Central region to support sustainable socio-economic development planning”

Approved by the Ministry of Natural Resources and Environment under Decision No. 1776/QĐ-BTNMT dated June 30, 2024. The project was submitted to the Party Committee of the Ministry and the Government via Submission No. 69/TTr-BTNMT dated July 10, 2024. The Government approved the proposal in Official Dispatch No. 5778/VPCP-CN dated August 14, 2024. The project’s groundwork and appraisal have been completed, awaiting Ministry approval for 2025 implementation.

1.5. Project “Investigation and assessment of sand, gravel, and cobble potential in the Mekong Delta riverbeds to support sustainable socio-economic development”

Submitted to the Party Committee of the Ministry and the Government via

Submission No. 69/TTr-BTN&MT dated July 10, 2024. The Government approved the project's implementation policy via Official Dispatch No. 5778/VPCP-CN dated August 14, 2024, assigning the Ministry to approve it. The Department has finalized and submitted the project for Ministry approval as a basis for implementation.



Photo: Drilling surveys for project “Investigation and assessment of sand, gravel, and cobble potential in the Mekong Delta riverbeds to support sustainable socio-economic development”

1.6. Project “Early warning of landslides and flash floods in Vietnam’s mountainous and midland regions”. The Department has developed an implementation plan, assigning specific responsibilities to affiliated units, and coordinated with 05 related units to unify task content for 2024 and beyond.

1.7. Task “Development of Planning for the Development and Application of Atomic Energy for the period 2021–2030, vision to 2050”. The Department completed the Planning Component for Radiation and Isotope Applications in the Natural Resources and Environment Sector with key objectives: Develop nuclear techniques for meteorological-hydrological observation and forecasting; fundamental investigation of water, geology, and minerals; environmental protection; and climate change response. Invest in infrastructure, equipment, and high-quality human resources for radiation and isotope technology application in the natural resources and environment sector across research, training, and practical units in a synchronized and modern manner. Geology and minerals: Effectively apply isotope and nuclear techniques in geological investigations, structural analysis, assessment and exploration of radioactive and rare earth minerals, geothermal resources, geological sample analysis; investigate and monitor areas prone to geological hazards; identify features of geological structures with underground water, CO₂ storage, and hazardous/radioactive waste disposal potential. Environmental protection: Continue regular monitoring of natural and artificial radioactive background environments; apply nuclear techniques to monitor environmental conditions at radioactive mineral sites; build radiation environmental status maps for socio-economic development. The results have been transferred to the Ministry of Science and Technology for integration into the Master Plan and submitted to the Prime Minister for promulgation under Decision No. 245/QĐ-TTg dated February 5, 2025.

2. Ministerial-level tasks

In 2024, the Vietnam Geological Department is implementing 17 ministerial-level projects funded by various sources, all currently on schedule.

3. Completed Projects

In 2024, the Department completed 05 projects as scheduled: (1) Project “Airborne magnetic-gravity survey at 1:250,000 scale of Vietnam’s sea and islands” for the Vietnam Administration of Seas and Islands; (2) Project “Investigation and assessment of geological structure and engineering geology to propose territorial utilization solutions for infrastructure development along

Vietnam's coastal zone"; (3) Project "Investigation and assessment of white sand mineral potential in coastal provinces from Quang Binh to Quang Nam"; (4) Project "Development of 1:250,000 natural radioactive environment maps - Phase II (2018–2022) for northern border and coastal provinces"; (5) Project "Investigation and assessment of radioactive environmental status in selected areas with radioactive anomalies in Kon Tum, Gia Lai, and Lam Dong provinces, proposing mitigation measures for radioactive environmental impacts."

III. DEVELOPMENT OF THE IMPLEMENTATION PLAN FOR THE TASK OF FORMULATING THE MASTER PLAN FOR BASIC GEOLOGICAL SURVEY OF MINERAL RESOURCES FOR THE PERIOD 2021–2030, WITH A VISION TO 2050

The task of developing an implementation plan for the formulation of the Master Plan for Basic Geological Survey of Mineral Resources for the period 2021–2030, with a vision to 2050, was carried out following the issuance and official publication of Decision No. 680/QĐ-TTg dated June 10, 2023, by the Prime Minister, approving the "Master Plan for Basic Geological Survey of Mineral Resources for the period 2021–2030, with a vision to 2050", in accordance with the provisions of the Law on Planning.

In compliance with the Law on Planning dated November 24, 2017; the Law amending and supplementing 37 Laws related to planning; Decree No. 37/2019/NĐ-CP dated May 7, 2019, of the Government detailing the implementation of several articles of the Law on Planning; and Decision No. 680/QĐ-TTg dated June 10, 2023, of the Prime Minister, the Ministry of Natural Resources and Environment (MONRE) reports to Deputy Prime Minister Trần Hồng Hà on the results of implementation as follows:

Based on Decision No. 680/QĐ-TTg dated June 10, 2023, of the Prime Minister approving the "Master Plan for Basic Geological Survey of Mineral Resources for the period 2021–2030, with a vision to 2050", and acting as the standing agency of the Appraisal Council, MONRE organized the public announcement of the Master Plan in accordance with the provisions of the Law on Planning.

According to Article 45 of the Law on Planning, MONRE drafted the Implementation Plan for the Master Plan for Basic Geological Survey of Mineral Resources for the period 2021–2030, with a vision to 2050, following the procedures for the development and submission of an implementation plan.

On October 14, 2024, MONRE issued Official Dispatch No. 7082/BTNMT-ĐCVN enclosing the implementation plan dossier to solicit feedback from ministries, sectors, local authorities, and subordinate units of MONRE in accordance with regulations. Simultaneously, the Plan was posted on the MONRE website from October 1 to October 30, 2024.

By October 30, 2024, the Planning Agency had received feedback from 6 ministries and sectors, 38 provincial-level People's Committees, and 15 subordinate units of MONRE. No public feedback was submitted via the Ministry's website.

On November 18, 2024, MONRE submitted Report No. 107/TTr-BTNMT to the Prime Minister, requesting approval of the Implementation Plan for the Master Plan.

Following the instructions of the Government Office in Official Dispatch No. 3148/PB-VPCP dated November 28, 2024, MONRE issued Official Dispatch No. 8519/BTNMT-ĐCVN dated December 4, 2024, to consult the Ministry of Planning and Investment (second round).

1. Objectives and Requirements

1.1 Objectives

- Effectively implement Decision No. 680/QĐ-TTg dated June 10, 2023, of the Prime Minister on approving the Basic Geological Survey Planning for Mineral Resources during the 2021–2030 period, with a vision to 2050 (Basic Geological Survey Planning for Mineral Resources), and build a roadmap for the effective implementation of programs and projects to achieve the goals, tasks, and solutions set forth by the Plan.

- Specify the schedule, steps of implementation, and resources for executing the programs, projects, and tasks to build policies and solutions aimed at attracting social resources to implement the Plan.

- Assign specific responsibilities to ministries, sectors, and localities, particularly in resolving or reporting to the competent authorities about obstacles related to mechanisms and policies during the implementation of the Plan.

- Focus on studying ways to overcome difficulties and obstacles to implement urgent and important projects, prioritized to serve the economic and social development of the country and localities.

1.2 Requirements

- The implementation plan for the Basic Geological Survey Planning for Mineral Resources must ensure feasibility and effectiveness; comply with and inherit resolutions, strategies, action programs, sectoral plans, and related sectoral planning and implementation plans that have been approved.

- Ensure feasibility and flexibility in implementing the projects at each stage, in line with the national context and resources.

- Demonstrate the assignment of tasks and coordination between relevant agencies during the implementation of the Basic Geological Survey Planning for Mineral Resources.

2. Content of the Plan

The implementation plan for the Basic Geological Survey Planning for Mineral Resources is built based on the provisions of Article 45 of the Planning Law, including the following main contents:

2.1. Public Investment Projects

Including key tasks, priorities for completion during the 2021–2030 phase:

- Building a Mineral Geological Database: Complete the national mineral geological database, integrating it with the national resources and environment database (Phase I to be completed by 2025; Phase II to be completed by 2030).

- Enhancing Technological Equipment Capacity for Basic Geological Survey on Minerals: Improve the quality, reliability, and effectiveness of basic geological surveys on minerals; enhance the capacity to investigate and evaluate deeply buried minerals; increase the effectiveness of geological and mineral investigation activities (to be implemented during 2026–2030).

- Strengthening Technological Equipment Capacity for the Vietnam Sea and Island Department: Procure additional equipment for basic geological surveys on marine minerals, precise and modern analytical devices for fundamental geological and marine mineral research, to enhance research capacity, forecasting, and guidance for marine geological and mineral investigations (to be implemented during 2026–2030).

- Strengthening Technological Equipment Capacity for the Institute of Geology and Mineral Sciences: Procure additional modern, precise analytical equipment to support fundamental geological and mineral research, enhance research, forecasting, and guidance for basic geological and mineral investigations, particularly for deeply buried minerals (to be implemented during 2026–2030).

2.2. Basic Geological Survey Projects on Mineral Resources

2.1. Key Tasks for Basic Geological Survey on Mineral Resources, Prioritized for Implementation during 2021–2030, Including 48 Projects, Divided into 8 Groups as Follows:

- Geological and Mineral Mapping at a 1:50,000 Scale for Land Areas: 8 projects (2021–2025: 4 projects, 2026–2030: 4 projects).

- Geophysical Surveying: Including ongoing tasks and surveys in areas with potential to discover promising mineral structures in Western Nghe An.

- Urban Geological Survey (1 project).

- Surveying Geological Hazards and Environmental Geology: Includes 8 projects, with 4 projects to be completed in the 2021–2025 phase and 4 projects in the 2026–2030 phase.

- Geological Heritage Survey: 1 project, to be completed during the 2021–2030 phase.

- Assessment of Potential for Strategic and Critical Minerals, and Urgently Needed Minerals, Including: Fuel minerals (coal, uranium, thorium); rare earth elements and precious metals, limestone for cement, river sand, marine sand, and natural sand substitutes. Includes 15 projects, with 9 projects completed during the 2021–2025 phase and 6 projects completed by 2030.

- Surveying Geological and Mineral Resources in Marine Areas: Includes 6 projects, with 4 projects in the 2021–2025 phase and 2 projects in the 2026–2030 phase.

- Investment Tasks: There are 6 tasks to be carried out until 2030, including 2 tasks currently under implementation, to be completed by the 2021–2025 phase, and 4 tasks to be implemented during 2021–2030.

The above key tasks will be prioritized for implementation and completion during the 2021–2030 period.

2.2. Basic Geological Survey Tasks on Mineral Resources to be Implemented during 2031–2050

These tasks are part of the Basic Geological Survey Planning for Mineral Resources but are not urgent for implementation before 2030. The funding sources for these tasks have not yet been identified. The tasks are expected to be carried out from after 2030 to 2050, including 20 projects.

2.3. Basic Geological Survey Tasks on Mineral Resources Eligible for Investment and Funding by Organizations and Individuals

A total of 16 tasks, including 8 tasks to be implemented during 2021–2030 and 8 tasks to be implemented after 2030.

2.4. International Cooperation Tasks

The projects under the international cooperation category include: (i) Urban geological survey tasks (subsurface geology, 3D and 4D geological mapping); (ii) Deep-sea geological survey tasks; (iii) Tasks responding to climate change, sea-level rise, research and evaluation of hazardous waste disposal structures, CO₂ storage; (iv) Tasks for developing and managing geological mineral resources databases.

2.3. Funding Sources for Implementing the Plan

The funding for implementing the Plan will come from the state budget and other legally mobilized funds according to the laws on state budgeting, public investment, and related regulations. Funding from organizations and individuals, both domestic and foreign, will be encouraged for investing in basic geological surveys on mineral resources for the projects in the approved investment list by the Prime Minister.

2.4. Solutions and Resources for Implementing the Plan

2.4.1. Completing the Legal Regulatory System

- Develop a legal document system to unify the regulations for managing basic geological surveys of mineral resources, covering fields such as: geological and mineral mapping, hydrogeology, engineering geology, environmental geology,

airborne geophysics, geological hazard investigation, geological heritage, marine geological and environmental resources investigation, etc.

- Develop, revise, and supplement Vietnamese Standards and Vietnamese Technical Regulations in fields such as geophysics, laboratory analysis, urban geological surveys, underground urban geology; geological hazard investigation; marine mineral geological surveys; environmental geological assessment, etc., in line with modern equipment and information usage requirements.

- Develop, revise, and supplement economic-technical norms for various types of work in basic geological surveys of mineral resources as the basis for formulating and promulgating unit prices for public service products in the geology and mineral sector annually. Supplement occupational incentive policies, hazardous work allowances, and other preferential regimes to ensure workers' income, motivate and encourage employees to be passionate about the profession.

2.4.2. Solutions on Financial Management Mechanism

- Develop and complete technical regulations, standards, and feasible technical norms to ensure quality and efficiency in performing basic geological survey tasks on mineral resources, especially in urban geological and engineering surveys, and 1:50,000 scale geological and mineral mapping in delta and coastal areas combined with geological hazard surveys to support sustainable development and climate change adaptation.

- Finalize economic-technical norms and unit price sets that match technical and technological requirements, especially for tasks not yet fully or suitably regulated, to encourage workers to improve quality and focus on specialized investigations.

- Prioritize state budget capital for urgent and key tasks to ensure implementation according to the plan's schedule.

- Mobilize investment capital from localities and sectors for urban geological surveys, transportation surveys, building material mineral surveys, and soil geochemical investigations to meet local demands.

- Attract funding from organizations and individuals to participate in investing and contributing capital to mineral potential assessment tasks.

- Revise policies and regimes appropriate to the specific characteristics of the geological sector to ensure the livelihood of geology workers and attract high-quality human resources and top experts in geological and mineral surveys.

- Manage professional quality (developing suitable and feasible regulations, standards, and technical norms; especially adding new content for urban geology, engineering geology, and 1:50,000 mapping combined with geological hazard investigation in delta and coastal areas for sustainable development and climate change adaptation).

- Manage financial operations (building reasonable and strict economic-technical norms, creating favorable conditions for implementing the plan; establishing suitable mechanisms for management, disbursement, and payment in line with geological survey specifics).

2.4.3. Solutions for Investment and Application of Advanced Science and Technology in Basic Geological Surveys of Mineral Resources

- There is a high demand for equipment used in geological production, but given the country's economic difficulties, the plan proposes focusing investment on 07 essential groups of equipment, including: drilling equipment; geophysical equipment; laboratory analysis equipment; specialized transport equipment; marine geological and mineral survey equipment; IT equipment; and geodetic-remote sensing equipment.

- Focus on researching and selecting effective, reliable advanced technologies, especially for deep mineral assessments, marine geological and mineral surveys, and geological hazard investigations for sustainable development and climate adaptation; and geological surveys for post-mining environmental restoration.

- Strengthen procurement of equipment and vehicles for effective task implementation, especially field investigation tools, geophysical measurement devices capable of deep-sea data collection and sampling, and deep-structure mineral forecasting.

- Invest in building modern sample analysis laboratories with high accuracy and reliability that meet international standards.

- Develop a database and information system on geology and mineral resources, updated and integrated with the national geographic database and the general

database of the natural resources and environment sector, in compliance with the sector's e-government architecture.

2.4.4. Solutions to Encourage Organizations and Individuals to Invest in Basic Geological Surveys of Mineral Resources

- Complete the legal framework related to encouraging organizations and individuals to invest in basic geological survey activities. The State's goal in offering such policies is to leverage the capital of financially capable stakeholders who are interested in mineral exploration and exploitation, thus reducing state investment, accelerating survey progress, and minimizing illegal mining.

- Add regulations on eligibility for investment contribution to geological surveys, focusing on selecting investors with sufficient financial capacity to fulfill contractual commitments. Also, supplement regulations on capital management from investors such as: financial capacity appraisal; third-party guarantees; capital transfer rules in investment contracts; rights to participate in inspection, monitoring, and acceptance of the survey projects they invest in.

- Establish regulations for penalties in case organizations or individuals violate investment contribution contracts.

2.4.5. Solutions on Communication and Awareness-Raising

- Use various multidimensional communication tools that combine traditional and modern methods. Through agencies such as the Geological Journal, the Journal of Natural Resources and Environment, the Natural Resources and Environment Newspaper, subordinate units of the Ministry of Natural Resources and Environment, and provincial/local authorities, strengthen coordination to deliver information directly to different community groups via printed newspapers, web portals, social networks, and local broadcasting about the process and results of past, ongoing, and future implementation of the “Master Plan for Basic Geological Survey of Mineral Resources 2021–2030, with a Vision to 2050.”

- Integrate publicity about the Master Plan into various programs:
 - i) Workshops and conferences exchanging information on basic geological surveys;
 - ii) Local development planning and activities (socio-economic development, environmental protection, disaster prevention, landslide warnings in mountainous and midland areas of Vietnam; disaster response and climate change adaptation).

- Publicize and share information and documents.

- Disseminate information to organizations and individuals involved in national defense and security tasks.

- Provide guidance to tourists via various notes on geological heritage and mineral resources from different localities.

- Monitor and evaluate public awareness-raising and communication activities.

2.4.6. Solutions for Training and Capacity Building

- Enhance training in geology, mineral resources, scientific research, innovation, IT, foreign languages, and creative design skills associated with actual production projects. Partner with educational institutions to promote STEM (science, technology, engineering, and mathematics) and STEAM (including arts) training; increase career orientation efforts in schools and universities to attract students to scientific and technical fields.

- Invest in building a high-quality workforce: i) Implement special policies to attract young scientists, outstanding graduates, and provide support for their career development to become leading experts in geology, geophysics, IT, etc.; gradually align standards with international benchmarks; and establish outstanding policies for internationally recognized experts. ii) Continue programs to select and send individuals for advanced training in prioritized fields in countries with developed science and technology. iii) Develop pilot programs to fund domestic-university collaborations with international institutions to train professionals in Vietnam.

- Deploy solutions to enhance the quantity and quality of human resources and promote public-private cooperation in training to meet sector demands: i) Cooperate with universities to reform training programs in line with industry requirements and to improve innovation skills. ii) Encourage universities to implement thesis projects (undergraduate, master's, doctoral) as real-world assignments. iii) Diversify training formats and materials using digital technology, social media, and communication channels.

- Promote talent attraction and workforce mobility through: i) Review and amend regulations to encourage two-way mobility between research institutes/universities and public service units; attract high-level science and technology personnel from abroad, overseas Vietnamese, and professionals from the private sector into leadership, research, and production roles at public institutions. ii) Develop a network connecting Vietnamese talent; encourage contributions from the overseas Vietnamese scientific community. iii) Attract international scientists and

experts, especially overseas Vietnamese experts, to participate in domestic activities through collaborative projects and science and technology missions.

- Strengthen retraining for the current workforce by diversifying training methods such as workshops, practical skills training, and frequent upskilling for scientific and technical personnel in all specialties. Collaborate with domestic and international experts to improve staff expertise via joint research, pilot production, etc.

- Collaborate with international organizations such as CCOP, IGCP, and AMCAP to train specialists in geological techniques, geophysical data processing and interpretation, sample analysis, database development, and foreign language proficiency to support international integration.

Adjust policies to attract young, skilled, and passionate workers committed to the profession.

2.4.7. Solutions for International Cooperation

- Promote international cooperation in the research and forecasting of mineral resources in deep-seated geological structures with mineral potential; geological and mineral investigations in maritime areas; urban geological surveys, including subsurface urban geological space, 3D and 4D geology; assessment of deep-hidden mineral resources, deep-sea mineral surveys, gas hydrates, iron-manganese nodules; development and management of geological and mineral databases; application of digital technology.

- Strengthen international cooperation to attract capital and advanced technologies from developed countries for geological and mineral investigations.

- Participate more deeply, broadly, and proactively in multilateral and bilateral cooperation frameworks and international forums on natural resources and environment, ensuring the presence and voice of Vietnam's geology and mineral sector in these cooperation frameworks.

- Enhance proactivity in identifying, establishing, and promoting cooperative relationships with foreign partners; strengthen and expand the scope of cooperation with traditional partners; identify new potential partners and proactively approach and broaden cooperation ties.

- Enhance international cooperation (IC) in the research and forecasting of mineral resources in deep-seated structures with mineral potential to discover new mines; collaborate to access scientific achievements in geology from developed countries and promote the application of modern methods, equipment, and technologies in basic geological investigations for minerals. Give priority to international cooperation in basic geological investigations of mineral resources in Vietnam's maritime zones.

- Develop and implement international cooperation projects in the fields of deep-sea geological and mineral investigations; energy exploitation (tidal energy, wave energy, wind energy, solar energy); mineral scientific surveys on Vietnam's continental shelf.

2.4.8. Solutions for Organizing and Monitoring the Implementation of the Plan

a) Solutions for Organizing the Implementation of the Plan

- Develop an implementation plan for the master plan through 5-year, 3-year, and annual plans.

- Regularly compile information and report on the implementation results of the master plan to guide planning for the following year.

- Based on the master plan implementation schedule, affiliated units shall develop detailed implementation plans for assigned tasks. Regularly compile information, report on the implementation progress, and promptly propose any difficulties to the management agency for direction.

- In case of new geological or mineral discoveries or urgent matters requiring investigation, the Ministry of Natural Resources and Environment shall proactively propose adjustments or additions to the master plan to the Prime Minister.

b) Solutions for Monitoring the Implementation of the Plan

- Monitor the implementation of the content outlined in the master plan.

- Monitor the implementation schedule annually, every 3 years, and every 5 years to promptly propose adjustments to content, budget, equipment, and resources for urgent tasks to achieve the objectives of the master plan.

- Monitor the results of task implementation under the master plan to promptly adjust the tasks and timelines as needed.

- Propose the development of legal documents and regulations on monitoring the implementation of the master plan for basic geological and mineral investigations.

2.5. Organization of Master Plan Implementation

Ministries and agencies shall develop implementation plans according to the task assignments in Article 2 of Decision No. 680/QĐ-TTg. Based on these plans, mechanisms, policies, and implementation solutions, and according to their respective functions and duties, responsibilities are assigned as follows:

2.5.1. Ministry of Natural Resources and Environment

- Bear overall legal responsibility before the law and the Prime Minister for the proposals and recommendations for approving the Implementation Plan of the Basic Geological and Mineral Investigation Master Plan. The content of the Implementation Plan must closely align with the objectives of the approved Master Plan, meet overall, optimal, efficient requirements, comply with legal regulations, and ensure feasibility and effectiveness during implementation.

- Organize the announcement of the master plan, disseminate and publicize its contents, and provide information about the Basic Geological and Mineral Investigation Master Plan to organizations and individuals to participate in monitoring the approved master plan implementation.

- Take the lead and coordinate with other ministries and sectors to effectively implement the Plan, in compliance with the Planning Law and related legal regulations, ensuring feasibility and effectiveness.

- Conduct assessments of the implementation of the Basic Geological and Mineral Investigation Master Plan, and report to the Prime Minister annually, every 5 years, or as required under Clause 2, Article 49, and Article 50 of the Planning Law and Decree No. 37/2019/ND-CP dated May 7, 2019. Based on the evaluation report, submit proposals to the Prime Minister for approval of adjustments to the Master Plan if necessary to match the actual situation and conditions.

- Review the Basic Geological and Mineral Investigation Master Plan and report to the Prime Minister every 5 years; submit proposals for adjustments to the Master Plan if necessary to suit the socio-economic development of each stage.

- Lead and coordinate with relevant agencies to revise and update the contents of the Master Plan during the implementation of Decision No. 680/QD-TTg; ensure that the updates do not alter the overall goals and directions of the Master Plan; compile and report the revision and updates to the Prime Minister during the periodic review of the Master Plan.

- Based on the approved Master Plan and results of geological and mineral investigations, annually compile a list of additional geological and mineral investigation projects eligible for investment by organizations and individuals and submit it to the Prime Minister for approval.

- Delimit and announce types of minerals, locations, coordinates, and areas of geological and mineral investigation projects eligible for investment by organizations and individuals on the Ministry's official website as per the approved Master Plan.

- Take the lead in drafting the Law on Geology and Minerals (amended Mineral Law), report to competent authorities for consideration of adjustments, amendments, and supplements to legal documents to facilitate localities in implementing socio-economic development projects.

- Take the lead and coordinate with relevant ministries, agencies, and provincial People's Committees in inspecting and supervising the implementation of the Basic Geological and Mineral Investigation Master Plan.

2.5.2. Ministry of Planning and Investment, Ministry of Finance

Based on the approved Master Plan in Decision No. 680/QD-TTg, the Implementation Plan, and the state budget balancing capacity, allocate funding for implementing the tasks under the Master Plan in accordance with laws on state budget, public investment, and related legal regulations.

2.5.3. Other Relevant Ministries and Agencies

Coordinate with the Ministry of Natural Resources and Environment to effectively implement the Master Plan and Decision No. 680/QD-TTg; promptly provide feedback to the Ministry on the quality, effectiveness, and usage needs of

geological and mineral investigation results in line with the Master Plan, for timely reporting to the Prime Minister to consider adjustments and additions to improve the quality and efficiency of implementation.

2.5.4. People's Committees of Provinces and Centrally-Run Cities

Responsible for coordinating, facilitating, and ensuring effective implementation of the geological and mineral investigation work as per the Master Plan within their administrative management areas. Allocate local budgets to meet the mineral investigation needs of the province in accordance with the approved Master Plan, and develop plans to mobilize other lawful funding sources for implementation based on local needs.

Coordinate with relevant ministries and agencies to inspect and supervise the implementation of the Master Plan on basic geological and mineral investigations within their administrative management areas.

IV. REPORT ON THE IMPLEMENTATION RESULTS OF THE PROJECT “GEOLOGICAL AND GEOLOGICAL RESOURCE MAP OF VIETNAM AND ADJACENT MARINE AREAS AT A SCALE OF 1:1,000,000”

Under the assignment of the Ministry of Natural Resources and Environment, the Vietnam Geological Department and Minerals issued Decision No. 723/QĐ-ĐCVN dated November 3, 2024, by the Director General of the Vietnam Geological Department, approving the contents and adjusted budget estimates for the “Scientific and Technological Information” task, including the project “Geological and Geological Resource Map of Vietnam and Adjacent Marine Areas at a Scale of 1:1,000,000” for the year 2024. With the continuous efforts of 60 authors and experts nationwide in the fields of geology and mineral resources, the project has been completed and published.

The content of the project “Geological and Geological Resource Map of Vietnam and Adjacent Marine Areas at a Scale of 1:1,000,000” reflects achievements spanning more than 150 years, since the first geological studies in Vietnam began. A comprehensive picture of Vietnam’s geology and earth resources has gradually taken shape and become increasingly clear. Results from fundamental research and surveys have produced various scientific outputs throughout the historical development of Vietnam’s geology sector. These include geological and mineral maps ranging from small scales (1:2,000,000; 1:1,000,000; 1:500,000) to medium and large scales (1:200,000; 1:50,000), along with specialized books and journals covering national, regional, and local scopes.

The “Geological and Geological Resource Map of Vietnam and Adjacent Marine Areas at a Scale of 1:1,000,000” and its explanatory book (Geology and Geological Resources of Vietnam, published in both Vietnamese and English) comprehensively compile existing related data across Vietnam's mainland and adjacent seas. The project aligns with the International Geoscience Programme IGCP 624: OneGeology – an international geological initiative.

This project is managed by the Ministry of Natural Resources and Environment and the General Geological Department and Minerals of Vietnam (renamed the Vietnam Geological Department in 2023), and implemented by the Center for Information, Archives, and Geological Museum in accordance with Decision No. 1398/QĐ-BTNMT dated August 6, 2013, by the Minister of Natural Resources and Environment.

This is a comprehensive scientific monograph on Earth sciences, conducted intermittently over many years. It builds upon past research and survey achievements, with data updated and supplemented up to early 2023. The project was completed by a collective of geological scientists from the Vietnam Geological Department, the Vietnam Geological Association, the Vietnam Petroleum Association, the Institute of Geology (Vietnam Academy of Science and Technology), the Institute of Geological Sciences and Mineral Resources (Ministry of Natural Resources and Environment), the Vietnam Oil and Gas Group (PVN), the Vietnam National Coal and Mineral Industries Group (TKV), Hanoi University of Mining and Geology, University of Science - Vietnam National University Hanoi, as well as several international scientists from Japan, France, and the Russian Federation.

The mapping and explanatory book were carried out under the scientific research project coded TNMT.03/10-15, with Đào Thái Bắc as the project leader; Trần Văn Trị as the scientific editor-in-chief, and Đào Thái Bắc and Nguyễn Xuân Bao as deputy editors. The work was completed at the Center for Information, Archives, and Geological Museum, under the Vietnam Geological Department, Ministry of Natural Resources and Environment. The publication was carried out under Decision No. 163/QĐ-ĐCVN dated February 3, 2023, by the Vietnam Geological Department.

Aside from the preface, the explanatory book accompanying the map includes three main parts:

- **Part I** consists of two chapters: An overview of the history of geological research and the natural geographical and geomorphological characteristics of

Vietnam, presenting key aspects of geological research history and the country's natural geography.

- **Part II** consists of five chapters: Stratigraphy, Magmatism, Metamorphism, Regional Tectonic Structures, and Geological Hazards and Environmental Geology.

- **Part III** consists of four chapters: Mineral Resources, Energy Resources, Water Resources, and Geological Heritage, presenting general characteristics of these resource types based on globally applied classification systems.

V. REPORT ON THE RESULTS OF GEOLOGICAL INFORMATION, ARCHIVING, AND MUSEUM WORK FOR PUBLIC SERVICE

1. Geological Information Work

- Maintenance of computer and network systems: Maintenance of the computer network system including servers, workstations, and peripheral devices was conducted. Timely troubleshooting and repairs were carried out. System and specialized software were maintained and kept operational, ensuring that the internal network and servers of the Center operated normally.

- Maintaining and updating website information on the Internet: The website operated stably with 1,010,382 visits in 2024, with no unauthorized access detected. System administration and data management were carried out, covering databases and static information. New information and articles were collected, created, and uploaded to the website. The website system and domain name were maintained in a stable condition.

- Maintaining operation of software supporting the management and exploitation of databases, including: Three database management (DBMS) software systems for geological and mineral investigation levels, geological information database management software, geological and mineral database management software for the Northwest region. These software systems were continuously used to update new information from the unit, from submitted archived reports, and from component projects under the scheme "Comprehensive investigation of mineral resources and completion of the 1:50,000-scale geological map of the Northwest region to serve sustainable socio-economic development planning." Some issues and incidents related to the software/system (e.g., memory overflow, certain software functions stopping due to incompatibility with updated operating system versions or library packages...) were regularly reviewed and promptly resolved.

- Maintaining and operating IT hardware: System equipment including 2 servers, 10 switches, 1 router, 7 WiFi access points, and 1 security device was relocated, cleaned, and had several small, time-worn components replaced to ensure operation. One backup server is currently experiencing a motherboard failure, and no compatible replacement parts are available in Vietnam.

- Data creation for the geological and mineral investigation-level database and geological information database: Converted standardized data into the 1.35 Investigation Unit (IU) database for geological and mineral investigation, and 1.73 IU for geological information database. For the geological and mineral investigation

database: structured data was input and cross-checked for 106,915 spatial fields and 100,809 non-spatial fields. For the geological information database: structured data was input and cross-checked for 25,225 non-spatial information fields. The databases were edited and proofread to ensure information retrieval and exploitation.

- Data creation for the database of the project “Investigation and assessment of sand, gravel, and cobble potential in riverbeds of the Mekong Delta for sustainable socio-economic development”: The Center is currently collecting and categorizing required data from geological mapping reports at 1:50,000 scale, urban geology, geological hazards, groundwater exploration, hydrogeology – engineering geology in provinces within the study scope of the project, including: Đồng Tháp, An Giang, Tiền Giang, Vĩnh Long, Cần Thơ, Hậu Giang, Bến Tre, Trà Vinh, and Sóc Trăng. The standardization of procedures for map editing using ArcGIS software and toolkits for spatial data construction is being implemented. In 2024, the Center digitized 22 specialized geological maps (Complex Type 1), and input and cross-checked 52,878 non-spatial structured information fields.

2. Geological Archiving Work

- Inspection and receipt of reports was carried out in accordance with Circular No. 12/2013/TT-BTNMT dated June 5, 2013 of the Ministry of Natural Resources and Environment on the handover, receipt, storage, preservation, and provision of data on geology and minerals, and the procedures for geological and mineral documentation exploitation under ISO 9001-2015, including: Paper report inspection (*Checked completeness and validity of legal documents; inspected format and presentation in accordance with current regulations; checked data consistency across printed and digital report sets; checked completeness and consistency across multiple copies of a report.*); CD report inspection (*Verified and organized data on CD sets; checked data accuracy and consistency with paper versions.*); Prepared minutes of geological and mineral documentation inspection results; Received revised reports based on inspection results; Issued certificates of document handover into geological archives; Categorized and registered documents, assigned preservation numbers, archive stamps, and drawing labels for booklets and drawing boxes; Completed transfer procedures of reports to the storage department.



Photo: Classification of documents submitted for archiving

In 2024, the unit completed the inspection and receipt of 190 reports according to archive codes, corresponding to 100 standard reports with preservation numbers from 5,547 to 5,736. However, due to insufficient government funding, only 44 standard reports were paid for, while the remaining 56 standard reports were received by the Center without funding.

- Preservation of the geological archive storage: The geological archive currently stores 5,105 geological reports across various topics, with two sets preserved for each report. In 2024, the Center transferred 190 newly received reports

from units inside and outside the Department into the paper document archive (Preservation numbers from 5,547 to 5,736); Completed preservation of 555 linear meters of paper archive documents, 789 m² of storage area; Archive rooms are always kept organized, clean, and free from termites; Preserved 6,215 digital storage devices, cleaned to prevent mold and ensure readability. The Archive is protected 24/7, including holidays and weekends, ensuring absolute safety for the documents, with no incidents of fire, explosion, or loss. The distribution of published geological publications is carried out regularly.



Photo: Archive staff conducting periodic inventory of documents



Photo: Archive staff conducting periodic inventory of documents

- Document reading service: The service for readers was carried out in accordance with current regulations, ensuring correct procedures and appropriate user access. In 2024, 29 official letters and 10 letters of introduction were received for the purpose of referencing and collecting geological and mineral documents from units within and outside the Vietnam Geological Department, corresponding to service for 57 individuals. Volume of documents provided: served 97 volumes of explanatory reports and appendices for reference, and 366 report drawings; Supplied digital documents including 4,734 pages of explanatory texts and appendices from 86 reports; 733 drawings from 84 reports.



Photo: Readers reviewing documents at the Center

- Organization of digital document archives: Compared labels of received storage media with the handover minutes; Inspected digital data on storage media; Backed up digital documents and transferred digital data into storage devices according to document classification; Created data catalogues for provision, exploitation, and use in support of state management requirements; Arranged storage media in specialized cabinets; Transferred digital data into storage devices and conducted document classification in conjunction with document appraisal and determination of preservation periods. Volume completed: 266.7 GB.



Photo: Document storage arrangement work

3. Geological Museum work

- Visitor service and educational research activities: In 2024, the Geological Museum welcomed 6,121 visitors, specifically:

- Geological Museum in Hanoi received a total of 2,925 visitors, including 2,568 domestic and 357 international visitors (among which there were 29 groups of students from universities such as Thuy Loi University, Vietnam National University, University of Architecture, University of Science, etc.).



- Geological Museum in Ho Chi Minh City welcomed a total of 3,196 visitors, including 2,869 domestic and 327 international visitors.



Photo: Study and educational groups visiting the Museum

- Specimen Preservation and Exhibition Work: The total number of specimens on display at the Geological Museum is 7,633 specimens (4,230 in Hanoi and 3,403 in Ho Chi Minh City). In 2024, a total of 3,000 leaflets introducing the Geological Museum were distributed. Information was collected and updated to supplement specialized explanatory materials, particularly targeting young visitors under 10 years old, whose visitation numbers have recently increased. A practice set of 33 specimens (sedimentary, magmatic, and metamorphic) was used for students from schools and universities. One new educational tour program was developed and implemented. Materials were checked, collected, and updated to supplement and replace 221 display specimen labels. Two Earth science video clips were recorded: “Summary of Earth’s 4.5 Billion Year History” and “The Collision of Lithospheric Plates.” One clip was edited to compile images of experiential and promotional activities of the Hanoi Geological Museum. A script was written, an exhibition layout designed, and a mobile exhibition was organized at Mai Dong Primary School. New documents and illustrative maps were printed for the display topics at the Ho Chi Minh City Museum. Display specimens were preserved in cabinets and stands;

cabinets, stands, models, and maps were protected; the specimens and exhibition areas were regularly cleaned; and electrical equipment in display cabinets and exhibition areas was regularly checked and replaced.

- Specimen Storage Preservation Work: In addition to the regularly exhibited specimens used for outreach and visitor services, 41,398 specimens are stored and preserved in 8 storage facilities (5 in Hanoi and 3 in Ho Chi Minh City). Specimens were labeled with identification numbers and preserved in drawers, shelves, and storerooms. A total of 33 specimens (sedimentary, magmatic, metamorphic) were provided for 12 student groups from universities visiting for study and research. Specimens were regularly cleaned, rotated, and inspected for preservation. An inventory of 20,606 specimen files was conducted, including sorting and checking sample cards from past years, cross-checking with archival records, and entering data into the computer system. In 2024, a comprehensive inventory of specimens was carried out at both museums. The number of displayed and stored specimens matched the records on file.

In 2024, the Hanoi Geological Museum received 07 specimen sets through the public service portal of the Ministry of Natural Resources and Environment. Of these: 02 sets were from geological projects, 04 sets from enterprises, and 01 set from an individual.

Through its activities, the Museum effectively met the needs of scientific research, education, learning, and visitation for students, scientists, and the general public. Visitors provided positive evaluations of the value of the specimen collections on display and the Museum's service attitude, both in feedback forms and on social media platforms.

The completion of professional tasks related to exhibition, preservation, and inventory has created a foundation for developing solutions to effectively utilize the Museum's resources and ensure stable long-term development.

VI. REPORT ON THE DELINEATION OF MINERAL RESERVE AREAS AND DISPERSED, SMALL-SCALE MINERAL AREAS

1. Management of National Mineral Reserve Areas

In 2024, the Department advised the Ministry in sending communications to provincial level People's Committees regarding the handover of documents and

materials related to national mineral reserve areas for management purposes. The Department received confirmation from 19 out of 26 provinces acknowledging the receipt of documents delineating national mineral reserve areas, to adjust and supplement such areas in accordance with Decision No. 645/QĐ-TTg dated May 6, 2014, by the Prime Minister, and to submit proposals for approval of national mineral reserve areas as prescribed by Decree No. 51/2021/NĐ-CP dated April 1, 2021, of the Government.

The provinces that confirmed receipt include: Bắc Kạn, Bà Rịa - Vũng Tàu, Bình Phước, Bình Thuận, Đắk Lắk, Đắk Nông, Gia Lai, Hưng Yên, Lâm Đồng, Lào Cai, Quảng Ngãi, Thái Bình, Thái Nguyên, Ninh Thuận, Hà Nội, Thanh Hoá, Nam Định, Quảng Ninh, and Quảng Nam.

2. Delineation of Dispersed and Small-Scale Mineral Areas

In 2024, the Department submitted to the Ministry of Natural Resources and Environment for approval and publication 08 areas containing dispersed and small-scale minerals, including:

- Marble in Quỳnh Hợp, Nghệ An (03 areas);
- Iron ore at Zone I, Lương Thịnh Commune, Trấn Yên District, Yên Bái Province;
- Iron ore at Km 24, Hưng Khánh Commune, Trấn Yên District, Yên Bái Province;
- Gia Tô Granite in Ninh Thuận;
- Primary gold at Khe Tăng, Phước Thành Commune, Phước Sơn District, Quảng Nam Province;
- Primary gold at Hơ Moong, Kon Tum Province.

3. Inspection of State Management Activities in Dispersed and Small-Scale Mineral Areas; Supervision of Mineral Exploration Projects under Provincial Authority

In 2024, the Department organized inspection delegations in three provinces: Thanh Hóa, Gia Lai, and Đắk Nông, in accordance with the approved plan and schedule. The inspection results recorded the current status of management and resource protection in areas with dispersed, small-scale minerals and national mineral reserve areas in these provinces, which, in general, meet the assigned responsibilities and comply with regulations on resource protection.



Image: Director General of the Vietnam Geological Department working with the People's Committee of Gia Lai Province

Regarding the supervision of mineral exploration projects under the jurisdiction of provincial-level People's Committees, it was noted that the supervision activities were assigned by the provincial authorities to qualified and experienced entities, ensuring compliance with geological and mineral laws and maintaining acceptable quality standards.



Image: Mr. Trần Mỹ Dũng - Deputy Director General of the Vietnam Geological Department working in Đắk Nông Province.

Appendix. List of documents for scattered and small mineral areas.

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
	RESOLVED							
1	Roofing slate in the Na Lay area, Điện Biên Province	Proposed by province	60 ha	Announced (Decision No. 1109/QĐ-BTNMT dated May 5, 2023)				
2	Placer titanium in Cang Gián Village, Quảng Trị Province	Proposed by province	14,56 ha	Announced (Decision No. 1324/QĐ-BTNMT dated May 12, 2023)				
3	Placer titanium in Sen Thủy, Quảng Bình Province	Proposed by province	25,3 ha	Announced (Decision No. 1817/QĐ-BTNMT dated July 4, 2023)				
4	Primary gold (G60) in Quảng Nam Province	Proposed by province	14,76 ha	Announced (Decision No. 1816/QĐ-BTNMT dated July 4, 2023)				
5	Làng Bún coal mine, Thái Nguyên	Proposed by Gia Sàng Iron and Steel JSC	05 ha	122=14,032 thousand tons 333=9,86 thousand tons	<500 thousand tons	- The mine has been licensed for exploitation	- Not part of national mineral reserve area	Vietnam Bureau of Geology and Minerals issued Official Dispatch No. 800/ĐCVN-ĐGTD dated May 10, 2023, in response to the Company.
6	Primary copper at Sầu, Giáo Liêm, Sơn Động, Bắc Giang	Proposed by Anh Phong JSC CV 30/CTAP 10/3/2023	285 ha	No data	<4500 tons Cu	- The mine has been licensed for exploitation	- Not part of national mineral reserve area	The dossier was transferred by the Vietnam Bureau of Geology and Minerals. Vietnam Bureau of Geology and Minerals provided its

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								opinion to KSVN in Official Dispatch No. 1043/ĐCVN-ĐGTD dated July 15, 2023.
7	Several mineral sites in Son La	Proposed by Tay Bac Construction, Transport and Mineral Exploitation LLC	Several	No data	Vietnam Bureau of Geology and Minerals issued Official Dispatch No. 1482/ĐCVN-ĐGTD dated August 9, 2023, in response to the Company.			
8	Marble in Quỳnh Hợp, Nghệ An (03 areas)	Proposed by province	19 ha	Announced (Decision No. 247/QĐ-BTNMT dated January 29, 2024) (Announced 03/10 proposed provinces)				
9	Iron at Area I, Lương Thịnh commune, Trấn Yên district, Yên Bái province	Proposed by province	8,8 ha	Announced (Decision No. 1808/QĐ-BTNMT dated July 2, 2024) (Announced 03/10 proposed provinces)				
10	Iron at Km 24, Hưng Khánh commune, Trấn Yên district, Yên Bái province	Proposed by province	7,9 ha	Announced (Decision No. 1808/QĐ-BTNMT dated July 2, 2024)				
11	Lignite at Tô Mậu, Lục Yên, Yên Bái (including 05 areas)	Proposed by province CV3643/UBND -TNMT 30/10/2023	74,7ha	Report T.126; Bđ.256; 03 areas without resources, 02 areas	<500 thousand tons	- The mine had been licensed for exploitation.	- Not part of national mineral reserve area	There is no data available on the estimated resources (category 333); therefore, the criteria for areas with dispersed and small-scale

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
				with coal resources level 334b		- The license has been revoked.		<p>mineral deposits have not been met.</p> <p>The Ministry of Natural Resources and Environment issued Official Letter No. 1042/BTNMT-ĐCVN dated February 20, 2024, to the People's Committee of Yen Bai Province, notifying the results of the review.</p>
12	Granite at Gia Tó, Ninh Thuận	Proposed by province CV2048/UBND-KTTH 23/5/2023	18,04 ha	<p>Announced (Decision No. 3476/QĐ-BTNMT dated October 30, 2024)</p> <p>(announced acreage 10,98 ha)</p>				
13	Primary gold at Khe Tăng, Phước Thành commune, Phước Sơn district, Quảng Nam province	Proposed by province CV378/UBND-KTN dated 18/01/2023	11 ha	<p>Announced (Decision No. 2882/QĐ-BTNMT dated September 6, 2024)</p> <p>(announced 01 area including 02 acreage; 11ha of total announced acreage)</p>				
14	Manganese at Khuôn Han	Proposed by province CV1929/UBND-KTTH dated 28/6/2024	15,85 ha (including 02 acreage)	No data	<200.000 tons MnO ₂	- Not part of prohibited or temporarily prohibited areas.	- Not part of project area	The license was granted prior to the Mineral Law of 2010; before the expiration, the exploration report for upgrading reserves was completed. The Ministry has reviewed the dossier and
	Manganese at Bậu hamlet (Khuôn Pục)		20,31 ha	No data	<200.000 tons MnO ₂			

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								issued Official Letter No. 7698/BTNMT-ĐCVN dated November 4, 2024, requesting the People's Committee of Ha Giang Province to approve the exploration report for upgrading reserves and report back to the Ministry for consideration and announcement of the area with dispersed and small-scale mineral deposits.
15	Primary gold at Hơ Moong, Kon Tum	Proposed by province CV951/UBND-NNTN dated 22/3/2024	11,28 ha (02 diện tích)	Announced (Decision No. 4285/QĐ-BTNMT dated December 27, 2024) (announced 01 area including 02 acreage; 4,8 ha of total announced acreage)				
16	03 coal areas at: (1) Tường Tiến – Tường Phong area; (2) Nhà Lương 1 area; (3) Nhà Lương 2 area	Proposed by province CV5520/UBND-KT dated 28/11/2024	(1) Tường Tiến-Tường Phong: 84,5 ha; (2) Nhà Lương 1: 40,9 ha và (3) Nhà	Announced (Decision No. 358/QĐ-BTNMT dated February 5, 2025) (announced 03 areas; 188,38 ha of total announced acreage)				

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
			Lương 2: 62,8 ha					
17	Basalt for paving at Đắk Smar, Gia Lai	Proposed by province CV1815/UBND -CNXD 13/7/2023	17 ha	Announced (Decision No. 358/QĐ-BTNMT dated February 5, 2025) (announced 03 areas; 188,38 ha of total announced acreage)				
18	02 quartz mineral areas: i) Khuổi Luông, Nà Phặc town, Ngân Sơn district ii) Nà Chiếm 1, Lương Bằng commune, Chợ Đồn district	Proposed by province CV8070/UBND -NNTNMT 04/11/2024	Khuổi Luông: 38,6 ha; Nà Chiếm 1: 3,38 ha	Announced (Decision No. 366/QĐ-BTNMT dated February 6, 2024) (announced 01 areas (Khuổi Luông); 10,98 ha of total announced acreage; The Nà Chiếm 1 area does not meet the delineation criteria.)				
	UNDER PROCESS							
19	Linh Đức coal, Linh Phú Commune, Chiêm Hóa, Tuyên Quang	Proposed by province CV3589/UBND -KT 03/8/2023	No data	No data	<500 thousand tons	- Not part of prohibited or temporarily prohibited areas.	- Not part of national mineral reserve area	The opinion of the Geological Department (KSVN) has been received. The dossier is incomplete; the enterprise is being requested to supplement it. Geological documents are being reviewed.
20	Mangan Lâm Bình, Tuyên Quang		No data	No data	<200.000 tons MnO ₂	- Not part of prohibited or temporarily prohibited areas.	- Not part of national mineral reserve area	

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								The Provincial Department of Natural Resources and Environment is being requested to review (according to Official Letter No. 66/ĐCVN-ĐGTD dated January 12, 2024).
21	02 iron areas in Trấn Yên, Yên Bái: Núi 409 (including 02 small areas), Cạn Còng (including 03 small areas)	Proposed by province CV1460/UBND -TNMT 19/5/2023; số 2931/UBND-TNMT 05/9/2023	Mountain 409: 40,8ha; Cạn Còng: 67ha	No data	<200 thousand tons Fe	- Not part of prohibited or temporarily prohibited areas.	- Not part of national mineral reserve area	<p>All three areas have been licensed for exploitation by the Provincial People's Committee. Licenses have been revoked. The mines have not yet been closed.</p> <p>The Northwest Geological Division is conducting a current status investigation and resource assessment.</p> <p>There is no basis for consideration at this time.</p>
22	Iron in Hưng Thịnh Commune, Trấn Yên District, Yên Bái Province	Proposed by province CV4514/UBND -TNMT ngày 16/12/2022; số 1777/UBND-KT 04/5/2023	6,6 ha	122=29,522 thousand tons Fe	<200 thousand tons Fe	- The mine has been licensed for exploitation.	- Not part of national mineral reserve area	A submission form has been sent to the Ministry. The Ministry has directed coordination with KSVN for review.

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								<p>The province has proposed to postpone consideration until the approval result of the Fe-Mn project under the Northwest Project is available.</p> <p>There is no basis for consideration at this time.</p>
23	Coal Suối Lúa-Suối In, Sơn La (including 02 areas: Suối Lúa and Suối In)	Proposed by province CV 3959/UBND-KT 04/10/2023	<p>Suối Lúa:20,5 6ha;</p> <p>Suối In: 25,02ha</p>	No data yet	<500 thousand tons	<p>- The mine has been licensed for exploitation.</p> <p>- The mine has been closed.</p>	- Not part of national mineral reserve area	A submission form has been sent to the Ministry. The Ministry has directed coordination with the local authorities to initially select a number of suitable areas that fully meet the criteria for delineation and to complete the dossier for submission to the Ministry; the dossier is currently being finalized for submission.
24	Lead-zinc Tân Tiến, Sơn Dương, Tuyên Quang	<p>Proposed by province</p> <p>CV1777/UBND -KT ngày 04/5/2023</p>	22 ha	No data	<9000 tons Pb+Zn	- Not part of prohibited or temporarily prohibited areas.	- Not part of national mineral reserve area	<p>A review has been conducted based on archived geological documents.</p> <p>The Department assigned the Northeast Geological</p>

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								<p>Division to compile documents under Official Letter No. 1565/ĐCVN-ĐGTD dated August 19, 2023. The Northeast Geological Division submitted a report under Official Letter No. 135/ĐCĐB-KT dated July 21, 2023.</p> <p>A field inspection has been carried out; the Department is requesting the Tuyên Quang Provincial DONRE to conduct a review (according to Official Letter No. 66/ĐCVN-ĐGTD dated January 12, 2024).</p>
25	Lead-zinc Đồng Hoan, Sơn Dương, Tuyên Quang	Proposed by province CV 1777/UBND-KT 04/5/2023	19,7 ha	No data	<9000 tons Pb+Zn	- Not part of prohibited or temporarily prohibited areas.	- Not part of national mineral reserve area	<p>A review has been conducted based on archived geological documents.</p> <p>The Department assigned the Northeast Geological Division to compile documents under Official Letter No. 1565/ĐCVN-</p>

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
								<p>DGTD dated August 19, 2023. The Northeast Geological Division submitted a report under Official Letter No. 135/ĐCĐB-KT dated July 21, 2023.</p> <p>There is not enough information on lead-zinc ore resource data.</p>
26	Lead-zinc Na Son, Tùng Bá, Vị Xuyên, Hà Giang	Proposed by province CV 3991/UBND-KTTH 06/12/2023	20 ha (khu I 11ha, khu II 9ha)	333= 5.956 tấn (QĐ 495/QĐ-ĐCKS-ĐC ngày 02/8/2006)	<9000 tons Pb+Zn	- The mine has been granted an exploitation license. - The project for mine closure is currently under construction.	- Not part of national mineral reserve area	The opinion of the Geological Department (KSVN) has been obtained. Geological documents are being reviewed.
27	Mangan Lâm Village, Bắc Quang, Hà Giang		57,98 ha	No data	<200.000 tons MnO ₂	- The mine has been licensed for exploitation.		

o.	Name of Area	Legal Status	Area	Resources		Temporarily restricted area	National mineral reserve area	Notes
				Approved	Degree			
						- A decision to close the mine has been made.		
28	Iron Sài Lương, Nậm Búng Commune, Văn Chấn District, Yên Bái	Proposed by province CV 4391/UBND-TNMT 21/12/2023	20,0 ha	No data	<200 thousand tons Fe	- The mine has been licensed for exploitation. - A decision to close the mine has been made.	- Not part of national mineral reserve area	Awaiting the results of the current status investigation and assessment by the Northwest Geological Division to complete the dossier for submission to the Ministry.
29	Iron in Nậm Búng Commune, Văn Chấn District, Yên Bái Province		4,0 ha	No data	<200 thousand tons Fe	- The mine has been licensed for exploitation. - A decision to close the mine has been made.	- Not part of national mineral reserve area	Awaiting the investigation results from the Northwest Geological Division to finalize the report dossier for submission to the Ministry.

VII. REPORT ON SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES AND INTERNATIONAL COOPERATION RESULTS

1. Regarding Science and Technology:

In 2024, the Department effectively implemented scientific research and development activities, technology transfer cooperation in the fields of geology, minerals, and environmental geology. These activities include: Research on tectonic architecture and endogenous mineralization in the Sông Chảy zone; development of a mathematical-geological-water resource model for earthquake prediction and warning, with testing in the Central Highlands region; research and development of an airborne gamma spectroscopy device using unmanned aerial vehicles (UAVs); development of technical standards for geophysics in engineering geological surveys, hydrogeology, and urban geology; development of geophysical technical standards for evaluating mineral resources in reservoir areas, riverbeds, and coastal zones; exploration potential of Nickel ore and associated minerals (Cu, Co, PGE) related to mafic and ultramafic formations in northern Vietnam, for mineral exploration; development of a set of criteria for identifying rare earths in weathered crust and proposing investigation and evaluation procedures; improvement of geological and mineral mapping methods at a scale of 1:50,000 for Vietnam's Mekong Delta region; proposal of technical regulations for multi-purpose geochemical and weathering crust mapping at a scale of 1/250,000. (Among these, 01 project has been successfully completed and accepted at the management level, 04 projects have completed the initial acceptance, and are awaiting submission to the Ministry of Natural Resources and Environment for management-level acceptance. 07 science and technology projects at the basic level have been approved, and 02 new Ministry-level science and technology projects for 2025 have been submitted for approval.)

2. Regarding International Cooperation:

In 2024, the Department organized several field surveys, experience exchange workshops, and signed memorandums of understanding with countries such as the United States, Netherlands, Australia, Russia, China, Germany, and South Korea in the fields of geology and minerals. Activities include: a study visit to the United States for learning about the management, extraction, and processing of rare earths, lithium, and mineral recycling for batteries; collaboration with the U.S. Department of Energy to organize discussions on raw material supply chain management to promote energy transition in Vietnam; cooperation with the Embassy of the Netherlands to organize a symposium on "Sustainable Offshore Sand Mining."; technology transfer cooperation with South Korea; marine deep-sea mineral research

cooperation with the Russian FESCO Transport Group; collaboration with the China Geological Survey; cooperation with the Korea Institute of Geoscience and Mineral Resources (KIGAM); proposal for cooperation with the Geological Department of Guangxi, China, and the ASEAN-China Cooperation Center; signed an MOU with Xcalibur Company, Australia, in Vietnam for airborne geophysical technology transfer; capacity-building for raw material management for energy transition in Vietnam, sponsored by the German government.



Photos: The Vietnam Geological Department receiving and working with the Russian delegation.



Photos: ASEAN-China Mineral Cooperation Forum Liaison Meeting.

In accordance with Decision No. 999/QĐ-TNMT dated April 15, 2024, by the Ministry of Natural Resources and Environment regarding sending a delegation to the United States to exchange professional experiences on basic geological surveys, economic geology, and resource estimation methods, the delegation, led by the Director of the Vietnam Geological Department, will visit Washington, California, and Nevada from May 5–10, 2024. The specific results of the meetings are as follows:

2.1. Meeting with the U.S. Department of Energy and U.S. Department of State:

Participants: Ministry of Natural Resources and Environment, U.S. Department of Energy, U.S. Department of State, Delloite Consulting Company.

- Assistant Secretary of the U.S. Department of Energy, Anna Shpitsberg, welcomed the delegation from the Ministry of Natural Resources and Environment and the Ministry of Public Security of Vietnam. She highlighted the value of the delegation's activities in the cooperation between the two agencies, contributing significantly to the agenda between Vietnam and the United States. Mr. Albert Degarmo and other members from the U.S. Department of Energy engaged in lively discussions and exchanges on geological and mineral programs, such as global geology, critical minerals, and U.S. mineral investigation and processing

technologies, as well as proposals for programs to support the development of geology and mineral laws for Vietnam.

- The Head of the Vietnamese Delegation, Dr. Trần Bình Trọng, delivered a welcome speech and provided an overview of the ongoing cooperation program with the U.S. Department of Energy and proposed a plan for 2025-2030. The agreement was made with the U.S. Department of Energy to develop a technical project on certain essential minerals, including rare earths, with Vietnam and the U.S. agreeing to report to the respective Ministries and governments for approval and implementation.
- The U.S. side expressed interest in the Ministry of Natural Resources and Environment designating a focal point to participate in the Vietnam-U.S. Energy Forum, held every two years, with this year's forum taking place in Washington, D.C., in September 2024. The U.S. also proposed a Global Energy Security Dialogue, which the Ministry of Natural Resources and Environment and the Ministry of Public Security of Vietnam will present for government approval.

*) Some photos of the Delegation at the U.S. Department of Energy and the U.S. Department of State.



Photos: The meeting at the U.S. Department of Energy, U.S. Department of State.



Photo: The Delegation takes a commemorative photo with the U.S. Bureau of Energy Resources, U.S. Department of State

2.2. Visit to the Mountain Pass Materials (MP Materials) Rare Earth Mine and Processing Plant

- The delegation visited MP Materials, the only active rare earth mining company currently operating in the U.S., which manages rare earth mining operations at the Mountain Pass mine in California. MP Materials reported that they activated their rare earth processing line at the end of 2020, following China's announcement to raise tariffs on U.S. imported ore products to 25% effective June 1, 2019. Previously, MP Materials mainly exported ore containing rare earth oxides to China for refining into neodymium, cerium, and other elements used in magnets, electric vehicles, smartphones, and various electronic products.

- The rare earths at the Mountain Pass mine, discovered in 1949, include cerium, lanthanum, neodymium, and europium. These were mined by the company Molycorp for more than half a century until 2015, when MP Materials acquired the site and restarted operations in 2017 under the leadership of CEO James H. Litinsky and COO Michael Rosenthal.

- The delegation toured the entire MP mine and the rare earth processing zone. It was observed that the high quality of the ore offers MP a strong competitive advantage by reducing processing costs. However, the company still faces pressure from environmental regulations, labor costs, wastewater treatment, transportation, etc. Nonetheless, the repair and improvement of resource treatment facilities at Mountain Pass have always been a key part of MP's plan since 2017. This strategy gained further momentum after China raised tariffs on imported ore by 10% in 2023, placing MP in a difficult position between the U.S. government and its largest market.

- The delegation also discussed a cooperation program with MP, and MP agreed to jointly develop a project with the Vietnam Department of Geology and other members of the delegation to be submitted for approval by both governments. MP is currently supported by the U.S. Department of Defense in developing research projects, field operations, and processing activities. The Vietnam Department of Geology is also collaborating with the U.S. Army Corps of Engineers and the U.S. Department of Defense on a program addressing shoreline subsidence in the Mekong Delta. These existing linkages facilitate collaborative project development. Vietnam hopes to soon send samples to MP Materials for analysis.

*) Some photos of the Delegation at MP Materials





Photos: The Delegation visits the Operations Zone of the Mountain Pass Materials Rare Earth Processing Plant (MP Materials).

2.3. Meeting with the University of Nevada

- The delegation had a working session with the University of Nevada, exchanging ideas on lithium mining for battery production in light of the growing global electric vehicle (EV) industry. Nevada is home to leading global companies in EV battery development and recycling, the only active lithium mine in the U.S., the largest lithium-producing site in North America, and advanced research infrastructure. The state's designation as a Tech Hub reflects its strategic plan to strengthen its critical technology ecosystem and become a global leader in the coming decade.

- Professor Frederick Steinmann of the College of Business, University of Nevada, stated: "University of Nevada, Reno conducts advanced research and operates nationally recognized educational programs related to resources and EV technology." "In coordination with the industry, Nevada has well-established workforce development programs to educate, train, and transition the next-generation workforce to the future economy. Additionally, we are proud of our efforts in building workforce development initiatives that strengthen economic ties

among the public, private, and nonprofit sectors.” “The U.S. Economic Development Administration’s recognition of Nevada as a Regional Innovation and Technology Hub not only demonstrates global leadership in advanced energy technology but also empowers the University to secure federal funding to support various strategies for establishing, attracting, retaining, and expanding businesses, as well as workforce development initiatives designed to continue building Nevada’s lithium battery industry and supply materials for EV manufacturing.”

- With natural reserves of raw materials essential for next-generation batteries, the Loop Tech Hub in Nevada is actively aligning innovation and economic development activities with startups, educational institutions, and workforce programs. These efforts aim to make the region a global leader in EV batteries and turn Nevada into a key link in the global lithium supply chain. This would enhance the flexibility and competitiveness of the battery economy and accelerate the energy transition.

- Following the presentations, the involved parties engaged in lively discussions about cooperation opportunities and joint reports. Various topics were analyzed in detail, and programs of collaboration between the University of Nevada and agencies within the Vietnamese delegation were proposed. The University representatives affirmed their commitment to maintaining contact with Vietnamese representatives to implement effective cooperation initiatives, contributing to the U.S.–Vietnam Comprehensive Partnership.





Photo: The Delegation takes a commemorative photo at the University of Nevada Headquarters.

2.4. Visit and Working Session with Redwood Materials Recycling Plant

- The delegation visited and held a working session at Redwood Materials, whose mission is “to build a circular supply chain to power a sustainable world, accelerate fossil fuel reduction, and manufacture affordable, sustainable batteries that can be recycled after their lifecycle.” Redwood promotes the localization of the global battery supply chain and is the first to produce both cathode and anode components in the U.S. from recycled batteries.

- Redwood Materials’ initial headquarters were in Reno, where its recycling operations began. Founded in 2019 with \$2 billion in funding, the company completed construction of its new headquarters and restructured operations in mid-April 2024. At the beginning of 2023, the company received a \$2 billion federal loan and now has a market capitalization of \$5 billion. Initially focused on collecting and recycling high-value metals like lithium, graphite, copper, and cobalt from used electronic batteries and production scrap, Redwood expanded its operations to include copper foil production for anodes and plans to produce cathodes - a critical component of EV batteries, with nearly all current supply imported from China, South Korea, and Japan.

- Speaking with the delegation, Mr. Chris Lister, Chief Operating Officer of Redwood Materials and Head of Supply Chain, said: “There’s a lot of capital and many announced or under-construction projects in battery manufacturing, with over 800 GW hours of capacity expected in the U.S. alone by the end of this decade.” “However, not many investments are being made in anode and cathode production in the U.S. From a business strategy perspective, today’s EV supply chain is problematic and faces many challenges. It may not be the most attractive investment segment in the EV space, but I believe it’s urgent and could become a key factor in the manufacturing process. That’s why we want to focus on this to recover and resell enough materials and metals, including lithium, cobalt, copper, and nickel to manufacture batteries for 100,000 new EVs.”

- The delegation shared and exchanged experiences on recycling activities, particularly metal recycling. This field plays an essential role in efficiently utilizing metal scrap to create valuable products for the market, especially as natural mineral resources are increasingly depleted and scarce. Both the delegation and the U.S. partners agreed on the irreplaceable value and importance of metal recycling for humanity. Therefore, it is vital to utilize scrap resources effectively to ensure a globally secure energy future.



Photo: The Delegation takes a commemorative photo at Redwood Materials Recycling Plant.

2.5. Assessment and Outcomes

Through discussions and exchanges between the delegation and U.S. counterparts, including presentations from both sides, the current situation and support measures for ensuring global energy supply have been clarified. It was found that the commonly discussed issues included energy imbalances, challenges and opportunities in mineral exploration and extraction, as well as refining of critical minerals, particularly rare earths, in the context of increasingly depleted global essential mineral supplies.

Given these challenges, there is a need for a common foundation and collaborative effort between Vietnam and the U.S. to integrate relevant agencies and assess bilateral cooperation programs through a comprehensive, multidimensional approach. The goals include strengthening the capacity of geological and mineral experts and proposing decision-support tools for the sustainable development of resources. Specific proposed solutions include: (1) Expert exchange programs between Vietnam and the United States; (2) Joint project development in Vietnam, including technical assistance projects on economic geology and mineral resources; (3) Cooperation in designing programs for resource protection and mitigating the impact of excessive mineral exploitation and geological survey activities.

VII. REPORT ON RESULTS OF JUDICIAL EXPERTISE IN THE FIELD OF GEOLOGY; RESULTS OF MONITORING OF MINERAL INVESTIGATION AND EXPLORATION PROJECTS

1. Results of Judicial Expertise in the Field of Geology

1.1. Results of Organizing and Implementing Judicial Expertise

In 2024, the Vietnam Department of Geology assigned the Geological Assessment and Exploration Division as the focal point to monitor, urge, and require individuals and organizations involved in judicial expertise to perform their tasks and report progress. The professional units were directly responsible for implementing the judicial expertise. Additionally, the Vietnam Department of Geology issued an internal procedure guiding case-based judicial expertise in geology under Decision No. 475/QĐ-ĐCVN dated July 6, 2023, to assist organizations and individuals in performing such tasks.

In 2024 (from January 1, 2023, to December 25, 2024), the Vietnam Department of Geology carried out judicial expertise by case with a total of 140 tasks (including 14 ongoing tasks from 2023 and 126 new assignments in 2024). Of these, 121 tasks were completed, 03 were halted, and 16 are ongoing, specifically as follows:

a) Tasks assigned by the Ministry of Natural Resources and Environment

- Central-level requests

+ Ongoing: 03 tasks

- Provincial-level requests

+ Completed: 15 tasks

+ Halted: 02 tasks

+ Ongoing: 04 tasks

- District-level requests

+ Completed: 15 tasks

+ Halted: 01 task

+ Ongoing: 01 task

b) Direct requests to subordinate units of the Vietnam Department of Geology

- Central-level requests

+ Ongoing: 01 task

- Provincial-level requests

+ Completed: 35 tasks

+ Ongoing: 04 tasks

- District-level requests

+ Completed: 55 tasks

+ Ongoing: 04 tasks



Photo: Expertise conducted at Bền Mountain mine, Vĩnh Minh Commune, Vĩnh Lộc District, Thanh Hóa Province

1.2. Results of Performing Judicial Expertise

1.2.1. Appointment, Dismissal of Judicial Experts, Issuance and Revocation of Judicial Expert Cards; Recognition and Cancellation of Recognition of Case-Based Experts and Organizations; Changes to Judicial Expert Information

a) Appointment and Dismissal of Judicial Experts

- Judicial experts appointed: 03 individuals
- Judicial experts dismissed: None

b) Issuance and Revocation of Judicial Expert Cards

- Cards issued: 03 cards
- Cards revoked: None

c) Recognition and Cancellation of Recognition of Judicial Experts and Organizations (Case-Based)

- Recognition: Under Decision No. 567/QĐ-BTNMT dated March 11, 2024, by the Minister of Natural Resources and Environment announcing the list of case-based judicial expert organizations and individuals under the Ministry, the Vietnam Department of Geology has 11 organizations and 68 individuals recognized. These experts meet the basic requirements in terms of professional qualifications, expertise, and work experience.

- Cancellation of Recognition: Under the same Decision No. 567/QĐ-BTNMT, 1 individual had their recognition revoked: (1) Mr. Mai Trọng Tú – retired under retirement policy.

1.2.2. Difficulties and Obstacles in Implementing Judicial Expertise

- Due to various subjective and objective reasons, the process of contract signing between the expert organizations and the requesting agencies often faces many challenges, delaying the progress compared to timelines set in the expertise requests.

- Upon receiving the assignment decision from the Ministry, the judicial experts must contact the representative of the requesting agency to discuss related contents. However, in many cases, the requesting agency may transfer the case to another investigative body (e.g., from district-level police to provincial-level police, or from the Ministry of Public Security to the provincial public security office). This necessitates re-establishing communication from scratch, which causes delays.

- Due to the specialized nature of investigation, experts often cannot verify whether geological/mineral samples provided are representative, affecting the accuracy and objectivity of the resulting expertise conclusions.

- Training and professional development on judicial expertise, especially for geological expertise and for officers in the Departments of Natural Resources and Environment, remains insufficient to meet procedural needs in litigation.

1.2.3. Recommendations and Proposals

- Regarding sample expertise: To ensure representativeness of geological/mineral samples submitted for assessment, requesting agencies should understand geological sampling protocols.

- Some complex cases require more time for study and evaluation before accepting or refusing an assessment request. This makes it difficult to meet deadlines specified in Clause 2, Article 11 and Article 26a of the Law on Judicial Expertise.

- Judicial expertise conclusions play a critical role in determining whether a case is correctly resolved. Inaccurate conclusions may lead to wrongful convictions or letting offenders go free. Completed judicial expertise in geology has been conducted based on accuracy and objectivity, supporting investigations, prosecutions, and trials in a just and lawful manner, minimizing errors and omissions. However, the high responsibility involved causes hesitation among experts. Thus, specific regulations are needed to protect the identity of organizations and individuals conducting judicial expertise before, during, and after the process.

- Regarding expertise costs: Current cost regulations are unclear, leading to delays and lack of adequate compensation for the expertise effort. The Vietnam Department of Geology recommends that the Ministry of Natural Resources and Environment cooperate with the Ministry of Public Security to issue regulations on cost principles and allowances for judicial experts who are salaried by the state.

2. Results of Monitoring Mineral Exploration Projects

In 2024, the Department assigned **10 units** to monitor the implementation of **17 mineral exploration projects** (15 newly assigned projects and 02 supplementary ones), including:

- Project: "Exploration to upgrade resource blocks under Mining License No. 298/GP-BTNMT dated 11/11/2022 in the 19b mining area, Đồng Tuyển Commune, Lào Cai City, Lào Cai Province"

- Project: "Exploration of laterite for cement additives in Vũ Bình Commune, Lạc Sơn District, Hòa Bình Province"

- Project: "Exploration of granite for tiling at Hòn Giò 1, Nhơn Hải Commune, Ninh Hải District, Ninh Thuận Province"

- Project: "Exploration of Suối Lài coal mine, Hà Khánh Ward, Hạ Long City, Quảng Ninh Province"

- Plan: "Supplement and consolidate documentation for resource evaluation of decorative marble at Đầm Tân Minh II marble mine, Mông Sơn Commune, Yên Bình District, Yên Bái Province"

- Project: "Exploration to upgrade reserves of white marble at Mông Sơn - Làng Cạn (now Làng Mới Hamlet), Mông Sơn Commune, Yên Bình District, Yên Bái Province"

- Project: "Exploration to upgrade reserves of primary tin ore in the southern subzone, western Núi Pháo area, Đại Từ District, Thái Nguyên Province"

- Project: "Exploration of wolfram ore in the Quảng Ngàn - Suối Ngàn area, Tân Thành Commune, Bắc Quang District and Việt Lâm, Quảng Ngàn Communes, Vị Xuyên District, Hà Giang Province"

- Project: "Exploration of limestone for cement raw materials at Zones I & II, Lộc Môn mine, Liên Sơn and Cao Dương Communes, Lương Sơn District, Hòa Bình Province"

- Project: "Exploration of clay shale for cement raw materials in Thống Nhất Commune, Lạc Thủy District, Hòa Bình Province"



Photo: Monitoring implementation of the project to upgrade reserves of tin and bismuth at Tây Núi Pháo mine by Thai Nguyen Non-Ferrous Metals Company – Vimico

- Plan: "Supplementary works and consolidated documentation for quality and reserve assessment of compact basalt for construction materials at Giao Ninh pozzolan mine, Bình Trung Commune, Châu Đức District, Bà Rịa – Vũng Tàu Province"

- Project: "Exploration of placer titan ore and associated minerals (quartz sand) in Vĩnh Tú Commune, Vĩnh Linh District, Quảng Trị Province"

- Project: "Supplementary exploration of associated minerals at Hồng Sơn limestone mine, Thanh Sơn Commune, Kim Bảng District, Hà Nam Province"

- Project: "Exploration to upgrade reserves within the boundary of Mining License No. 2128/GP-BTNMT dated December 7, 2012 for Trảng Bạch coal mine, Quảng Ninh Province"

- Plan: "Consolidation of data and determination of resources and reserves of quartzite at Đồn Vàng mine, Thanh Sơn Town, Thanh Sơn District, Phú Thọ Province"

- Project: "Exploration to upgrade iron ore reserves within the boundary of extended Mining License No. 52/GP-BTNMT dated February 15, 2024 for Kíp Tước iron mine, Hợp Thành Commune, Lào Cai City, Lào Cai Province"

- Project: "Exploration to upgrade white marble reserves within the boundary of Mining License No. 809/GP-BTNMT dated May 4, 2010, in Làng Lạnh II area, Liễu Đô Commune, Lục Yên District, Yên Bái Province"

The Department has provided guidance and oversight for the supervision of exploration projects, and has reviewed 18 reports on the results of completed project supervision. Official documents have been sent to the National Mineral Reserve Assessment Council to serve as a basis for the appraisal and approval of the exploration result reports.



Photo: Supervision of exploration drilling at Khe Cham II - IV coal mine