



JABATAN MINERAL DAN GEOSAINS MALAYSIA
MINERALS AND GEOSCIENCE DEPARTMENT MALAYSIA

**LAPORAN
TAHUNAN**

20

12

Annual Report



KEMENTERIAN SUMBER ASLI DAN ALAM SEKITAR MALAYSIA
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT MALAYSIA



Photo: Ling Nan Ley

Terletak berdekatan Bukit Larut (Bukit Maxwell), Perak, Taman Tasik Taiping yang masyhur ini dahulunya ialah sebuah lombong bijih timah sebelum ia diwartakan sebagai taman awam dalam tahun 1880.

The famous Taiping Lake Gardens located near Bukit Larut (Maxwell Hill), Perak was originally a tin mining ground before it was established as a public garden in 1880.



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2012

Laporan Tahunan
Annual Report

KEMENTERIAN SUMBER ASLI DAN ALAM SEKITAR
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

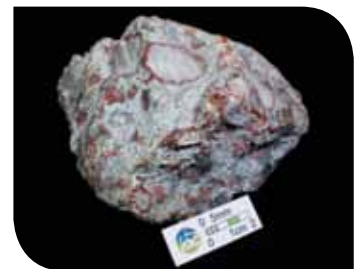
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Quartz



Sarabauite

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Profil Pejabat Office Profiles
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Sorotan Peristiwa Event Highlights
Habibah Tahir • Azizan Ali

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Abdul Hadi Abdul Rahman	JMG Terengganu
Asminah Rajuli	JMG N. Sembilan/Melaka
Hamdan Ariffin	JMG Kedah/Perlis/Pulau Pinang

**Penghargaan kepada semua Pengarah Bahagian, Pengarah Cawangan (Ibu Pejabat) dan Pengarah Negeri di atas usaha bagi menjamin kualiti dan ketepatan maklumat yang dilaporkan oleh pejabat masing-masing.*

**Sincere gratitude to all Division Directors, Section Directors (Headquarters) and State Directors for their efforts in ensuring the quality and accuracy of information reported by their respective offices.*

Perutusan Ketua Pengarah Message From The Director General



“Saya gembira melaporkan bahawa JMG telah mencapai kejayaan yang memberangsangkan dalam beberapa inisiatif baru di samping melaksanakan tanggungjawab rutin.”

“I am happy to report that JMG has achieved impressive milestones in several new initiatives besides having successfully accomplished its routine responsibility.”

DATO' YUNUS ABD RAZAK
Ketua Pengarah / Director General
JMG



Bagi tahun 2012, dengan bajet mengurus RM 62.46 juta dan peruntukan pembangunan sebanyak RM 10.23 juta yang diberikan kepada Jabatan, saya gembira melaporkan bahawa JMG telah mencapai kejayaan yang memberangsangkan dalam beberapa inisiatif baru selain telah berjaya melaksanakan tanggungjawab rutin. Pencapaian bajet mengurus dan pembangunan bagi tahun ini ialah masing-masing 99.32% dan 99.62%.

Aktiviti geosains yang dilaksanakan oleh Jabatan ditumpukan ke atas penyiasatan dalam pemetaan geologi, warisan geologi, hidrogeologi, geologi kejuruteraan, geologi alam sekitar dan geologi marin. Pemetaan geologi telah dijalankan di Terengganu dan di kawasan Bukit Bunoh, Lenggong, Perak. Status pemetaan geologi sehingga kini ialah 86.52% dari jumlah kawasan di Semenanjung Malaysia, 29.98% di Sarawak dan 27.9% di Sabah.

Pembangunan sumber air tanah di negeri-negeri juga merupakan sebahagian daripada Projek Bidang Keberhasilan Utama Negara (NKRA). Pembangunan tersebut telah dijalankan melalui kerjasama antara JMG dengan pelbagai agensi kerajaan negeri. JMG juga bekerjasama dengan Jabatan Alam Sekitar dalam menjalankan penggerudian dan pembinaan telaga untuk membekalkan air bagi memadam kebakaran bermusim di kawasan tanah gambut yang kering di negeri Johor, Selangor / Wilayah Persekutuan, Kelantan, Pahang dan Sarawak. Di bawah Projek Khas Bekalan Air, JMG telah menyumbang kepakaran dalam bidang air bawah tanah melalui kerjasama dengan Kementerian Tenaga, Teknologi Hijau dan Air Malaysia (KeTTHA) dan Badan Kawal Selia Air Negeri Sembilan (BKSA) dalam menilai potensi sumber air bawah tanah di kawasan bermasalah bekalan air di Selangor dan Negeri Sembilan. JMG juga bekerjasama dengan Kementerian Kemajuan Luar Bandar dan Wilayah (KKLW) di dalam Projek Bekalan Air Luar Bandar (BALB) di Sarawak.

For the year 2012, with a recurrent budget of RM 62.46 million and a development allocation of RM 10.23 million given to the department, I am happy to report that JMG has achieved impressive milestones in several new initiatives besides having successfully accomplished its routine responsibility. Achievements of the recurrent and development budgets for the year were 99.32% and 99.62% respectively.

Geoscience activities carried out by the department focussed on investigations in geological mapping, geoheritage, hydrogeology, engineering geology, environmental geology and marine geology. Geological mapping was carried out in the state of Terengganu and in Bukit Bunoh area, Lenggong, Perak. The overall status of geological mapping for Peninsular Malaysia is 86.52%, Sarawak 29.98% and Sabah 27.9%.

Groundwater resource development in each state constitutes part of the National Key Result Area (NKRA) project initiatives, and was conducted through the cooperation of JMG with various state agencies. JMG also collaborated with the Department of Environment Malaysia to drill and develop wells for groundwater to extinguish seasonal peatland fires in Johor, Selangor / Federal Territories, Kelantan, Pahang and Sarawak. Under the Water Supply Special Project, JMG has worked together with the Ministry of Energy, Green Technology and Water (KeTTHA) and Badan Kawal Selia Air, Negeri Sembilan (BKSA) and contributed its expertise for the assessment for of potential groundwater resources in Selangor and Negeri Sembilan. JMG has also provided technical assistance to the Ministry of Rural and Regional Development (KKLW) for the Rural Water Supply Project (BALB) in Sarawak.

Sepanjang tahun ini, di bawah Program Eksplorasi Mineral, kajian tinjauan mineral berlogam telah dijalankan di Johor, Negeri Sembilan, Kedah, Kelantan dan Terengganu. Penilaian susulan telah dilaksanakan di Negeri Sembilan, Perak, Kedah, Pahang, Sarawak dan Sabah. Anomali emas, bijih besi, timah dan mangan telah ditemui di negeri-negeri tersebut. Projek Penilaian Sumber Mineral Perindustrian telah dijalankan ke atas mineral-mineral perindustrian iaitu lempung, batuan silika, feldspar, barit, pasir binaan dan batu kapur. Longgokan-longgokan sumber mineral yang berpotensi telah dikenal pasti. Penilaian sumber batu arang telah dilaksanakan di negeri Sarawak dan Sabah dan berhasil menemui lipit batu arang yang mempunyai gred high volatile bituminous coal.

Pada keseluruhannya, industri perlombongan dan pengkuarian bagi tahun 2012 terus menunjukkan prestasi yang memberangsangkan. Sebanyak 178 buah lombong, 312 kuari serta 120 peniaga bijih dan loji pemprosesan mineral beroperasi pada akhir tahun 2012. Bagi menentukan aktiviti perlombongan dan pengkuarian dapat beroperasi di tahap keselamatan yang baik, sebanyak 2,882 pemeriksaan teknikal telah dijalankan ke atas operasi perlombongan, kuari, kilang amang, loji pemprosesan mineral dan pemeriksaan ke atas urusan pemegang lesen bijih mineral dan emas mentah.

Selaras dengan kehendak kerajaan bagi menggalak dan mempelbagai penggunaan sumber mineral tempatan bagi menyumbang kepada pembangunan sektor perindustrian negara melalui R&D, JMG terus menjalankan projek-projek R&D berkaitan teknologi berasaskan lempung, silika, batuan dan bahan termaju. Untuk menggalak pengusahahasilan sumber mineral secara mampan, R&D berkaitan teknologi pemprosesan mineral, perlombongan, pengkuarian dan pemulihan lombong dan kuari juga dijalankan.

During the year, reconnaissance evaluation for metallic mineral resources was carried out in Johor, Negeri Sembilan, Kedah, Kelantan and Terengganu under Mineral Exploration Programme. Follow-up metallic mineral resources assessment was carried out in Negeri Sembilan, Perak, Kedah, Pahang, Sarawak and Sabah where gold, iron ore, tin ore and manganese anomalies were identified. The Industrial Mineral Resource Evaluation Project was conducted to delineate clay, silica rock, feldspar, baryte, construction sand and limestone resources where potential deposits have been subsequently identified. Coal evaluation was carried out in Sarawak and Sabah and coal seams of high volatile bituminous grade were encountered.

Generally, the mine and quarry industry continued to perform vibrantly during the year 2012. There were a total of 178 mines, 312 quarries as well as 120 ore dealers and mineral processing plants in operation at the end of 2012. To ensure the safe operation of mines and quarries, a total of 2,882 technical inspections were carried out on the operation of mines, quarries, amang and mineral processing plants and as well as on mineral ore and raw gold license holders.

In line with the government's aspiration to encourage and diversify the use of local mineral resources, and contribute towards development of the country's industrial sector through R&D, JMG continued to carry out research projects related to clay-based, silica-based, rock-based and advanced material technology. R&D on mineral processing, mining and quarrying, and mine and quarry rehabilitation technologies were also conducted to encourage sustainable development of mineral resources in the country.

JMG terus berperanan dalam menyalurkan input berkaitan industri mineral meliputi peringkat antarabangsa di mana input-input telah disediakan bagi membantu kerajaan dalam pelbagai mesyuarat, perjanjian dan misi pelaburan seperti dalam forum Perjanjian Dagangan Bebas, Pertubuhan Dagangan Dunia, dagangan dua hala dan hubungan antarabangsa. Di peringkat ASEAN, JMG telah menghadiri mesyuarat Kumpulan Kerja Teknikal ASOMM Ke-9 dan mesyuarat ASOMM Ke-12 (ASEAN Senior Officials Meeting in Minerals) di Brunei Darussalam.

Kerjasama antarabangsa saintifik 2012 diteruskan dengan Thailand dalam projek pemetaan sempadan bersama. Mesyuarat Pertama Kumpulan Kerja Geologi Kawasan Langkawi-Tarutao Transect telah diadakan di Langkawi manakala kerja lapangan bersama telah dijalankan di Pulau Tarutao-Adang-Rawi, Thailand. Mesyuarat ke-2 Kumpulan Kerja Malaysia-Thailand dan Mesyuarat ke-9 Jawatankuasa Pemetaan Sempadan Geologi Malaysia-Thailand (MT-JGSC) telah diadakan di Wilayah Trang, Thailand.

Dalam hubungan kerjasama dua hala Malaysia-Indonesia, mesyuarat Technical Working Groups dan the 3rd Steering Committee meeting on Scientific and Technical Cooperation in the field of Geology and Mineral Resources di antara Malaysia dan Indonesia telah diadakan di Kota Kinabalu, Sabah. Kerja lapangan bersama Kumpulan Kerja Kajian Hidrogeologi Malaysia-Indonesia telah dijalankan di Pulau Sebatik, Tawau, Sabah.

Dalam tahun 2012, JMG telah diberi penghormatan dan kepercayaan sebagai tuan rumah kepada 48th Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) Annual Session dan 59th CCOP Steering Committee Meeting yang keduanya diadakan dengan jayanya di Langkawi.

JMG continued to play an active role in the global arena where mineral industry data inputs prepared by JMG were used by the Malaysian government in meetings, agreements and trade missions and in forums such as the Free Trade Agreement, World Trade Organisation, bilateral trade and international cooperation. At the ASEAN level, JMG had attended the 9th ASOMM (ASEAN Senior Officials Meeting in Minerals) Working Group Meeting and the 12th ASOMM Senior Official Meeting which were held in Brunei Darussalam.

International scientific co-operation with Thailand on the joint border mapping project continued in 2012. The First Meeting of the Malaysia-Thailand Working Group on the Geology of Langkawi-Tarutao Transect Area was held in Langkawi while a joint field excursion was conducted in Tarutao-Adang-Rawi Islands, Thailand. The 2nd Malaysia-Thailand Working Group Meeting and the 9th Malaysia-Thailand Border Joint Geological Survey Committee (MT-JGSC) were held in Trang Province, Thailand.

Under the auspices of the bilateral cooperation between Malaysia and Indonesia, both Technical Working Group and the 3rd Steering Committee on Scientific and Technical Cooperation in the field of geology and mineral resources held their meetings respectively in Kota Kinabalu, Sabah. A Malaysia-Indonesia Hydrogeological Study Working Group joint fieldwork was conducted in the Sebatik Island, Tawau, Sabah.

In 2012, JMG was given the honour and trust to host the 48th Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) Annual Session and 59th CCOP Steering Committee Meeting, both of which were successfully held in Langkawi.



Satu memorandum persefahaman kerjasama saintifik telah dimeterai antara Jabatan Mineral dan Geosains Malaysia (JMG) dan Universiti Malaysia Terengganu (UMT) pada bulan 25 September 2012. MOU ini akan memberi manfaat yang besar kepada kedua-dua pihak dalam pelbagai kajian bersama khususnya dalam kajian perubahan iklim, kenaikan paras laut dan pengurusan pantai. Pada bulan November 2012, satu Program Persampelan Geologi Kuaterner di bawah DelSea II-CCOP telah diadakan di UMT yang melibatkan peserta dari JMG dan UMT.

Saya mengambil peluang ini untuk merakamkan terima kasih kepada Kementerian Sumber Asli dan Alam Sekitar (NRE) di atas peranan kepimpinan dan hubungan erat dengan pihak JMG. Saya juga ingin menyampaikan setinggi-tinggi penghargaan kepada semua staf JMG di atas komitmen dan sumbangan yang telah diberikan. Saya juga memanjangkan penghargaan saya kepada agensi kerajaan yang lain dan sektor swasta di atas kerjasama rapat dan sokongan yang telah diberikan kepada JMG.

A Memorandum of Understanding on scientific cooperation was signed between the Minerals and Geoscience Department Malaysia (JMG) and Universiti Malaysia Terengganu (UMT) on 25th September 2012. The MOU will benefit both parties significantly in a broad scope of joint studies, notably research studies on climate change, sea level rise and coastal management. In November 2012, a Quaternary Geology Sampling Programme under the CCOP-DelSea II Project was held at UMT and involved participants from both JMG and UMT.

I would like to take this opportunity to thank the Ministry of Natural Resources and Environment (NRE) for the leadership and the close rapport with JMG. I would also like to express my deep appreciation to the staff of JMG for their commitment and contributions and to other government agencies and the private sector for their close co-operation and support given to JMG.



DATO' YUNUS ABD RAZAK
Ketua Pengarah / Director General
JMG



Photo: Ling Nan Ley

Gua Dagang di Gua Niah, Sarawak diberi nama sempena kegiatan perniagaan sarang burung dan guano oleh peniaga-peniaga di masa lalu. / The Trader's Cave of Niah Cave, Sarawak, which is where the bird's nest and guano traders conducted their business in days gone by, hence the name.

Profil Korporat Corporate Profile

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Profil Korporat Corporate Profile

Visi / Vision

Peneraju pembangunan mineral dan geosains menjelang 2020
Leader in mineral and geoscience development by 2020

Misi / Mission

Menyumbang kepada peningkatan daya saing ekonomi negara dan kualiti hidup melalui penggunaan maklumat, perkhidmatan berkepakaran tinggi serta penyelidikan berkaitan mineral dan geosains yang efektif
To contribute towards enhancement of the nation's economic competitiveness and quality of life through effective usage of mineral and geoscience information, specialised expert services and related research

Objektif Strategik / Strategic Objectives

1. Memperkasa pengurusan modal insan dan kapasiti organisasi ke arah meningkatkan kecekapan penyampaian perkhidmatan
To strengthen the management of human capital and organisational capacity towards improving the efficiency of service delivery
2. Memperkukuh keupayaan aktiviti mineral dalam eksplorasi, pembangunan dan promosi untuk memacu ekonomi negara
To intensify the capability of mineral exploration, development and promotion activities to spearhead the national economy
3. Memantap pelaksanaan perkhidmatan geosains berkepakaran tinggi ke arah pembangunan mampan yang menyumbang kepada kesejahteraan hidup dan pemeliharaan alam sekitar
To strengthen the implementation of specialised geoscience services towards sustainable development that contributes to the well-being of mankind and conservation of environment
4. Memperkukuh penyelidikan dan pembangunan (R&D) mineral untuk memajukan industri mineral negara
To intensify research and development (R & D) on minerals for increased growth and advancement in the nation's mineral industry

Objektif / Objectives

- Menyediakan maklumat komoditi mineral bagi meningkatkan pertumbuhan industri berasaskan mineral
To provide mineral commodity information to enhance the growth of mineral-based industries
- Menggalakkan penggunaan optimum maklumat dan perkhidmatan geosains bagi pembangunan negara yang mampan
To encourage the optimal use of geoscience information and services for the sustainable development of the country
- Memastikan perusahaan sumber mineral berkembang secara teratur, selamat, cekap dan mesra alam serta mendatangkan pulangan yang maksimum kepada negara
To ensure that mineral resources are exploited in a systematic, safe, efficient and environmentally friendly manner as well as to secure their maximum returns to the country
- Menggalak dan mempelbagai penggunaan sumber mineral tempatan bagi menyumbang kepada pembangunan sektor perindustrian negara melalui aktiviti-aktiviti penyelidikan dan pembangunan (R&D)
To encourage and diversify the use of local mineral resources so as to contribute towards the development of the country's industrialisation through research and development (R&D) activities
- Menyediakan perkhidmatan kepakaran dalam bidang mineral, geosains dan perlombongan di peringkat nasional dan antarabangsa bagi menggalakkan pelaburan dalam sektor mineral dan perancangan pembangunan negara
To provide expert services in the fields of mineral, geoscience and mining at national and international levels so as to promote investments in the mineral sector and for national development planning

Fungsi / Functions

- Mengendali eksplorasi mineral secara sistematik
To undertake systematic mineral exploration
- Mengendali penyiasatan pelbagai bidang geosains seperti pemetaan geologi, sumber air bawah tanah, geologi kejuruteraan, bencana geologi, geologi alam sekitar, geologi marin, geofizik, dan bidang-bidang geosains lain secara sistematik
To undertake systematic investigations in various geoscience disciplines such as geological mapping, groundwater resources, engineering geology, geological hazards, environmental geology, marine geology, geophysics, and others
- Menyedia perkhidmatan analisis geokimia dan ujian fizikal bahan batuan dan mineral
To provide geochemical analyses and physical tests on rock materials and minerals
- Bertindak sebagai bank data nasional bagi semua maklumat berkaitan dengan geosains dan sumber mineral negara
To act as the national depository for all information related to geoscience and mineral resources of the country
- Mengumpul, menganalisis dan menyebarkan data dan maklumat berkaitan eksplorasi mineral, perlombongan dan aktiviti yang berkaitan
To collect, analyse and disseminate data and information pertaining to mineral exploration, mining and related activities
- Menyedia perkhidmatan nasihat teknikal dan kepakaran dalam bidang mineral, geosains, perlombongan dan pengkuarian
To provide technical advisory and expert services in the fields of mineral, geoscience, mining and quarrying
- Membantu dan bekerjasama dengan pihak swasta dan industri dalam usaha pembangunan sektor mineral
To assist and co-operate with the private sector and industry to develop further the mineral sector
- Menentukan supaya aktiviti perlombongan mineral serta aktiviti lain yang berkaitan dengannya dijalankan dengan cara yang selamat, cekap dan sistematik
To ensure that mining of minerals and related activities are carried out safely, efficiently and systematically
- Melaksana dasar dan arahan Kerajaan berhubung dengan industri mineral dan geosains, disamping mentadbir dan menguatkuasakan undang-undang yang berkaitan
To implement government policies and directives with regards to the mineral industry and geoscience, besides administration and enforcement of regulations
- Menjalankan penyelidikan dan pembangunan (R&D), pemindahan teknologi, pembangunan sumber mineral serta mempromosi hasil penyelidikan supaya digunakan oleh pihak industri
To carry out research and development (R&D), technology transfer, mineral resources development and promotion of research products so that they are acceptable to the industry

Piagam Pelanggan / Client's Charter

Maklumat Mineral dan Geosains / Mineral and Geoscience Information

- Membekalkan laporan geologi (termasuk peta), mineral dan bidang-bidang geosains lain yang telah diterbitkan dan sedia ada, dalam masa 1 hari selepas permohonan diterima
To supply available and published geological (including maps), mineral and other geoscience reports within 1 day upon receipt of request
- Membekalkan laporan dan peta geologi, mineral dan bidang-bidang geosains lain yang belum diterbitkan dan sedia ada, dalam masa 1 minggu selepas permohonan diterima
To supply available but unpublished geological maps, mineral and other geoscience reports within 1 week upon receipt of request
- Membekalkan maklumat berdigit sedia ada dalam masa 3 hari selepas permohonan diterima
To supply available digital information within 3 days upon receipt of request

Perkhidmatan Kepakaran / Expert Services

- Menyediakan perkhidmatan kepakaran apabila diminta dalam rangka masa yang ditetapkan atau dipersetujui bersama dengan pelanggan, terutamanya bagi bidang-bidang:
To provide expert services upon request, within the time frame stipulated or mutually agreed upon with the client, especially in the fields of:
 - Pemetaan geologi
Geological mapping
 - Siasatan mineral
Mineral investigation
 - Siasatan air bawah tanah
Groundwater investigation
 - Siasatan geofizik
Geophysical investigation
 - Siasatan geologi kejuruteraan
Engineering geology investigation
 - Siasatan geologi alam sekitar
Environmental geology investigation

Perkhidmatan Perlombongan dan Pengkuarian Mining and Quarrying Services

Perkhidmatan Makmal Laboratory Services

- Menyediakan perkhidmatan makmal apabila diminta bagi bidang berikut:
To provide laboratory services upon request for
 - Kajian mineralogi dan petrologi
Mineralogical and petrological studies
 - Analisis sampel bijih, mineral, aloi, batuan, kelodak, konsentrat, tanah dan air
Analyses of ores, minerals, rocks, silts, concentrates, rocks and water samples
 - Ujian mineral perindustrian
Industrial mineral tests
 - Ujian sedimentologi
Sedimentological tests
 - Ujian geologi kejuruteraan
Engineering geology tests

dalam tempoh yang dipersetujui, sekiranya mandatori, atau jika rutin, dalam tempoh 2 minggu selepas sampel diterima
within the time frame stipulated or mutually agreed upon with the client if it is mandatory, or within 2 weeks if it is routine, upon receipt of samples

- Mengeluarkan Lesen Melombong / Lesen Kuari dalam tempoh 30 hari dari tarikh penerimaan permohonan yang lengkap
To issue Mining Licences or Quarrying Licences within 30 days upon receipt of duly completed application forms
- Menyediakan laporan-laporan teknikal yang tepat dan lengkap berkaitan dengan kepentingan perlombongan, dalam tempoh 30 hari dari tarikh penerimaan permohonan yang disertakan dengan dokumen-dokumen yang lengkap
To prepare comprehensive technical reports relating to mining interest within 30 days upon receipt of application supported by duly completed documents

Perkhidmatan Dagangan Mineral Mineral Commerce Services

- Memberi ulasan ke atas permohonan untuk mengeksport mineral dalam tempoh 5 hari dari tarikh penerimaan permohonan yang disertakan dengan dokumen-dokumen yang lengkap
To provide comments on mineral export applications within 5 days upon receipt of applications accompanied by duly completed documents
- Mengeluarkan Lesen Bijih Mineral dalam tempoh 30 hari dari tarikh penerimaan permohonan yang lengkap
To issue Mineral Ore Licences within 30 days upon receipt of duly completed application forms
- Mengeluarkan dan membaharukan permit pengangkutan konsentrat timah dalam tempoh 1 jam
To issue and renew permits for transportation of tin concentrates within 1 hour

Dasar Kualiti / Quality Policy

Jabatan Mineral dan Geosains Malaysia komited untuk memastikan produk dan perkhidmatannya sentiasa memenuhi keperluan pelanggan. Untuk mencapai matlamat ini, pengurusan jabatan serta seluruh warga JMG adalah komited untuk:

The Minerals and Geoscience Department Malaysia is committed to ensuring customer satisfaction in its products and services. To achieve this goal, the JMG management as well as the constituents are committed to:

- Melaksanakan sistem kualiti berdasarkan kepada keperluan MS ISO 9002;
Implementing a quality system based on MS ISO 9002 qualifications;
- Memastikan bahawa produk dan perkhidmatan tepat pada masanya;
Ensuring that datelines are met in both products and services;
- Memastikan bahawa peningkatan kualiti dilaksanakan secara berterusan;
Continuance of quality improvement is implemented;
- Membina pasukan kerja yang kuat, responsif dan mempunyai etika kerja yang positif, dan
Building of a strong and responsive work force with positive work ethics;
- Meningkatkan pengetahuan dan kemahiran melalui latihan.
Development of knowledge and skills through training.





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- 1 **DATO' YUNUS ABD RAZAK**
(Ketua Pengarah / *Director General*)
- 2 **MUSTAPHA MOHD LIP**
(Timbalan Ketua Pengarah – Korporat dan Ekonomi Mineral)
(*Deputy Director General – Corporate and Mineral Economics*)
- 3 **MOHAMMED HATTA ABD. KARIM**
(Timbalan Ketua Pengarah – Operasi)
(*Deputy Director General – Operation*)
- 4 **DATO' ZULKIFLY ABU BAKAR**
(Pengarah – Pusat Penyelidikan Mineral)
(*Director – Mineral Research Centre*)
- 5 **MIOR SALLEH HUDDIN MIOR JADID**
(Pengarah – Bahagian Perkhidmatan Teknikal)
(*Director – Technical Services Division*)

Pengurusan Tertinggi
Top Management

KETUA PENGARAH
(Ketua Pengarah / Director General)

TIMBALAN KETUA PENGARAH
(KORPORAT & EKONOMI MINERAL)
DEPUTY DIRECTOR GENERAL
(CORPORATE & MINERAL ECONOMICS)

Hal Ehwal Korporat
Corporate Affairs

Ekonomi Mineral
Mineral Economics

Pengurusan Maklumat
Information Management

TIMBALAN KETUA PENGARAH
(OPERASI)
DEPUTY DIRECTOR GENERAL
(OPERATION)

Penyelarasan Pelaksanaan Operasi
Operation Implementation Coordination

- JMG Sarawak • JMG Sabah • JMG Perak • JMG Pahang
- JMG Johor • JMG Selangor / Wilayah Persekutuan
- JMG Kelantan • JMG Kedah / Perlis / Pulau Pinang
- JMG Negeri Sembilan / Melaka • JMG Terengganu

PENGARAH
(PUSAT PENYELIDIKAN MINERAL)
DIRECTOR
(MINERAL RESEARCH CENTRE)

Teknologi Berasaskan Lempung
Clay-based Technology

Teknologi Berasaskan Silika
Silica-based Technology

Teknologi Berasaskan Batuan
Rock-based Technology

Teknologi Bahan Termaju
Advanced Material Technology

Teknologi Pemprosesan Mineral
Mineral Processing Technology

Teknologi Perlombongan & Pengkuarian
Mining & Quarrying Technology

Teknologi Pemulihan Lombong & Kuari
Mine & Quarry Rehabilitation Technology

PENGARAH
(BAHAGIAN PERKHIDMATAN TEKNIKAL)
DIRECTOR
(TECHNICAL SERVICES DIVISION)

Perkhidmatan Geosains
Geoscience Services

Perkhidmatan Makmal
Laboratory Services

Perkhidmatan Pembangunan Lombong & Kuari
Mine and Quarry Development Services

Pengurusan Maklumat
Information Management

Pentadbiran & Kewangan
Administration & Finance

11

Hal Ehwal Korporat Corporate Affairs

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Hal Ehwal Korporat Corporate Affairs

Kewangan / Finance

Perbandingan Peruntukan dan Perbelanjaan Mengurus 2008-2012
Comparison of Recurrent Allocation and Expenditure 2008-2012

Tahun Year	Peruntukan Allocation (RM)	Perbelanjaan Expenditure (RM)	%
2008	58,957,700	58,313,037	98.91
2009	56,155,132	54,941,451	97.84
2010	53,187,100	52,868,204	99.40
2011	58,743,900	58,570,135	99.70
2012	62,459,968	62,035,983	99.32

Perbandingan Peruntukan dan Perbelanjaan Pembangunan 2008-2012
Comparison of Development Allocation and Expenditure for 2008-2012

Tahun Year	Peruntukan Allocation (RM)	Perbelanjaan Expenditure (RM)	%
2008	41,790,000	41,371,434	99.00
2009	34,350,000	34,372,389	100.07
2010	25,793,370	25,690,240	99.60
2011	5,544,010	5,251,252	94.72
2012	10,234,000	10,195,508	99.62

Sumber Manusia / Human Resource

Perjawatan 2012 2012 Staffing

Kumpulan perkhidmatan Service group	Jumlah perjawatan Total number of post	Bil. jawatan diisi Number of post filled	Bil. jawatan belum diisi Number of vacant posts
Pengurusan Tertinggi Top Management	7	7	0
Pengurusan & Profesional (Gred 41-54) Management & Professional (Grade 41-54)	316	303	13
Kumpulan Sokongan I (Gred 17- 40) Supporting Group I (Grade 17 - 40)	567	537	30
Kumpulan Sokongan II (Gred 1-16) Supporting Group II (Grade1-16)	196	180	16
Jumlah Keseluruhan Grand Total	1086	1027	59

Pembangunan Sumber Manusia Human Resource Development

Dalam meneruskan usaha untuk mencapai visi dan misi jabatan, proses memperkasa pengurusan modal insan dan kapasiti organisasi ke arah meningkatkan kecekapan penyampaian perkhidmatan terus mendapat perhatian pengurusan jabatan. Oleh itu, pembangunan modal insan dijadikan objektif strategi yang utama dalam hala tuju JMG 2011-2015 bagi melahirkan insan yang berkepakaran tinggi, berdaya saing, kreatif dan berinovasi serta sikap positif dan memiliki nilai insaniah. Sehubungan dengan itu, pelbagai program terus dilaksanakan, antaranya ialah program latihan modul jabatan, luar jabatan dan luar Negara, di samping pengajian ijazah lanjutan.

In pursuing the vision and mission of the department, it is important for the department to strengthen the human capital management and the organisational capacity so as to improve the efficiency of service delivery of the department. The development of human capital is one of the major strategic objectives of the JMG 2011-2015 Strategic Plans for nurturing highly specialised, competent, creative and innovative personnels with positive attitude and intrinsic value. Accordingly, many training programmes were implemented including the departmental training module programmes, local and overseas programmes, as well as post-graduate studies programme.

Program latihan Training programme	Dalam jabatan In-house	Luar jabatan Local	Luar negara Overseas	Jumlah Total
Sumber Mineral Mineral Resources	10	4	4	18
Geosains Geoscience	40	72	27	139
Lombong & Kuari Mine & Quarry	6	14	7	27
Kimiabumi Geochemistry	2	10	1	13
Penyelidikan Research	12	13	2	27
Pengurusan Maklumat Information Management	35	52	2	89
Pengurusan Sumber Manusia Human Resource Management	86	142	0	228
Pengurusan Kewangan Financial Management	6	63	0	69
Pembangunan Kendiri Self Development	13	48	0	61
Kualiti & Produktiviti Quality & Productivity	19	26	0	45
Kursus Wajib Compulsory Course	2	5	0	7
Bahasa & Komunikasi Language & Communication	1	4	0	5
Lain - lain Others	31	89	0	120
Jumlah Total	263	542	43	848

Program Latihan Dalam Jabatan In-House Training Programme

Sebanyak 263 program latihan dalam Jabatan melibatkan kursus, bengkel, taklimat, seminar, persidangan dan ceramah telah dilaksanakan oleh semua pejabat sepanjang 2012. Seramai 9,811 peserta telah menghadirinya. Sebahagian besar daripadanya merupakan program yang terdapat dalam takwim latihan yang dirancang.

A total of 263 in-house programmes involving courses, workshops, briefings and seminars were conducted during 2012. A total of 9,811 participants were involved in these programmes. Most of these programmes were scheduled in the planned training calendar.

Program Latihan Luar Jabatan (Tempatan) Local Training Programme

Sebanyak 542 kursus, bengkel dan seminar telah dihadiri oleh 2,095 kakitangan Jabatan. Program ini melibatkan agensi penganjur seperti INSTUN, NRE, INTAN, INTIM, JPM, AKAUNTAN NEGARA, INSPIN, AKADEMI SAINS, MIMA, USM, INTAN, FRIM, JANM, JPA, SUK, NAHRIM, LPPKN, SIRIM, UNIMAS, LHDN, USM, UTP, IGM dan lain-lain.

A total of 542 courses, workshops and seminars were attended by a total of 2,095 participants. These programmes involved organising agencies such as INSTUN, NRE, INTAN, INTIM, JPM, AKAUNTAN NEGARA, INSPIN, AKADEMI SAINS, MIMA, USM, INTAN, FRIM, JANM, JPA, SUK, NAHRIM, LPPKN, SIRIM, UNIMAS, LHDN, USM, UTP, IGM and others.

Program Latihan Luar Negara Overseas Training Programme

Sebanyak 43 program latihan, mesyuarat dan lawatan di luar negara iaitu ke Jepun, Korea Selatan, Indonesia, Filipina, Rusia, Vietnam, Singapura, Australia, Brunei, Sri Lanka, Switzerland, Kemboja, China dan Thailand telah dianjurkan oleh CABIS, APEC, ASOMM, AUSTRALIAN TRADE COMMISSION, KIGAM, AOTS, AMMIN, GAI, CCOP, JPA, GS of China dan pelbagai agensi luar negara. Seramai 103 anggota jabatan telah mengikuti program ini.

A total of 43 training programmes, meetings and overseas visits to Japan, South Korea, Indonesia, The Philippines, Russia, Vietnam, Singapore, Australia, Brunei, Sri Lanka, Switzerland, Cambodia, China and Thailand were organised by the CABIS, APEC, ASOMM, AUSTRALIAN TRADE COMMISSION, KIGAM, AOTS, AMMIN, GAI, CCOP, JPA, GS of China and other overseas agencies. A total of 103 staff of the department attended these programmes.

Pengajian Ijazah Lanjutan Sesi 2013/ 2014
Post-Graduate Studies for Session 2013/ 2014

Bil. No.	Nama pegawai Name of officer	Universiti University	Bidang pengajian Field of study
1	Hisam Hj Ahmad	Dalam Negara	Pemodelan GIS dalam Hidrogeologi GIS Modelling in Hydrogeology
2	Wan Salmi Wan Harun	Dalam Negara	Geologi Geology
3	Salmiah Nawi@Muhammad	Luar Negara	Perlombongan Mining
4	Mohd Irwan Ariff	Dalam Negara	Geofizik Sekitaran Environmental Geophysics
5	Zahidi Hamzah	Dalam Negara	Geologi Geology
6	Azmi Abu Bakar	Dalam Negara	Mineral Industri Industrial Minerals
7	Edward Muol	Dalam Negara	Geomatik Geomatic
8	Jayawati Fanilla Sahih	Dalam Negara	Geologi Geology
9	Dana Badang	Dalam Negara	Alam Sekitar dan Pembangunan Environment and Development

Pengurniaan dan Kepujian Awards and Accolades

Pingat Darjah Kebesaran Honorary Titles and Awards

Bil. No.	Penerima Recipient	Jawatan Position	Pejabat Office	Pingat darjah kebesaran Medal decoration
1	Mustapha Mohd Lip	Timbalan Ketua Pengarah Deputy Director General	JMG Ibu Pejabat	Darjah Kebesaran Johan Setia Mahkota (JSM)
2	Zakaria Hussain	Pengarah Director	JMG Ibu Pejabat	Darjah Ahli Mahkota Perak (AMP)
3	Dr. Kamaludin Hassan	Pengarah Director	JMG Perak	Pegawai Bintang Kenyalang (PBK)
4	Chin Siew Yee	Timbalan Pengarah Deputy Director	Bahagian Perkhidmatan Teknikal, Ipoh	Darjah Ahli Mahkota Perak (AMP)
5	Sulong Enjop	Ketua Pegawai Kajibumi Principal Geologist	JMG Sarawak	Pingat Perkhidmatan Awam Pingat Perkhidmatan Bakti (Perak) (PPB)
6	Maimunah Mustakim	Pembantu Tadbir Assistant Administration	JMG Ibu Pejabat	Pingat Pangkuan Negara (PPN)
7	Muhamad Daniel Tan	Juruteknik Ukur Survey Technician	JMG Selangor	Pingat Jasa Kebaktian (PJK)
8	Kamarul Ariffin Abdul Rahman	Pembantu Galian Mining Assistant	JMG Perak	Pingat Jasa Kebaktian (PJK)
9	Ayob Khan Ratu	Pembantu Am Pejabat Office General Assistant	JMG Ibu Pejabat	Pingat Pangkuan Negara (PPN)

Anugerah Perkhidmatan Cemerlang Tahun 2012 (Tahun Penilaian: 2011)
Excellent Service Award 2012 (Year of Assessment: 2011)

<i>Ibu Pejabat Headquarters</i>	
1	Kamuradin Md Slar Pegawai Kajibumi , C52
2	Siti Aminah Abdul Sarif Pegawai Kajibumi, C48
3	Mohd Zulkiflee Che Soh Pegawai Kajibumi, C48
4	Yusari Basiran Pegawai Kajibumi, C44
5	Basharuddin Ismail Pegawai Kajibumi, C44
6	Rohani Mat Yasan Penolong Pegawai Tadbir, N32
7	Sazali Khairudin Juruteknik Ukur, J26
8	Rusmini Mat Lazim Pembantu Tadbir (P/O), N17
9	Sarinah Alwi Pegawai Khidmat Pelanggan, N17
<i>Bahagian Perkhidmatan Teknikal Technical Services Division</i>	
10	Noor Bakri Endut Pegawai Kajibumi, C52
11	Halim Darahim Pegawai Kajibumi, C44
12	Hamid Ariffin Pegawai Kajibumi, C44
13	S.Pasupati A/L Subramaniam Pegawai Kimiabumi, C41
14	Zahrnaji Mohd Salleh Penolong Jurutera, J29
15	Juwairiah Abdul Hamid Pembantu Makmal, C22
16	Selamah Ibrahim Pembantu Makmal, C22
17	Zaitun Othman Pembantu Makmal, C22
18	Nazira Bon Pembantu Tadbir (Kew), W22
19	Che Nordin Ismail Juruteknik, J22
20	Salasiah Din Pembantu Tadbir (P/O), N17
21	Nik Heryshamzely Deraman Pembantu Kajibumi, C17
22	Shahini Hussin Pembantu Am Pejabat, N4
23	Thirunukarasoo A/L Suppiah Pembantu Am Pejabat, N4
24	Mat Ya Mohamed Safani Pemandu Kenderaan, R6
<i>Pusat Penyelidikan Mineral Mineral Research Centre</i>	
25	Mahadi Abu Hassan Pegawai Penyelidik, Q52
26	Rashita Abd Rashid Pegawai Penyelidik, Q48
27	Anuar Othman Pembantu Penyelidik, Q22
28	Zulkifly Abdul Manaf Pembantu Penyelidik, Q17
29	Ezulia Mat Johar Pen. Peg. Teknologi Maklumat, F29
30	Salim Kassim Pelukis Pelan, J22
31	Norazlina Hamid Pembantu Tadbir (Kew), W17
32	Ishak Bakar Pekerja Awam Khas, R3
33	Zamri Osman Pembantu Am Pejabat, N1
34	Anuar Osman Pembantu Am Pejabat, N1

JMG Kedah / Perlis / P.Pinang		
35	Zainol Husin	Pegawai Kajibumi, C52
36	Ishak Ahmad	Pembantu Kajibumi, C22
37	Ismail Ghazali	Juruteknik Ukur, J22
38	Sukriah Seman	Pembantu Tadbir (P/O), N17
JMG Perak		
39	Mohd Irwan Ariff	Pegawai Kajibumi, C41
40	Norziazrin Adam	Penolong Pegawai Tadbir, N27
41	Kamarul Ariffin Abdul Rahman	Pembantu Galian, C22
42	Mazuan Harun	Juruteknik Ukur, J22
43	Mohamad Azaudin Hasnat	Pekerja Awam, R4
JMG Selangor / W. Persekutuan		
44	Mohd Sidi Daud	Pegawai Kajibumi, C52
45	Herzalyuzmiew Zainuddin	Penolong Pegawai Galian, C27
46	Rohana Saadin	Juruteknik Ukur, J17
47	Kintan Md Yusof	Pem. Setiausaha Pejabat, N17
JMG N.Sembilan / Melaka		
48	Mohd Hisham Md. Nawi	Pegawai Galian, C41
49	Nurul Huda Ismail	Pembantu Kajibumi, C17
50	Jefri Mohamad	Pengawal Keselamatan, Kp11
JMG Johor		
51	Noraini Basiri	Pegawai Kajibumi, C41
52	Wan Mohd Subri Wan Abdullah	Pembantu Kajibumi, C17
53	Badrul Nizam Abu Bakar	Pembantu Kajibumi, C17
54	Mohd Khairani Othman	Juruteknik Ukur, J17
JMG Pahang		
55	Wan Saifulbahri Wan Mohammad	Pegawai Kajibumi, C48
56	Wan Norizan Wan Abd Majid	Pembantu Tadbir (P/O), N22
57	Mohd Faizal Nasron	Pembantu Am Pejabat, N1
58	Mohamad Rusli Mat Min	Pemandu Kenderaan, R3
JMG Terengganu		
59	Rusli Mat Din	Pembantu Kajibumi, C22
60	Muhammad Anizan Nasir @ Ghani	Pembantu Tadbir (P/O), N22
61	Nor Fadilah Sulong	Pembantu Tadbir (Kew), W17
JMG Kelantan		
62	Mohd Badarudin Hasan	Pegawai Kajibumi, C52
63	Mohamed Hizam Abdul Kadir	Pegawai Galian, C44
64	Mohamad Shah Rizal Jaafar	Pembantu Kajibumi, C17
65	Rosli Awang	Pembantu Galian, C17
66	Noor Azila Mat Jusoh	Pegawai Khidmat Pelanggan, N17

JMG Sarawak

67	Setebin @ Roslan Rajali	Pegawai Kajibumi, C44
68	Mohd Shahrizal Mohamed Sharifodin	Pegawai Kajibumi, C41
69	Hermawati Tambeng	Pegawai Kimiabumi, C41
70	Silvia Joseph	Pegawai Teknologi Maklumat, F41
71	Ngang Gano	Pembantu Kajibumi, C22
72	Aluwi Jamri	Pembantu Kajibumi, C22
73	Marina Mardzuki	Pembantu Makmal C22 (Kup)
74	Tarmidzie Karim	Pembantu Kajibumi, C17
75	Noroskasmayantinazima Paimi	Pembantu Tadbir (Kew), W17
76	Gelayan Ensareban	Pembantu Perpustakaan, S17
77	Alex Aguan Senong	Pemandu Kenderaan, R6

JMG Sabah

78	Rokiah Abdullah	Pegawai Kimiabumi, C44
79	Eddie Affandy Mohd Yusslee	Pegawai Kajibumi, C41
80	Nurzuhairil Zubir	Pegawai Kajibumi, C41
81	Normi Adok	Pen. Peg. Teknologi Maklumat, F29
82	Ebahrim Bedin	Pembantu Kajibumi, C22
83	Kapis Lagang	Pembantu Makmal, C22
84	Chong Shok Han @ Margaret	Pembantu Tadbir (P/O), N22
85	Mejah Birud	Pegawai Khidmat Pelanggan, N17



Para penerima Anugerah Perkhidmatan Cemerlang 2012.
Recipients of JMG 2012 Excellent Service Award.

Pembangunan Dasar / Policy Development

Dasar Geosains Negara National Geoscience Policy

Jabatan bekerjasama erat dengan Kementerian Sumber Asli dan Alam Sekitar (NRE) bagi menggubal Dasar Geosains Negara. Beberapa siri Seminar Peringkat Kebangsaan dan Perundingan Pihak Berkepentingan telah diadakan sepanjang tahun 2012. Dasar ini dijangka siap pada tahun 2013. Ianya diharap akan menjadi panduan bagi menentukan halatuju dan strategi pengurusan geosains negara ke arah mencapai negara berpendapatan tinggi dan kehidupan rakyat yang sejahtera serta alam sekitar yang terpelihara.

The Department is working very closely with the Ministry of Natural Resources and Environment (NRE) to formulate the National Geoscience Policy. A series of National Level Seminar and Stakeholders Consultation was held during the year 2012. This policy is expected to be completed by the year 2013. Hopefully, it will serve as a guide for determining the direction and management strategies for national geoscience sector in moving towards high-income country and achieving peaceful living as well as environmental sustainability.

Pernyataan Dasar Policy Statement

Untuk menerajui pembangunan lestari sumber asli bumi melalui pembangunan dan aplikasi geosains bagi melindungi dan memulihara alam sekitar; pembangunan sosio-ekonomi dan kesejahteraan negara; dan memartabatkan kedaulatan negara.

To spearhead the sustainable development of the earth's natural resources through the development and application of geoscience for the protection and conservation of the environment; the socio-economic development and wellbeing of the nation; and to uphold the sovereignty of the country.

Objektif Objective

1. Memartabatkan keselamatan dan kedaulatan negara melalui pengurusan sumber asli bumi yang berkesan.
 2. Memacu transformasi ekonomi negara dan meningkatkan kesejahteraan masyarakat melalui pembangunan dan pengurusan guna tanah yang berkesan, cekap, ekonomik, dan lestari.
 3. Memupuk dan meningkatkan budaya kreatif, inovatif dan keusahawanan dalam pengurusan sumber asli bumi, pembangunan teknologi dan pengkomersialan.
 4. Memperkasakan modal insan, institusi dan penyelidikan sumber asli bumi untuk meningkatkan pembangunan sosio-ekonomi dan kesejahteraan negara.
 5. Memperkukuhkan kerangka institusi berteraskan geosains yang berkaitan sumber, proses dan sistem bumi bagi pembangunan lestari.
1. To uphold the national security and sovereignty through an effective management of the earth's natural resources.
 2. To drive the economic transformation of the nation and improve the wellbeing of the community through effective, efficient, economic, and sustainable land use management and development.
 3. To foster and enhance a culture of creativity, innovation and entrepreneurship in the management of the earth's natural resources, the development of technology and commercialisation.
 4. To strengthen human capital, institutions and research on earth's natural resources to enhance the socio-economic development and wellbeing of the nation.
 5. To strengthen geoscience institutional framework for sustainable development of the earth's resources, processes and systems.

Kerjasama Antarabangsa International Cooperation

Kerjasama Teknikal dan Saintifik Malaysia-Indonesia dalam bidang Geologi dan Sumber Mineral / Malaysia-Indonesia Scientific and Technical Cooperation in the field of Geology and Mineral Resources

21-23.02.2012

- Mesyuarat Pertama Kumpulan Kerja Kajian Hidrogeologi dan kerja lapangan di Pulau Sebatik, Tawau, Sabah.
First Interim Working Group Meeting on Hydrogeological Study and fieldwork in Sebatik Island, Tawau, Sabah.



03-08.07.2012

- Mesyuarat Kumpulan Kerja Hidrogeologi di Kota Kinabalu, Sabah.
Hydrogeology Working Group Meeting in Kota Kinabalu, Sabah.

26-30.11.2012

- Kumpulan Kerja Teknikal ke-2 (TWG2) - Sumber Mineral dan Tenaga
Technical Working Group 2 (TWG2) - Mineral and Energy Resources



Mesyuarat di JMG Kuching, Sarawak.
Meeting at JMG Kuching, Sarawak.



Lawatan lapangan delegasi TWG2 di Jugan, Bau, Sarawak.
Field excursion of the TWG2 delegation at Jugan, Bau, Sarawak.

Photo: Yong Mee Ling

Pemetaan Geologi Bersama Sempadan Malaysia-Thailand (MT-JGS) Malaysia-Thailand Border Joint Geological Survey (MT-JGS)

22-28.01.2012

- Kerja lapangan bersama di Pulau Tarutao-Adang-Rawi, Thailand. / *Joint field excursion in Tarutao-Adang-Rawi Islands, Thailand.*



21-24.03.2012

- Kerja lapangan bersama di kawasan Pulau Langkawi. / *Joint fieldwork in Langkawi Islands.*



21-24.03.2012

- Mesyuarat Pertama Kumpulan Kerja Geologi Kawasan Langkawi-Tarutao Transect di Hotel De Baron, Langkawi. / *First Interim Meeting of the Working Group on the Geology of Langkawi-Tarutao Transect Area and Geological Conservation and Geological Tourism in Langkawi-Tarutao Islands in Hotel De Baron, Langkawi.*



Pengerusi Bersama En. Mior Sallehuddin Mior Jadid, Pengarah Bahagian Perkhidmatan Teknikal, JMG dan En. Montri Luengingkasoot, Pengarah Biro Penyiasatan Kajibumi, DMR, Thailand.

Joint Chairmen Mr. Mior Sallehuddin Mior Jadid, Director Technical Services Division, JMG and Mr. Montri Luengingkasoot, Director, Bureau of Geological Survey, DMR, Thailand.

11-12.09.2012

- Mesyuarat ke-2 Kumpulan Kerja Malaysia-Thailand dan Mesyuarat ke-9 Jawatankuasa Pemetaan Sempadan Geologi Malaysia-Thailand (MT-JGSC) di Wilayah Trang, Thailand. / *2nd Malaysia-Thailand Working Group Meeting and 9th Malaysia-Thailand Border Joint Geological Survey Committee (MT-JGSC) Meeting in Trang Province, Thailand.*



Mesyuarat dirasmikan oleh Timbalan Gabenor Wilayah Trang, Thailand, En. Chaiyot Thongchai pada 12 September 2012.

The meeting was officiated by the Deputy Governor of Trang Province, Thailand, Mr. Chaiyot Thongchai on 12 September 2012.



Ahli Mesyuarat MT-JGSC.
Members attending the MT-JGSC meeting.

13-15.09.2012

- Kerja lapangan bersama di Wilayah Trang, Nakhon Si Thammarat, Surat Thani dan Koh Samui, Thailand. / *Joint field excursion in Trang Province, Nakhon Si Thammarat, Surat Thani and Koh Samui, Thailand.*



Projek kerjasama JMG-Agensi Mine Reclamation Corporation (MIRECO), Republik Korea untuk rawatan Acid Mine Drainage (AMD) / JMG-Mine Reclamation Corporation (MIRECO), Republic of Korea cooperation project on Acid Mine Drainage (AMD)

26.04. 2012

- Perjanjian projek kerjasama untuk rawatan "Acid Mine Drainage" tapak bekas Lombong Mamut di Kota Kinabalu, Sabah. / Joint project agreement on the Acid Mine Drainage (AMD) treatment of ex-Mamut Copper Mine in Kota Kinabalu, Sabah.



Wakil dari JMG Malaysia dan MIRECO, Korea.
Representatives from JMG Malaysia and MIRECO, Republic of Korea.



Lawatan oleh rombongan MIRECO, Korea ke tapak bekas Lombong Mamut, Sabah.
Visit by MIRECO, Korea to the ex-Mamut Copper Mine, Sabah.

24.05.2012

- Ceramah teknikal berkenaan AMD oleh Dr. Min Jang (MIRECO) di Pusat Penyelidikan Mineral, Ipoh. [Technical Talk on AMD by Dr. Min Jang \(MIRECO\) at Mineral Research Centre, Ipoh.](#)



01.07.2012

- Lawatan tapak oleh rombongan MIRECO di bekas lombong Mamut, Sabah. / [Site visit by MIRECO to the ex-Mamut Copper Mine, Sabah.](#)



Mesyuarat Pegawai-pegawai Kanan Asean berkaitan Mineral ASEAN Senior Officials Meeting on Minerals (ASOMM)

25-29.06.2012

- Program Latihan Pangkalan Data Sumber Mineral di Yogyakarta, Indonesia.
Training Programme on Mineral Resources Database in Yogyakarta, Indonesia.



05-06.12.2012

- Mesyuarat ASOMM ke-12 di Brunei Darussalam. / *12th ASOMM meeting in Brunei Darussalam.*



Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP)

04-08.11. 2012

➤ 48th CCOP Annual Session.



09-10.11.2012

➤ 59th CCOP Steering Committee Meeting.



JMG-China ASEAN Business Investment Summit (CABIS)

12.03.2012

➤ Lawatan Sekretariat CABIS. / *Visit of the CABIS Secretariat.*



Ketua Pengarah JMG dan Mr. Hu Fuzhang, Assistant Inspector of CCPIT Guangxi Committee, Deputy Secretary General of CABIS.
Director General JMG and Mr. Hu Fuzhang, Assistant Inspector of CCPIT Guangxi Committee, Deputy Secretary General CABIS.

Taklimat dan perbincangan bersama delegasi CABIS dan pegawai-pegawai JMG Malaysia.
Briefing and discussion session with CABIS delegation and JMG Malaysia.



Delegasi CABIS bersama pegawai-pegawai JMG, NRE dan Dewan Perlombongan Malaysia.
CABIS delegation with JMG, NRE and Malaysian Chamber of Mines.

11-13.05.2012

- Forum Kerjasama Perlombongan dan Pameran China-ASEAN 2012 di Nanning, China.
China-ASEAN Mining Cooperation Forum and Exhibition 2012, Nanning, China.



Sesi forum.
Forum session.



Mesyuarat delegasi Malaysia dengan usahawan-usahawan China.
Meeting between Malaysian delegation and Entrepreneurs from China.

Pelawat luar negara / Overseas visitors

22-24.02.2012

- Lawatan kerja delegasi Department of Geology and Minerals, Lao PDR.
Visit of delegation from Department of Geology and Minerals, Lao PDR.



Ketua Pengarah JMG dan Mrs. Chansarath BOUPHA, Deputy Director General Department of Geology and Minerals, Ministry of Natural Resources and Environment of Lao PDR.
Director General of JMG and Mrs. Chansarath BOUPHA, Deputy Director General Department of Geology and Minerals, Ministry of Natural Resources and Environment of Lao PDR.



Lawatan ke Unit Geographical Information System (GIS), Cawangan Pengurusan Maklumat.
Visit to Geographical Information System (GIS) Unit, Information Management Division.



Delegasi Lao PDR dan pegawai-pegawai JMG Malaysia.
Lao PDR delegation and JMG Malaysia officers.

26.06.2012 - 9.08.2012

- Lawatan dan latihan delegasi Geological Survey of Bangladesh.
Training and visit of delegation from Geological Survey of Bangladesh.



Lawatan ke Muzium Geologi, Ipoh
Visit to the Geology Museum, Ipoh.



Lawatan ke Pusat
Penyelidikan Mineral, Ipoh.
Visit to the Mineral Research
Centre, Ipoh.

27-28.08.2012

- Lawatan delegasi Ketua Pengarah, Department of Mineral Resources of Thailand (DMR) ke JMG Malaysia.
Visit of Director General, Department of Mineral Resources of Thailand (DMR) delegation to JMG Malaysia.



02.10.2012

- Lawatan delegasi Her Excellency The High Commission of The Kingdom of Lesotho.
Visit of Her Excellency The High Commission of The Kingdom of Lesotho delegation.



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Aktiviti Geosains Geoscience Activities

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Photo: Ling Nan Ley

Bahagian dalam Gua Niah, Sarawak. / Inside of the Niah Cave, Sarawak.

Aktiviti Geosains Geoscience Activities

Aktiviti geosains yang merupakan teras utama JMG dilaksanakan berterusan oleh Jabatan dengan menyediakan pelbagai maklumat geologi melalui kegiatan pemetaan geologi, warisan geologi, hidrogeologi, geologi kejuruteraan, geologi alam sekitar dan geologi marin. Maklumat geosains yang berkualiti serta memenuhi kehendak *stake holder* dan pelanggan adalah input penting yang dapat digunakan secara efektif dalam perancangan guna tanah bagi mencapai pembangunan mampan serta mengurangkan risiko bencana dan memelihara alam sekitar.

Pemetaan geologi dijalankan bagi mengumpul, menyelia dan menyebarkan maklumat asas geologi yang amat diperlukan dalam kerja-kerja carigali sumber mineral dan perancangan gunatanah serta kesesuaian tapak untuk pembangunan. Pemetaan warisan geologi pula dapat menilai dan memelihara tapak geologi yang berpotensi sebagai warisan negara di samping dapat mempromosikannya sebagai kawasan geopelancongan bagi menjana sosioekonomi serta kelestarian alam sekitar. Maklumat hidrogeologi merupakan input penting di dalam pengurusan sumber air bawah tanah bagi memastikan ia dapat terus diguna sebagai bekalan air negara manakala maklumat pemetaan geobencana dan penilaian risiko bencana terutama di kawasan perbandaran dan penempatan amat berguna kepada pihak berkuasa tempatan dalam merancang pembangunan yang lebih sistematik.

Geoscience activities which constitute one of the main thrusts of JMG were conducted continuously by the Department to provide necessary geological information through various activities like geological mapping, geological heritage, hydrogeology, engineering geology, environmental geology and marine geology. Quality geoscience information that meet the requirements of stakeholders and customers are important inputs as they can be used effectively in land use planning to achieve sustainable development and reduction in the risk of disasters as well as protection of the environment.

Geological mapping is carried out to collect, collate and disseminate basic geological information which is very much needed in the exploration of mineral resources and land use planning as well as in the determination of the suitability of the site for development. Geological heritage mapping is carried out to assess and conserve potential geological sites as national heritages as well as to promote geotourism that would enhance the socio-economic status and environmental sustainability. Hydrogeological information is important in the management of groundwater resources to ensure that it can be used continuously as one of the nation's water supply while information from geohazard mapping and disaster risk assessment, especially in urban and settlement areas is very useful to the local authorities in systematic development planning.

Pemetaan Geologi / Geological Mapping

Status pemetaan geologi sehingga kini ialah 86.52% dari jumlah kawasan di Semenanjung, 29.98% di Sarawak dan 27.9% di Sabah. Pemetaan geologi rantau pada skala 1:63,360 dan pemetaan geologi Kuaterner telah dijalankan di Terengganu. Selain daripada itu, pemetaan geologi khusus juga dijalankan di kawasan Bukit Bunoh, Lenggong, Perak.

The status of geological mapping for Peninsular is 86.52%, Sarawak 29.98% and Sabah 27.9%. Regional geological mapping on the scale of 1:63,360 and Quaternary geological mapping were carried out in the state of Terengganu. Specific geological mapping was also carried out in Bukit Bunoh, Lenggong, Perak.

Pemetaan geologi rantau Regional geological mapping

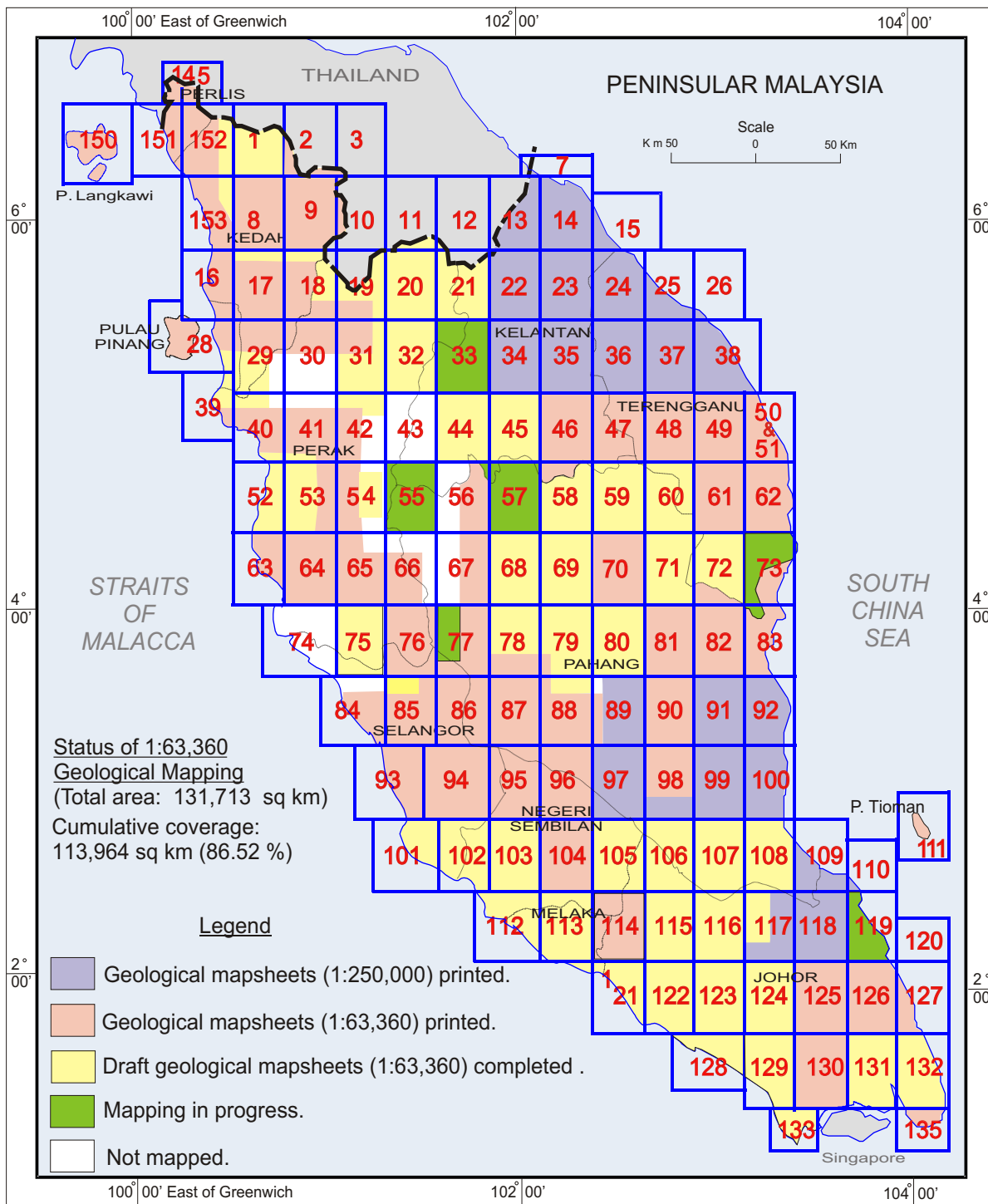
Negeri State	Kawasan Area	Liputan Coverage (km ²)	Penemuan / Catatan Findings / Remarks
Terengganu	Chukai & Kuantan	100	Laporan pemetaan geologi meliputi Syit 73 (Chukai) dan sebahagian Syit 83 (Kuantan) telah siap dalam bentuk manuskrip. / The draft geological mapping report covering Sheet 73 (Chukai) and part of Sheet 83 (Kuantan) was completed.
Pahang	Kuala Tembeling	-	Laporan peta berjudul Geologi dan Sumber Mineral Kawasan Kuala Tembeling, Pahang telah diterbitkan. / A map report entitled Geology and Mineral Resources of Kuala Tembeling Area was published.
Jumlah : Total :		100	

Pemetaan geologi Kuaterner Quaternary geological mapping

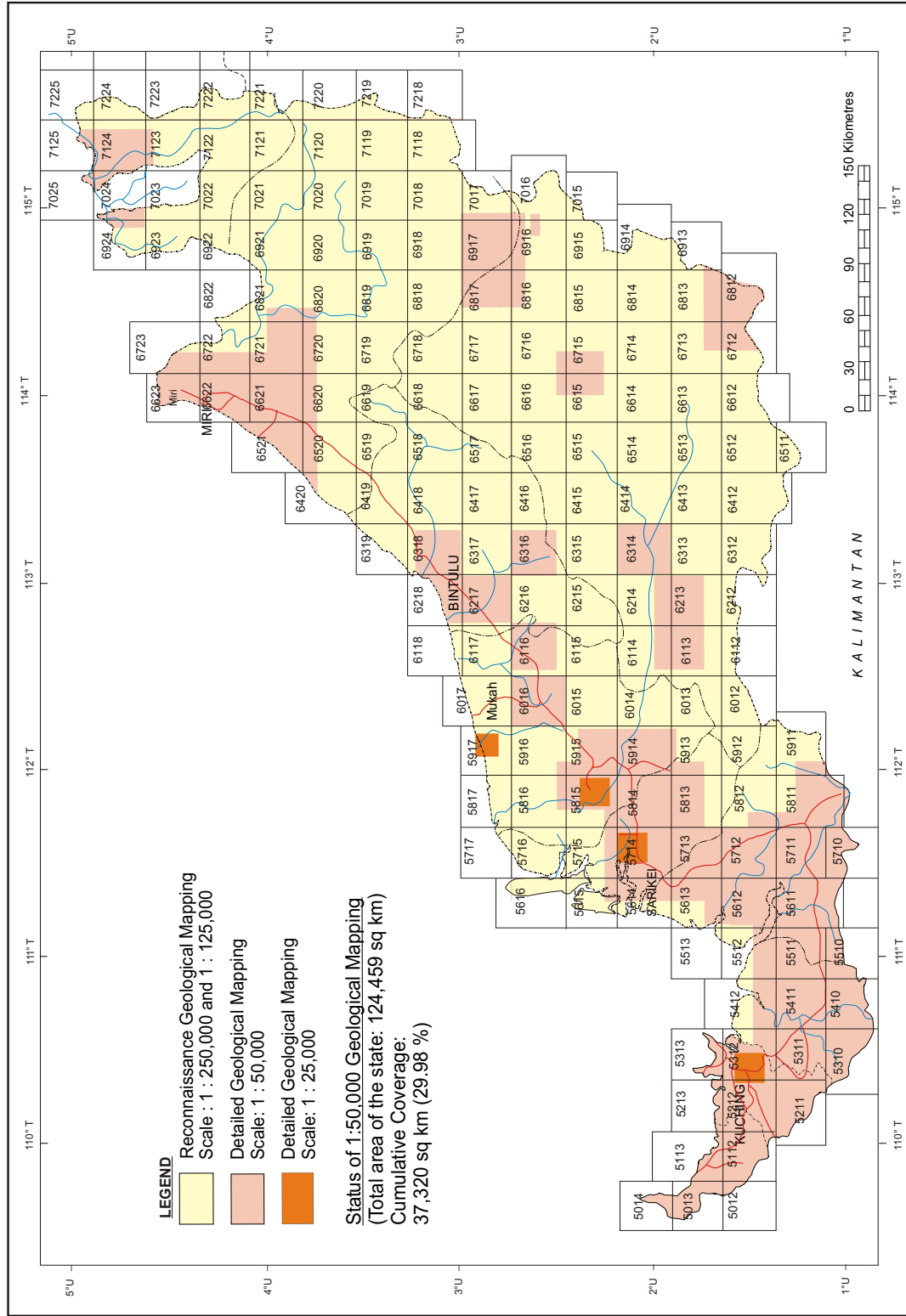
Negeri State	Kawasan Area	Liputan Coverage (km ²)	Penemuan / Catatan Findings / Remarks
Terengganu	Merang	90	Kajian perubahan aras laut kuno. Analisis mikrofosil dan penentuan usia dijalankan terhadap sampel gambut dari lubang gerimit manakala sampel permukaan pantai dianalisis untuk diatom. Paleo sea level change study. Augered peat sample were analysed for microfossils and dating was conducted. Surface samples from the beach were analysed for diatom.
Jumlah : Total :		90	

Pemetaan geologi khusus Specific geological mapping

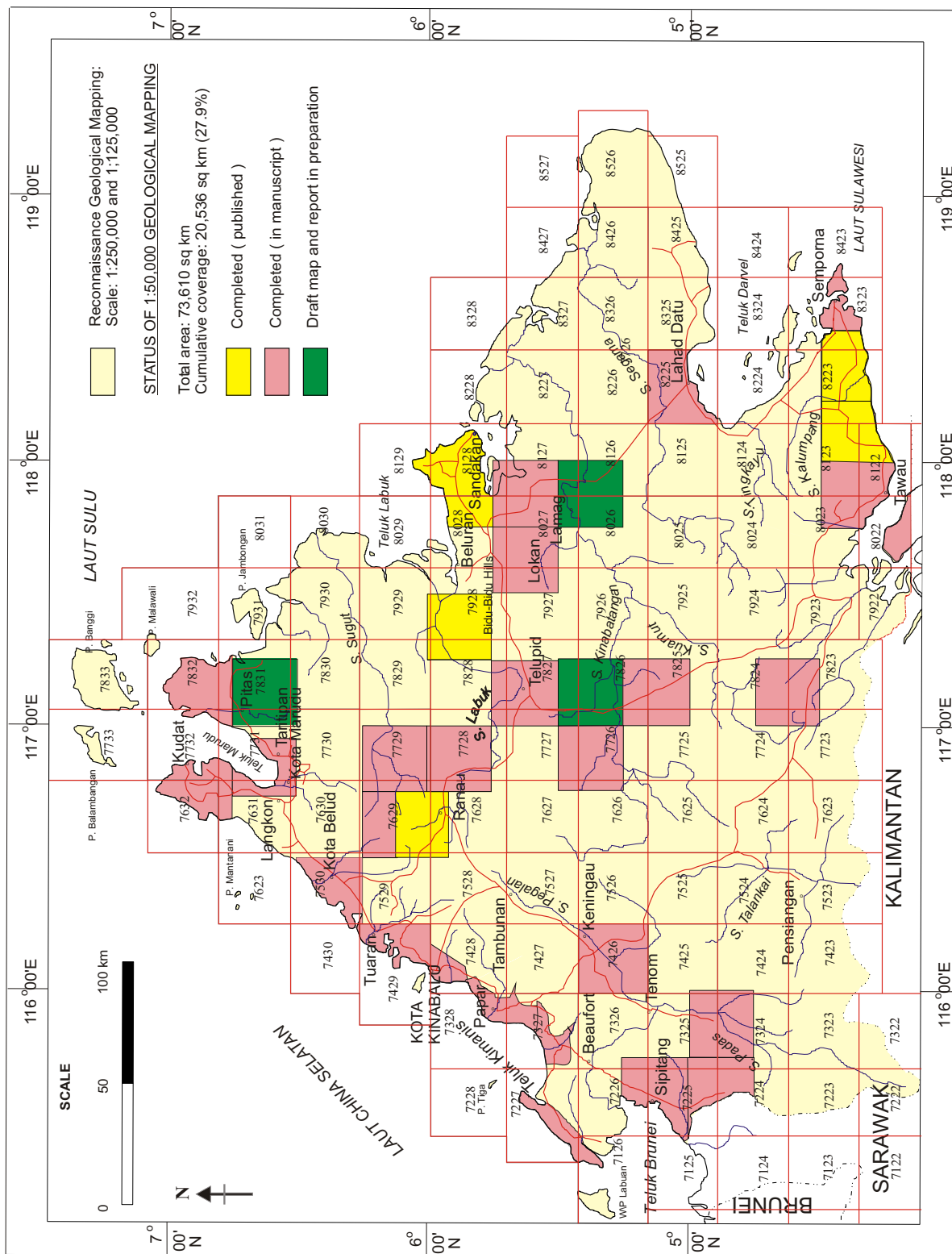
Negeri State	Kawasan Area	Liputan Coverage (km ²)	Penemuan / Catatan Findings / Remarks
Perak	Bukit Bunoh, Lenggong	10	Pemetaan geologi telah dijalankan di kawasan hentaman meteorit. Dua kertas teknikal berjudul "Morphology of Bukit Bunoh: Remote Sensing And Field Evidences" dan "Morphology of Bukit Bunoh: Core Drilling Evidences" telah dibentangkan di International Conference on Archeology of Meteorite Impact, 2012, Pulau Pinang. / Geological mapping was carried out at the meteorite impact site. Two technical papers entitled Morphology of Bukit Bunoh: Remote Sensing and Field Evidences and Morphology of Bukit Bunoh: Core Drilling Evidences were presented at the International Conference on Archeology of Meteorite Impact, 2012, Penang.
Jumlah : Total :		10	



STATUS PEMETAAN GEOLOGI SEMENANJUNG MALAYSIA, 2012
STATUS OF GEOLOGICAL MAPPING PENINSULAR MALAYSIA, 2012



STATUS PEMETAAN GEOLOGI SARAWAK, 2012
STATUS OF GEOLOGICAL MAPPING SARAWAK, 2012



STATUS PEMETAAN GEOLOGI SABAH, 2012
STATUS OF GEOLOGICAL MAPPING SABAH, 2012

Kajian perubahan aras laut kuno di Merang, Terengganu Paleo sea level change study in Merang, Terengganu



Persampelan persisir pantai untuk analisis diatom.
Beach sampling for diatom analysis.



Persampelan permukaan pantai untuk kajian persekitaran enapan.
Beach surface sampling for deposition environment study.



Kerja penggerimitan untuk persampelan gambut.
Augering for peat sample.

Warisan Geologi / Geological Heritage

Kajian warisan geologi telah dijalankan bagi memastikan khazanah alam semulajadi yang sangat berharga dapat dipelihara bagi tatapan generasi akan datang. Menerusi kajian ini, konsep tapak terpelihara, monumen geologi dan lanskap berpemandangan indah dapat diperkenalkan kepada orang awam. Pencirian warisan geologi telah dijalankan di tapak-tapak terpilih bagi cadangan dan penarafan samada sebagai geotapak, tapak warisan geologi kebangsaan atau geopark.

Geological heritage studies were carried out to ensure that the wealth of nature can be conserved for future generations. Through these studies, the concept of site conservation, geological monument, and beautiful landscape can be promoted to the public. Characterisation on the geological heritage has also been carried out at the selected sites in order to propose and promote the sites to either geosite, national geological heritage site or geopark status.

Sebahagian daripada struktur-struktur geologi menarik dalam Formasi Mersing, Tanjung Lompat, Kota Tinggi, Johor. / *Some interesting geological structures in Mersing Formation at Tanjung Lompat, Kota Tinggi, Johor.*



Photo: Mohd. Fauzi Rajimin

1. Lipatan tak harmoni. / *Non-harmonic folding.*
2. Struktur ramping dan ampul. / *Pinch and swell structure.*
3. Struktur boudin. / *Boudinage structure.*

Enapan fosil di Gua Bukit Pinang, Geopark Langkawi.
Fossil deposit at Gua Bukit Pinang, Langkawi Geopark.



Photo: Muhammad Mustadza Mazni

Pemetaan warisan geologi
Geological heritage mapping

Negeri State	Kawasan Area	Status Status	Catatan Remarks
Johor	Tanjung Balau, Kota Tinggi	Tapak Warisan Geologi Kebangsaan National Geological Heritage Site	Permohonan rasmi pewartaan kedua-dua tapak sebagai tapak warisan geologi telah dihantar melalui KEJORA kepada Jabatan Warisan Negara untuk pertimbangan. Formal application for gazettelement of both sites as the National Geological Heritage Sites has been submitted to the Department of National Heritage through KEJORA.
	Batu Layar, Kota Tinggi		
Kedah	Pulau Singa Kechil	Geopark Langkawi Langkawi Geopark	Menjalankan kajian lanjut untuk monumen geologi, rupabumi, lanskap, kepelbagaian struktur geologi, batuan, fosil dan mineral. Carried out detail studies for geological monument, landform, landscape, geological structure, rock, fossil and mineral diversity.
	Pulau Rebak Besar		
	Pulau Bumbun		
	Gunung Raya		
	Teluk Mempelam		
	Pulau Dua & Pulau Lima		
	Pulau Jong		
	Pasir Tengkorak		
	Pulau Tepor		
	Gua Bukit Pinang		
Perlis	Gua Kelam	Cadangan Geotapak Kebangsaan Proposed National Geosite	Mempunyai nilai kepelbagaian batuan, rekreasi dan lanskap. Rock, recreational and landscape diversities.
	Guar Keteri		Mempunyai kepelbagaian fosil. / Fossil diversity.
	Gua Bukit Kubu		Kepelbagaian rupabumi (Paras laut kuno). Landform diversity (Ancient sea-level).
	Gunung Perlis		Kajian lanskap berpemandangan indah. / Scenic landscape.
	Taman Negeri Perlis	Geotapak Geosite	Kepelbagaian batuan. / Rock diversity.
	Gua Wang Burma		Kepelbagaian rupabumi. Landform diversity.
	Gua Cenderawasih		Kepelbagaian fosil. / Fossil diversity.
	Utan Aji		Lanskap berpemandangan indah. / Scenic landscape.
Bukit Lagi			
Sarawak	Lembangan Sarawak, Kuching (Bako, Santubong, delta dan pulau-pulau, Bau dan Tanah Tinggi Bengoh)	Cadangan Geopark Delta Sarawak Proposed Sarawak Delta Geopark	Beberapa siri perbincangan di antara Kumpulan Warisan Geologi Malaysia dan Jawatankuasa Pelaksana Pembangunan Geopark Kebangsaan telah diadakan. Satu kertas kerja bertajuk "Significant Geosite in the proposed Sarawak Delta Geopark, Sarawak" juga disediakan untuk Simposium Rimba 3 (Research Innovation for Malaysian Peninsula, Borneo and Australia). A series of discussions were held between the National Geological Heritage Group and the National Geopark Development Committee. A working paper entitled "Significant Geosites in the proposed Sarawak Delta Geopark, Sarawak" was also prepared for Simposium Rimba 3 (Research Innovation for Malaysian Peninsula, Borneo and Australia).



Photo: Muhammad Mustadza Mazni

1. Endapan fosil di Gua Bukit Kubu, Kuala Perlis, Perlis. / Fossil deposit at Gua Bukit Kubu, Kuala Perlis, Perlis.
2. Monumen geologi berbentuk kapal di Pulau Jong, Geopark Langkawi. / Geological monument resembling a ship at Pulau Jong, Langkawi Geopark.

Photo: Dana Badang

Tapak Pemuliharaan Warisan Budaya,
Megalith Batu Ritong, Pa' Lungan, Bario, Sarawak
Batu Ritong Megalith at Cultural Heritage Conservation
Site at Pa' Lungan, Bario, Sarawak.



Photo: Nizarulikram Abdul Rahim

Fosil kayu yang ditemui di dalam Aluvium Tua, Ulu Tiram, Johor.
Petrified wood discovered from the Old Alluvium, Ulu Tiram, Johor.



Hidrogeologi / Hydrogeology

Aktiviti hidrogeologi dilaksanakan di bawah Projek Pembangunan Air Bawah Tanah RMKe-10. Projek ini dijalankan oleh pejabat-pejabat negeri bagi mendapatkan maklumat air bawah tanah untuk tujuan pemodelan kawasan lembangan, menilai potensi sumber air bawah tanah dan membekalkan air bersih kepada penduduk di kawasan yang menghadapi masalah bekalan air.

Pembangunan air bawah tanah di negeri-negeri juga merupakan sebahagian daripada Projek Bidang Keberhasilan Utama Negara (NKRA) yang telah dijalankan melalui kerjasama antara JMG dengan beberapa agensi kerajaan. JMG Johor, Selangor / Wilayah Persekutuan, Kelantan, Pahang dan Sarawak telah menjalin kerjasama dengan Jabatan Alam Sekitar dalam menjalankan penggerudian dan pembinaan telaga untuk memadam kebakaran bermusim di kawasan tanah gambut yang kering.

Di bawah Projek Khas Bekalan Air, Jabatan telah menyumbang kepakaran dalam bidang air bawah tanah melalui kerjasama dengan pelbagai agensi seperti Kementerian Tenaga, Teknologi Hijau dan Air Malaysia (KeTTHA). Badan Kawal Selia Air Negeri Sembilan (BKSA) dan Kementerian Kemajuan Luar Bandar dan Wilayah (KKLW).

Pemantauan air bawah tanah dijalankan sepanjang tahun untuk memantau kualiti air, memelihara dan mengelakkan pengurangan sumber air bawah tanah yang disebabkan oleh pengepaman berlebihan dan pencemaran. Pemantauan di kawasan akuifer cetek seperti di kawasan gambut pula dijalankan untuk memantau penurunan paras air bawah tanah terutama yang berkaitan dengan aktiviti pertanian yang menyebabkan kawasan tersebut menjadi kering dan terdedah kepada kebakaran semasa musim kemarau. Program pemantauan yang dijalankan meliputi pensampelan dan pengukuran paras air bawah tanah serta penyelenggaraan system penaisan air bawah tanah ringkas (SPATR).

Hydrogeology activities undertaken include the implementation of groundwater development projects under the RMKe-10. The projects were carried out by the state offices to acquire groundwater data for the purpose of basin modelling, assessment of potential of groundwater resources at certain areas as well as to provide clean water for the people in areas facing shortage of water supply.

Groundwater development in each state constitutes part of the National Key Result Area (NKRA). The development was carried out through cooperation between JMG and various state agencies. JMG Johor, Selangor / Federal Territories, Kelantan, Pahang and Sarawak have collaborated with Department of Environment Malaysia in carrying out drilling and developing wells to supply water for the seasonal fire-fighting in dry peatland areas.

Under the Water Supply Special Project, JMG has contributed its expertise through collaboration with various such as Ministry of Energy, Green Technology and Water (KeTTHA) and Badan Kawal Selia Air Negeri Sembilan (BKSA) and Ministry of Rural Development (KKLW).

Monitoring of groundwater was carried out in throughout the year to monitor water quality, preserve and prevent reduction of groundwater resources due to over-pumping and contamination. In addition, monitoring of shallow peat aquifers was also carried out to check water levels in peat land used for agricultural purposes, where peat land can become dry, combustible and fire-prone during dry seasonal spells. Monitoring programmes include the measurement of groundwater levels, collection of samples for laboratory analysis and maintenance of Groundwater Filtration Systems (SPATR).

Pembangunan Air Bawah Tanah Groundwater Development

Penggerudian dan pembinaan telaga Drilling and well construction

Negeri State	Lokasi Location	TE* EW*	TP* PW*	TM* MW*	Catatan Remarks
Johor	Muar	1	-	-	Pembinaan telaga untuk projek Penentuan Zon Potensi Air Bawah Tanah Lembangan Sungai Muar yang merupakan projek kerjasama JMG-ARSM. / Well construction for Potential Groundwater Zone of Sungai Muar Basin joint JMG-ARSM project.
	Kg. Sg. Peroh, Kluang	-	1	-	Telaga diguna sebagai sumber bekalan air bersih kepada penduduk kampung. / Supply clean water to villagers.
Negeri Sembilan	Felda Palong 14, Gemas 4	-	1	-	Membekalkan air bersih kepada 100 pengguna. Supply clean water to 100 consumers.
Selangor	Bestari Jaya, Kuala Selangor	8	1	-	Kajian awal potensi air tanah menggunakan sistem susupan tebing sungai. Jangkaan luahan air tanah adalah 30 juta liter sehari. Preliminary study on groundwater potential from river bank infiltration system. Expected yield is about 30 million litres per day.
Perak	Chikus-Sungai Manik	9	-	-	Pembinaan telaga pengejetan untuk tujuan pemantauan air tanah. Construction of jetting well for groundwater monitoring.
	Kinta	-	3	-	Pembinaan telaga pengeluaran bagi membekalkan air kepada Sekolah Rendah Agama Tarbiah Islamiah, Tanjung Rambutan, Maahad Tahfiz, Tambun dan Pusat Pemulihan Jiwa, Bt 8, Ulu Kinta. Construction of production well to supply water to Sekolah Rendah Agama Tarbiah Islamiah, Tanjung Rambutan, Maahad Tahfiz, Tambun dan Pusat Pemulihan Jiwa, Bt 8, Ulu Kinta.
Kedah	Melele, Kodiang	-	1	-	Pembinaan telaga pengeluaran dilengkapi sistem SPATR bagi membekalkan air kepada pelajar SMA Nahdah Hasanah, Kodiang. Construction of production well complete with SPATR system to supply water for the students of SMA Nahdah Hasanah, Kodiang.
	Derang, Pokok Sena	1	-	-	Telaga akan dimajukan sebagai telaga pengeluaran bagi membekalkan air kepada pelajar SMA Maahad Tarbiyah. / The well will be developed as a production well to supply water for students of SMA Maahad Tarbiyah.
Pahang	Bukit Ibam, Rompin	1	2	-	Pembinaan telaga tiub dengan sistem bekalan air lengkap di kawasan bermasalah bekalan air. Projek memberi faedah kepada 100 orang penduduk. / Construction of production well to supply water in the water-stress area. The project benefited 100 residents.
	Tg. Lumpur, Kuantan	-	1	-	Telaga diguna untuk bekalan air kepada jemaah Surau Al-Ubudiyyah. Production well to supply water to Surau Al-Ubudiyyah.
Kelantan	Pasir Puteh, Bachok & Tumpat	-	-	10	Pembinaan telaga untuk pemantauan air tanah dan juga untuk pemodelan Lembangan Sungai Kelantan. Pemodelan menunjukkan luahan selamat akuifer cetek ialah 509 juta liter sehari. / Construction of wells for groundwater monitoring and Sg. Kelantan basin modelling. Modelling indicates a safe yield value for shallow aquifer of 509 million litres per day.

Terengganu	Kemaman	21	-	-	Pembinaan telaga eksplorasi bagi mendapatkan data untuk pemodelan Lembangan Kemaman. / <i>Construction of exploration wells for Kemaman Basin modeling.</i>
	Kg. Pelam, Kuala Berang	-	1	-	Pembinaan telaga untuk tujuan ternakan kambing. <i>Well construction for animal farming project.</i>
	Batu Rakit	-	1	-	Pembinaan telaga pengeluaran di SM Tengku Mizan Zainal Abidin untuk membekalkan air tambahan. / <i>Production well construction for Tengku Mizan Zainal Abidin Secondary School to provide supplementary water supply.</i>
Sabah	Kg. Kuala Punteh, Keningau	-	1	-	Pembinaan telaga pengeluaran yang bermanfaat kepada 800 orang penduduk kampung. / <i>Construction of production well benefited about 800 villagers.</i>

TE* / EW* = Telaga Eksplorasi / *Exploration Well*

TP* / PW* = Telaga Pengeluaran / *Production Well*

TM* / MW* = Telaga Pemantauan / *Monitoring Well*

Penggerudian dan pembinaan telaga di kawasan kebakaran tanah gambut *Drilling and construction of wells in fire prone peat area*

Negeri State	Lokasi Location	Luahan telaga / Yield (m³/jam)	Kedalaman Depth (m)	Catatan Remarks
Pahang	Parit Jono, Muar	9.1	60	Telaga telah tersedia untuk digunakan bagi mengawal kebakaran. <i>The wells are ready for use in case of peat fire.</i>
	Kampung Tuansseh, Kota Tinggi	6.4	84	
Selangor	Pulau Kempas, Kuala Langat	38	-	
	Bukit Cheding, Kuala Langat	36	-	
Pahang	Gebeng, Kuantan	16	25	
	Kg. Batu Putih, Penor, Kuantan	30	30	
Kelantan	Kg Kual Kecil, Bachok	42	60	
Sarawak	Kuala Baram	-	144	
Sabah	Kg. Kayul, Kuala Penyu	10	33.3	

Projek khas bekalan air
Special water supply project

Projek Project	Negeri State	Sumber Kewangan Fund Source	Catatan Remarks
Projek Penilaian Potensi Sumber Air Bawah Tanah di Negeri Sembilan	Negeri Sembilan	Badan Kawal Selia Air Negeri Sembilan (BKSA)	Menjalankan penilaian potensi sumber air bawah tanah di kawasan yang menghadapi masalah bekalan air. <i>Carried out groundwater potential assessment in areas with water supply problem.</i>
Projek Menaik Taraf Empangan Mini Air Graviti Kg. Tubiel, Matunggong, Kudat	Sabah	Kementerian Sumber Asli dan Alam Sekitar <i>Ministry of Natural Resources and Environment</i>	Menaik taraf empangan mini air graviti dan sistem pempaipaan yang telah memberi manfaat kepada 120 orang penduduk. <i>Upgrading of mini dam and piping system that have benefited 120 villagers.</i>
Projek NKRA <i>Rural Basic Infrastructure</i>	Sarawak	Kementerian Kemajuan Luar Bandar dan Wilayah <i>Ministry of Rural and Regional Development</i>	Menjalankan 61 projek sistem bekalan air graviti, 22 sistem penapaian air hujan, 9 sistem penapisan air sungai atau kolam dan sebuah sistem telaga tiub. Projek ini telah memberi faedah kepada 2,618 keluarga iaitu seramai 13,090 orang yang tinggal di pedalaman Sarawak. <i>Carried out water supply projects that included 61 gravity-feed systems, 22 rain harvesting systems, 9 filtration systems for river and pond water, and one tube well system. A total of 2,618 families with 13,090 people in the rural areas of Sarawak have benefited from the NKRA project.</i>
Penyelenggaraan Sistem Penapisan Air Bawah Tanah Sekolah Sarawak (SPATR)		Kementerian Pelajaran Malaysia <i>Ministry of Education Malaysia</i>	Menjalankan penyelenggaraan sistem SPATR di 14 buah sekolah di sekitar Kuching, Kapit, Sibu, Mukah, Miri, Samarahan, Betong dan Limbang. <i>Carried out maintenance work for the SPATR systems at 14 schools in Kuching, Kapit, Sibu, Mukah, Miri, Samarahan, Betong and Limbang areas.</i>
Projek Bekalan Air Graviti <i>Gravity Water Supply Project</i>			Menyiapkan projek bekalan air graviti yang melibatkan kerja pemasangan paip dan pembinaan takungan air di Sk Telagus, Balai Ringin, Bahagian Kota Samarahan. <i>Completion of water supply project that included laying and installation of pipes for gravity feed system at Sk Telagus, Balai Ringin, Bahagian Kota Samarahan.</i>

Program pemantauan air bawah tanah
Groundwater monitoring programme

Negeri State	Bil. Telaga Dipantau No. of Well Monitored	Catatan Remarks
Johor	40	Pemantauan dijalankan dua kali setahun di seluruh negeri dan pulau-pulau luar pantai dan didapati tidak ada perubahan ketara kualiti air tanah. Monitoring was conducted twice a year throughout the state including offshore islands and there were no significant changes in groundwater quality.
Negeri Sembilan	24	Mendapatkan data sekitaran kualiti air tanah dan paras air bawah tanah. Pemantauan termasuk menyelenggara sistem rawatan air tanah di perkampungan Orang Asli dan menaik taraf sistem pempaipaan dan rawatan telaga di Institusi Pemulihan Dadah Jelebu. To obtain groundwater quality and groundwater level baseline data. The monitoring involved maintenance of the groundwater treatment system at Orang Asli villages and upgrading of piping and groundwater treatment system at Institusi Pemulihan Dadah Jelebu.
Melaka	21	
Selangor	40	Pemantauan dijalankan dua kali setahun dan tidak ada perubahan ketara kualiti air tanah. Monitoring was conducted twice a year and there were no significant changes in groundwater quality.
Perak	45	Pemantauan dijalankan dua kali setahun dan tidak ada perubahan ketara kualiti air tanah. Monitoring was conducted twice a year and there were no significant changes in groundwater quality.
Kedah	28	Persampelan dan pengukuran paras air tanah dijalankan sekali setahun dan tidak ada perubahan ketara kualiti air tanah.
Perlis	1	Sampling and water level measurement were carried out once a year and there were no significant changes in groundwater quality.
Pulau Pinang	2	
Pahang	17	Tidak ada perubahan kualiti dan paras air bawah tanah yang ketara. No significant changes in groundwater level and quality.
Kelantan	68	Pengukuran paras air bawah tanah dijalankan sebulan sekali manakala pemantauan kualiti air bawah tanah dua kali setahun. Pemantauan mendapan tanah dijalankan empat kali setahun di kawasan medan telaga pengeluaran Pintu Geng, Wakaf Baru, Pasir Hor dan Kenali. Groundwater level was measured once a month while water sampling was carried out twice a year. Land subsidence monitoring was conducted 4 times a year in Pintu Geng, Wakaf Baru, Pasir Hor and Kenali well fields.
Terengganu	49	Pemantauan dijalankan sekali setahun di seluruh negeri dan pulau-pulau luar pantai dan didapati tidak ada perubahan ketara kualiti air tanah. Monitoring was conducted once a year throughout the state including offshore islands and there were no significant changes in groundwater quality.
Sarawak	22	Tidak ada perubahan ketara kualiti air bawah tanah. There were no major changes in water quality.
Sabah	26	Program pemantauan air bawah tanah tertumpu di kawasan Papar, Kuala Penyu, Menumbok dan Keningau. Meliputi kerja-kerja persampelan dan pengukuran paras air bawah tanah. Groundwater monitoring programme involved the groundwater table measurement and water sampling. Carried out in Papar, Kuala Penyu, Menumbok and Keningau areas.
Jumlah: Total:	383	



Pengambilan sampel air bawah tanah menggunakan peristaltic pump di Kg. Semerbok, Rembau, Negeri Sembilan.
Taking groundwater samples using a peristaltic pump at Kg. Semerbok, Rembau, Negeri Sembilan.



Pengukuran paras air bawah tanah di Kg. Semerbok, Rembau, Negeri Sembilan.
Groundwater level measurement at Kg. Semerbok, Rembau, Negeri Sembilan.



Pengukuran E.coli dalam sampel air bawah tanah menggunakan kaedah colilert.
Measurement of E. coli in groundwater samples using colilert.





Photo: Hassan Saru

Penggerudian dan pembinaan telaga di Kg. Aur, Bukit Ibam, Rompin, Pahang.
Drilling and construction of a well at Kg. Aur, Bukit Ibam, Rompin, Pahang.



Kerja penggerudian dan telaga di Kg. Kayul, Kuala Penyu, Sabah.
Well drilling works at Kg. Kayul, Kuala Penyu, Sabah.



Penggerudian telaga cetak menggunakan mesin gerudi mudah alih di Tumpat, Kelantan.
Shallow well drilling work using portable drilling machine at Tumpat, Kelantan.



Demonstrasi pengepaman air bawah tanah untuk kawalan kebakaran gambut di Kg. Kual, Bachok, Kelantan.
Demonstration of groundwater pumping for peat fire control at Kg. Kual, Bachok, Kelantan.

Geologi Kejuruteraan Engineering Geology

Pembangunan yang pesat telah menyebabkan kawasan sesuai untuk pembangunan semakin berkurangan sehingga memasuki kawasan sensitif alam sekitar termasuk kawasan lereng bukit. Sehubungan itu, Jabatan telah mengambil langkah-langkah yang proaktif bagi mencegah atau mengurangkan berlakunya kejadian geobencana dengan melaksanakan pemetaan geologi terain dan pemetaan geologi kejuruteraan. Maklumat daripada aktiviti pemetaan tersebut digunakan secara meluas di dalam perancangan guna tanah oleh pihak berkuasa tempatan dan pelbagai agensi kerajaan. Jabatan juga terlibat secara langsung dalam menjalankan siasatan geobencana seperti kejadian tanah runtuh dan lubang benam untuk mengetahui punca kejadian dan faktor-faktor geologi pencetus kejadian dan seterusnya mencadangkan langkah kawalan dan pencegahan kepada pihak berkuasa negeri.

The rapid pace of development has resulted in the corresponding decrease of ideal areas suitable for development and at times the development has encroached into environmentally sensitive areas including hillsides. Accordingly, the department has taken proactive measures to prevent or reduce geohazard incidents by implementing terrain mapping and engineering geology mapping. Information from these mapping activities was extensively referred to in landuse planning by the local authorities and government agencies. The department was also directly involved in geohazard investigations such as landslide and sink hole occurrences in order to determine the possible causes and contributing geological factors and ultimately to proposed viable effective mitigation and prevention measures to the state authorities.

Pemetaan geologi kejuruteraan Engineering geological mapping

Negeri State	Kawasan Area	Jenis pemetaan Type of mapping	Liputan Coverage	Catatan / Remarks
Melaka	Bukit Beruang	Pemetaan Cerun Slope mapping	1.5 km ²	Penilaian awal terhadap kestabilan cerun di kawasan menara Telekom Malaysia. Preliminary study on the slope stability of Telekom Malaysia tower compound.
Selangor/ Wilayah Persekutuan	Taman Bukit Permai, Cheras	Pemetaan Cerun Slope mapping	100 m	Pemetaan geologi dan survei ketakselajaran untuk tujuan penilaian kestabilan cerun. Geological mapping and discontinuity survey for slope stability assessment.

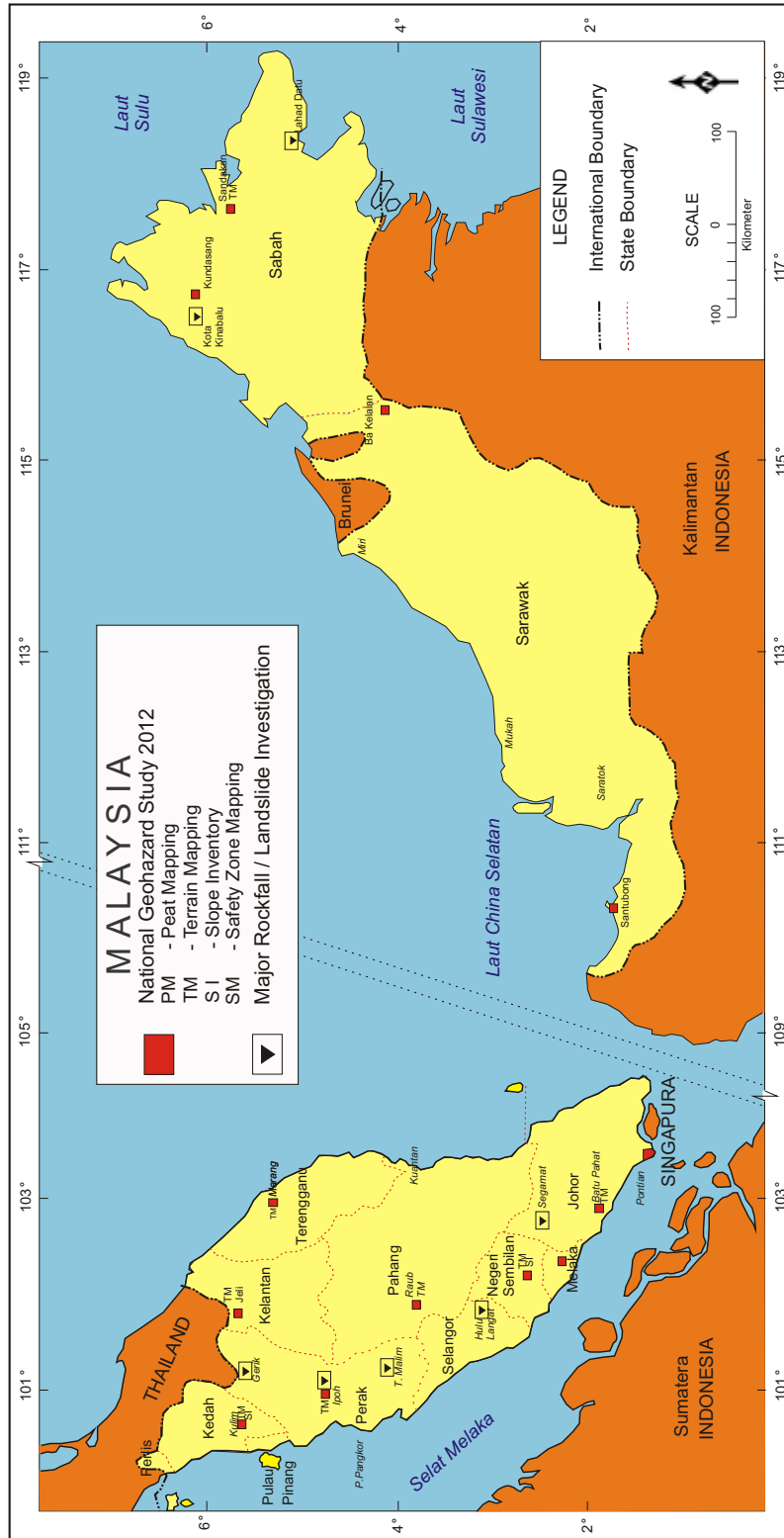
Pemetaan Geologi Terain Geological Terrain Mapping

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Catatan / Remarks
Johor	Bukit Soga & Bukit Banang, Batu Pahat dan Nusajaya	60	Membantu pihak Majlis Perbandaran Batu Pahat (MPBP) dalam perancangan guna tanah. / <i>Provided assistance to Batu Pahat Municipal Council (MPBP) in landuse planning.</i>
Negeri Sembilan	Kuala Pilah	43	Menyediakan pelbagai peta tematik yang sesuai untuk pembangunan dan perancangan guna tanah. / <i>Provided various thematic maps that are relevant for development and landuse planning.</i>
Perak	Meru-Jelapang, Kinta	50	Menyediakan maklumat geologi terain untuk Rancangan Tempatan Ipoh 2020. / <i>Provided geological terrain mapping input for the 2020 Ipoh Local plan.</i>
Kedah	Kulim	50	Pemetaan geologi terain bagi perancangan pembangunan. Siap untuk cetakan. / <i>Geological terrain mapping area for development planning. Ready for printing.</i>
Kelantan	Jeli	107	Meliputi Blok 292 dan Blok 293. / <i>Covered Block 292 and Block 293.</i>
Terengganu	Bukit Kor, Marang	75	Meliputi Blok 635 (25 km ²) dan Blok 684 (50km ²). / <i>Covered Block 635 (25km²) and Block 684 (50km²).</i>
Pahang	Raub	25	Pemetaan terain dan inventori cerun. / <i>Geological terrain mapping and slope inventory.</i>
Sarawak	Santubong	10	Pemetaan pada skala 1:10,000 bagi menyediakan pelbagai peta tematik yang sesuai untuk pembangunan dan perancangan guna tanah. / <i>Mapping on 1:10,000 scale to produce various thematic maps that are relevant for development and landuse planning.</i>
	Ba Kelalan	20	Pemetaan pada skala 1:10,000 bagi menyediakan pelbagai peta tematik yang relevan untuk pembangunan dan perancangan guna tanah. / <i>Mapping on 1:10,000 scale to provide various thematic maps that are relevant for development and landuse planning.</i>
Sabah	Sandakan	20	Input geologi digunakan dalam perancangan pembangunan. / <i>Geological input was considered in the development planning.</i>
Jumlah: / Total:		460	

Siasatan geobencana Geohazard investigation

Negeri State	Lokasi Area	Jenis Bencana Type of Hazard	Catatan / Remarks
Johor	Segamat	Kegagalan cerun Slope failure	Permohonan dari Pejabat Tanah Daerah Segamat untuk: 1. Menyiasat kejadian kegagalan cerun potongan jalan di dalam kawasan perindustrian Segamat 2. 2. Menyiasat risiko kegagalan cerun akibat kerja pengorekan tanah di Lot 1537 dan 1554, Mukim Sungai Segamat. <i>The request was from Pejabat Tanah Daerah Segamat for:</i> 1. Investigation on landslide occurrence in the Segamat 2 industrial area. 2. Investigation on landslides at Lot 1537 and Lot 1554, Mukim Sungai Segamat, Segamat.

Selangor / Wilayah Persekutuan	Jalan Batu 6 1/4, Puchong	Tanah mendap Ground settlement	Siasatan mendapan akibat pergerakan tanah tambakan berhampiran tembok penahan yang menyebabkan keretakan dinding rumah. / Investigation on ground settlement at filled platform near rubble wall that have resulted in the cracking of the house wall.
	Menara Tinjau, Ampang, Hulu Langat	Gelinciran tanah Landslide	Siasatan gelinciran tanah pada cerun potongan jalan dari Ampang ke Hulu Langat yang telah menghalang lalulintas. / Investigation on landslide at cut slope along the Ampang-Hulu Langat stretch that have caused traffic disruption.
	Institut Alam Sekitar Malaysia (EiMAS), UKM Bangi	Gelinciran tanah Landslide	Permintaan daripada JAS untuk siasatan geologi ke atas gelinciran tanah pada cerun tambakan di dalam alur saliran semulajadi. Kejadian dikhuatiri mengancam keselamatan struktur bangunan berhampiran. / Geological investigation on landslide at the embankment within natural concave valley as requested by DOE. Previous landslip occurrences and this major earth movement had caused concerns over the safety of nearby building.
	Taman Sunway Semenyih, Semenyih	Tanah mendap Ground settlement	Siasatan kejadian mendapan tanah yang telah menyebabkan beberapa buah rumah teres di atas platform tambakan mengalami keretakan. / Investigation on ground settlement that had caused houses built on the filled platform to develop cracks.
Perak	Lembah Kinta	Tanah mendap dan lubang benam Land subsidence and sinkhole	Siasatan tujuh kes tanah mendap dan lubang benam dengan diameter antara 0.5-3.5m yang berlaku di kawasan sedang dibangunkan dan penempatan. Investigation on seven cases of land subsidences and sinkholes with diameters between 0.5-3.5m occurred in areas under development as well as in residential areas.
		Jatuhan batuan Rockfall	Siasatan dua kes jatuhan batuan yang melibatkan kerosakan hartabenda. Investigation on two cases of rockfalls that had caused damage to properties.
	Bersia, Gerik	Gelinciran tanah Landslide	Siasatan gelinciran tanah pada cerun potongan di Loji Rawatan Air Gerik V, Bersia yang mengakibatkan gangguan kepada bekalan air di Daerah Gerik. Investigation on landslide that occurred on the cut slope at the Gerik V Water Treatment Plant, Bersia which had affected water supply in Gerik District.
	Tanjung Malim	Gelinciran tanah Landslide	Siasatan gelinciran tanah pada cerun potongan berhampiran blok asrama lelaki INSTUN yang mencetuskan kebimbangan penghuni dan pihak pengurusan. Investigation on landslide that occurred on the cut slope nearby INSTUN's men hostel block which had caused worries among the residents and the management.
Terengganu	Felda Selasih, Setiu	Tanah mendap Land subsidence	Siasatan kejadian tanah mendap dan lubang benam di kawasan tambakan di dalam alur saliran semulajadi bagi tujuan pembinaan rumah. / Investigation of land subsidence and sinkholes that occurred at filled platform on concave slope for residential development.
Pahang	Gua Telinga	Batu runtuh Rock falls	Kejadian menyebabkan laluan masuk di dalam gua menjadi sempit. The event had narrowed the passage way into the cave.
Sarawak	Taman Payak Udak, Bandar Betong	Gelinciran tanah Landslide	Kegagalan satah peralapisan yang miring ke arah permukaan cerun mengakibatkan kerosakan jalan akses. / Plane failure along bedding surfaces which were dipping toward the slope face, causing damages to the access road.
Sabah	Kg. Terusan, Lahad Datu	Tanah runtuh Landslide	Kejadian berlaku pada bulan Februari dan telah meragut dua nyawa, seorang cedera parah dan sebuah rumah musnah. / Incident occurred in February and had claimed two lives, another seriously injured and destroyed a house.
	Kg. Kiau, Kota Belud	Tanah runtuh Landslide	Kejadian berlaku pada bulan Mei menyebabkan tiga buah kampung terputus hubungan (Kg. Kiau Taburi, Kg. Kiau Nuluh dan Kg. Kiau Bersatu), memusnahkan lapan buah rumah dan menjejaskan 3,000 penduduk. Incident occurred in May which had cut-off the access road linking the three villages (Kg. Kiau Taburi, Kg. Kiau Nuluh and Kg. Kiau Bersatu) and destroyed eight houses and affected 3,000 residents.



AKTIVITI GEOLOGI KEJURUTERAAN, 2012
ENGINEERING GEOLOGY ACTIVITIES, 2012



Photo: Edward Muol

1. Kegagalan cerun di Jalan Kg. Puneng Kelalan, Ba Kelalan, Sarawak.
Slope failure at Kg. Puneng Kelalan road section, Ba Kelalan, Sarawak
2. Bongkah-bongkah batuan hasil daripada aliran puing di bahagian timur kawasan Santubong, Kuching, Sarawak.
Rock boulders as a result of debris flow at the eastern side of Santubong area, Kuching, Sarawak.
3. Kawasan pemetaan geologi terain di bahagian timur Santubong, Kuching, Sarawak.
Geological terrain mapping area at the eastern side of Santubong, Kuching, Sarawak.

Photo: Mohd Shukri Ramlan

Puing runtuh yang terdiri daripada bahan tambakan, struktur penahan gabion dan tanah terluhawa, Jalan Ampang-Hulu Langat, Hulu Langat, Selangor.
Landslide debris made up of fill material, gabion blocks and weathered granitic soil at Ampang-Hulu Langat road, Hulu Langat, Selangor.





Tanah runtuh pada cerun potongan di Loji Rawatan Air Gerik V, Bersia, Gerik, Perak.
Landslide on cut slope at Gerik V Water Treatment Plant, Bersia, Gerik, Perak.



Tanah runtuh di kawasan blok asrama lelaki INSTUN, Tanjung Malim, Perak.
Landslide at INSTUN's men hostel block area, Tanjung Malim, Perak.



Gelinciran tanah yang memusnahkan sebuah bungalow di Kg. Kiau, Kota Belud, Sabah.
Landslide that destroyed a bungalow at Kg. Kiau, Kota Belud, Sabah.

Geologi Alam Sekitar / Environmental Geology

Ulusan laporan penilaian kesan alam sekeliling Review of environmental impact assessment reports

Ulusan laporan penilaian kesan alam sekeliling untuk projek pembangunan Review of environmental impact assessment reports for development projects

Negeri State	Bil. ulasan No. of review	Catatan Remarks
Johor	31	Cadangan pembangunan bercampur, perumahan, industri, tapak pelupusan sisa pepejal, infrastruktur dan pertanian. / Proposed mixed development for housing, industry, landfill, infrastructure and agriculture.
Melaka	2	Cadangan pembangunan bercampur dan tapak pelupusan sisa pepejal. / Proposed mixed development and landfill site.
Negeri Sembilan	3	Cadangan pembangunan bercampur dan tapak pelupusan sisa pepejal. / Proposed mixed development and landfill site.
Selangor	60	Cadangan pembangunan bercampur, perumahan, industri, kuari, pengambilan pasir laut, perlombongan pasir, pusat peranginan, infrastruktur dan pertanian. / Proposed mixed development, housing, industry, kuari, sand dredging, sand mining, resort and hotel, infrastructure and agriculture.
Perak	11	Cadangan pembangunan bercampur, perumahan, industri, tapak pelupusan sisa pepejal, infrastruktur dan pertanian. / Proposed mixed development, housing, industry, landfill, landfill, infrastructure and agriculture.
Kedah	13	Cadangan pembangunan bercampur, perumahan, restoran, resort dan hotel, perindustrian, pembangunan persisir pantai, skim pindahan dan empangan. / Proposed mixed development, housing, restaurant, resort and hotel, industrial, coastal development, transfer scheme and dam.
Pulau Pinang	14	Cadangan pembangunan bercampur, perumahan dan perindustrian. / Proposed mixed development, housing and industry.
Perlis	3	Cadangan pembangunan bercampur dan empangan. / Proposed mixed development and dam.
Kelantan	10	Cadangan pembangunan bercampur, perumahan, industri, loji rawatan air, perlombongan, tapak pelupusan sisa pepejal, infrastruktur dan pertanian. / Proposed mixed development, housing, industry, water treatment plant, mining, landfill, infrastructure and agriculture.
Terengganu	2	Cadangan pembangunan bercampur, perumahan, industri, tapak pelupusan sisa pepejal, infrastruktur dan pertanian. / Proposed mixed development, housing, industry, landfill, landfill, infrastructure and agriculture.
Pahang	12	Cadangan pembangunan di Kawasan Sensitif Alam Sekitar (KSAS) di daerah Kuantan, Cameron Highlands, Bentong, Bera dan Pulau Tioman. / Proposed development in Environmentally Sensitive Areas in Kuantan, Cameron Highlands, Bentong, Bera districts and Tioman Island.
Sarawak	33	Cadangan pembangunan perumahan, pembinaan jalanraya dan jambatan, empangan, pengairan, tapak pelupusan sisa pepejal, penimbunan tanah, bekalan air, loji rawatan air, penyaluran elektrik, kuari, lombong arang batu, industri gas dan petroleum, loji ferro-alloi, loji silikon, loji titanium, jelapang padi dan penanaman sawit di atas tanah Adat Bumiputra (NCR Sarawak). / Proposed development on housing, construction of roads and bridges, dam, irrigation, landfill, reclamation, water supply, water treatment, electricity transmission, quarry, coal mining, oil and gas industry, ferro-alloy plant, silicon plant, titanium plant, paddy fields, and palm oil cultivation in Native Customary Right Land (Sarawak NCR).
Sabah	21	Cadangan pembangunan kuari, pengeluaran bahan tanah/pasir/kelikir, pembinaan jalan, industri gas dan minyak, institusi pendidikan, kilang kelapa sawit, ladang kelapa sawit, empangan, pembangunan perumahan dan pusat peranginan. / Proposed quarry, earth/sand/gravel extraction, road construction, oil and gas industry, educational institution, palm oil mills, oil palm plantations, dam, housing and resort centre.
Jumlah / Total:	215	

Kajian Geologi Alam Sekitar Environmental Geology Studies

Negeri State	Kawasan Locality	Catatan Remarks
Melaka	Kerubung	Kajian taburan dan sebaran bahan larutresap dalam air permukaan dan air bawah tanah di kawasan tapak pelupusan sampah Kerubung, Melaka. / <i>The study of leachate distribution and transportation in surface water and groundwater of the Kerubung landfill, Melaka.</i>
Sarawak	Ulu Melatai, Ulu Baleh	Kajian susulan tapak tanah runtuh berskala besar yang telah memberi impak kepada alam sekitar di Ulu Sungai Baleh dan Batang Rajang. / <i>Follow up study at the site of a large scale landslide that caused environmental impact in Upper Baleh River and Batang Rajang.</i>
Sabah		Terlibat dengan Projek Jabatan Perlindungan Alam Sekitar dalam menyediakan “Dasar Alam Sekitar Negeri Sabah” dan “Garis panduan Penyediaan Laporan Kajian Impak Terhadap Alam Sekitar”. / <i>Involved with the Environmental Protection Department in the project entitled “Sabah Environmental Policy” and “Environmental Impact Assessment Study Guidelines”.</i>



Photo: Muhammad Fawwaz Zainal Abedin

Pengukuran kualiti air di Tapak Pelupusan Sampah Kerubung, Melaka.
Measurement of water quality at Kerubung Landfill Site, Melaka.



Wakil dari pelbagai agensi kerajaan yang terlibat semasa menjalankan kajian dari udara di kawasan Ulu Melatai, Baleh, Bahagian Kapit, Sarawak.

Representatives from government agencies involved in the aerial surveillance of Ulu Melatai area, Baleh, Kapit Division, Sarawak.



Photo: Abdul Razak Zainal Abidin

Kejadian tanah runtuh dan hakisan di kawasan bukit dan lereng curam, Ulu Melatai, Bahagian Kapit, Sarawak.
Landslide and severe erosion of steep slopes in hilly area at Ulu Melatai, Kapit Division, Sarawak.



Photo: Freddy H. Chinta

Kelodakan di kuala Sungai Melatai, Bahagian Kapit, Sarawak.
Siltation at the mouth of Sungai Melatai, Kapit Division, Sarawak.

Geologi Marin Marine Geology

Aktiviti Geologi Marin dalam tahun ini tertumpu kepada perancangan survei hidrografi dan penyediaan draf laporan submission Projek Pelantar Benua Malaysia Fasa 2 untuk Commission on the Limits of the Continental Shelf (CLCS), survei geofizik and persampelan bagi Projek Sumber Pasir Laut Yayasan Melaka dan juga pelaksanaan program saintifik bersama dengan Universiti Malaysia Terengganu.

Aktiviti utama Projek Pelantar Benua Malaysia Fasa 2 melibatkan perancangan survei hidrografi di Laut Cina Selatan yang dijangka akan dilaksanakan dalam tahun 2013. Perancangan teliti diperlukan untuk survei ini memandangkan projek ini berkepentingan negara dan berkos tinggi. Kompilasi data telah diuruskan berterusan, di samping itu juga beberapa siri mesyuarat, sesi perbincangan, kursus dan bengkel telah diadakan untuk pasukan kerja teknikal bagi merangka dan menyediakan laporan submission kepada CLCS di Bangsa-Bangsa Bersatu.

Projek kajian sumber pasir laut Yayasan Melaka telah dimulakan pada bulan Jun 2012 dengan pelaksanaan survei geofizik di perairan laut Negeri Melaka untuk memperoleh data seismik, side-scan sonar, batimetri dan navigasi. Sejumlah 455 km garis survei geofizik telah disiapkan, manakala sejumlah 76 sampel cekau dan 76 sampel teras telah dikutip dan selesai pada bulan Disember 2012. Analisis sampel juga telah disiapkan.

Marine Geology activities for the year focussed on hydrographic survey planning and drafting of the Malaysia Continental Shelf Phase 2 submission report for the Commission on the Limits of the Continental Shelf (CLCS), geophysical and sampling survey for the Yayasan Melaka marine sand resource project as well as joint scientific programmes with University Malaysia Terengganu.

The main activity for Phase 2 of the Continental Shelf Project involved planning of the hydrographic survey in the South China Sea which is expected to be carried out in 2013. Careful planning for the survey is necessary as this project is of national interest and incurs high cost. Compilation of data is currently on-going, together with a series of meetings, discussion, courses and workshops which were also conducted for the Technical Working Group in preparation for report submission to CLCS in the United Nations.

Marine sand resource study for Yayasan Melaka was initiated in June 2012 with the conduct of geophysical surveys in offshore Malacca waters to acquire seismic, side-scan sonar, bathymetry and navigation data. A total of 455 km of geophysical survey lines were completed together with the collection of a total of 73 grab and 76 core samples under the sampling programme which was completed in December 2012. Analysis of these samples was also completed.

Satu Memorandum Persefahaman (MOU) telah ditandatangani di antara Jabatan Mineral dan Geosains (JMG) dengan Universiti Malaysia Terengganu (UMT) pada 25hb September 2012. MOU ini akan memberikan manfaat signifikan kepada kedua-dua pihak signatori melalui pelbagai bidang kajian dan penyelidikan bersama terutamanya berkaitan perubahan iklim, kenaikan paras laut dan pengurusan persisiran pantai. Pada bulan November 2012, satu Program Persampelan Geologi Kuaterner di bawah Projek DelSea II telah diadakan di UMT yang melibatkan peserta dari JMG dan UMT.

Sejumlah 25 permohonan dari pelbagai syarikat untuk lesen melombong pasir laut di bawah Seksyen 4 Akta Pelantar Benua 1966 (dipinda 1972) telah dikaji dan ulasan telah dikemukakan kepada Jabatan Ketua Pengarah Tanah dan Galian (JKPTG). Permohonan lesen melibatkan kawasan lepas pantai di Negeri Selangor, Perak, Johor, Pahang, Negeri Sembilan, Melaka dan Labuan. Satu permohonan khidmat nasihat berhubung dengan permohonan pasir laut juga telah diberikan.

A Memorandum of Understanding (MOU) was signed between the Minerals and Geoscience Department (JMG) and University Malaysia Terengganu (UMT) on 25th September 2012. The MOU will benefit both signatories significantly through collaborative research studies notably on climate change, sea level rise and coastal management. In November 2012, a Quaternary Geology Sampling Programme under the auspices of DelSea II Project was held at UMT and involved participants from both JMG and UMT.

A total of 25 applications from various companies for offshore sand mining license under Section 4, Continental Shelf Act 1966 (revised 1972) were reviewed for the Department of Director General of Land and Mines. The applications were from offshore waters of Selangor, Perak, Johore, Pahang, Negeri Sembilan, Malacca and Labuan. One advisory service was also provided on marine sand application.



Pengambilan sampel teras semasa survei untuk Projek Yayasan Melaka.
Core sampling during the survey for Yayasan Melaka Project.



Interpretasi sampel bersama Dr Yoshiki Saito dari Jepun semasa Program Persampelan Geologi Kuaterner di bawah DelSea II.
Sample interpretation with Dr Yoshiki Saito from Japan during Quaternary Geology Sampling Program under DelSea II.

Khidmat Nasihat Geosains Geoscience Advisory Services

JMG secara aktif memberi khidmat nasihat kepada agensi kerajaan, pihak swasta dan individu dalam aspek hidrogeologi, geologi kejuruteraan, ulasan guna tanah dan maklumat geosains.

Khidmat nasihat hidrogeologi merangkumi pelesenan air bawah tanah, kelulusan sumber air mineral semula jadi dan potensi penggunaan sumber air bawah tanah untuk pertanian, industri dan domestik. Umumnya di semua negeri, JMG adalah ahli tetap di dalam Jawatankuasa Penggunaan Sumber Air Peringkat Negeri dan Jawatankuasa Kelulusan Pembungkusan Sumber Air Mineral Semulajadi dan Jawatankuasa Pelesenan Sumber Air Bumi.

Khidmat nasihat geologi kejuruteraan dan guna tanah pula merangkumi aspek perancangan pembangunan bandar baru, penjajaran jalan dan perancangan guna tanah. JMG juga terlibat dalam penilaian kawasan berisiko geobencana melalui keanggotaannya dalam jawatankuasa peringkat negeri seperti Jawatankuasa Perancangan Negeri, Jawatankuasa Bencana Negeri, Jawatankuasa Kawasan Sensitif Alam Sekitar dan Jawatankuasa Tanah Tinggi dan Pembangunan Lereng Bukit.

Ulasan Pusat Setempat (OSC)

Kawalan pembangunan adalah sangat penting di negara ini untuk memperkasa dan memperkemaskini proses perbandaran. Sehubungan itu, fungsi jabatan menjadi semakin penting dan mencabar, terutamanya bagi cadangan pemajuan yang melibatkan kawasan sensitif alam sekitar dan kawasan sensitif geologi. JMG adalah agensi tunggal kerajaan yang mempunyai kepakaran khusus dalam bidang geologi dan bertanggungjawab membekalkan maklumat geologi bagi menilai risiko geobencana dan kesan pembangunan ke atas alam sekitar.

Sepanjang tahun ini JMG telah memberi khidmat nasihat secara aktif dalam aspek kebenaran merancang untuk Pusat Setempat (OSC) kepada PBT di samping memberikan pandangan teknikal kepada pihak swasta terutama kepada pihak pemaju di mana sebanyak 7,041 ulasan OSC telah dikeluarkan.

JMG gives advisory services to government agencies, private sectors and individuals on the aspects of hydrogeology, engineering geology, reviews of land use planning and geoscience information.

Advisory service on hydrogeology covers the licensing of groundwater extraction, approval on natural mineral water sources and giving advice on the potential use of groundwater resources for agriculture, industry and domestic uses. JMG is also a permanent member in the State Water Resources Management Committee, Licensing of Natural Mineral Water Committee and Licensing of Groundwater Resources Committee.

Advisory service on on engineering geology and land use covers the aspects of planning and development of new township, road alignment and land use planning. JMG is also involved in the assessment of areas with geohazard risk and serves as a member in the State Planning Committee, State Disaster Committee, Environmentally Sensitive Areas Committee and High Land and Hillside Development Committee.

One Stop Centre (OSC) Review

Appropriate control of development is very important in this country in order to strengthen and streamline the process of urbanisation. Accordingly, the functions of the department are becoming increasingly more important and challenging, especially in assessing and approving development proposals involving environmentally and geologically sensitive areas. Among the government agencies, JMG is the sole department with specialised expertise in geology and is responsible in providing geological information to assess geohazard risk and the effect of development on the environment.

During the year, JMG has been actively giving advisory services to local authorities through One Stop Centre (OSC) as well as giving technical support to the private sector mainly to the property developers. A total of 7,041 OSC reviews were completed.

Negeri State	Jenis ulasan / Type of review		
	Pusat Setempat One Stop Centre (OSC) (Bil./No.)	Guna tanah Land use (Bil./No.)	Maklumat geosains am General geoscience information (Bil./No.)
Johor	810	-	-
Melaka	180	-	1
Negeri Sembilan	270	4	5
Selangor	2,998	347	205
Perak	395	-	12
Kedah	361	38	-
Pulau Pinang	148	-	-
Perlis	44	-	-
Kelantan	119	58	22
Terengganu	832	33	-
Pahang	884	15	120
Sarawak	-	-	-
Sabah	-	-	-
Jumlah: / Total:	7,041	437	343

Khidmat Nasihat Hidrogeologi Hydrogeology Advisory Services

Negeri State	Bil. ulasan No. of review	Catatan Remarks
Johor	35	Khidmat nasihat kepada Kerajaan Negeri Johor untuk mendapatkan sumber air bawah tanah bagi mengatasi masalah kualiti air Sg. Muar dan Sg. Benut yang tercemar. Khidmat nasihat berkaitan air bawah tanah juga diberi kepada pihak swasta dan juga orang perseorangan. / <i>Advisory services were rendered to Johor State Government for groundwater feasibility study in resolving the problem of polluted Sg. Muar dan Sg. Benut. Technical advice was also provided to private sector and individual pertaining to groundwater resources.</i>
Melaka	6	Menyediakan ulasan teknikal abstraksi air bawah tanah bagi tujuan perlesenan sumber air bawah tanah dan air mineral. Khidmat nasihat berkaitan air bawah tanah juga diberi kepada pihak swasta dan juga orang perseorangan. / <i>Provided technical reviews of groundwater abstraction for the licencing of ground water and mineral water. Technical advice was also provided to private sector and individual pertaining to groundwater resources.</i>
Negeri Sembilan	4	
Selangor	20	Khidmat nasihat kepakaran dan membantu pihak Lembaga Urus Air Selangor (LUAS) dalam memberi ulasan untuk permohonan lesen abstraksi air bawah tanah. Khidmat nasihat berkaitan air bawah tanah juga diberi kepada pihak swasta dan juga orang perseorangan. / <i>Advisory services to Selangor Water Board (LUAS) on groundwater resources and technical reviews on groundwater abstraction licencing. Technical advice was also provided to private sector and individual pertaining to groundwater resources.</i>
Perak	5	Khidmat nasihat berkaitan air bawah tanah kepada agensi kerajaan, pihak swasta dan orang perseorangan. / <i>Technical advice to government agencies, private sectors and individual pertaining to groundwater resources.</i>

Kedah	8	Menyediakan ulasan teknikal potensi sumber air bawah tanah untuk pertanian, domestik, industri dan perlesenan air mineral yang dipohon oleh agensi kerajaan, pihak swasta dan individu. <i>Provided technical review regarding the potential use of groundwater for agriculture, domestic use, industrial sectors and mineral water licencing as requested by government agencies, private sectors and individuals.</i>
Kelantan	18	Menyediakan khidmat nasihat berkaitan perlesenan air mineral serta sumber air bawah tanah. <i>Provide advisory services regarding mineral water licencing and groundwater resources.</i>
Terengganu	2	Khidmat nasihat berkaitan air bawah tanah diberi kepada pihak swasta dan orang perseorangan. <i>Technical advice was provided to private sector and individual pertaining to groundwater resources.</i>
Pahang	3	Khidmat nasihat berkaitan air bawah tanah diberi kepada pihak swasta dan orang perseorangan. <i>Technical advice was provided to private sector and individual pertaining to groundwater resources.</i>
Sabah	9	Khidmat nasihat berkaitan air bawah tanah diberi kepada pihak swasta dan orang perseorangan. <i>Technical advice was provided to private sector and individual pertaining to groundwater resources.</i>
Jumlah: / Total:	110	

Khidmat Nasihat Geologi Kejuruteraan Engineering Geology Advisory Services

Negeri State	Bil. ulasan No. of review	Catatan Remarks
Selangor	2	Siasatan tanah bagi mengetahui keadaan tapak letakan struktur pendasaran bangunan yang berkemungkinan mempengaruhi integriti struktur pangsapuri. / <i>Soil investigation was conducted to ascertain the subsurface ground condition that may have influenced the structural integrity of the apartment.</i>
Perak	7	Khidmat nasihat kepakaran kepada pelanggan berkaitan maklumat geologi kejuruteraan bagi tapak pembinaan. / <i>Advisory services regarding engineering geological information for construction purposes.</i>
Kelantan	10	Berkaitan aspek geologi kejuruteraan. / <i>Advisory services regarding engineering geological information.</i>
Terengganu	9	Khidmat nasihat dan laporan kerja tanah. / <i>Advisory services on engineering geological information pertaining to landuse planning.</i>
Pahang	116	Khidmat nasihat berkaitan isu geologi pembangunan di kawasan-kawasan terpilih Pahang. <i>Advisory services pertaining to geological issues on selected development areas in Pahang.</i>
	5	Ulasan bagi Rancangan Tempatan Daerah (RTD) dan pindaan-pindaan RTD. <i>Reviews for Local Plan (RTD) and RTD Revisions.</i>
Sarawak	8	Khidmat nasihat berkaitan maklumat geologi kejuruteraan <i>Advisory services regarding engineering geological information</i>
Sabah	102	Input geologi kejuruteraan bagi siasatan tapak cadangan pembangunan di kawasan sensitif geologi di Sabah. / <i>Engineering geological input for proposed development site investigation in geological sensitive area in Sabah.</i>
Jumlah: Total :	259	

Khidmat Nasihat Lain

JMG telah dilantik oleh Universiti Sains Malaysia untuk menjalankan kerja-kerja penggerudian di sekitar Bukit Bunuh, Lenggong, Perak bagi menentukan stratigrafi dan ciri-ciri sub-permukaan kesan hentaman meteorit. Sebanyak dua lubang gerudi dengan kedalaman 118 m dan 61.4 m telah berjaya digerudi bagi tujuan tersebut. Teras gerudi yang diperolehi telah dianalisis untuk mengenal pasti jenis batuan dan menentukan perubahan mineral kesan hentaman tersebut.

Khidmat nasihat telah disampaikan melalui Seminar Kajian Geoterma Sebagai Sumber Tenaga Boleh Baharu yang telah dianjurkan di Marriott Hotel, Putrajaya pada 17.02.2012 sebagai kick-off pelaksanaan projek dan untuk memberi kefahaman kepada Ahli Jawatankuasa Pelaksana dan agensi terlibat mengenai kajian geoterma yang akan dilaksanakan. Seminar adalah usahasama JMG Perak, Sustainable Energy Development Authority Malaysia (SEDA) dan Kementerian Sumber Asli dan Alam Sekitar (NRE).

Bagi memberi kefahaman dan meningkatkan kesedaran masyarakat terhadap risiko kejadian batu runtuh berhampiran bukit batu kapur, satu seminar Kesedaran Risiko Batu Runtuh di Kawasan Bukit Batu Kapur Lembah Kinta, Perak telah dianjurkan bersama oleh JMG Perak and Majlis Bandaraya Ipoh (MBI) pada 13 Mac 2012 di Dewan Azlan Shah, MBI.

Seminar Perubahan Aras Laut Kuno – Kefahaman Terhadap Sejarah Pembentukan Bumi telah dianjurkan pada 26 Mac 2012 di Mini Auditorium, Institut Penyelidikan Hidraulik Kebangsaan Malaysia (NAHRIM), Serdang, Selangor. Objektif seminar adalah untuk meningkatkan pengetahuan para peserta terhadap perubahan aras laut kuno implikasi kenaikan aras laut akibat perubahan cuaca. Seminar adalah anjuran bersama JMG Malaysia, Perak, NAHRIM dan Universiti Kebangsaan Malaysia.

Other Advisory Services

JMG has been appointed by the University Science of Malaysia to carry out drilling works at the vicinity of Bukit Bunuh, Lenggong, Perak to determine the stratigraphy and the characteristics of sub-surface effects of meteorite impact. A total of two deep drill holes with depths of 118 m and 61.4 m have been successfully drilled for these purposes. The drill cores obtained were studied for rock type identification and mineral changes due to the meteorite impact.

Advisory services were delivered through a seminar on Geothermal as Renewable Energy Study which was conducted at Marriott Hotel, Putrajaya as a kick-off for the project implementation and for better understanding for the Implementation Committee Member and related agencies on the geothermal study that will be undertaken. The seminar was jointly organized by JMG Perak, Sustainable Energy Development Authority Malaysia (SEDA) and Ministry of Natural Resource and Environment (NRE).

In order to increase public awareness on rockfall risk near limestone hills, an awareness seminar on Rockfall Risk at Limestone Hills in Kinta Valley was jointly organised by JMG Perak and the Ipoh City Council (MBI) on the 13th March 2012 at Dewan Azlan Shah, MBI.

Seminar On Paleo Sea Level Change – Understanding The Earth Formation History was held on 26th March 2012 at Mini Auditorium, National Hydraulic Research Institute of Malaysia (NAHRIM), Serdang, Selangor. The objective of the seminar is to disseminate information on paleo sea level changes and implication of sea level changes due to climate change.

Aktiviti Mineral Mineral Activities

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Photo: Habibah Tahir

Gua Kelawar, Langkawi. / Kelawar Cave, Langkawi.

Aktiviti Mineral Mineral Activities

Aktiviti-aktiviti mineral yang dijalankan oleh JMG melibatkan penilaian sumber mineral berlogam, mineral perindustrian dan mineral tenaga. Di samping itu, JMG juga berperanan membekalkan maklumat komoditi mineral bagi membantu meningkatkan perkembangan industri mineral negara.

Penilaian sumber mineral berlogam dilaksanakan pada peringkat tinjauan dan juga susulan bagi mineral-mineral terpilih. Kajian telah menemui beberapa kawasan berpotensi emas, bijih besi, timah dan mangan. Penilaian sumber mineral perindustrian di beberapa buah negeri pula telah menggariskan kawasan-kawasan yang mempunyai rizab pasir binaan, feldspar, batuan silika, batu kapur dan lempung. Hasil penilaian sumber mineral tenaga yang dijalankan di Sarawak dan Sabah pula telah mengenal pasti beberapa kewujudan dan rizab batu arang yang berpotensi.

Mineral activities carried out by JMG involve resource evaluation for metallic, industrial and energy minerals. Apart from that, JMG also plays a role in providing mineral commodity information to support the development of the nation's mineral industry.

Metallic mineral resource evaluation for selected minerals involved reconnaissance and follow-up survey. As a result, several localities with potential for gold, iron ore, tin and manganese mineralization were delineated. Resource evaluation for industrial minerals in several states has also delineated areas with significant reserves of construction sand, feldspar, silica rock, limestone and clay. For energy minerals, coal resource evaluation in Sarawak and Sabah has identified several potential coal occurrences and reserves.

Mineral Berlogam / Metallic Minerals

Penilaian Sumber Mineral Berlogam

Penilaian tinjauan sumber mineral berlogam telah dijalankan di lima buah negeri iaitu Johor, Negeri Sembilan, Kedah, Kelantan dan Terengganu dengan jumlah liputan kawasan seluas 135 km². Hasil kajian awalan menunjukkan kewujudan berbagai mineral yang berpotensi di kebanyakan negeri.

Penilaian susulan/terperinci sumber mineral berlogam telah dilaksanakan di enam buah negeri iaitu Negeri Sembilan, Perak, Kedah, Pahang, Sarawak dan Sabah dengan jumlah kawasan liputan seluas 184 km². Anomali emas, bijih besi, timah dan mangan telah ditemui di negeri-negeri tersebut.

Metallic Mineral Resources Evaluation

Reconnaissance evaluation for metallic mineral resources was carried out in five states namely Johore, Negeri Sembilan, Kedah, Kelantan and Terengganu covering a total area of 135 km². Preliminary study showed that there are occurrences of potential minerals in most of these states.

Follow-up metallic mineral resource evaluation was carried out in six states namely Negeri Sembilan, Perak, Kedah, Pahang, Sarawak and Sabah covering a total area of 184 km². Gold, iron ore, tin ore and manganese anomalies were identified.

Penilaian sumber mineral berlogam (tinjauan)
Metallic mineral resources evaluation (reconnaissance)

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Tujuan kajian Purpose of study	Catatan Remarks
Johor	Bukit Besar, Jemaluang, Mersing.	10	Tinjauan potensi besi Iron potential survey	Batu ber kandungan tinggi besi dengan nilai Fe antara 27% hingga 36%. / Iron-rich rocks with Fe value between 27% to 36%.
Negeri Sembilan	Titi, Jelebu	53	Tinjauan potensi bijih timah Tin potential survey	Purata SnO ₂ 16,235 ppm. Average SnO ₂ 16,235 ppm.
Kedah	Karangan, Mahang	34	Eksplorasi bijih timah Tin exploration	Kajian tinjauan awal menunjukkan pemineralan bijih timah terdapat di zon batuan metamorf. / Preliminary study suggested tin mineralisation pattern in the metamorphic zone.
Kelantan	Gua Musang, Tanah Merah & Kuala Krai	24	Eksplorasi bijih besi dan mangan Iron ore and manganese exploration	Kewujudan bijih besi dan mangan di sekitar Jajahan Kuala Krai, Gua Musang dan Tanah Merah / Occurrences of iron ore and manganese in Jajahan Kuala Krai, Gua Musang and Tanah Merah.
Terengganu	Sungai Cenderung, Kemaman	14	Eksplorasi bijih timah Exploration for tin	Satu kawasan anomali telah ditemui. An anomalous area was delineated.
Jumlah: / Total:		135		

Penilaian sumber mineral berlogam (susulan / terperinci)
Metallic mineral resources assessment (follow-up / detailed)

Negeri State	Lokasi Location	Liputan Coverage (km ²)	Sasaran Target	Catatan Remarks
Negeri Sembilan	Linggi & Lukut, Port Dickson	53	Anomali timah Tin anomaly	Kawasan Sungai Linggi menunjukkan kandungan konsentrat yang tinggi. / The Sungai Linggi area shows high concentrate content.
Perak	Batu Kurau, Daerah Larut Matang & Selama	4	Potensi mangan Manganese potential	Kajian susulan sumber mangan dengan menggunakan kaedah lelubang. Tujuan kajian adalah untuk menentukan nilai kandungan mangan dan anggaran sumber. / Follow-up study on manganese resources using pitting method. The purpose of this study is to estimate the manganese concentration and resource volume.
Kedah	Kg. Perigi, Yan	2	Potensi besi Iron potential	Singkapan batuan kuartzit dengan pemineralan besi (hematit dan magnetit) telah ditemui. / Outcrops of quartzite containing magnetite and hematite have been found.
Pahang	Jeransang	30	Potensi besi Iron potential	Satu kawasan berpotensi telah ditemui. A potential area was delineated.
	Lanchang	30	Potensi emas Gold potential	Kepingan emas telah dijumpai dalam sedimen konsentrat. Gold flakes were found in stream concentrates.
	Endau	20	Potensi bauksit Bauxite potential	Bauksit bergred rendah. Low grade bauxite.

Sarawak	Gunung Merachi, Serian	17	Anomali emas Gold anomaly	Kawasan berpotensi untuk kajian terperinci. Potential area for detailed survey.
	Gunung Nyendeng, Serian	2	Potensi emas Gold potential	Sejumlah 600 sampel tanah dan 10 sampel batuan telah dikutip. Sampel-sampel sedang dianalisis. A total of 600 soil and 10 rock samples were collected. The samples are still being analyzed.
Sabah	Balung, Tawau	1	Potensi emas Gold potential	Sejumlah 252 sampel tanah dan 54 sampel batuan telah dikutip. Nilai maksimum emas dalam sampel tanah adalah 0.349 ppm dan dalam sampel batuan adalah 0.061ppm. / A total of 252 soil samples and 54 rock samples were collected. The maximum gold value in soil samples was 0.349 ppm and in rock samples was 0.061ppm.
	Wasai-Mansan, Telupid	4	Potensi bauksit Bauxite potential	Sejumlah 33 sampel tanah telah dikutip. Nilai maksimum alumina adalah 34.12 %. / A total of 33 soil samples were collected. The maximum alumina value was 34.12%.
	Sg Mailo, Telupid	21	Potensi bauksit Bauxite potential	Sejumlah 169 sampel tanah telah dikutip. Nilai maksimum alumina adalah 41.95 %. / A total of 169 soil samples were collected. The maximum alumina value was 41.95%.
Jumlah: / Total:		184		



Photo: Saiful Azwan

Pendulangan timah plaser di kawasan Kongkoi, Titi, Negeri Sembilan.
Panning of tin placer in Kongkoi area, Titi, Negeri Sembilan.



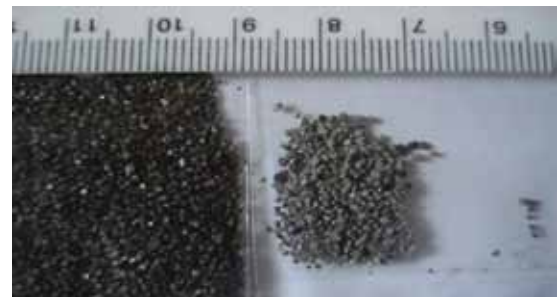
Photo: Fakhruddin Afif

Singkapan kuartzit dan telerang kuarza mengandungi hematit dan magnetit berhampiran kaki Gunung Jerai, Kedah.
Quartzite and quartz vein containing hematite and magnetite found near the foot of Gunung Jerai, Kedah.



Photo: Razimi Ahmad

Butiran emas hasil pendulangan di kawasan Sg. Sampor, Lanchang, Pahang.
Gold flakes in panned concentrate in Sg. Sampor area, Lanchang, Pahang.



Ujian pengenalan bijih timah di lapangan menggunakan zinc disc dan asid HCl, kawasan Sg. Cenderoh, Terengganu.
Recognition test for tin ore in the field using zinc disc and HCl acid at Sg. Cenderoh area, Terengganu.



Photo: Fakhruddin Afif Fauzi

Singkapan kuartzit dengan hematit di kawasan Kampung Perigi, Yan, Kedah.
Quartzite with hematite in Kampung Perigi area, Yan, Kedah.



Photo : Noorazhar Ngatimin

Bungkah batuan kaya besi (bijih besi) di kawasan Bukit Besar, Jemaluang, Mersing, Johor.
Iron rich boulders (iron ore) found in Bukit Besar area, Jemaluang, Mersing, Johor.

Mineral Perindustrian / Industrial Minerals

Penilaian Sumber Mineral Perindustrian

Projek Penilaian Sumber Mineral Perindustrian merupakan sambungan kepada Projek Mineral Perindustrian Semenanjung, Projek Mineral Perindustrian Sarawak dan Projek Mineral Perindustrian Sabah yang telah dijalankan dalam Rancangan Malaysia Ke-9. Kesemua projek telah dilaksanakan secara tinjauan dan susulan bagi kawasan-kawasan yang telah dikenal pasti berpotensi.

Jenis-jenis mineral perindustrian yang dikaji dengan jumlah liputan kawasan masing-masing ialah lempung – 87 km², batuan silika – 56.8 km², feldspar – 1.5 km², Barit – 25 km², pasir binaan – 64 km² dan batu kapur – 3.5 km². Kajian yang dijalankan telah mengenal pasti longgokan sumber mineral perindustrian dengan anggaran rizab bagi pasir binaan 185.5 juta tan metrik, batuan silika 413 juta tan metrik, lempung 297 juta tan metrik dan batu kapur 719 juta tan metrik.

Industrial Mineral Resources Evaluation

The Industrial Mineral Resources Evaluation Projects were continuation of the Peninsular Industrial Mineral Project, Sarawak Industrial Mineral Project and Sabah Industrial Mineral Project that were carried out under the Ninth Malaysian Plan. Both reconnaissance and follow-up surveys were carried out in all potential areas previously identified.

The industrial minerals studied with their respective coverage areas are clay – 87 km², silica rock – 56.8 km², feldspar – 1.5 km², Baryte – 25 km², construction sand – 64 km² and limestone – 3.5 km². Estimated reserves for construction sand (185.5 million tonnes), silica rock (413 million tonnes), clay (297 million tonnes) and limestone (719 million tonnes) were identified from these studies.

Barit Baryte

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Catatan Remarks
Pahang	Jenderak, Kuala Tembeling, Pulau Tawar	25	Analisis makmal sedang dilakukan. Laboratory analysis in progress.

Pasir Binaan Construction Sand

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Catatan Remarks
Sabah	Sandakan	56	Kajian menunjukkan berpotensi digunakan sebagai bahan binaan. Anggaran rizab adalah 70 juta meter padu (185.5 juta tan metrik). The results shows that this area has potential for construction sand. Estimated reserve is about 70 million cubic metres (185.5 million tonnes).
	Sungai Tuaran	8	Tujuh zon dengan jumlah rizab sebanyak 42,000 tan metrik telah dikenal pasti. Keputusan ujian makmal menunjukkan pasir dari Sungai Papar sesuai digunakan sebagai agregat halus dalam kerja-kerja binaan. Seven zones with total reserves of 42,000 tonnes were identified. Results from the laboratory shows that the sand is suitable for use as fine aggregates.
Jumlah : Total :		64	186 juta tan metrik / million tonnes

Feldspar Feldspar

Negeri State	Kawasan Area	Jenis batuan asal Parent rock type	Liputan Coverage (km ²)	Catatan Remarks
Kelantan	Gua Musang (Padang Malim)	Tuf riolit Rhyolitic tuff	1.5	Feldspar di kawasan ini mempunyai nilai purata fluks (Na ₂ O + K ₂ O) 9% Feldspar in this area has an average flux (Na ₂ O + K ₂ O) value of 9%.

Batuan Silika Silica Rock

Negeri State	Kawasan Area	Jenis batuan Rock type	Liputan Coverage (km ²)	Catatan Remarks
Negeri Sembilan	Kemajuan Kg. Sg. Muntoh, Jelebu	Batuan kuarza Quartz rock	0.3	Anggaran rizab: 35.2 juta meter padu (93.3 juta tan metrik). Purata SiO ₂ 98.8% dan berpotensi sebagai ferrosilikon aloi. Estimated reserve: 35.2 million cubic metres (93.3 million tonnes). Average value of SiO ₂ is 98.8% and potential for ferrosilicon alloy.
	Padang Biawas, Kuala Pilah	Batuan kuarza Quartz rock	0.1	Anggaran rizab: 7.3 juta meter padu (19.3 juta tan metrik). Purata SiO ₂ 98.8% dan berpotensi sebagai ferrosilikon aloi. Estimated reserve: 7.3 million cubic metres (19.3 million tonnes). Average value of SiO ₂ is 98.8% and potential for ferrosilicon alloy.
	FELCRA Purun, Jelebu	Batuan kuarza Quartz rock	0.1	Anggaran rizab: 3 juta meter padu (8.0 juta tan metrik). Purata SiO ₂ 98.3% dan berpotensi sebagai ferrosilikon aloi. Estimated reserve: 3 million cubic metres (8.0 million tonnes). Average value of SiO ₂ is 98.3% and potential for ferrosilicon alloy.
	Bukit Tajam, Port Dickson	Batuan kuarza Quartz rock	1.2	Anggaran rizab: 102.7 juta meter padu (272.2 juta tan metrik). Purata SiO ₂ 97.9% dan berpotensi sebagai ferrosilikon aloi. Estimated reserve: 102.7 million cubic metres (272.2 million tonnes). Average value of SiO ₂ is 97.9% and potential for ferrosilicon alloy.
	Ladang Hillside, Seremban	Batuan kuarza Quartz rock	0.1	Anggaran rizab: 0.1 juta meter padu (0.3 juta tan metrik). Purata SiO ₂ 98.6%. Estimated reserve: 0.1 million cubic metres (0.3 million tonnes). Average value of SiO ₂ is 98.6%.
Perak	Hulu Lasah (Daerah Kuala Kangsar)	Kuarza Quartz	1	Permatang kuarza mengandungi silika (SiO ₂) dengan purata 99.1%. Anggaran rizab: 1.13 juta meter padu (3 juta tan metrik). The average of silica (SiO ₂) is 99.1%. Estimated reserve: 1.13 million cubic metres (3 million tonnes).
	Lawin (Daerah Hulu Perak)	Kuarzit Quartzite	2	Permatang kuarzit mengandungi silika (SiO ₂) dengan purata 97.9%. Anggaran rizab: 1.89 juta meter padu (5 juta tan metrik). The average of silica (SiO ₂) is 97.9%. Estimated reserve: 1.89 million cubic metres (5 million tonnes).
Terengganu	Sg. Mas, Kemaman	Kuarza Quartz	1.5	Kajian tinjauan mendapati kawasan ini berpotensi sebagai sumber batuan silika. Reconnaissance survey indicated that this area has the potential for silica rock resources.
Sarawak	Lundu-Sematan, Kuching	Batu rijang Chert	50.5	Tiga kawasan dikenal pasti mempunyai sumber batuan silika. Anggaran rizab: 4.55 juta meter padu (12.05 juta tan metrik). Three areas for silica rock resources have been identified. Estimated reserve: 4.55 million cubic metres (12.05 million tonnes).
Jumlah: Total:			56.8	413.2 juta tan metrik / million tonnes

Batu kapur Limestone

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Catatan Remarks
Kedah	Pulau Timun	3.0	Anggaran rizab adalah sebanyak 596 juta tan metrik dengan beberapa lokaliti ber kandungan magnesium tinggi. Estimated reserve is 596 million tonnes where some localities show high magnesium content.
Perlis	Wang Kelian & Kaki Bukit	0.5	Anggaran rizab adalah sebanyak 123 juta tan metrik di mana kebanyakan kandungan CaCO ₃ adalah ber julat 80%-95%. Estimated reserve is 123 million tonnes, where most of the CaCO ₃ content range from 80% - 95%.
Jumlah: / Total:		3.5	719 juta tan metrik / million tonnes

Lempung Clay

Negeri State	Kawasan Area	Jenis batuan asal Parent rock type	Liputan Coverage (km ²)	Catatan Remarks
Johor	Sungai Perepat, Kota Tinggi		10	Anggaran rizab adalah sebanyak 27.3 juta tan metrik lempung marin dan berpotensi sebagai bahan mentah agregat ringan. Lempung yang dibakar menggelembung antara 6.3% hingga 16.4%. Estimated reserve of marine clay is 27.3 million tonnes and can be used for lightweight aggregates. The clay after firing bloat between 6.3% to 16.4%.
Selangor	Kampung Sungai Lang dan Olak Lempit, Daerah Kuala Langat		9	Dua longgokan telah dikenal pasti dengan anggaran rizab 121 juta tan metrik dan 16 juta tan metrik. Two deposits were identified with estimated reserve of 121 million tonnes and 16 million tonnes respectively.
	Ladang Sg. Buloh dan Sg Talang, Daerah Kuala Selangor		14	Dua longgokan telah dikenal pasti dengan anggaran rizab 52 juta tan metrik dan 81 juta tan metrik. Two deposits were identified with an estimated reserve of 52 million tonnes and 81 million tonnes respectively.
Sarawak	Mukah-Balingan, Mukah	Batuan berargilit Argillaceous rock	54	Longgokan kecil lempung dengan anggaran rizab 105,300 tan metrik telah dikenal pasti. A small deposit of fire clay with an estimated reserve of 105,300 tonnes was identified.
Jumlah: / Total:			87	297.4 juta tan metrik / million tonnes



Photo: Fadzrul Hafith Margono

Sampel lempung marin di kawasan Sungai Perepat, Kota Tinggi, Johor.
 Marine clay samples from Sungai Perepat area, Kota Tinggi, Johor.



Photo: Khairul Zaman Ibrahim

Bebola lempung marin dari kawasan Sungai Perepat, Kota Tinggi, Johor selepas pembakaran.
 Calcined marine clay from Sungai Perepat, Kota Tinggi, Johor.



Photo: Saiful Azwan

Persampelan batuan kuarza menggunakan mesin pemecah batu di Kg. Sg. Muntoh, Titi, Negeri Sembilan.
 Sampling of quartz rocks using pneumatic hammer in Kg. Sg. Muntoh, Titi, Negeri Sembilan.



Photo: Azmi Abu Bakar

Panorama permatang kuarza di kawasan Hulu Lasah, Perak.
 Panoramic view of quartz ridge in Hulu Lasah area, Perak.



Sumber feldspar di Padang Malim, Gua Musang, Kelantan.
Feldspar resources in Padang Malim, Gua Musang, Kelantan



Batu kapur berlapis Formasi Setul yang mempunyai tekstur stilolit di kawasan Wang Kelian, Perlis.
Bedded limestone of Setul Formation with stylolitic texture at Wang Kelian area, Perlis.



Photo: Japri Bujang

Longgokan lempung kawasan Rh Awing, Mukah, Sarawak.
Fire clay deposit at Rh. Awing area, Mukah, Sarawak.



Batu kapur Formasi Setul berwarna kelabu gelap, bertekstur halus dan mengandungi mikro-teleraung kalsit serta tekstur stilolit dari kawasan Wang Kelian, Perlis.
Grey colour and fine-grained limestone of Setul Formation with stylolitic texture and calcite veinlets from Wang Kelian area, Perlis.



Persampelan pasir menggunakan peralatan cekau di Sungai Tuaran, Sabah.
Sand sampling by using grap sampler at Tuaran River, Sabah.

Mineral Tenaga

Energy Mineral

Penilaian Sumber Batu Arang

Penilaian sumber batu arang telah dilaksanakan di negeri Sarawak dan Sabah yang masing-masing meliputi jumlah keluasan 60 km² dan 30 km². Eksplorasi batu arang pada peringkat tinjauan di Sarawak melibatkan kawasan Tunoh, Kapit dalam Formasi Nyalau. Ketebalan lapisan batu arang tersebut berjulat dari 0.2 m ke 1.30 m dan menunjukkan tekstur grafitik.

Di Sabah, kajian batu arang telah dilaksanakan di Blok Susui dan Sg. Naundung, Kalabakan. Unjuran tambahan lipit batu arang sejauh 500 m telah dijangka di kawasan Blok Susui berdasarkan tafsiran survei geofizik. Manakala di kawasan Sg. Naundung, satu lipit batu arang telah ditemui berketebalan satu meter yang mempunyai gred *high volatile bituminous coal*.

Coal Resources Evaluation

Coal evaluation was carried out in Sarawak and Sabah covering a total area of 60 km² and 30 km² respectively. Reconnaissance coal exploration in Sarawak involved re-assessment of coal resources in Nyalau Formation in Tunoh area, Kapit. The thickness of coal seam in this area ranges from 0.2 m to 1.3 m and the coal shows graphitic textures.

In Sabah, coal exploration was conducted in Susui Block, Pinangah area and in Sg Naundung, Kalabakan area. Based on geophysical interpretation, an additional length of 500 m of coal seam in Susui Block was inferred. While in Sg Naundung, a one-metre coal seam of *high volatile bituminous coal* grade was encountered.

Batu arang Coal

Negeri State	Kawasan Area	Liputan Coverage (km ²)	Gred Grade	Catatan Remarks
Sarawak	Tunoh, Kapit	60	Batu arang jenis ' <i>High Volatile Bituminous Coal</i> ' <i>High Volatile Bituminous coal type</i>	22 singkapan batu arang berketebalan antara 0.2 m sehingga 1.3 m. 22 coal outcrops with thicknesses ranging from 0.2 m to 1.3 m.
Sabah	Blok Susui Pinangah, Sabah	5	Batu arang jenis ' <i>High Volatile Bituminous Coal</i> ' <i>High Volatile Bituminous coal type</i> .	Unjuran lipit batu arang sejauh 500 m dijangka wujud di kawasan kajian berdasarkan tafsiran survei geofizik. An additional seam extension of 500 m is expected in the area based on geophysical survey.
	Sg. Naundung/ Sempadan Sabah-Kalimantan	25	Batu arang jenis ' <i>High Volatile Bituminous Coal</i> ' <i>High Volatile Bituminous coal type</i> .	Satu lipit batu arang setebal satu meter dijumpai di kawasan ini. A one-metre thick bright coal seam encountered in the area.
Jumlah : / Total :		90		



Photo: Nightingale Lian

Survei geofizik menggunakan kaedah keberintangan elektrik di kawasan Pinangah, Sabah.
Geophysical survey using resistivity method in Pinangah area, Sabah.



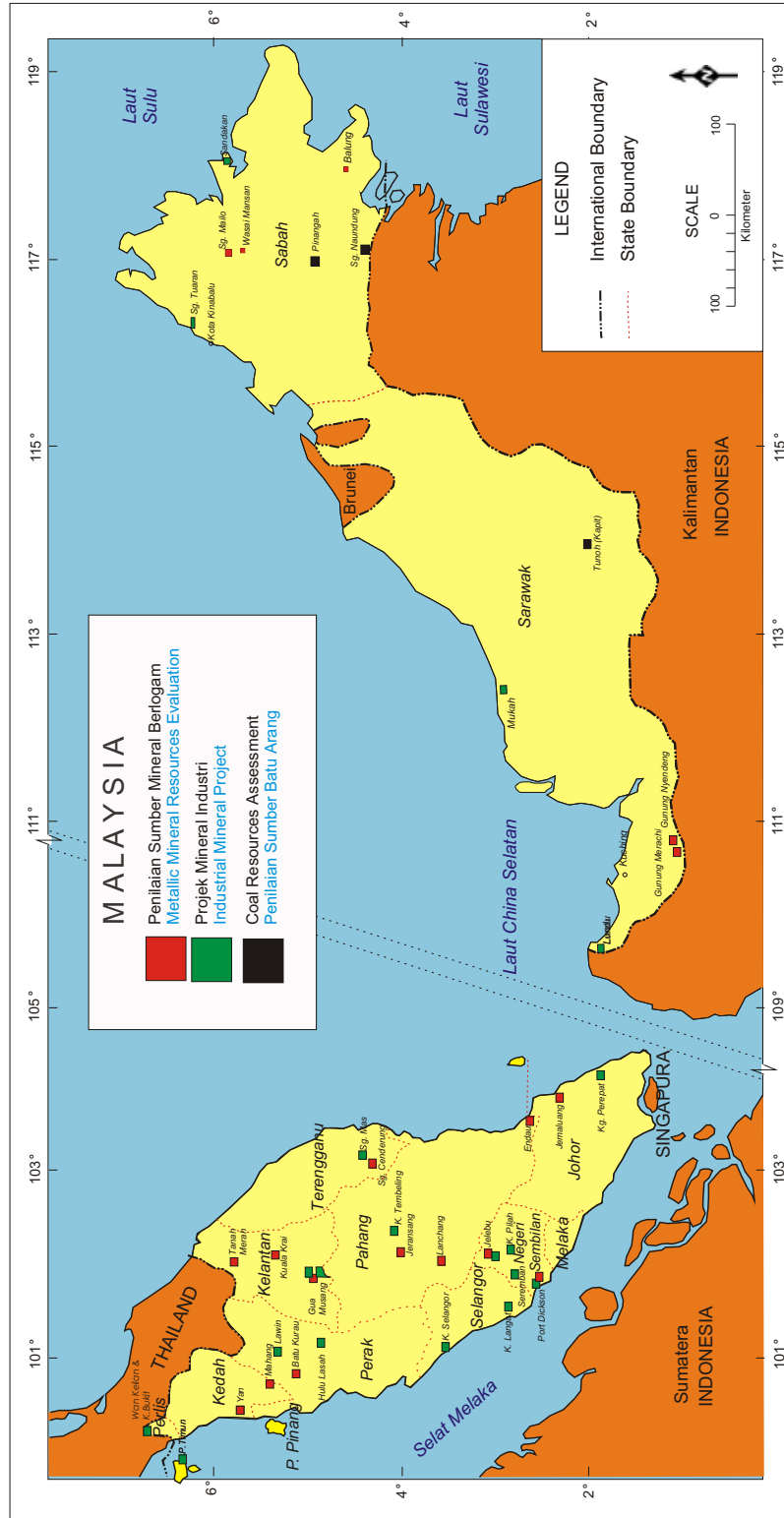
Photo: Chung Pit Soon

Lapisan batu arang di Ulu Sg. Naunding, Tawau, Sabah.
Coal seam at Ulu Sg. Naunding, Tawau, Sabah.



Photo : Joseph Jubin Aro

Singkapan batu arang di Sg. Sagan, Tunoh, Sarawak.
Coal outcrop at Sg. Sagan, Tunoh, Sarawak.



AKTIVITI SUMBER MINERAL, 2012
MINERAL RESOURCES ACTIVITIES, 2012

Ekonomi Mineral / Mineral Economics

Pada tahun 2012, Jabatan Mineral dan Geosains Malaysia (JMG) telah menyediakan maklumat dan analisis komoditi mineral yang meliputi pengumpulan, penyusunan dan penyebaran maklumat mengenai eksplorasi, perlombongan, pengkuarian, pengeluaran mineral, dagangan, pelaburan dan status perkembangan industri-industri berasaskan mineral. Seperti tahun-tahun sebelumnya, JMG menerbitkan lima laporan iaitu Malaysian Minerals Yearbook, Industrial Mineral Production Statistics and Directory of Producers in Malaysia, Malaysian Mining Industry, Malaysian Mineral Trade Statistics dan Review of Mineral-Based Industries in Malaysia. Selain dari menjalankan tugas rutin ini, JMG juga menjalankan kajian komoditi mineral untuk bijih besi iaitu di bawah Rolling Plan Pertama (2011/2012) RMKe-10.

Bagi tahun 2012, JMG meneruskan sumbangannya dalam penyediaan input mengenai status mineral kepada agensi-agensi kerajaan untuk digunakan mengikut keperluan masing-masing. Antara tujuannya adalah untuk kiraan sumbangan sektor perlombongan kepada ekonomi negara oleh Bank Negara dan imbalan tenaga negara oleh Pusat Tenaga Negara. JMG juga telah mengedarkan sejumlah 720 naskah laporan berkala Statistik Bulanan Industri Perlombongan Malaysia kepada semua pejabat JMG negeri dan agensi-agensi lain yang berkaitan.

In the year 2012, the Minerals and Geoscience Department (JMG) provided information and analysis of mineral commodities involving the collection, collation and distribution of information related to exploration, mining, quarrying, mineral production, commercial investment and the development status of mineral-based industries. As in previous years, JMG continued with the publication of the Malaysian Minerals Yearbook, Industrial Mineral Production Statistics and Directory of Producers in Malaysia, Malaysian Mining Industry, Malaysian Mineral Trade Statistics and Review of Mineral-based Industries in Malaysia. Apart from these routine activities, JMG also conducted a mineral commodity study for iron ores under the First Rolling Plan (2011/2012) of the 10th Malaysian Development Project.

For the year 2012, JMG continued to provide periodical inputs on the status of minerals to the Ministry of Natural Resources and Environment (NRE) and other government agencies such as the Malaysian Tin Board, Treasury Department, Central Bank of Malaysia, Finance Ministry, Department of Statistics, Pusat Tenaga Malaysia, MIDA and MITI. The inputs were used among others to calculate the calculation of the mineral sector to the country's economy as well as in the formulation of the national energy balance. JMG have distributed 720 copies of the Monthly Statistics Report on the Mining Industry in Malaysia to state JMG offices and other relevant agencies.

JMG juga merupakan pusat rujukan bagi harga komoditi mineral. Tahun 2012 telah memberi cabaran kepada JMG dalam kompilasi harga komoditi mineral di mana harga komoditi mineral sentiasa berubah terutamanya harga emas. Selain menerima pertanyaan dari pihak luar, JMG juga menyediakan laporan mingguan harga komoditi mineral yang untuk pembentangan dalam Mesyuarat Pasca-Kabinet bersama Kementerian Sumber Asli dan Alam Sekitar.

Peranan JMG dalam menyalurkan input berkaitan industri mineral meliputi peringkat antarabangsa di mana input-input telah disediakan bagi membantu kerajaan dalam pelbagai mesyuarat, perjanjian dan misi pelaburan seperti dalam forum Perjanjian Dagangan Bebas, Pertubuhan Dagangan Dunia, dagangan dua hala dan hubungan antarabangsa. Dalam hubungan ini sejumlah 7 ikhtisar negara telah disediakan dalam tahun 2012. Di peringkat ASEAN, dua orang pegawai kanan telah menghadiri mesyuarat Kumpulan Kerja Teknikal ASOMM Ke-9 pada 25-28 September 2012 dan juga mesyuarat ASOMM Ke-12 (ASEAN Senior Officials Meeting in Minerals) pada 5-6 Disember 2012 dan kedua-dua mesyuarat ini telah diadakan di Brunei Darussalam. Malaysia telah membentangkan dua kertas kerja teknikal dalam mesyuarat tersebut.

Dalam hubungan kerjasama dua hala Malaysia-Indonesia, JMG bertindak sebagai urusetia dalam penganjuran mesyuarat dan kelancaran pelaksanaan program-program teknikal yang telah dipersetujui. Beberapa pegawai JMG telah menghadiri mesyuarat Kerjasama Saintifik dan Teknikal dalam bidang Geologi dan Sumber Mineral antara Malaysia dan Indonesia yang telah diadakan di Kota Kinabalu, Sabah pada 3-6 Julai 2012. JMG juga telah terlibat dalam pelaksanaan aktiviti-aktiviti seperti kerja lapangan korelasi geologi yang telah diadakan dalam tahun yang sama.

JMG continued to play its role as the reference centre for prices of mineral commodities. 2012 has been a challenging year for JMG in the compilation of information on mineral commodity prices due to constant market fluctuations especially in the price of gold. Other than public enquiries, JMG also prepared weekly data on mineral commodity prices which were traded in the Kuala Lumpur Tin Market (KLTM) and London Metal Exchange (LME) for the presentation by the Director General in post-cabinet meetings with the Ministry of Natural Resources and Environment.

JMG played its contributory role in the global arena where mineral industry inputs prepared by the Department were used by the Malaysian government in various meetings, agreements and trade investment missions and in forums such as the Free Trade Agreement (FTA), World Trade Organisation (WTO), bilateral trade and international cooperation. In this context, a total of seven country briefs were prepared in 2012. At the ASEAN level, two senior JMG officers attended the 9th ASOMM (ASEAN Senior Officials Meeting in Minerals) Working Group Meeting and the 12th ASOMM Senior Official Meeting which was held from 25-28th September 2012 and from 5-6th December 2012 respectively in Brunei Darussalam. Malaysia presented two technical papers in the meetings.

In the Malaysia-Indonesia bilateral scientific cooperation programme, JMG acted as the secretariat to oversee the organisation of steering committee meetings and the smooth implementation of technical programmes that have been agreed upon by both countries. A number of JMG officers attended the Malaysia-Indonesia meeting on Scientific and Technical Cooperation in the field of Geology and Mineral Resources held in Kota Kinabalu, Sabah on 3-6th July 2012. JMG was also involved in the implementation of field work on the geological correlation which was also held in the same calendar year.

JMG secara berterusan membantu dan memberi kerjasama kepada Kementerian Sumber Asli dan Alam Sekitar (NRE) dalam urusan berkaitan pembangunan mineral. Dalam Mesyuarat Majlis Tanah Negara 2012, JMG telah menyediakan satu kertas kerja. JMG telah menghadiri 67 mesyuarat Jawatankuasa Permit Eksport Mineral (JAPEM). Jawatankuasa ini diketuai oleh NRE bertanggungjawab mengeluarkan permit eksport mineral. Pegawai JMG juga adalah ahli Pasukan Petugas Pasir Kebangsaan (National Sand Task Force) yang diterajui NRE bagi menangani isu pergerakan pasir di dalam dan ke luar negara. JMG juga terlibat dalam Jawatankuasa Teknikal Bagi Menjadikan Industri Mineral sebagai salah satu sektor National Key Economic Area (NKEA).

Dalam menjalinkan hubungan jabatan dengan pihak industri, pegawai-pegawai JMG berterusan melakukan lawatan-lawatan kerja ke lombong-lombong dan juga industri-industri berasaskan mineral. Lawatan ini juga adalah salah satu cara JMG memperolehi maklumat dan maklumbalas berkaitan dengan pembangunan, penggunaan bahan mineral dan produk-produk hiliran berasaskan mineral yang dihasilkan terutamanya industri-industri baru. Dalam tahun 2012, lawatan telah dilakukan ke enam industri berasaskan mineral, 27 lombong dan dua kuari. Dalam tempoh yang sama JMG juga telah menerima sejumlah 127 pertanyaan berkenaan mineral dari dalam dan luar negara.

JMG continued to assist and cooperate with the Ministry of Natural Resources and Environment (NRE) in matters pertaining to the development of minerals. In the 2012 National Land Council meeting, JMG have presented one technical paper. JMG have also attended 67 Minerals Export Permit Committee meetings during the year. The committee headed by NRE is responsible in issuing mineral export permits. JMG is also a member of the National Sand Task Force responsible in handling issues related to sand movement within and out of the country. JMG was also involved in the Technical Committee to include mineral industry as one of National Key Economic Area (NKEA).

To establish close rapport with industry, JMG officers continually made working visits to various mines and mineral-based industries in the country to collect information related to the development and utilization of minerals, as well as the production of value-added downstream mineral products. For the year 2012, JMG officers visited six mineral-based industries, 27 mines and two quarries. For the same period, JMG received and processed a total of 127 enquiries on minerals from within the country and also from abroad.





Lawatan ke lombong bijih besi Syarikat Limemax, Kota Tinggi, Johor.
Visit to iron ore mine Limemax Company, Kota Tinggi, Johor.



Lawatan ke Kuari Hap Seng, Tawau, Sabah.
Visit to Hap Seng Quarry, Tawau, Sabah.

Khidmat Nasihat Mineral Mineral Advisory Services

Berbagai khidmat nasihat telah diberikan kepada Pihak Berkuasa Negeri dan pihak swasta berkenaan dengan guna tanah dan pembebasan mineral. Pertanyaan daripada pelanggan berkaitan maklumat mineral juga telah dilayani sama ada secara lisan atau ulasan bertulis.

Various advisory services were given to State Local Authorities as well as the private sector pertaining to land use and mineral clearance. Enquiries on mineral information from interested parties or individuals were also attended to either verbally or as written.

Pejabat JMG JMG Office	Khidmat nasihat mineral Mineral advisory services		
	Ulasan guna tanah Landuse review (bil. / no.)	Ulasan pembebasan mineral Mineral clearance review (bil. / no.)	Pertanyaan Enquiries (bil. / no.)
Ibu Pejabat	-	-	127
Johor	39	296	18
Melaka	-	-	-
Negeri Sembilan	142	-	27
Selangor	24	19	12
Perak	104	193	54
Kedah	71	7	10
Pulau Pinang	1	-	9
Perlis	14	-	4
Kelantan	18	134	20
Terengganu	130	68	59
Pahang	97	66	-
Sarawak	9	1	5
Sabah	91	-	15
Jumlah perkhidmatan Total no. of services	740	784	360

Aktiviti Lombong Dan Kuari Mine And Quarry Activities

Pembangunan Lombong dan Kuari <i>Mine and Quarry Development</i>	88
Kawalseliaan dan Penguatkuasaan <i>Monitoring and Enforcement</i>	91
Khidmat Nasihat Lombong dan Kuari <i>Mine and Quarry Advisory Services</i>	95

Photo: Ling Nan Ley

Tasik Biru yang indah di Bau, Kuching, Sarawak telah terbentuk daripada pit lombong emas dedah. Pit lombong ini yang berkedalaman 120 m ialah pengeluar emas terbesar dalam sejarah di kawasan perlombongan emas Bau.

The picturesque Tasik Biru or literally means 'blue lake' in Bau, Kuching, Sarawak was formed from a open cast gold mining pit. The mining pit, with a depth of 120 m was the biggest historical producer of gold in the Bau gold mining area.

Aktiviti Lombong dan Kuari Mine and Quarry Activities

Pembangunan Lombong dan Kuari Mine and Quarry Development

Jabatan juga memberi perkhidmatan teknikal dan kepakaran dalam bidang perlombongan, pengkuarian dan pemprosesan mineral. Perkhidmatan pakar seperti penyediaan garis panduan dan peraturan mengenai keselamatan, pemulihan tanah lombong dan pengendalian bahan letupan dan bahan toksik dilaksanakan oleh Cawangan Perkhidmatan Lombong dan Kuari di Bahagian Perkhidmatan Teknikal. Ini termasuk mengendalikan latihan kepada pegawai dan kakitangan dalaman serta juga agensi-agensi kerajaan lain. Selain itu cawangan itu juga bertanggungjawab sebagai Urusetia bagi pengendalian peperiksaan pembedil jabatan. Ini melibatkan penyediaan dan penyemakan soalan peperiksaan serta menjalankan ujian amali di lapangan dengan kerjasama pejabat JMG negeri.

Perundangan dan garis panduan

Dalam tahun 2012, JMG telah terlibat dalam penyediaan menggubal peraturan baru, menyediakan draf garis panduan dan menyemak draf peraturan seperti berikut:

- menggubal satu peraturan baru, Peraturan Pembangunan Mineral (Pemprosesan Mineral)
- menyediakan dua draf garis panduan Pemantauan Habuk Terampai menggunakan alat 'High Volume Sampler (HVS)' dan Persampelan Habuk Termendap menggunakan alat 'Dustfall Deposition Gauge (DDG)'
- menyemak dua draf peraturan iaitu Peraturan-Peraturan Pembangunan Mineral (Efluen) dan Peraturan-peraturan Pembangunan Mineral (Peletupan)

The department also provides technical and expert services in the fields of mining, quarrying and mineral processing. Expert services such as the formulation of guidelines and regulations pertaining to safety, rehabilitation of mining land and handling of explosive and toxic materials are carried out by the Mine and Quarry Services Section of the Technical Services Division. This includes organising training for staff in the department as well as for other government agencies. The section also acted as the secretariat for the department shotfirer examination. This involves the preparation and reviewing of examination papers and conducting practical tests at sites in collaboration with the JMG State Offices.

Legislation and guidelines

In the year 2012, JMG was involved in the drafting of amendments to laws and guidelines with regards to mining and quarrying as follows:

- drafting a new regulation, Mineral Development Regulations (Mineral Processing)
- drafting two guidelines on Suspended Dust Monitoring using 'High Volume Sampler (HVS)' and Sampling of Deposited Dust using 'Dustfall Deposition Gauge (DDG)'
- reviewing two draft regulations namely Mineral Development Regulations (Effluent) and Mineral Development Regulation (Blasting)

Urusetia peperiksaan pembedil jabatan

Tujuan peperiksaan pembedil jabatan adalah untuk menilai tahap kompetensi bakal pembedil di dalam industri perlombongan dan pengkuarian negara. Peperiksaan ini menguji aspek teori dan amali. Hanya mereka yang lulus kedua-dua peperiksaan teori dan amali sahaja diiktiraf telah mencapai tahap kompetensi minima sebagai pembedil dan melayakkannya menjalankan kerja-kerja peletupan di lombong dan kuari.

Peperiksaan teori pembedil telah dijalankan sebanyak 3 siri iaitu pada bulan April, Julai dan Oktober dan melibatkan seramai 138 orang calon. Bagi peperiksaan amali pula, Bahagian Perkhidmatan Teknikal dengan kerjasama pejabat JMG negeri telah mengendalikan 5 ujian amali bagi menilai 26 orang calon.

Secretariat for department shotfirer examination

The Department shotfirer examination was conducted to assess the competency of potential shotfirers in the mining and quarrying industry. Only those who pass both the theoretical and practical examinations are deemed to have achieved the minimal competency level to be a licensed shotfirer and qualified to do blasting works in mines and quarries.

Three series of shotfirer examinations (theory) were carried out in April, July and October and involved a total of 138 candidates. For the shotfirer practical exam, the Technical Services Division in collaboration with the state JMG offices conducted 5 practical tests to evaluate 26 candidates.

Peperiksaan Pembedil (Teori) Explosive Examination (Theory)

Peperiksaan Pembedil (Teori) Explosive Examination (Theory)	Pusat peperiksaan Examination centre	Bilangan calon Number of candidates	Lulus Passed
Session 1/2012 (5 April 2012)	7	43	32
Session 2/2012 (12 July 2012)	3	49	25
Session 3/2012 (11 October 2012)	8	46	29

Pengauditan kepatuhan

Dua pengauditan kepatuhan kepada penggunaan borang-borang pemeriksaan lombong dan kuari telah dijalankan di JMG Selangor dan JMG Negeri Sembilan dan Melaka. Pengauditan kepatuhan dijalankan adalah untuk menilai kesesuaian penggunaan borang-borang pemeriksaan lombong dan kuari. Borang pemeriksaan ini adalah untuk merekodkan tahap keselamatan serta pengawalan alam sekitar di lombong dan kuari.

Compliance auditing

Two compliance audits were done on the use of mine and quarry inspection form at JMG Selangor and JMG Negeri Sembilan and Melaka. Compliance auditing was done to assess the suitability of the usage of mine and quarry inspection forms. The forms are used as a means to record the occupational safety and health level as well as the environmental control in mines and quarries.

Latihan

JMG telah memberi latihan bagi mempertingkatkan pengetahuan dan kemahiran pegawai terutamanya dalam aspek pengawalseliaan dan penguatkuasaan lombong dan kuari. Dalam tahun 2012, empat kursus / bengkel telah dijalankan.

Kursus / Bengkel Course / Workshop	Tarikh & Tempat Date & Venue	Peserta Participants
Bengkel Perlaksanaan Peraturan Pembangunan Mineral (Skim Pengendalian Melombong, Buku Rekod dan Pelan) Implementation of Mineral Development Regulation (Mining Operational Scheme, Record Books and Plan)	16 -18 April 2012 Kuala Lipis, Pahang	21 orang Pegawai Galian dari pejabat JMG seluruh Malaysia. 21 Mine Officers from all JMG offices.
Kursus Penguatkuasaan/Pemantauan Mineral dan Bahan Batuan yang dieskpot Course on Enforcement/Monitoring of Mineral and Rock Material export	5-7 June 2012 Johor Bahru, Johor	28 orang Penolong Pegawai Galian, Pembantu Galian dan kakitangan JMG Johor yang terlibat dengan tugas pemeriksaan di CIQ. 28 Assistant Mine Officers, Mine Assistants and JMG Johor staff who involved in CIQ inspection.
Kursus Penutupan Lombong Mine Closure Course	3-6 September 2012 Lumut, Perak	23 orang Pegawai Galian dan Pegawai Penyelidik dari semua pejabat JMG. 23 Mine Officers and Research Officers from all JMG offices.
Kursus Persampelan Efluen Effluent Sampling Course	9-11 October 2012 Ipoh, Perak	29 orang Pembantu Galian dan Pembantu Penyelidik. 29 Mine Assistants and Research Assistants.

Pemantauan kualiti udara

Dalam tahun 2012, sebanyak 62 kerja pengukuran kualiti udara telah dijalankan. Kerja-kerja pemantauan habuk telah dilaksanakan di kuari-kuari, loji pemprosesan mineral, kawasan perumahan dan pelupusan sisa industri dan tapak binaan di sekitar negeri Perak. Jumlah kutipan hasil bagi kerja itu adalah sebanyak RM15,500. Kerja pemantauan ini dijalankan atas permintaan daripada pihak industri dan juga konsultan alam sekitar sebagai memenuhi syarat kelulusan EIA.

Di samping kerja-kerja pemantauan kualiti udara, enam analisis ke atas sampel air yang mengandungi habuk telah dijalankan bagi pihak jurutera perunding. Sampel habuk ini diperolehi melalui kaedah Dustfall Deposition Gauge yang dikendalikan oleh pihak jurutera perunding itu sendiri ke atas kilang Pahang Cement di Kuantan, Pahang dan juga kuari Imerys Minerals (M) Sdn Bhd, Ipoh. Nilai kutipan hasil yang telah diperolehi bagi khidmat analisis yang telah dijalankan ialah sebanyak RM480.

Trainings

JMG also provides training to increase knowledge and expertise of officers, especially in the monitoring and enforcement activities. In the year 2012, four courses/workshops were conducted.

Air quality monitoring

In the year 2012, 62 air quality measurements were carried out. These dust monitoring works were carried out in quarries, mineral processing plants, housing and industrial waste disposal areas and construction sites. The total revenue collected for these works were RM15,500. The monitoring works were conducted upon request by the industry and environmental consultants in order for them to fulfil the approval conditions of EIA.

In addition to the work of the air quality monitoring, six analyses on water samples containing the dust from engineering consultants were also conducted. The Deposition Dustfall Gauge samples were collected by the consultants from Pahang Cement plant in Kuantan, Pahang and Imerys Minerals (M) Sdn Bhd Quarry, in Ipoh, Perak. The total revenue collected for these analysis works was RM480.

Hasil Kerja Work Output

Jenis pemantauan Type of monitoring	Bilangan kerja / Work quantity				Nilai kerja Work value * (RM)
	Agensi kerajaan Government agencies		Sektor swasta * Private sector		
	JMG	Luar Jabatan Other Department	Lombong & Kuari Mine & Quarry	Perumahan Housing	
Habuk / Dust	-	-	-	-	-
i. HVS	-	-	32	24	15,500
ii. DDG (analisis)	-	-	3	-	480
Gegaran / Shake	-	-	-	-	-
Ledakan Udara / Air Blast	-	-	-	-	-
Bunyi / Noise	-	-	-	-	-
Jumlah / Total	-	-	35	24	15,980

Kawalseliaan dan Penguatkuasaan Monitoring and Enforcement

Industri perlombongan dan pengkuarian terus menunjukkan prestasi yang memberangsangkan dalam tahun 2012. Terdapat sebanyak 178 buah lombong, 312 kuari serta 120 peniaga bijih dan loji pemprosesan mineral beroperasi pada akhir tahun 2012.

Antara fungsi jabatan adalah untuk menentukan aktiviti perlombongan mineral dan aktiviti berkaitan dijalankan secara selamat, efisien dan memenuhi standard alam sekitar dan amalan kejuruteraan terbaik. Ini termasuk membuat pemeriksaan ke atas operasi perlombongan dan pengkuarian, pengeluaran kelulusan operasi dan lesen di samping memberi perkhidmatan khidmat nasihat serta kepakaran.

Pemeriksaan Teknikal Operasi Lombong dan Kuari

Tugas penguatkuasaan undang-undang dan kawalseliaan operasi perlombongan, pengkuarian dan pemprosesan mineral melibatkan pemeriksaan di lapangan. Ia bertujuan memastikan pematuhan syarat-syarat lesen atau kelulusan berkaitan keselamatan dan penjagaan alam sekitar. Pemeriksaan ini juga adalah sebahagian daripada proses penyediaan laporan untuk permohonan-permohonan tenemen mineral, kerja peletupan dan sebagainya seperti aduan atau kejadian kemalangan di lombong dan kuari.

The mining and quarrying industry continue to show a vibrant performance during the year 2012. There were a total of 178 mines, 312 quarries as well as 120 ore dealers and mineral processing plant operating at the end of 2012.

Among the functions of the department is to ensure that mining of minerals and related activities are carried out safely, efficiently and conforming to the environmental standards and best engineering practices. This includes inspection of mine and quarry operations, issuance of operational approvals and licences as well as providing advisory and expert services.

Technical Inspections of Mine and Quarry Operations

Technical inspection of mining, quarrying and mineral processing operations is to ensure compliance of the conditions stipulated in the licences or approvals with regard to the safety and the protection of the environment. The field inspection or investigation is also a prerequisite for the preparation of report pertaining to the application for mineral tenements, blasting works approval, complaints and mine or quarry accidents.

Dalam tahun 2012, sejumlah 2,882 pemeriksaan teknikal telah dilaksanakan meliputi sebanyak 1,325 pemeriksaan ke atas operasi perlombongan, 1,202 pemeriksaan ke kuari, 172 pemeriksaan ke kilang amang (hasil samping perlombongan bijih timah) dan loji pemrosesan mineral, dan 183 pemeriksaan ke atas urusan pemegang lesen bijih mineral dan emas mentah.

Tambahan kepada pengawalseliaan ke atas kerja peletupan yang dijalankan di lombong dan kuari, pihak JMG juga dirujuk oleh Pihak Berkuasa Tempatan untuk membantu menilai serta memantau kerja-kerja peletupan yang dijalankan dalam kawasan pembangunan. Sebanyak 255 kerja peletupan projek pembangunan telah diperiksa dan dinilai sepanjang tahun. Kebanyakan pemeriksaan teknikal tapak peletupan selain kuari ini adalah di Selangor, Pulau Pinang, Sabah dan Perak.

Pemantauan dan Kawalseliaan Aktiviti Perlombongan dan Pengkuarian

Tugas pemantauan dan pengawalseliaan yang dijalankan ke atas aktiviti perlombongan dan pengkuarian adalah untuk memastikan aktiviti perlombongan dan pengkuarian dijalankan secara teratur dan sistematik, mengikut amalan kejuruteraan terbaik dan mematuhi peruntukan perundangan. Aspek keselamatan operasi perlombongan adalah tertakluk di bawah Akta Pembangunan Mineral 1994 dan Enakmen atau Ordinan Perlombongan Negeri manakala bagi operasi pengkuarian pula adalah tertakluk kepada Peraturan Kuari Negeri.

Operasi perlombongan dan pengkuarian pada lazimnya akan memberi kesan kepada alam sekitar. Oleh itu, adalah penting operasi tersebut melaksanakan langkah secukupnya untuk menangani kemungkinan pencemaran terhadap air dan udara serta kesan gegaran bumi dan kebingitan bunyi akibat kerja peletupan. Justeru itu bagi memastikan aktiviti perlombongan dan pengkuariaan dijalankan dengan baik, kerja pemantauan berkala telah dilakukan. Sepanjang tahun 2012, sebanyak 50 persampelan efluen lombong dan 399 kerja pemantauan gegaran dan peletupan telah dijalankan.

In 2012, a total of 2,882 technical inspections were carried out which cover 1,325 inspections on mining operations, 1,202 on quarries, 172 inspections on amang (tin mining by-product) and mineral processing plant operations and 183 on mineral ores and raw gold licence holders.

In addition to the supervision of the blasting works carried out in mines and quarries, the state JMG offices were also referred to by the Local Authorities to assist in the evaluation and monitoring of blasting activities in development areas. A total of 255 development project blasting works were assessed and evaluated during the year. Most of the blasting sites inspected were in Selangor, Pulau Pinang, Sabah and Perak.

Monitoring and Supervision of Mine and Quarry Activities

The task of monitoring and supervising mine and quarry activities is to ensure that these activities are carried out in an orderly and systematic manner in accordance to best engineering practices and in compliance with the provisions of the laws and regulations. Safety aspects of mining operations come under the purview of the Mineral Development Act 1994 and State Mining Enactments or Ordinances while quarry operations come under State Quarry Rules.

Mine and quarry operations usually will have an impact on the environment. Therefore it is important for such operations to implement adequate measures to mitigate potential water and air pollution as well as the impact of ground vibration and air blast (noise) due to blasting. Thus, to ensure that mine and quarry activities are carried out properly, periodic monitorings were conducted. A total of 50 mine effluent samplings and 399 vibration and blast monitorings were conducted during 2012.

Pihak jabatan amat mengambil perhatian terhadap aduan pihak awam berkaitan aktiviti perlombongan dan pengkuarian. Semua aduan yang diterima akan disiasat dan diberikan perhatian sewajarnya dengan segera. Sejumlah 69 aduan telah diterima dan disiasat manakala sebanyak 43 perintah dan arahan telah dikeluarkan kepada pengusaha.

Pelesenan

Di bawah Akta Pembangunan Mineral (APM) 1994, pemegang pajakan melombong hendaklah mengemukakan dan mendapatkan kelulusan bagi suatu skim pengendalian melombong daripada Pengarah Galian sebelum sebarang operasi pembangunan dan perlombongan dilaksanakan. Dalam tahun 2012, pihak jabatan telah meluluskan sejumlah 175 Skim Pengendalian Melombong di bawah APM dan 154 Surat Kebenaran Pengkuarian di bawah Peraturan Kuari Negeri. Negeri yang telah menguatkuasakan Peraturan Kuari ialah Perak, Selangor, Pahang, Kelantan, Terengganu dan Negeri Sembilan.

Lesen Bijih Mineral dan Lesen Pembeli Emas yang dikeluarkan di bawah Enakmen Bijih Mineral dan Enakmen Pembeli Emas Mentah membenarkan pemegangnya untuk membeli, menjual, menyimpan dan memproses bijih mineral dan emas mentah masing-masingnya. Lesen ini dikeluarkan secara tahunan dan luput pada akhir tahun kalendar. Sebanyak 251 Lesen Bijih Mineral, 7 Lesen Pembeli Emas telah dikeluarkan sepanjang 2012. Selain itu pihak jabatan juga telah mengeluarkan sebanyak 171 Permit Mengangkut Bijih Padat Timah bagi tujuan mengangkut konsentrat timah dari lombong, kedai pembeli bijih atau loji pemrosesan amang ke kilang pelebur timah, Malaysia Smelting Corporation, di Pulau Pinang.

Seperti diperuntukkan dalam Peraturan Kuari, pemegang permit / lesen kuari hendaklah melantik seorang pengurus kuari berkelayakan dan pembedil kompeten untuk bertanggungjawab ke atas operasi dan kerja peletupan di kuari. Seseorang yang dilantik sebagai pengurus perlu lulus ujian Pengurus Kuari yang dijalankan oleh jabatan. Dalam tahun 2012, sebanyak 7 ujian Pengurus Kuari telah dilaksanakan.

Public complaints on mine and quarry operations are of concern to the department. All complaints received would be investigated and appropriate actions would be taken promptly. A total of 69 complaints were received and investigated while a total of 43 orders and directives were issued to the operators.

Licensing

Under the Mineral Development Act (MDA) 1994, a mining lease holder need to submit and obtain approval from the Director of Mines for an operational mining scheme before any development and mining operation commences. For the year 2012, the department approved a total of 175 operational mining schemes under the MDA and 154 Letters of Authority to Quarry under the state Quarry Rules. The states enforcing the Quarry Rules are Perak, Selangor, Pahang, Kelantan, Terengganu and Negeri Sembilan.

The Mineral Ores and Gold Buyers Licences issued under the Mineral Ores Enactment and Gold Buyers Enactment authorise licence holders to buy, sell, store and treat mineral ores and raw gold respectively. These licences are issued annually and they expire at the end of each calendar year. A total of 251 Mineral Ores Licences, 7 Raw Gold Buyers Licences were issued during 2012. Apart from that the department also issued a total of 171 Tin Ore Concentrate Transport Permits for the purpose of transporting tin concentrates from the mines, tin ore dealers or amang processing plants to the tin smelter, Malaysia Smelting Corporation, in Pulau Pinang.

As stipulated in the Quarry Rules, a quarry permit / licence holder shall need to appoint a qualified quarry manager and competent shotfirer to be responsible for the operation and blasting work in a quarry. The person appointed as a manager needs to pass the Quarry Manager test conducted by the department. In 2012, a total of 7 Quarry Manager Tests were conducted.

Adalah menjadi objektif jabatan untuk memastikan semua kerja peletupan di lombong, kuari dan juga projek pembangunan di bawah kawal seliaan jabatan dijalankan dengan selamat. Justeru, untuk mencapai hasrat itu pihak jabatan juga menjalankan Ujian Pembedil Amali kepada calon yang telah lulus Peperiksaan Pembedil Teori. Hanya calon yang lulus kedua-dua ujian akan dikeluarkan Sijil Pembedil sebagai pembedil berkelayakan dan dibenarkan menjalankan kerja peletupan. Dalam tahun 2012, pihak jabatan telah menjalankan sebanyak 20 Ujian Amali Pembedil dan mengeluarkan sejumlah 12 Sijil Pembedil baru dan 67 pembaharuan sijil kepada pemohon yang layak. Sehingga akhir tahun 2012, terdapat sejumlah 503 pemegang Sijil Pembedil di seluruh negara.

Daripada rekod jabatan, pengeluaran mineral tempatan telah menunjukkan peningkatan sejak lima tahun yang lalu. Sebahagian mineral yang dihasilkan ini dieksport ke luar negara. Bagi tujuan mengeksport bahan mineral dan batuan, pengeksport memerlukan permit eksport yang dikeluarkan oleh Kementerian Sumber Asli dan Alam Sekitar (NRE). Setiap permohonan permit eksport hendaklah disertai surat penilaian teknikal yang disediakan oleh JMG. Sebanyak 818 dan 1115 surat penilaian teknikal untuk eksport mineral dan bahan batuan masing-masingnya telah disediakan dalam tahun ditinjau.



Kursus pembedil anjuran bersama Institut Kuari Malaysia (IQM), Persatuan Kuari Sarawak (SQA) dan JMG Malaysia di Kuching, Sarawak.

The shotfirer course jointly-organised by the Institute of Quarrying Malaysia (IQM,) Sarawak Quarry Association (SQA) and JMG Malaysia in Kuching, Sarawak.

It is the objective of the department to ensure that all blasting works in mines, quarries and other development projects under the supervision of the department are carried out in a safe manner. Thus, to achieve that the department also conducted Shotfirer Practical Tests for candidates who had passed their Shotfirer Theory Examination. Only candidates who have passed both tests will be issued Shotfirer Certificates as qualified shotfirers and allowed to carry out blasting work. During the year 2012, the department conducted 20 Shotfirer Practical Tests and issued a total of 12 new Shotfirer Certificates and 67 renewed certificates to qualified applicants. As of the end of 2012, there were a total of 503 shotfirer certificate holders in the country.

The department's record indicates an increase in the local mineral production over the past five years. Some of the minerals produced were exported. For the purpose of exporting minerals and rock material, an exporter needs to have an export permit issued by the Ministry of Natural Resource and Environment (NRE). Every application has to be accompanied by a technical assessment report prepared by JMG. During the year, a total of 818 and 1115 technical assessment reports were prepared for the export of minerals and rock material respectively.



Peperiksaan amali pembedil di Pagoh Quarry, Pagoh, Johor.
Shotfirer practical examination at Pagoh Quarry, Pagoh, Johor.

Khidmat Nasihat Lombong dan Kuari *Mine and Quarry Advisory Services*

Disamping menjalankan pengawalseliaan dan pemantauan ke atas operasi perlombongan dan pengkuarian, JMG juga berperanan memberi khidmat nasihat dan kepakaran kepada pihak Berkuasa Negeri, agensi kerajaan serta pihak swasta berkaitan dengan pembangunan industri mineral. Khidmat yang diberikan merangkumi penyediaan laporan bagi permohonan tenemen mineral, permohonan tapak kuari dan memberi ulasan kepada laporan kajian Impak Alam Sekitar (EIA).

Sepanjang tahun 2012, sejumlah 1,388 permohonan baru dan pembaharuan untuk Lesen Carigali / Lesen Penjelajahan dan Pajakan Melombong, 51 permohonan untuk tapak kuari, 29 ulasan (EIA) dan 168 laporan teknikal lain kepada pelbagai agensi disediakan. Sejumlah 560 laporan pembebasan mineral telah disediakan bertujuan membantu pihak berkuasa membuat keputusan perancangan yang lebih baik untuk mengelakkan pemajiran enapan mineral. Di samping itu pihak jabatan juga menerima sebanyak 1,586 pertanyaan berkaitan aktiviti perlombongan dan pengkuarian.

Apart from overseeing and monitoring mine and quarry operations, JMG also provides advisory and expert services to State Authorities, government agencies and the private sector related to development of the mineral industry. Services provided include preparation of reports for mineral tenement application, application for quarry sites and providing comments and inputs for Environmental Impact Assessment (EIA) reports.

During the year 2012, a total of 1,388 new and renewal applications for Prospecting / Exploration Licences and Mining Leases, 51 quarry land applications, 29 EIA reports and 168 other technical reports for various agencies were processed. A total of 560 mineral clearance reports were prepared to assist the relevant authority make better planning decision and avoid sterilization of mineral deposits. Apart from that the department also received a total of 1,586 enquiries on mine and quarry activities.

Aktiviti-aktiviti lain

Sesi dialog, seminar dan pameran merupakan wadah jabatan bagi meningkatkan kesedaran pihak awam terhadap industri mineral serta juga untuk menyelesaikan masalah yang dihadapi penduduk berkaitan dengan aktiviti perlombongan dan pengkuarian. Sejumlah 23 sesi perjumpaan dan penerangan sedemikian telah diadakan di negeri-negeri sepanjang tahun 2012.

JMG telah menganjurkan dialog bersama pengusaha kuari negeri Perak pada 4hb Disember 2012. Objektif utama dialog itu adalah untuk memaklumkan pihak industri mengenai dasar-dasar kerajaan negeri terkini yang berkaitan aktiviti pengkuarian. Seramai 76 peserta dari syarikat kuari dan 16 peserta dari syarikat jurutera perunding telah hadir.



Tapak pemrosesan bijih besi Lombong Yayasan Melaka.
Iron ore processing plant of the Yayasan Melaka Mine.

Other Activities

The department conducted dialogues, seminars and exhibitions to increase public awareness on the mineral industry as well as, to solve issues and problems faced by the public pertaining to mining and quarrying activities. A total of 23 engagements and education sessions were held in the states during 2012.

JMG conducted a dialogue with quarry operators in Perak on 4th December 2012. The main objective of the dialogue was to inform the operators on the latest state government policy pertaining to the quarry industry. A total of 76 participants from quarry companies and 16 from consultant companies attended the dialogue session.



Photo: Hamlee Ismail
Bekas lombong emas Lubuk Mandi, Marang, Terengganu.
Lubuk Mandi ex-gold mine, Marang, Terengganu.

SENARAI AKTIVITI PEMBANGUNAN LOMBONG & KUARI DALAM TAHUN 2012
LIST OF MINE & QUARRY DEVELOPMENT ACTIVITIES IN 2012

	Johor	Melaka	Negeri Sembilan	Selangor	Perak	Kedah	Perlis	Pulau Pinang	Kelantan	Terengganu	Pahang	Sarawak	Sabah	JUMLAH
PEMERIKSAAN TEKNIKAL OPERASI LOMBONG DAN KUARI / TECHNICAL INSPECTION OF MINE & QUARRY OPERATIONS														
Pemeriksaan Teknikal Operasi Lombong <i>Mine Operation Technical Inspection</i>	181	3	6	0	141	28	-	-	197	70	674	25	0	1325
Pemeriksaan Teknikal Operasi Kuari <i>Quarry Operation Technical Inspection</i>	205	4	50	105	356	40	9	135	45	28	200	5	20	1202
Pemeriksaan Teknikal Operasi Kilang Amang / Loji Pemrosesan Mineral / Amang Plant / Mineral Processing Plant Operations Technical Inspection	15	1	1	7	96	4	-	4	0	-	40	4	0	172
Pemeriksaan Teknikal Tapak Peletupan (selain Kuari) <i>Technical Inspection of Blasting Sites (other than quarries)</i>	4	-	-	96	22	9	-	85	0	-	0	1	38	255
Pemeriksaan Teknikal Kawasan Carigali <i>Technical Inspection of Exploration Areas</i>	1	-	2	0	24	-	-	-	10	-	1	0	0	38
Pemeriksaan buku urusiaga mineral (termasuk kedai bijih / kedai emas) / Account books inspection on mineral dealings (including tin ore dealer / gold dealer)	50	-	-	33	49	4	-	6	3	-	38	0	0	183
PEMANTUAN DAN KAWALSELIA AKTIVITI PERLOMBONGAN DAN PENGKUARIAN / MONITORING OF MINE & QUARRY ACTIVITIES														
Persampelan efluen lombong / Mine effluent sampling	3	1	-	0	2	-	-	-	0	-	28	4	12	50
Siasatan aduan / Complaint investigation	9	-	2	0	9	5	-	7	10	3	16	6	2	69
Perintah dan arahan / Orders and instructions	3	-	-	0	21	-	-	2	2	-	11	4	0	43
Kompaun / Compounds	0	-	-	0	0	-	-	-	0	-	0	0	0	0
Laporan kemalangan lombong dan kuari <i>Mining and quarrying accident reports</i>	0	-	-	0	3	-	-	-	0	-	0	3	0	6
Kerja ukur tanah sempadan dan cerun <i>Survey works on land boundary and slope</i>	0	-	-	0	0	12	-	248	0	3	20	0	0	283
Kerja ukur gegaran dan pemantauan peletupan <i>Vibration and blast monitoring</i>	11	9	5	199	141	-	-	-	2	-	20	0	12	399

PERLESENAN / LICENSING														
Skim Pengendalian Melombong Operational Mining Scheme	18	2	9	1	14	7	-	-	22	15	75	13	0	175
Surat Kebenaran Pengkuarian Letter of Authority to Quarry	0	-	14	16	69	-	-	-	10	14	31	0	0	154
Lesen Bawah Tanah / Underground Licence	0	-	-	0	0	-	-	-	0	-	0	1	0	1
Lesen Air Tahunan / Negeri / Permit Air Annual / State Water Licence / Water Permit	0	-	-	0	0	-	-	-	0	1	8	0	0	9
Lesen Membeli Emas Mentah Gold Buyers Licence	0	-	-	0	0	-	-	1	1	-	5	0	0	7
Lesen Bijih Mineral / Mineral Ores Licence	50	2	3	33	60	13	-	9	0	-	81	0	0	251
Permit Mengangkut Bijih Padat Timah / Emas Mentah Tin Ore Concentrate / Raw Gold Transport Permit	14	-	-	15	113	7	-	-	0	2	20	0	0	171
Laporan Penilaian Teknikal Eksport Mineral Technical Assessment Report for Mineral Export	382	-	16	5	121	6	-	23	62	-	116	87	0	818
Laporan Teknikal Perakuan Eksport Bahan Batuan Technical Assessment Report for Rock Material Export	426	-	-	0	208	384	-	1	1	28	1	12	54	1115
Permit Letupan / Blasting Permit	4	-	-	22	0	12	3	15	0	4	3	0	0	63
Laporan Perakuan Magazin Letupan Report for Explosives Magazine Approval	0	-	2	0	0	-	-	1	0	-	0	1	0	4
Pengeluaran / Pembaharuan Sijil Pembedit Issuance / Renewal of Shot Firer Certificate	19	-	6	0	5	7	2	6	5	2	0	1	8	61
Lencongan Sungai / River Diversion	0	-	-	0	0	-	-	-	0	3	2	0	0	5
Ujian Pengurus Lombong / Kuari Test for Mine / Quarry Managers	0	-	-	0	6	-	-	-	1	-	0	0	0	7
Ujian Amali Pembedit / Shot Firer Practical Test	8	-	-	0	3	-	-	-	0	-	2	0	7	20
KHIDMAT NASIHAT / ADVISORY SERVICES														
Ulasan Laporan EIA / EIA Report Review	6	1	4	0	4	1	-	6	2	-	4	1	0	29
Laporan Permohonan Lesen Carigali / Pajak Prospecting and Mining Lease Application Report	7	-	11	0	17	24	-	-	229	-	1094	6	0	1388
Laporan Permohonan Tanah Kuari Quarry Land Application Report	5	-	3	0	16	3	-	-	0	21	1	2	0	51
Laporan Pembebasan Mineral Mineral Clearance Report	8	-	-	0	289	52	8	3	1	12	185	2	0	560
Lain-lain Laporan Teknikal Untuk Agensi Lain Miscellaneous Technical Report for other agencies	1	-	2	0	0	-	-	1	13	21	4	9	117	168
Pertanyaan Mengenai Maklumat Lombong / Kuari Enquires on Mine / Quarry Information	156	-	9	0	1	22	4	11	179	22	1117	31	34	1586
LAIN-LAIN / OTHERS														
Seminar / Dialog / Pameran Seminar / Dialogue / Exhibition	5	-	-	0	1	-	-	1	0	7	1	6	2	23

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Penyelidikan & Pembangunan Research & Development

Penyelidikan dan Pembangunan (R&D) Jabatan Mineral dan Geosains Malaysia dilaksanakan di Pusat Penyelidikan Mineral (PPM).

Objektif R&D adalah

- Untuk menggalak dan mempelbagai penggunaan sumber mineral tempatan bagi menyumbang kepada pembangunan sektor perindustrian negara melalui R&D
- Untuk menggalak pengusahahasilan sumber mineral secara mampan melalui R&D

PPM berfungsi untuk

- Menjalankan R&D berasaskan mineral tempatan supaya dapat menghasilkan bahan mula dan bahan tambah nilai untuk digunakan oleh industri
- Membangun teknologi pemprosesan mineral dan kitar semula yang bersesuaian
- Menjalankan penyelidikan bersama Institusi Pengajian Tinggi, agensi R&D yang lain serta pihak industri dalam bidang mineral
- Mengkomersil hasil R&D yang signifikan melalui pemindahan teknologi kepada pihak yang berminat
- Berperanan sebagai penasihat dan pusat rujukan dalam perkara-perkara yang berkaitan dengan penyelidikan mineral tempatan
- Menjalankan R&D berkaitan pengusahahasilan mineral, impak alam sekitar dan pemulihan serta menyediakan perkhidmatan sokongan kepada jabatan dalam menangani masalah yang berkaitan

Selaras dengan kehendak kerajaan bagi memajukan teknologi berasaskan mineral, JMG menjalankan projek-projek R&D berkaitan teknologi berasaskan lempung, silika, batuan dan bahan termaju. Untuk menggalak pengusahahasilan sumber mineral secara mampan, R&D berkaitan teknologi pemprosesan mineral, perlombongan, pengkuarian dan pemulihan lombong dan kuari dijalankan.

The research and development (R&D) activities of Minerals and Geoscience Department (JMG) are conducted in Mineral Research Centre (PPM).

The objectives of R&D are

- To encourage and diversify use of local mineral resources so as to contribute towards the development of the country's industrial sector through R&D
- To encourage the development of mineral resources in a sustainable manner through R&D

The functions of PPM are

- To carry out R&D on local minerals in order to produce starting and value added materials for industrial use
- To develop suitable mineral processing and recycling technologies
- To carry out collaborative research with institutes of higher learning, other R&D agencies and industries in the field of minerals
- To commercialise significant R&D results through technology transfer to interested parties
- To assume advisory role and act as a reference centre in areas related to research in local minerals
- To undertake R&D in mineral extraction, environmental impact and rehabilitation as well as providing support services to the department in overcoming related problems

In line with the government's aspiration to develop the mineral based industry, JMG carried out projects related to clay-based, silica-based, rock-based and advanced material technology. To encourage the development of mineral resources in a sustainable manner, R&D on mineral processing, mining, quarrying and rehabilitation technology were carried out.

Teknologi Berasaskan Lempung

Clay-based Technology

Bil. No.	Aktiviti / Projek R&D R&D Activity / Project	Hasil / Penemuan / Catatan Output / Finding / Remarks
1	R&D penghasilan bebola seramik untuk bahan sokongan pemangkin dalam industri petro-kimia mengguna lempung tempatan dan bahan seramik lain. R&D on the development of ceramic balls as catalyst support materials in the petrochemical industries using local clay and other ceramic raw materials.	Sebanyak 13 formulasi jasad bebola seramik telah dihasilkan. Dua formulasi jasad telah digunakan dalam kerja-kerja pra-pengkomersilan di kilang di Pahang. Sebanyak 200 kg jasad bebola seramik yang telah diproses telah diujguna dalam penghasilan bebola seramik. Maklumbalas dari pihak kilang adalah positif. A total of 13 formulations of ceramic ball bodies have been developed. Two of the formulations had been used in pre-commercialization testing at a factory in Pahang. About 200 kg ceramic ball body formulation was prepared for the testing. A positive feedback was received from the factory.
2	R&D penghasilan jasad tembikar putih (tembikar tanah dan tembikar batu) menggunakan lempung tempatan – Usahasama JMG(PPM) dan Perbadanan Kemajuan Kraftangan Malaysia, Cawangan Perak. R&D on the development of whiteware bodies (earthenware and stoneware) using local clay and other ceramic raw materials resources – R&D collaboration project between JMG(PPM) and Perbadanan Kemajuan Kraftangan Malaysia, Cawangan Perak.	Lapan formulasi jasad tembikar telah dihasilkan. Empat formulasi jasad (2 tembikar tanah & 2 tembikar batu) telah diujguna oleh pihak Kraftangan Perak dan diterima sebagai produk baru kraftangan. Eight formulations of whiteware bodies have been developed. Four of the formulations have been tested by Perbadanan Kemajuan Kraftangan Malaysia, Cawangan Perak and accepted as new potential products for commercialisation.



Photo: Loo Quek Hong

1. Penghasilan bebola seramik di kilang menggunakan jasad yang dibangunkan oleh JMG.
Production of ceramic balls in the factory using bodies developed by JMG.
2. Pelbagai saiz bebola seramik yang dihasilkan di makmal.
Ceramic balls of various sizes produced in the laboratory



Photo:
Loo Quek Hong

Produk tembikar ujian menggunakan licau oleh rakan industri.
Ceramic test products using glazes by the industrial partner.



Kertas Teknikal Technical Papers

1. Kori Mohammad, 2012. Pencirian dan tambahnilai bahan lempung, Bengkel Penyelidikan Produk Berasaskan Lempung, PPM, 12 Sept 2012.
2. Abdul Rois & Hamdan Yahya, 2012. Teknologi penghasilan tembikar putih, Bengkel Penyelidikan Produk Berasaskan Lempung, PPM, 12 Sept 2012.
3. Hamdan Yahya, Abdul Rois & Kori Mohammad, 2012. The study of ball clays from three locations in Perak as component materials for the development of high-end ceramic bodies, Persidangan Tahunan JMG 2012, Hotel Pullman, Kuching 19-22 Jun 2012.

Teknologi Berasaskan Silika Silica-based Technology

Bil. No.	Aktiviti / Projek R&D R&D Activity / Project	Hasil / Penemuan / Catatan Output / Finding / Remarks
1	R&D penyediaan dan pencirian jubin kaca seramik tersinter dari kaca kitar semula R&D on the preparation and characterisation of sintered glass-ceramic tiles from recycled sheet glass	Jubin kaca seramik tersinter yang dihasilkan telah menunjukkan kualiti yang setanding dengan spesifikasi standard ISO 13006 untuk jubin seramik. Oleh kerana kos pembuatan dan pengeluaran yang rendah, kaca-seramik yang dihasilkan ini dapat digunakan dalam industri pembinaan terutamanya sebagai jubin lantai dan dinding. The sintered glass ceramic tiles produced showed quality comparable to the specifications of ISO 13006 standard for ceramic tiles. Due to low manufacturing and production cost, the glass ceramic produced can be used in the construction industry, particularly as floor and wall tiles.
2	R&D penghasilan kaca lembut daripada pasir silika tempatan R&D on the production of soft glass from local silica sand	Kaca lembut termasuk di dalam kumpulan kaca soda-kapur-silika (SLS) yang terkenal dalam industri penghasilan kaca kraf yang menggunakan teknik 'lamp working'. Ia dihasilkan dengan meleburkan kaca pasir silika dan bahan-bahan kimia tertentu. Rod kaca yang dihasilkan ini berpotensi untuk dibuat beberapa produk dengan kawalan suhu <i>torch</i> yang bersesuaian oleh pembuat kaca yang berpengalaman. Soft glass is one of the soda-lime-silicate (SLS) glass which is well-known in the craftware industry using lamp working technique. It is produced by melting local silica sand and certain chemicals. The glass rod has the potential to be made into a number of products with appropriate temperature control torch by experienced glass maker.

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Technical Papers

1. Marlinda Daud & Mahadi Abu Hassan, 2012. Preparation of soft glass using local silica sand as starting material for craftware: A preliminary study. Persidangan Tahunan JMG 2012, Hotel Pullman, Kuching 19 -22 Jun 2012.
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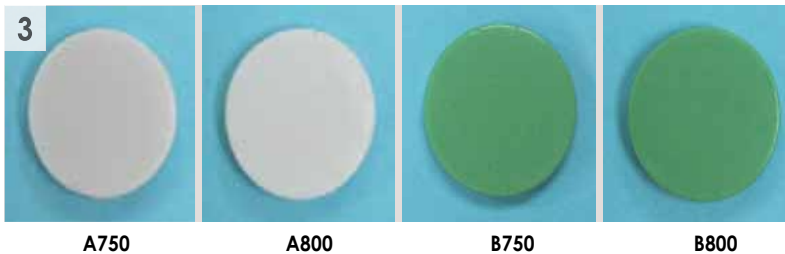


Photo: Mohd Razli

1. Pembentukan sampel ujian dengan menggunakan alat penekan hidraulik.
Formation of test samples using hydraulic press.
2. Sampel ujian dimasukkan kedalam ketuhar untuk proses persinteran.
Test samples loaded into the furnace for sintering process.
3. Jubin kaca seramik yang terhasil selepas proses pensinteran.
Glass-ceramic tiles produced after sintering process.
4. Rod kaca lembut yang dihasilkan oleh JMG.
Soft glass rod produced by JMG.
5. Rod kaca lembut sedang diuji menggunakan torch di syarikat kaca.
Testing of soft glass rods using a torch at a glass company.

Teknologi Berasaskan Batuan Rock-based Technology

Bil. No.	Aktiviti / Projek R&D R&D Activity / Project	Hasil / Penemuan / Catatan Output / Finding / Remarks
1	R&D penghasilan kalsium karbonat termendak (PCC) berstruktur terkawal daripada bahan mula bergred rendah pada skala yang dipertingkatkan The production of controlled structures of precipitated calcium carbonate (PCC) from low grade starting material at a larger scale	PCC berstruktur terkawal dapat dihasilkan secara larutan berionik pada skala yang dipertingkatkan. Kajian telah dijalankan menggunakan bahan buangan industri, iaitu kapur karbida sebagai bahan mula. Kajian ini mendapati kadar adukan yang rendah perlu digunakan untuk menghasilkan PCC berbentuk bijian. Reaktor prototaip untuk menghasilkan PCC telah difailkan untuk paten. PCC with controlled shape was synthesised at a larger scale by ionic solution. Waste material from industry namely carbide lime was used as the starting material. The study showed that low stirring rate must be used to obtain grain-shape PCC. The prototype reactor for producing PCC has been filed for patent.
2	Kajian penyediaan kertas menggunakan kalsium karbonat termendak (PCC) dari JMG dan sumber komersil dengan bantuan polietiliminamina (PEI) dan poliakrilamida (PAM) Study on the preparation of paper using PCC from JMG and commercial sources with the aid of polyethyleneimine (PEI) and polyacrylamide (PAM)	Sifat kertas daripada pengisi PCC JMG adalah baik dan sama taraf dengan kertas yang dihasilkan dari bahan pengisi komersial. The properties of the paper prepared using PCC from JMG are good and comparable with the paper that was prepared from commercial filler.
3	Perkhidmatan ujian batu dimensi Dimension stone testing services	Sejumlah 150 sampel dari pihak swasta telah diuji. A total of 150 samples from private sector were tested.



Photo: Rahman Aziz

1. Larutan ionik bersukrosa yang dikumpulkan dari penuras tekanan.
Ionic sucrose solution collected from pressure filter.
2. Tangki pengkarbonatan bagi pensintesis PCC dari 400-500 liter larutan ionik bersukrosa.
Carbonation tank used to synthesise PCC from 400-500 litre ionic sucrose solution.



Sistem Pengurusan Kualiti MS ISO 9001:2008 bagi ujian batu dimensi

Makmal Seksyen Teknologi Berasaskan Batuan, Pusat Penyelidikan Mineral (PPM) telah dianugerahkan sijil MS ISO 9001:2008 untuk perkhidmatan ujian batu dimensi. MS ISO 9001:2008 adalah satu set piawaian dan keperluan dalam pembangunan sistem pengurusan kualiti untuk memastikan kehendak dan keperluan pelanggan sentiasa dipenuhi. Pemiawaian ini juga membantu PPM membangunkan satu mekanisma untuk membuat penambahbaikan berterusan dalam memberikan perkhidmatan.

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Management Quality System of MS ISO 9001:2008 for dimension stone tests

The Rock-based Technology Section, Mineral Research Centre (PPM) was awarded MS ISO 9001:2008 certification for the testing of dimension stones. MS ISO 9001:2008 is a set of standards and requirement for the development of a quality management system to ensure the expectations of customers are met. The standardisation also enables PPM to develop mechanisms for continual improvement of services.

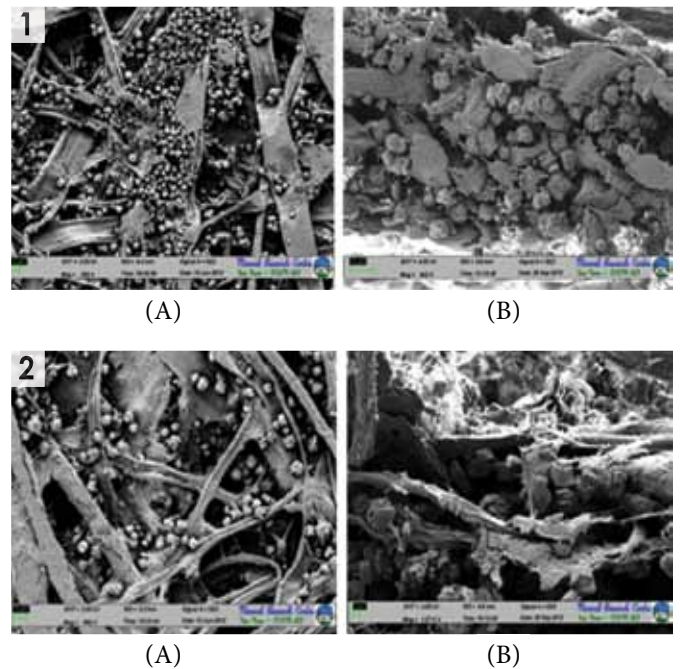


Photo: Azlin Zahara

1. Contoh mikrograf SEM bahagian permukaan kertas (A) dan keratan rentas (B) bagi kertas yang dihasilkan dengan pemukulan 4000 putaran dan dirawat dengan PEI. Typical SEM micrograph of the paper surface (A) and cross-sectional area (B) after 4000 beating and treated with PEI.
2. Contoh mikrograf SEM bahagian permukaan kertas (A) dan keratan rentas kertas (B) yang dihasilkan dengan pemukulan 8000 putaran dan dirawat dengan PEI. Typical SEM micrograph of the paper surface (A) and cross-sectional area (B) after 8000 beating and treatment with PEI.

Teknologi Bahan Ter maju

Advanced Material Technology

Bil. No.	Aktiviti / Projek R&D R&D Activity / Project	Hasil / Penemuan / Catatan Output / Finding / Remarks
1	Penghasilan biokomposit diopsid-wolastonit menggunakan mineral tempatan untuk aplikasi perubatan dan pergigian. Production of biocomposite diopsid-wollastonite using local mineral for medical and dental applications.	Diopsid dan wolastonit sintetik dihasilkan menggunakan kaedah pembakaran pasir silika, batu kapur dan dolomit tempatan dan biokomposit diopsid-wolastonit dapat dihasilkan melalui pensinteran bahan sintetik ini pada suhu 800°C-1100°C. Synthetic diopside and wollastonite were produced by firing local silica sand, limestone and dolomite and diopside-wollastonite biocomposite was produced by sintering of the synthetic materials at temperature of 800°C-1100°C.
2	Penghasilan ingot gigi restoratif menggunakan mineral tempatan. Production of dental restorative ingots using local minerals.	Kaca-seramik berasaskan leusit ($KA1Si_2O_6$) dihasilkan menggunakan pasir silika dan feldspar tempatan untuk digunakan sebagai bahan ingot gigi restoratif. Ingot yang dihasilkan mempunyai kekuatan dan sifat bioaktif setanding dengan ingot komersil. A leucite ($KA1Si_2O_6$) based glass-ceramic was produced using local silica sand and feldspar to be used as a dental restorative material ingots. The strength and bioactive properties of the ingots produced were comparable to commercial ingots.

Kertas Teknikal

Technical Papers

- Malek Selamat & Siti Mazatul Azwa, 2012. Synthesis of leucite glass-ceramics using Malaysian silica sand and feldspar for restorative dental materials. Persidangan Jabatan Mineral dan Geosains Malaysia 2012, Hotel Pullman, Kuching Sarawak 19-22 Jun 2012.
- Siti Mazatul Azwa & Malek Selamat, 2012. Crystallisation behaviour and properties of leucite glass-ceramics. International Conference of Solid State Science and Technology. Hotel Holiday Inn, Melaka 18-20 October 2012.



Photo: Siti Azwa

Diopsid dan wolastonit sintetik yang dihasilkan daripada dolomit, batu kapur dan pasir silika.
Synthetic diopside and wollastonite produced from dolomite, limestone and silica sand.

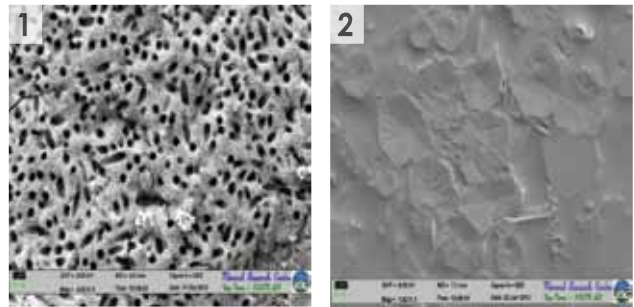


Photo: Azlin Zahara

- Mikrograf FESEM permukaan komposit diopsid-wolastonit selepas direndam dalam larutan SBF selama 7 hari menunjukkan pertumbuhan hidroksiapatit (tulang tiruan). / Field Emission Scanning Electron Microscope (FESEM) micrograph of surface of the diopside-wollastonite composite after being immersed in Synthetic Body Fluid (SBF) for 7 days showing hydroxyapatite (artificial bone) growth.
- Struktur hablur leusit yang terbentuk dipermukaan ingot selepas proses pensinteran. / Crystal structure of leucite that formed on the surface of ingot after the sintering process.



Photo: Haminuddin Khalid

Ingot leusit yang dihasilkan menggunakan pelbagai komposisi feldspar.
Leucite ingots produced using different feldspar compositions.

Teknologi Pemprosesan Mineral Mineral Processing Technology

Aktiviti penyelidikan yang dijalankan tertumpu kepada kajian teknologi hijau dalam pemprosesan mineral dan kajian rawatan sisa sianida. Selain itu, terdapat juga aktiviti penyelidikan kontrak yang telah dijalankan atas permintaan dari pihak industri.

Untuk kajian teknologi hijau dalam pemprosesan mineral, aktivitiya tertumpu kepada mendapatkan kaedah pemprosesan alternatif untuk bijih timah primer yang lebih cekap dan mesra alam. Dua kajian yang telah disiapkan ialah yang berkaitan:

- a) pengasingan mineral sulfida dengan kaedah pengapungan sampel bijih kompleks
- b) pencirian, pembebasan mineral dan proses awal untuk sampel bijih kompleks yang mengandungi kasiterit bersaiz halus.

Kajian rawatan sisa sianida, masih bertumpu untuk menghasilkan sistem penyokong silika untuk pemangkin titanium. Penyokong aerogel yang dihasilkan telah menunjukkan sifat hydrophobic yang amat baik namun ianya masih mengalami retakan. Ini terjadi kerana proses pengeringan aerogel yang dibuat dengan menggunakan reagen masih belum mencapai tahap kesesuaiannya.

Antara penyelidikan kontrak yang telah dijalankan ialah proses pengasingan magnetit untuk sampel yang diperolehi dari Pulau Sumbawa, Indonesia dan kajian prosesan bijih timah untuk sampel aluvium dari Kuala Langat, Selangor bagi membantu rekabentuk loji pemprosesan.

Research activities carried out focus on the study of green technology in mineral processing and cyanide wastewater treatment. In addition, contract research activities were also carried out based on request from the industry.

For the study of green technology in mineral processing, activities were focused on developing more efficient and environmentally friendly alternative processing methods for primary tin. Two completed studies were related to:

- a) the separation of sulphide minerals from complex ore samples by froth flotation process
- b) characterisation studies, mineral liberation and preliminary processing studies for complex ore samples containing fine-sized cassiterite.

For cyanide wastewater treatment, research focused on the production of silica support systems for titanium catalyst. The aerogel silica support produced showed very good hydrophobic characteristics. However the aerogel silica support still experienced cracking. This occurred because the right parameters for the drying of aerogel using reagent have not been determined.

The contract research carried out were on the separation of magnetite samples obtained from the island of Sumbawa, Indonesia and on studies of alluvial tin sample from Kuala Langat, Selangor for designing the processing plant.

Kertas Teknikal

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1. Md. Muzayin Alimon, Ismail Ibrahim, Nazwin Ahmad & Salmah Baharuddin, 2012. Pemprosesan bijih timah kompleks: Kaedah pengapungan buih sebagai alternatif untuk proses pengasingan mineral-mineral sulfida, Persidangan JMG, 19 - 22 Jun 2012, Kuching, Sarawak.
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3. Ismail Ibrahim, 2012. Introduction to FTIR and zeta potential and its uses. Taklimat pemantapan pembantu penyelidik. Hotel Heritage, Cameron Highland, Pahang. 1 November 2012.
4. Md. Muzayin Alimon, 2012. Processing method of sulfide ores in reducing AMD effect. Workshop on Acid Mine Drainage (AMD), 19-20 November 2012, Mineral Research Centre, Ipoh, Perak.



Photo: Haminuddin Khalid

Mesyuarat penyelidikan usahasama dengan Pusat Pengajian Sains Pergigian, Kampus Kesihatan, USM Kelantan.
[Meeting on joint research with the School of Dental Sciences, Health Campus, USM Kelantan.](#)

Teknologi Perlombongan dan Pengkuarian Mining and Quarrying Technology

Kajian potensi AMD di kawasan lombong aktif

Kajian mengenai potensi saliran asid lombong (AMD) telah dijalankan di lombong emas di Pahang dan lombong timah di Perak. Sampel kajian diperolehi daripada kawasan longgokan hampas kering dan sisa loji pemrosesan. Hasil kajian mendapati sesetengah sampel berpotensi menghasilkan AMD jika tidak dirawat dan dibuang dengan kaedah yang betul. Di samping itu, kajian ini juga bertujuan menguji dan menambahbaik kaedah ujian-ujian yang dipraktikkan untuk mengenalpasti potensi AMD seperti ujian statik dan kinetik.

Kajian rawatan arsenik dalam air sisa lombong emas menggunakan zeolit, clinoptilolite, abu terbang batu arang (coal fly ash) dan schwertmannite

Zeolit A, clinoptilolite dan abu terbang batu arang telah diuji untuk penyingkiran arsenik dari air sisa lombong emas. Keputusan menunjukkan bahawa prestasi zeolit A lebih baik dalam mengurangkan arsenik dalam air sisa lombong berbanding clinoptilolite dan abu batu arang terbang. pH adalah faktor utama bagi menentukan kecekapan penyingkiran arsenik daripada air sisa lombong. Ujian keberkesanan schwertmannite sebagai penyerap arsenik daripada air sisa lombong emas dibuat dengan menggunakan kaedah kolum aliran menegak. Ujian dengan schwertmannite mampu mengurangkan paras arsenik kepada kepekatan ≤ 0.10 mg/l dan ini menunjukkan potensi schwertmannite sebagai bahan penyerap untuk merawat arsenik dalam air sisa lombong.

Projek AMD di kawasan bekas Lombong Tembaga Mamut

Projek ini adalah projek usahasama antara JMG-MIRECO (Mine Reclamation Corporation, Korea). Jangkamasa projek ini adalah selama 2 tahun. Pada tahun ini projek ini tertumpu kepada pengumpulan data, maklumat dan kerja-kerja makmal untuk penentuan bahan penneutralan yang sesuai digunakan untuk rawatan AMD di kawasan bekas Lombong Tembaga Mamut.

Study on potential AMD at active mine sites

The study of Acid Mine Drainage (AMD) potential was conducted in gold mines in Pahang and tin mines in Perak. Samples were collected from dry dumps and processing plant tailings. The study indicated that some samples have the potential to generate AMD if they are not treated and disposed in the correct way. In addition, the study also aims to improve on the static and kinetic test methods that have been practised to identify AMD potential.

Treatment of arsenic in gold mine wastewater using zeolites, clinoptilolite, coal fly ash and schwertmannite

Zeolite A, clinoptilolite and coal fly ash had been tested for the removal of arsenic (As) from gold mine wastewater. The results showed that zeolite A performs better in reducing As concentration in the mine wastewater than clinoptilolite and coal fly ash. pH is the key factor in determining the efficiency of As removal from the mine wastewater. Arsenic removal from gold mine wastewater by using schwertmannite as adsorbent was tested using vertical flow column experiments. This study indicates that schwertmannite is able to reduce the concentration of arsenic to ≤ 0.10 mg/l and has potential as adsorbent for the treatment of arsenic in mine wastewater.

AMD project at ex-Mamut Copper Mine area

This project is a collaborative project between the JMG-MIRECO (Mine Reclamation Corporation, Korea). The project period is 2 years. This year the project focused on the collection of data, information and laboratory work for the determination of suitable neutralisation materials for the treatment of AMD in ex-Mamut Copper Mine area.

Pembangunan Indeks Pencemaran Partikulat Kuari (QPPI)

JMG telah menjalankan kajian keatas dua pencemar partikulat debu iaitu debu bersaiz halus (PM_{10}) dan debu bersaiz kasar (PM_{30}) dan kaedah kombinasi yang kolektif untuk membangunkan satu indeks baru iaitu Indek Pencemar Partikulat Kuari (QPPI). Indek baru QPPI menggunakan model kombinasi agregat. Satu perisian baru yang dikenali sebagai QPPIs V1.0 (Quarry Particulate Pollution Index Software) juga telah berjaya dihasilkan. QPPI ini sesuai untuk mengenal pasti punca debu dan menganggarkan pencemaran di sekitar kuari. Ia akan dapat membantu kawalan pencemaran debu di kuari-kuari.

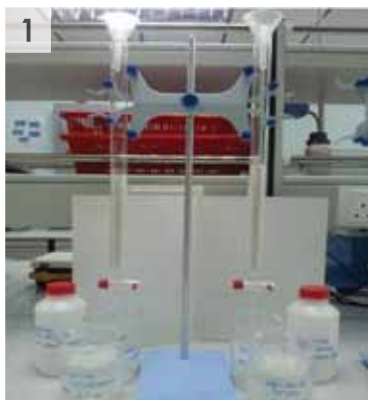


Photo: Norinsafrina

1. Kolum untuk ujian penjerapan.
Columns used for adsorption tests.
2. Penjerap yang digunakan dalam ujikaji.
Adsorbents used in the experiment.

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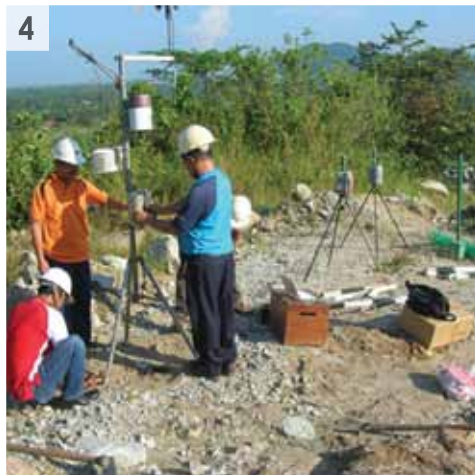


Photo: Shamsulkamal

1. Kerja-kerja persampelan di bekas Lombong Tembaga Mamut.
Sampling work at ex-Mamut Copper Mine.

Photo: Izhar Abadi

2. Kerja-kerja persampelan debu di kuari menggunakan alat mendapan debu.
Dust sampling in quarry with dust deposit gauge.



3. Persampelan debu di kawasan kuari dengan alat HVS.
Dust sampling in quarry area with High Volume Sampler (HVS).

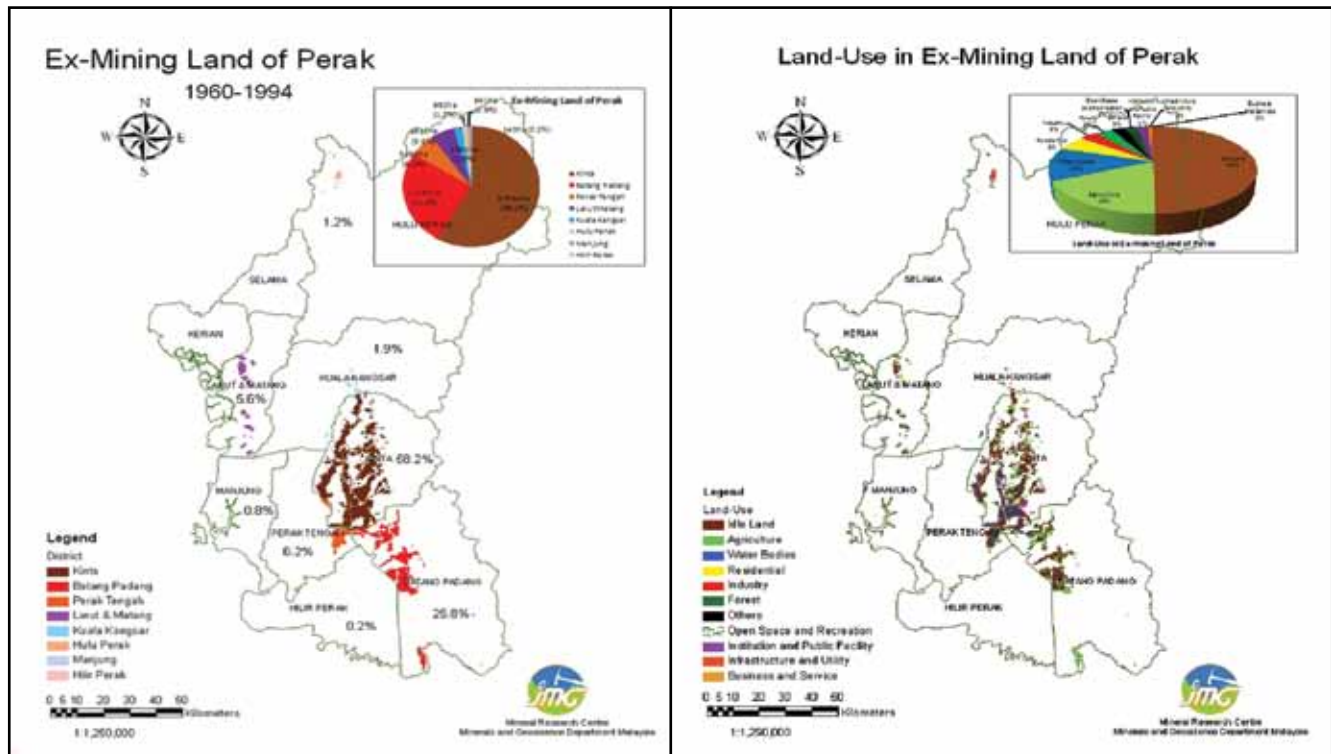
4. Pemasangan peralatan pemantauan cuaca di kawasan kuari.
Installation of weather station in quarry area.

Teknologi Pemulihan Lombong dan Kuari Mine and Quarry Rehabilitation Technology

Bil. No.	Aktiviti / Projek R&D R&D activity / project	Hasil / Penemuan / Catatan Output / Finding / Remarks
1	Kajian maklumat geospasial tanah bekas lombong negara National geospatial information studies of ex-mining land	Kajian maklumat geospasial tanah bekas lombong di negeri Perak menghasilkan maklumat berikut: 1. Peta tematik taburan tanah bekas lombong di negeri Perak. 2. Peta tematik gunatanah kawasan bekas lombong di negeri Perak. Hasil kajian di negeri Perak boleh digunakan untuk tujuan perancangan pembangunan kawasan bekas lombong. Geospatial information studies of ex-mining land in Perak produced the following information: 1. Thematic map of distribution of ex-mining land in Perak. 2. Thematic map of land-use in ex-mining areas in Perak. The result of the study in Perak can be used for the purpose of development planning of ex-mining land.

Kertas Teknikal Technical Papers

- Ramli Mohd Osman & Mohd Anuar Ishak, 2012. Geospatial analysis of ex-mining land in Perak. National Geoscience Conference 2012, Kuching, 23-24 Jun 2012.
- Ramli Mohd Osman & Mohd Anuar Ishak, 2012. Land-use of ex-mining land in Perak. International Symposium on Reclamation, Rehabilitation and Restoration towards a Greener Asia, Kuala Lumpur, 3-5 July 2012.



Contoh peta-peta hasil kajian maklumat geospasial tanah bekas lombong negara bagi negeri Perak.
Sample maps derived from the national geospatial information studies of ex-mining land in Perak.

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Perkhidmatan Sokongan Teknikal Technical Support Services

Pengurusan Maklumat Information Management

Infrastruktur, Keselamatan dan Aplikasi ICT

Pada awal tahun 2012, JMG telah mula merancang untuk membangunkan Sistem Pengurusan Keselamatan Maklumat (*Information Security Management System – ISMS*) MS ISO/IEC 27001:2007 dengan bimbingan dari Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU) dan Kementerian Sumber Asli dan Alam Sekitar (NRE). Dalam proses pembangunan ISMS ini, satu Jawatan kuasa Pelaksana ISMS JMG telah diwujudkan pada bulan September 2012.

Skop “Sistem Pengurusan Keselamatan Maklumat (ISMS)” JMG merangkumi operasi dan pengurusan Pusat Data termasuk Sistem MINGEOSIS dan portal rasmi Jabatan Mineral dan Geosains Malaysia. Persijilan ISMS dijangka boleh diperolehi pada pertengahan tahun depan sekiranya pihak JMG dapat melepasi tiga audit yang akan dijalankan oleh badan persijilan bertauliah.

Di samping itu, JMG juga terlibat dengan projek *Government Data Centre-2 (GDC-2)* yang dikendalikan oleh pihak MAMPU. JMG merupakan salah satu agensi yang terpilih daripada 48 agensi kerajaan bagi menyertai projek GDC-2 ini.

GDC-2 menawarkan dua perkhidmatan yang utama, iaitu:

- i. *Data Centre Hosting*; dan
- ii. *Disaster Recovery Centre Services*

ICT Infrastructure, Security and Application

In early 2012, JMG initiated development of the Information Security Management Systems (ISMS) MS ISO/IEC 27001:2007 under the guidance of the Administrative Modernization and Management Planning Unit of Malaysia (MAMPU) and the Ministry of Natural Resources and Environment (NRE). JMG ISMS Implementation Committee was set up in September 2012 to conduct the ISMS development process.

JMG’s scope of the “Information Security Management System (ISMS)” covers the operation and management of the Data Centre including MINGEOSIS and the official Minerals and Geoscience Department Malaysia web portal. ISMS certification is expected to be achieved in the middle of next year if JMG passes three audits conducted by the appointed certification body.

In addition, JMG is also involved in the Government Data Centre-2 (GDC-2) project which is being developed and implemented by MAMPU. JMG is among 48 government agencies selected to participate in GDC-2.

GDC-2 offers two major services namely:

- i. *Data Centre Hosting*; and
- ii. *Disaster Recovery Centre Services*

JMG terlibat dalam kedua-dua perkhidmatan ini. JMG akan mengambil bahagian dalam enam aplikasi dalam Disaster Recovery Centre. Lebih dari 15 aplikasi JMG akan dimigrasikan ke GDC-2. Projek ini dijangka siap pada akhir tahun 2013.

Kelajuan *bandwidth* talian Internet di Bahagian Perkhidmatan Teknikal (BPT), Ipoh telah dinaik taraf dari 4 Mbps kepada 20 Mbps untuk dikongsi oleh 320 orang pengguna di Kompleks JMG Ipoh dan mempercepatkan capaian ke atas maklumat MINGEOSIS. Indeks Ketersediaan Perkhidmatan Rangkaian di Pusat Data JMG BPT telah berjaya dikekalkan pada tahap 99.3% setiap bulan.

Pengurusan Data Berkomputer

Program Operasi *Key-in Data* (OPS KID) telah dijalankan di pejabat negeri untuk mengenalpasti masalah sistem MINGEOSIS samada dari segi pengguna, perisian, perkakasan dan infrastruktur. Selain itu, OPS KID juga merupakan persediaan terhadap pengauditan sistem MINGEOSIS yang dijalankan oleh Unit Audit Dalam NRE. Unit Audit Dalam telah membuat lawatan tapak ke Kompleks Ipoh, JMG Kedah / Perlis / P.Pinang, Pahang, Terengganu dan Sabah dalam tempoh bulan September hingga November 2012. Hasil penemuan akan dibentangkan pada tahun 2013.

Beberapa aktiviti penyelenggaraan dan pengukuhan sistem MINGEOSIS telah dijalankan seperti berikut:

- i. Penyelenggaraan HYDROdat
- ii. Peningkatan METALdat
- iii. Pengukuhan MINGEOSIS
- iv. Pelaporan Statistik MINEdat dan QUARRYdat

Aplikasi Sistem Maklumat Geografi dan Kartografi Berdigit

Penyediaan peta geologi digital, penghasilan peta tematik, perkongsian data spatial, percetakan peta, pengumpulan data spatial dan bantuan sokongan teknikal merupakan aktiviti sepanjang tahun 2012. Di samping itu kerja-kerja kartografi dengan menggunakan perisian grafik masih diteruskan untuk menghasilkan rajah-rajah yang sesuai dengan keperluan pelanggan.

JMG is involved in both of these services. JMG will take part in six applications of the Disaster Recovery Centre. JMG will migrate more than 15 applications to the GDC-2. The project is expected to be completed by the end of 2013.

Internet connection bandwidth speeds in the Technical Services Division (BPT), Ipoh, has been upgraded from 4 Mbps to 20 Mbps for the 320 users in Ipoh JMG Complex. The upgrading also facilitated the accelerated access to MINGEOSIS information. The Network Service Availability Index of the Data Centre has been consistently at the level of 99.3% per month.

Computerised Data Management

Operation *Key-in Data* (OPS KID) was carried out at several state offices to identify problems and issues related to MINGEOSIS with regards to users, software, hardware and infrastructure. OPS KID was also held to prepare for MINGEOSIS system auditing conducted by the NRE's Internal Audit Unit. The Audit Unit made site visits to several offices such as Ipoh Complex, JMG Kedah / Perlis / Penang, JMG Pahang, JMG Terengganu and JMG Sabah in the period from September to November 2012. The findings of the audit will be presented in 2013.

A number of maintenance activities and upgrading of MINGEOSIS system were also conducted as follows:

- i. HYDROdat maintenance
- ii. Upgrading of METALdat
- iii. Reinforcement of MINGEOSIS
- iv. Statistical reporting for QUARRYdat and MINEdat

Geographical Information System and Digital Cartography

Activities for the year 2012 include the preparation of digital geological maps, thematic map production, spatial data sharing, printing of maps, spatial data collection and providing technical support. In addition cartographic works to produce diagrams and figures using graphics software were continued.

Di Ibu Pejabat, sebanyak 13 draf pertama peta geologi digital berdasarkan skala 1:63,360 telah disiapkan.

At the Headquarters, a total of 13 draft digital geological maps of scale 1:63,360 were completed.

Bil. No.	Nombor Syit Sheet Number	Tajuk Title
1	29	Geological Map of Kulim
2	44	Geological Map of Kuala Betis
3	46	Geological Map of Sungai Aring
4	56	Geological Map of Gunung Bedong
5	67	Geological Map of Kuala Medang
6	75	Geological Map of Changkat Jong
7	97	Geological Map of Tasik Bera
8	98	Geological Map of Sungai Jeram
9	109	Geological Map of Padang Endau
10	117	Geological Map of Sungai Selai
11	133	Geological Map of Kukup
12	150	Geological Map of Pulau Langkawi
13	153	Geological Map of Alor Setar

Selain itu, kerja-kerja pengumpulan dan kompilasi data digital mineral dan geosains yang dibekalkan oleh JMG negeri terus dipergiatkan. Data-data berkenaan dikompilasi dan disediakan dalam format GIS sebagai memenuhi keperluan stake holder dan pelanggan.

In addition, compilation of mineral and geoscience digital data from state JMG offices were intensified. These data were compiled and prepared in GIS format in order to meet the requirement of the stakeholders and customers.

Bahagian Perkhidmatan Teknikal (BPT) telah melakukan suntingan bagi 10 unit peta digital termasuk enam peta geologi dan empat peta fotogeologi. Sebanyak 1,275 unit gambarajah dan peta kecil pelbagai skala telah disediakan menggunakan perisian grafik dan sejumlah 103 peta pelbagai skala telah dimbas.

The Technical Services Division has completed editing of 10 digital maps that included six geological maps and four photo-geological maps. A total of 1,275 diagrams and small maps of various scales were prepared using graphics software and a total of 103 maps of various scales were scanned.

Di JMG Sabah, sebanyak 14 peta tematik berbagai skala telah siap didigit dan dikemaskinikan. Manakala di JMG KPP, sejumlah tujuh kerja-kerja GIS telah dilakukan yang meliputi penghasilan peta dan pelan serta pengumpulan data geospasial. Di samping itu, sebanyak 30 peta / rajah telah disiapkan melalui kerja-kerja kartografi. Di JMG Johor, sebanyak 39 peta dan rajah telah dihasilkan melalui kerja-kerja kartografi digital. Manakala di JMG Pahang, satu peta geologi digital bagi kawasan Pasir Mas telah disiapkan.

For JMG Sabah, 14 thematic maps of various sizes were digitised and updated. At JMG KPP, a total of seven GIS assignments has been carried out which include production of maps and plans, and compilation of geospasial data. In addition, a total of 30 cartographic maps/diagrams were completed. In JMG Johore, a total of 39 cartographic maps and diagrams were prepared. At JMG Pahang, a digital geological map of the Pasir Mas area was completed.

Bagi JMG Selangor, kerja-kerja tertumpu kepada penyediaan peta kesesuaian pembinaan dan geologi bagi ulasan EIA untuk projek pembangunan. Untuk memenuhi permintaan berkenaan, sejumlah 206 peta telah disediakan. Di samping itu data-data digital juga disediakan kepada pelajar IPT untuk tujuan penyelidikan.

Bagi Negeri Kelantan, kerja-kerja pendigitalan peta bagi tahun 2012 lebih banyak tertumpu kepada penyediaan peta pembebasan mineral di samping peta taburan sumber mineral Negeri Kelantan. Sejumlah 18 unit peta telah dihasilkan.

Penyuntingan dan Perpustakaan

Untuk mencapai salah satu fungsi JMG yang penting iaitu mengumpul, menganalisis dan menyebarkan data dan maklumat berkaitan mineral dan geosains, JMG telah menerbitkan hasil penemuan dan kajiannya dalam berbagai laporan teknikal dan peta, dan penerbitan-penerbitan ini disebarkan melalui perpustakaan-perpustakaan JMG di seluruh Malaysia.

Pada tahun 2012, satu laporan peta telah diterbitkan iaitu “Geologi dan Sumber Mineral Kawasan Kuala Tembeling, Pahang Darul Makmur” (Laporan Peta No. 23). Sebanyak tiga garis panduan juga telah diterbitkan iaitu Garis Panduan Pensampelan Bahan Batuan dan Mineral, Garis Panduan Eksplorasi Biji Timah Primer dan Garis Panduan Eksplorasi Arang Batu. Disamping itu, satu Prosedur Operasi Standard – Siasatan Bencana Tanah Runtuh juga telah diterbitkan.

JMG telah menerima kedatangan seramai 3,725 orang pelawat yang membuat rujukan, penyelidikan serta membeli laporan dan peta di perpustakaan. Penjualan peta, laporan dan lain-lain bahan terbitan jabatan telah menghasilkan kutipan hasil sebanyak RM146,532.

JMG Selangor focused on the preparation of construction and geological suitability maps for Environment Impact Assessment (EIA) review of development projects. To meet the demand, a total of 206 maps were prepared. In addition digital data were also prepared for the university students conducting research.

For JMG Kelantan, the main focus was digitization of mineral clearance maps and mineral resources map of Kelantan with the production of 18 maps.

Editing and Library

One of the important functions of JMG is to collect, analyse and disseminate data and information pertaining to minerals and geoscience. In fulfilling this important role, JMG publishes its findings and research results in various technical reports and maps, and also disseminates these publications through its libraries in various states in the country.

In 2012, a map report titled “Geologi dan Sumber Mineral Kawasan Kuala Tembeling, Pahang Darul Makmur” (Map Report No. 23) was published. Three guidelines namely: Guideline on Rock and Mineral Material Sampling (JMG.GP.02), Guideline on Primary Tin Ore Exploration (JMG.GP.07) and Guideline on Coal Exploration were also published. One Standard Operation Procedure – Landslide Investigation was also published.

JMG has recorded a slight increase in the total number of visitors coming to JMG Libraries compared with the previous year. A total of 3,725 visitors called at the libraries for reference, research and the purchase of reports and maps. The sales of maps, reports and other departmental publications have also shown a slight decrease compared to the previous year. The overall total revenue collected from sales for the year was RM146,532.00.

Perpustakaan Library	Jumlah pelawat No. of visitor	Penjualan bahan terbitan jabatan / Sales of departmental publication					Jumlah penjualan Total sales (RM)
		Laporan / Report		Peta / Map		Lain-lain / Others	
		Bil. No.	Jumlah Amount (RM)	Bil. No.	Jumlah Amount (RM)	Jumlah Amount (RM)	
Ibu Pejabat / Headquarters	1421	314	23,958	589	48,683	210	72,851
Bahagian Perkhidmatan Teknikal	355	83	5,550	77	6,230	2,467	14,247
Sarawak	225	235	24,130	55	3,873	-	28,003
Sabah	143	49	3,760	46	4,160	215	8,135
Pusat Penyelidikan Mineral	4	-	-	-	-	-	-
Johor	29	18	990	26	1352	-	2 342
Negeri Sembilan / Melaka	24	25	2,080	18	1,800	-	3,880
Selangor / Wilayah Persekutuan	-	-	-	-	-	-	-
Kedah / Perlis / Pulau Pinang	100	43	2,000	23	1,510	100	3,610
Kelantan	102	43	2,360	31	3,100	100-	5,560
Terengganu	170	64	2,736	26	2,600	-	5,336
Pahang	1,152	23	1,950	35	2,960		4,910
Jumlah / Total	3,725	897	69,514	926	76,268	3,092	146,532

Perkhidmatan Geofizik Geophysical Services

Semenanjung Malaysia

Perkhidmatan geofizik yang telah diberikan adalah meliputi survei-survei keberintangan 2-D, transient elektromagnet, seismos dan pengelogan geofizik.

Survei keberintangan 2-D telah dilaksanakan di 13 lokasi meliputi sejumlah 17,700 meter-garis untuk kajian air bawah tanah dan siasatan tapak. Survei transient elektromagnet telah dilaksanakan di satu lokasi dengan jumlah pencerapan sebanyak 71 stesen. Survei ini dijalankan untuk kajian air bawah tanah. Survei seismos telah dijalankan di satu lokasi meliputi sejumlah 780 meter-garis untuk kajian tapak. Siasatan dengan menggunakan kaedah pengelogan geofizik telah dijalankan di enam telaga di empat lokasi.

Peninsular Malaysia

Geophysical services provided include 2-D resistivity, transient electromagnetic, seismic and geophysical logging surveys.

2-D resistivity surveys were carried out for groundwater study and site investigation at 13 locations covering 17,700 line-metres. Transient electromagnetic survey was carried out at one location for groundwater study with a total of 71 observation stations. The survey was conducted for groundwater study. A seismic survey for site investigation was conducted at one location covering 780 line-metres. Investigation using geophysical logging method was conducted at six wells in four locations.

Kaedah : Keberintangan imej 2-D
Method : 2-D Resistivity

Negeri / State	Kawasan / Area	Liputan (meter-garis) Coverage (line-metre)	Penemuan / Catatan Findings / Remarks
Johor	(i) Kluang	3,200	Kajian air bawah tanah / Groundwater study
	(ii) Segamat	800	Kajian air bawah tanah / Groundwater study
	(iii) Muar	800	Kajian air bawah tanah / Groundwater study
Kelantan	(i) Tok Bali	1,400	Kajian air bawah tanah / Groundwater study
Negeri Sembilan	(i) Gemas	1,600	Kajian air bawah tanah / Groundwater study
	(ii) Lukut	800	Kajian air bawah tanah / Groundwater study
	(iii) Sri Menanti	600	Kajian air bawah tanah / Groundwater study
	(iv) Simpang Pertang	3,820	Kajian air bawah tanah / Groundwater study
Perak	(i) Telok Intan	1,600	Kajian air bawah tanah / Groundwater study
	(ii) Chemor	1,000	Kajian tapak / Site investigation
	(iii) Jelapang	640	Kajian tapak / Site investigation
	(iv) Immigration Department Complex, Bukit Berapit, Pengkalan Hulu	720	Kajian tapak / Site investigation
	(iv) Immigration Department Complex, Bukit Berapit, Pengkalan Hulu	800	Kajian tapak (survei dijalankan oleh Unit Geofizik JMG Sabah) / Site investigation (surveyed by JMG Sabah Geophysics Unit)
Terengganu	(i) Setiu	720	Kajian tapak / Site investigation
Jumlah liputan / Total coverage		18,500	

Kaedah : Elektromagnet Transient
Method : Transient Electromagnet

Negeri State	Kawasan Area	Liputan (stesen) Coverage (station)	Penemuan / Catatan Findings / Remarks
Kelantan	Tok Bali	71	Kajian air bawah tanah / Groundwater study
Jumlah liputan / Total coverage		71	

Kaedah : Seismos
Method : Seismic

Negeri State	Kawasan Area	Liputan (meter-garis) Coverage (line-metre)	Penemuan / Catatan Findings / Remarks
Perak	Pengkalan Hulu	780	Kajian tapak / Site investigation
Jumlah liputan / Total coverage		780	

Kaedah : Pengelogan geofizik
Method : Geophysical logging

Negeri State	Kawasan Area	Liputan (bil. telaga) Coverage (no. of wells)	Penemuan / Catatan Findings / Remarks
Johor	Mersing	2	Perakuan air mineral / Mineral water certification
Selangor	Batang Kali	1	Perakuan air mineral / Mineral water certification
Kelantan	Tok Bali	2	Pembangunan telaga / Well development
Pahang	Raub	1	Perakuan air mineral / Mineral water certification
Jumlah liputan / Total coverage		6	

Kaedah : Mikro-graviti
Method : Micro-gravity

Negeri State	Kawasan Area	Liputan (stesen) Coverage (station)	Penemuan / Catatan Findings / Remarks
Perak	Immigration Department Complex, Bukit Berapit, Pengkalan Hulu	650	Pemetaan struktur sub-permukaan (dijalankan oleh Unit Geofizik JMG Sarawak Mapping of subsurface structure (surveyed by JMG Sarawak Geophysics Unit)
Jumlah liputan / Total coverage		650	

Sarawak

Siasatan geofizik melibatkan kaedah *resistivity 2D imaging* telah dijalankan di kawasan Kuala Baram, Miri untuk kajian eksplorasi air bawah tanah dan menentukan lokasi lubang gerudi pembinaan telaga tiub. Sebanyak 10 garisan profil merangkumi sejumlah 7.6 km telah dijalankan.

Sarawak

Geophysical investigations were carried out in Kuala Baram, Miri using 2D resistivity imaging method for groundwater exploration and to determine the borehole locations for tube wells. Ten profile lines covering a total of 7.6 km were carried out.

Kaedah : Keberintangan Imej 2-D
Method : 2-D Resistivity Imaging

Negeri State	Kawasan Area	Liputan Coverage (line-km)	Penemuan / Catatan Findings / Remarks
Sarawak	Kuala Baram, Miri	3	Kajian eksplorasi air bawah tanah / Groundwater exploration Eksplorasi air bawah tanah (oleh Unit Geofizik JMG Sabah Groundwater exploration (carried out by JMG Sabah Geophysics Unit)
	Kuala Baram, Miri	4.6	
Jumlah liputan / Total coverage		7.6	



Photo : Shahrul Ridzuan Zainal Rashid

Penyediaan garisan kajian keberintangan di Kuala Baram, Miri, Sarawak.
Preparation of resistivity survey line in Kuala Baram, Miri, Sarawak.

Sabah

Siasatan Geofizik telah dijalankan melibatkan kaedah *Resistivity 2D Imaging* di kawasan Pinangah dan Kuala Penyu. Siasatan geofizik termasuk pemrosesan data untuk eksplorasi batu arang telah dijalankan di kawasan Pinangah. Siasatan yang terdiri daripada 5 garisan siasatan dengan jumlah keseluruhan panjang 1000 m ini bertujuan untuk mengesan unjuran lapisan batu arang. Hasil dari siasatan ini, beberapa tapak penggerudian telah dicadangkan.

Menjalankan kerja lapangan geofizik termasuk pemrosesan data untuk projek Kebakaran Gambut, Aktiviti Hidrogeologi di kawasan sekitar Kuala Penyu. 3 garisan siasatan telah dilakukan di mana jumlah keseluruhan sepanjang 1300 m. Hasil yang diperolehi berjaya mengesan anomali air bawah tanah dengan nilai resistiviti yang berbeza mengikut geologi sesuatu kawasan dan beberapa tapak penggerudian telah dicadangkan.

Sabah

Geophysical survey consisting of 2D resistivity imaging was carried out at the Pinangah and Kuala Penyu areas. Geophysical field survey including data processing for coal exploration was carried out at the Pinangah area. The survey consisted of 5 lines with a total length of 1000 m to trace the extension of coal seams. As a result of this survey, a few drilling sites have been proposed.

A geophysical field survey including data processing was carried out around Kuala Penyu area. The survey consisted of 3 lines with a total length of 1300 m. The geophysical results assisted in the detection of anomalies in the groundwater resource with varying resistivity values related to the geology of the area. A few drilling sites have been proposed.

Kaedah : Keberintangan imej 2-D Method : 2-D imaging

Negeri State	Kawasan Area	Liputan Coverage (line-km)	Penemuan / Catatan Findings / Remarks
Sabah	Pinangah	1	Mengesan unjuran lapisan arang batu di Lembangan Arang Batu Pinangah. Tracing the extension of coal seams in the Pinangah coalfield.
	Kuala Penyu	1.3	Eksplorasi air bawah tanah di kawasan Kuala Penyu. Groundwater exploration in the Kuala Penyu area.
Jumlah liputan / Total coverage		2.3	



1. Siasatan 2D resistiviti untuk mengesan unjuran lapisan batu arang di Pinangah, Sabah.
[2D Resistivity survey to trace the extension of coal seams at Pinangah, Sabah.](#)
2. Siasatan 2D resistiviti untuk mencari air bawah tanah di kawasan tanah gambut yang sering terbakar di Kuala Penyu, Sabah.
[2D resistivity survey to explore for groundwater in the fire prone peat area at the Kuala Penyu, Sabah.](#)
3. Siasatan 2D resistiviti di kawasan gambut yang mudah terbakar di Kuala Baram, Miri, Sarawak.
[2D resistivity survey in the fire prone peat area at Kuala Baram, Miri, Sarawak.](#)

Mineralogi dan Petrologi

Mineralogy and Petrology

Semenanjung Malaysia

Kerja rutin yang dijalankan mencapai 3,896 unit kerja dengan nilai kerja RM 119,964. Kerja-kerja tersebut dijalankan untuk jabatan, agensi-agensi kerajaan lain dan juga pelanggan swasta.

Peninsular Malaysia

A total of 3,896 units of routine work valued at RM 119,964.00 were completed for the department, other government agencies and private sectors.

Senarai khidmat analisis yang dijalankan oleh Unit Mineralogi dan Petrologi, Bahagian Perkhidmatan Teknikal Details of analytical services carried out by the Mineralogy and Petrology Unit, Technical Services Division

	Untuk industri mineral For the mineral industry		Untuk agensi kerajaan For government agencies	
	Bilangan unit kerja Number of work unit	Nilai kerja Value of work (RM)	Bilangan unit kerja Number of work unit	Nilai kerja Value of work (RM)
Pengenalan sampel batuan dan mineral Identification of rock and mineral specimen	30	2,100.00	154	10,780.00
Pemeriksaan petrografi terperinci Detailed petrographic examination	6	420.00	-	-
Anggaran mineral kuantitatif Quantitative mineral estimation	219	19,710.00	24	2,160.00
Pengasingan magnetik / Bromoform Magnetic separation/Bromoform	427	29,890.00	313	21,910.00
Penyediaan keratan mikro/gilap/sinar-x Micro/polished/x-ray section preparation	8	320.00	106	5,040.00
Ujian kimia / Chemical test	122	1,220.00	-	-
Koleksi batuan dan mineral Rock and mineral collection	1	70.00	13	910.00
Pengenalan batu permata / Identification of gemstone	60	1,304.00	-	-
Kerja fotografi / Photographic work	-	-	2,413	24,130.00
Jumlah kecil / Sub-total	873	55,034.00	3023	64,930.00
Jumlah unit kerja Total number of work units	3,896	Jumlah nilai kerja Total value of work		119,964.00

Sarawak

Pada tahun 2012, JMG Sarawak telah melaksanakan 624 unit kerja rutin dengan nilai sebanyak RM15,760. Kerja-kerja yang dilakukan merangkumi penyediaan slaid keratan nipis batuan, pengenalan batuan dan penyediaan laporan petrografi. Kebanyakan kerja tersebut adalah atas permintaan sektor swasta.

Sabah

Sepanjang tahun 2012, Aktiviti Mineralogi dan Petrologi, di bawah Unit Geosains JMG Sabah, telah melaksanakan tugas dan kerja-kerja termasuklah menyedia, menganalisa dan membuat keratan nipis batuan, pengenalan contoh batuan / mineral dan menyediakan fotomikrograf. Sebanyak 1,348 kerja berkaitan mineralogi dan petrologi dengan nilai kerja sebanyak RM23,345 telah dilaksanakan.

Antara kerja-kerja permintaan luaran yang dilaksanakan ialah analisis batuan / mineral dari segi jenis, dan analisa geokimia / XRD / XRF untuk sampel batuan / mineral.

Sarawak

Routine work totalling 624 units with a work value of RM15,760 was carried out by JMG Sarawak in 2012. The works carried out includes the preparation of rock thin-sections, petrographical examinations and the preparation of petrographic reports. Most of the work was carried out upon the request by the private sectors.

Sabah

Throughout the year 2012, the Mineralogy and Petrology Activity under the Geoscience Unit JMG Sabah, has performed various work which include preparation and petrographical analysis of rock thin sections, rock sample identification, as well as preparation of photomicrograph. A total of 1,348 mineralogy and petrology related studies, including geochemical analysis, XRF and XRD, with a work value of RM23,345.00 were completed.

Among the various external requests carried out include rock / mineral type identification, and geochemical, XRF and XRD analyses for rock / minerals.

Kerja yang dijalankan oleh Unit Mineralogi dan Petrologi, JMG Sarawak dan Sabah Work carried out by the Mineralogy and Petrology Activity, JMG Sarawak and Sabah

Tugas / Task	Jumlah unit / Number of units	
	Sarawak	Sabah
Penyediaan keratan nipis / Rock thin-section preparation		
a. Dari permintaan dalaman (JMG) / Internal request	18	45
b. Dari permintaan luar (Luar Jabatan) / External request	163	64
Analisis petrografi / Petrographical analysis:		
a. Luaran (Luar Jabatan) / External request	429	121
b. Dalaman (MinPet) / Internal request	14	45
Pemeriksaan kuantitatif mineral / Quantitative mineral Examination	-	-
Gambarmikro keratan nipis / Photomicrographs of rock thin section	-	818
Bilangan pelanggan / Client		
a. Orang awam / General public	7	67
b. Pelajar / Student	4	28

Fotogeologi dan Penderiaan Jauh

Photogeology and Remote Sensing

Fotogeologi dan Penderiaan Jauh

Photogeology and Remote Sensing

Bil. No	Kawasan Area	Luas (km ²) Coverage (km ²)	Tujuan Purpose	Catatan Remarks
A. Pemetaan fotogeologi / Photogeological mapping				
1	Kawasan Transek 6: Langkawi-Tarutao, skala 1: 50,000 Transect 6 area: Langkawi-Tarutao, scale 1: 50,000	525	Pemetaan Geologi Sempadan Border Geological Mapping	Peta fotogeologi dan laporan disediakan. / Photogeological map and report prepared.
2	Kawasan Gunung Benom (syit 78), Pahang, skala 1: 63,360. Gunong Benom area (sheet 78), Pahang, scale 1: 63,360	1200	Pemetaan fotogeologi Semenanjung Malaysia Photogeological mapping of Peninsular Malaysia	Peta fotogeologi disediakan. Photogeological map prepared.
3	Kawasan Bukit Bunuh (sebahagian lembar 3464-Batu Kurau dan 3564-Lenggong), Perak, skala 1: 25,000 / Bukit Bunuh area (part of sheet 3464-Batu Kurau and 3564-Lenggong), Perak, scale 1: 25,000	150	Untuk kajian saintifik kawasan Bukit Bunuh, Lenggong Perak / For the scientific research of Bukit Bunuh, Lenggong Perak	Peta fotogeologi disediakan. Photogeological map prepared.
B. Perkhidmatan tafsiran foto / Photo-interpretation services				
1	Kawasan Pengkalan Hulu (sebahagian syit 18-Baling), Perak, skala 1: 63,360 / Pengkalan Hulu area (part of sheet 18-Baling), Perak, scale 1: 63,360	36	Kajian geofizik dan air tanah Geophysical and groundwater studies	Peta tafsiran disediakan. Interpretation map prepared.
2	Kawasan Tambun (sebahagian lembar 3660-Slim River), Perak, skala 1: 25,000 / Tambun area (part of sheet 54-Ipoh), Perak, scale 1: 25,000	36	Kajian struktur geologi dan air panas / Geological structure and hot spring studies	Peta tafsiran disediakan. Interpretation map prepared.
3	Kawasan Ulu Selim (sebahagian lembar 3660-Slim River dan 3760-Kampung Satak), Perak, skala 1: 25,000. / Ulu Selim area (part of sheet 3660-Slim River and 3760-Kampung Satak), Perak, scale 1: 25,000	150	Pemetaan geologi dan prospek geotermal Geological mapping and geothermal prospects	Peta tafsiran disediakan. Interpretation map prepared.
4	Kawasan Kuala Pilah (sebahagian syit 104-Kuala Pilah), Negeri Sembilan, skala 1: 63,360 / Kuala Pilah area (part of sheet 104-Kuala Pilah), Negeri Sembilan, scale 1: 63,360	144	Pemetaan permatang kuartza Quartz ridge mapping	Peta tafsiran disediakan. Interpretation map prepared.
5	Kawasan Lembangan Sg. Muar, Johor-Negeri Sembilan-Melaka, scale 1: 170,000 / Basin area of Sg. Muar, Johor-Negeri Sembilan-Melaka, scale 1: 170,000	6000	Kajian pembangunan air tanah Groundwater development studies	Peta tafsiran disediakan. Interpretation map prepared.
C. Perkhidmatan lain / Other Services				
1	Penyediaan Peta imej (Landsat TM) kawasan Lembah Kinta (sebahagian syit 53-Batu Gajah dan 54-Ipoh), Perak, skala 1: 170,000 untuk pemetaan kawasan batu kapur dan pameran. / Preparation of Image map (Landsat TM) of Kinta Valley area (part of sheet 53-Batu Gajah and 54-Ipoh), Perak, scale 1: 170,000 for Limestone area mapping and exhibition.			
2	Taklimat 'Teknik penderiaan jauh untuk interpretasi jenis batuan dan struktur geologi' bagi Pemodelan GIS Lembangan Muar. Briefing on 'Remote sensing technique for interpretation of rock type and geological structure' for GIS Modeling In Muar Basin'.			
3	Fotograf Udara Kawasan Bukit Tinggi-Genting Sempah, Pahang, skala 1:25,000 untuk kajian teknikal tanah runtuh. Aerial photographs of Bukit Tinggi-Genting Sempah area, Pahang, scale 1: 25,000 for landslide technical study.			
4	Penyediaan kertas 'Morphology of Bukit Bunuh Crater: Remote Sensing and Field Evidences' untuk dibentangkan di 'International Conference On Archaeogeology'. Preparation of paper 'Morphology of Bukit Bunuh Crater: Remote Sensing and Field Evidences' for the International Conference on Archaeogeology'.			
5	Khidmat perunding kepada Engeo Bumi Sdn. Bhd. mengenai tafsiran fotograf udara kawasan Kuala Terengganu (sebahagian syit 38-Kuala Terengganu), Negeri Terengganu, skala 1: 25,000 untuk pemetaan teren. / Consultancy services to Engeo Earth Sdn. Limited on the interpretation of aerial photographs consultancy of the Kuala Terengganu area, scale 1: 25,000 for terrain mapping.			
6	Pembentangan kertas bertajuk 'Struktur Geologi kawasan Ulu Selim berdasarkan tafsiran fotoudara dan imej satelit' di Seminar Kajian Geoterma Sebagai Sumber Tenaga Boleh Baharu. / Presentation of the paper 'Geological Structure of Ulu Slim area based on interpretation of aerial photograph and satellite images' in the Seminar on Geothermal Research as Renewable Energy Sources.			
7	Latihan industri untuk 2 orang pelajar Universiti dalam Penggunaan Remote Sensing Dalam Kajian Geologi. Industrial training for 2 students in The Use of Remote Sensing in Geological Study.			

Makmal Kimiabumi Geochemical Laboratory

Perkhidmatan analisis geokimia

Makmal-makmal Kimiabumi di Ipoh, Kuantan, Kuching dan Kota Kinabalu menyediakan perkhidmatan analisis kimia/ujian fizikal berkualiti serta khidmat nasihat kepada pelanggan dalaman Jabatan, agensi-agensi kerajaan lain dan pelanggan swasta untuk membantu pembangunan sektor mineral, industri berasaskan mineral, aktiviti kitar semula logam dan eksplorasi/pembangunan sumber air bawah tanah di Malaysia. Dalam tahun 2012 sejumlah 56,930 analisis telah disiapkan dengan nilai kerja keseluruhan RM1,617,312.00 di mana 4,268 daripada analisis tersebut telah diselesaikan untuk pelanggan swasta dengan kutipan hasil bernilai RM174,544.00.

Sistem pengurusan makmal MS ISO/IEC 17025:2005 dan akreditasi makmal

Dalam tahun 2012, keempat-empat Makmal Kimiabumi di Ipoh, Kuantan, Kuching dan Kota Kinabalu berjaya melaksana dan mengekalkan sijil akreditasi MS ISO/IEC 17025:2005 setelah audit dilaksanakan oleh Jabatan Standard Malaysia di makmal masing-masing. Di samping itu, Jabatan Standards Malaysia juga telah meluluskan permohonan Makmal Kimiabumi Ipoh untuk menambahkan lagi 14 ujian ke dalam skop akreditasi seperti berikut:-

- *Determination of SiO₂, Fe₂O₃, TiO₂, CaO and MgO in Silica Sand by XRF - 5 ujian;*
- *Determination of CaO MgO, SiO₂, Fe₂O₃, TiO₂, Al₂O₃, K₂O, P₂O₅ and MnO in Limestone by XRF- 9 ujian*

Geochemical analytical services

The respective Geochemical Laboratories in Ipoh, Kuantan, Kuching and Kota Kinabalu provide testing and consultancy services to officers of the Department, other government agencies and the private sector, to assist development of the mineral and mineral-based industries, metal recycling activities and ground water exploration/development in Malaysia. For the year 2012, a total of 56,930 analyses were completed with a total work value of RM1,617,312.00 of which 4,268 analyses were completed for the private sector with a revenue collection of RM174,544.00.

MS ISO/IEC 17025:2005 Laboratory Management System and Accreditation

For the year 2012, all the four Geochemical Laboratories in Ipoh, Kuantan, Kuching and Kota Kinabalu successfully implemented and retained their MS ISO/IEC 17025 accreditation certificate after assessment audits were conducted by the Department of Standards, Malaysia in the respective laboratories. In addition, the Department of Standards has approved the Ipoh Geochemical Laboratory's application to increase the scope of accreditation by 14 tests as follows:-

- *Determination of SiO₂, Fe₂O₃, TiO₂, CaO and MgO in Silica Sand by XRF - 5 tests;*
- *Determination of CaO MgO, SiO₂, Fe₂O₃, TiO₂, Al₂O₃, K₂O, P₂O₅ and MnO in Limestone by XRF- 9 tests*

Persijilan Akreditasi MS ISO/IEC 17025:2005
MS ISO/IEC 17025:2005 Accreditation Certification

Makmal Laboratory	Persijilan Akreditasi MS ISO/IEC 17025:2005 MS ISO/IEC 17025:2005 Accreditation Certification				Penandatanganan sijil ujian SAMM Approved signatory for SAMM test certificates
	No. sijil Certificate No.	Sah sehingga Valid until	Tempoh persijilan Certification duration	Skop akreditasi Scope of accreditation	
Ipoh	SAMM 116	31 Ogos 2014	1997-2012 15 tahun	Pasir silika - 11 Batu kapur - 14 Bullion emas 1 Air tanah - 11 Jumlah ujian/tests :- 37	15 Pegawai Kimia bumi Geochemists
Kuching	SAMM 173	12 Ogos 2014	1999-2012 13 tahun	16 ujian batu arang	5 Pegawai Kimia bumi Geochemists
Kota Kinabalu	SAMM 263	07 Jan 2015	2004-2012 8 tahun	3 ujian tanah	3 Pegawai Kimiabumi Geochemists
Kuantan	SAMM 508	04 Apr 2014	2011-2012 2 tahun	1 ujian sampel geokimia	4 Pegawai Kimiabumi Geochemists

Nota:- SAMM :- Skim Akreditasi Makmal Malaysia (*Malaysian Laboratory Accreditation Scheme*)

Di samping itu, audit dalaman antara makmal serta mesyuarat kajian semula pengurusan berjadual terus diadakan mengikut jadual yang ditetapkan untuk memantau dan memastikan sistem pengurusan MS ISO / IEC 17025 dilaksanakan dengan berkesan.

Bagi memenuhi keperluan mandatori standard pengurusan MS ISO / IEC 17025:2005 dan usaha berterusan untuk meningkatkan lagi kualiti perkhidmatan analisis kepada pelanggan Jabatan, ketiga-tiga makmal di Ipoh, Kuching dan Kota Kinabalu telah berjaya mengelolakan dan / ataupun mengambil bahagian dalam program-program ujian kecekapan/perbandingan antara makmal. Ketiga-tiga Makmal

Jabatan telah menunjukkan prestasi baik dan kecekapan teknikal dalam semua program ujian kecekapan / perbandingan antara makmal yang disertai.

In addition, interlaboratory internal audits and management review meetings were conducted regularly as scheduled to monitor and ensure the effective implementation of the MS ISO / IEC 17025 management system.

As part of mandatory requirements for compliance with the MS ISO / IEC 17025:2005 management standard and continuous effort to further improve the quality of testing services provided to the Department's customers, the 3 laboratories in Ipoh, Kuching and Kota Kinabalu successfully organised and / or participated in several Proficiency Testing (PT) / Interlaboratory Cross-check programmes.

The Department's laboratories have demonstrated good performance and competency in all the Proficiency Testing / Interlaboratory Cross-check programmes participated.

Penyertaan dalam program PT / Perbandingan di antara Makmal Participation in PT and Interlaboratory Cross-check Programmes

No. No.	Nama Program Ujian Kecekapan / Perbandingan di antara Makmal Name of Proficiency Testing (PT) /Interlaboratory X-check programme	Penganjur / Pengelola Program Programme Provider / Organiser
Makmal Ipoh / Ipoh Laboratory		
1	8 PT programme on Water testing:- ENVITEST 2 (Round 2) – Trace metals <i>Al, Cd, Cr & Cu</i> ENVITEST 2 (Round 1) – Trace metals <i>Fe, Mn, Pb, Ni & Zn</i> ENVITEST 4 - Total Solids, Suspended Solids & Total Dissolved solids ENVIEST 5 – Turbidity & Alkalinity ENVITEST 6 – <i>Hg & As</i> WAPAS 1 – Anions- <i>Cl, SO₄, NO₃ & F</i> WAPAS 5 - Na & K WAPAS 6 – Hardness, Ca & Mg	Jabatan Kimia Malaysia (Chemistry Department Malaysia)
2	Interlaboratory Cross-check on silica sand JMG/2012/SND – SiO ₂ , Fe ₂ O ₃ , TiO ₂ , Al ₂ O ₃ , CaO, MgO, Cr ₂ O ₃ , K ₂ O, NaO and LOI.	Makmal Ipoh
Makmal Kuching / Kuching Laboratory		
1	5 PT programme on Water testing:- ENVITEST 2 (Round 1) – Trace metals Al, Cd, Cr & Cu ENVITEST 2 (Round 2) – Trace metals Fe, Mn, Pb, Ni & Zn ENVITEST 4 - Total Solids, Suspended Solids & Total Dissolved solids ENVIEST 5 – Turbidity & Alkalinity WAPAS 6 – Hardness, Ca & Mg	Jabatan Kimia Malaysia (Chemistry Department Malaysia)
2	Interlaboratory Cross-check on silica sand JMG/2012/SND – SiO ₂ , Fe ₂ O ₃ , TiO ₂ , Al ₂ O ₃ , CaO, MgO, Cr ₂ O ₃ , K ₂ O, NaO and LOI.	Makmal Ipoh
Makmal Kota Kinabalu / Kota Kinabalu Laboratory		
1	1 PT programme on Water testing:- ENVIEST 6 - Hg & As	Jabatan Kimia Malaysia (Chemistry Department Malaysia)
2	Interlaboratory Cross-check on silica sand JMG/2012/SND – SiO ₂ , Fe ₂ O ₃ , TiO ₂ , Al ₂ O ₃ , CaO, MgO, Cr ₂ O ₃ , K ₂ O, NaO and LOI.	Makmal Ipoh
3	PT Mexico – Carbonate (CO ₃ ²⁻) and bicarbonate (HCO ₃ ⁻) in geothermal water	Mexico

Penyertaan dalam Pembangunan Standard Malaysia

Pegawai-pegawai Kimiabumi Makmal Kimiabumi, Ipoh terus mewakili Jabatan dalam beberapa Jawatankuasa Teknikal / Kumpulan Kerja SIRIM dan telah menyumbang secara aktif dalam pembangunan piawai-piawai Malaysia baru serta juga kajian semula piawai-piawai lama yang melebihi 5 tahun.

Participation in the development of Malaysian Standards

Geochemists of the Ipoh Geochemical Laboratory continued to represent the Department in several SIRIM Technical Committees / Working Groups and have contributed actively to the development of new Malaysian Standards as well as revision of Malaysian Standards which were more than five years old.

Bil. No.	Jawatankuasa / Kumpulan Kerja Teknikal Technical Committee/Working Group
1	Industrial Standard Committee B for Chemicals and Materials (ISC B)
2	Working Group for Lime and Lime Products

Latihan Teknikal

Dalam usaha membangunkan modal insan Jabatan dan selaras dengan polisi Kerajaan untuk pembelajaran berterusan, Makmal Kimiabumi Ipoh telah berjaya mengelola dan melaksanakan tiga kursus teknikal dalaman untuk staf makmal.

Technical Training

As part of human resource development in the Department, and in-line with the Government's policy of continuous learning, the Ipoh laboratory successfully conducted three in-house technical training courses for laboratory staff.

Bil. / No.	Kursus latihan teknikal dalaman / In-house technical training course	Tarikh dan tempat / Date and venue
1.	Kursus "Traceability" dan Kawalan Kualiti Data-data Ujian Course on Traceability and Quality Control of Test Data	03-04 April 2012, Sri Petaling, K. Lumpur
2.	Bengkel "Flame Atomic Absorption Spectrometry"-Teori dan Aplikasi Workshop on "Flame Atomic Absorption Spectrometry- Theory and Applications"	29-30 Mei 2012 Petaling Jaya
3	Bengkel "Proficiency Testing" dalam Sistem Pengurusan Makmal MS ISO/IEC 17025:2005 Workshop on "Proficiency Testing" in the MS ISO/IEC 17025:2005 Laboratory Management System	16-18 Julai 2012, Pulau Pinang

Sepanjang tahun, staf teknikal makmal juga telah menghadiri pelbagai kursus latihan dan bengkel teknikal tempatan yang dianjurkan oleh Institut Kimia Malaysia, Jabatan Standard Malaysia dan SIRIM Training Services untuk meningkatkan pengetahuan dan kompetensi mereka dalam menjalankan analisis makmal serta juga pelaksanaan sistem pengurusan makmal MS ISO/IEC 17025:2005.

Di samping itu, ketiga-tiga Makmal di Ipoh, Kuching dan Kota Kinabalu juga telah memberikan latihan praktikal selama 8-10 minggu kepada lapan orang pelajar dari lima universiti tempatan (UMT, UPM, UNIMAS, USM dan UiTM).

Throughout the year, laboratory staff continued to attend various technical training courses / workshops organised by the Malaysian Institute of Chemistry, Department of Standards and SIRIM Training Services to improve their knowledge and competency in laboratory testing as well as implementation of the MS ISO/IEC 17025:2005 management system.

In addition, the laboratories in Ipoh, Kuching and Kota Kinabalu continued to provide 8-10 weeks attachment training programmes to eight undergraduate students from five local universities (UMT, UPM, UNIMAS, USM and UiTM).

Latihan praktikal untuk pelajar universiti Practical training for university students

Bil. No.	Universiti University	Bilangan Pelajar No. of students	Tempoh Latihan Training duration	Tempat Latihan Training Venue
1	Universiti Malaysia Terengganu [UMT], Kuala Terengganu	3	8 minggu/weeks	Makmal Ipoh (1) dan Makmal Kuching (2)
2	Universiti Pertanian Malaysia [UPM] Serdang, Selangor	2	10 minggu/weeks	Makmal Kota Kinabalu (1) dan Makmal Kuching (1)
3	Universiti Malaysia Sarawak (UNIMAS), Kuching	1	8 minggu/weeks	Makmal Ipoh
4	Universiti Sains Malaysia Pulau Pinang [USM]	1	8 minggu/weeks	Makmal Ipoh
5	Universiti Teknologi MARA [UiTM] Arau, Perlis	1	8 minggu/weeks	Makmal Ipoh
	Jumlah: / Total:	8		

Penghasilan kerja perkhidmatan makmal geokimia tahun 2012
Geochemical laboratory services work output for the year 2012

Jenis sampel Type of sample	Penghasilan Output	Perkhidmatan makmal (Semenanjung) Laboratory services (Semenanjung)				Perkhidmatan makmal (Sarawak) Laboratory services (Sarawak)				Perkhidmatan makmal (Sabah) Laboratory services (Sabah)			
		Sampel dalam jabatan Internal sample	Agensi kerajaan Government agencies	Sektor swasta Private sector	Sampel dalam jabatan Internal sample	Agensi kerajaan Government agencies	Sektor swasta Private sector	Sampel dalam jabatan Internal sample	Agensi kerajaan Government agencies	Sektor swasta Private sector	Sampel dalam jabatan Internal sample	Agensi kerajaan Government agencies	Sektor swasta Private sector
Sampel geokimia (Sedimen, tanah, konsentrat & batuan)	Bilangan analisis Number of analysis	10,777	-	133	1,892	-	29	6,573	6	29			
Geochemical (Sediment, soil, concentrate & rock)	Nilai kerja Work value (RM)	160,550.00	-	4,548.00	28,630.00	-	1,456.00	137,800.00	240.00	1,980.00			
Air (Air tanah, air permukaan, effluen)	Bilangan analisis Number of analysis	18,328	2,124	170	1,134	-	-	4,514	36	188			
Water (Ground water, surface water, effluents)	Nilai kerja Work value (RM)	459,020.00	53,300.00	3,980.00	26,605.00	-	-	101,215.00	810.00	4,865.00			
Batu arang Coal	Bilangan analisis Number of analysis	-	-	-	327	-	772	-	-	-			
	Nilai kerja Work value (RM)	-	-	-	10,218.00	-	22,672.00	-	-	-			
Silikat (Batu silikat, Agregat & Debu batu arang)	Bilangan analisis Number of analysis	2,512	6	7	-	-	21	-	-	-			
Silicates (Silicate rock, Aggregate & Coal ash)	Nilai kerja Work value (RM)	176,540.00	420.00	310.00	-	-	1,290.00	-	-	-			
Mineral perindustrian (Pasir silika, batu kapur, lempung, feldspar)	Bilangan analisis Number of analysis	1,220	846	2,140.00	569	-	96	1,346	-	8			
Industrial minerals (Silica sand, limestone, clay, feldspar)	Nilai Kerja Work value (RM)	68,495.00	58,395.00	101,019.00	37,990.00	-	4,830.00	90,970.00	-	800.00			

Bijih berlogam (lmenit, bijih besi, struverit, zircon) Metalliferous ores (lmenite, iron ore, struverite, zircon)	Bilangan analisis Number of analysis	282	2	621	-	-	-	-	-	-	-	-	-
	Nilai Kerja Work value (RM)	19,740.00	70.00	24,244.00	-	-	-	-	-	-	-	-	-
Logam & aloi (Emas, ingot logam & pelbagai aloi) Metals & Alloy (Gold, metal ingot & miscellaneous alloy)	Bilangan analisis Number of analysis	-	168	-	-	-	-	-	-	-	-	-	-
	Nilai Kerja Work value (RM)	-	11,760.00	0.00	-	-	-	-	-	-	-	-	-
Pelbagai sampel (Sludge, sisa industri) Miscellaneous (Sludges, industrial waste etc.)	Bilangan analisis Number of analysis	-	-	54	-	-	-	-	-	-	-	-	-
	Nilai Kerja Work value (RM)	-	-	2,550.00	-	-	-	-	-	-	-	-	-
Jumlah / Total	Bilangan analisis Number of analysis	33,119	3,146	3,125	3,922	0	12,433	12,433	42	225			
	Nilai Kerja Work value (RM)	884,345.00	123,945.00	136,651.00	103,443.00	0.00	30,248.00	329,985.00	1,050.00	7,645.00			
Jumlah keseluruhan Overall total	Bilangan analisis Number of analysis		39,390			4,840			12,700				
	Nilai Kerja Work value (RM)		1,144,941.00			133,691.00			338,680.00				
Jumlah besar Grand total	Bilangan analisis / Number of analysis	Nilai kerja (RM) / Work value (RM)											
	Sampel dalam jabatan 49,474	Agensi kerajaan 3,188	Sektor swasta 4,268	Jumlah 56,930	Sampel dalam jabatan 1,317,773.00	Agensi kerajaan 124,995.00	Sektor 174,544.00	Nilai kerja termasuk bayaran (RM) Work value including payment (RM) 1,617,312.00	Kutipan Hasil (RM) Revenue collection 174,544.00				

Makmal Geologi Kejuruteraan Engineering Geology Laboratory

Makmal ini menjalankan perkhidmatan ujian penentuan ciri-ciri mekanikal, fizikal dan kekuatan agregat batuan dan tanah. Ia memberi perkhidmatan sokongan geoteknik kepada aktiviti geologi kejuruteraan, perlombongan, pengkuarian dan aktiviti-aktiviti lain jabatan. Makmal ini juga menawarkan perkhidmatan geoteknik kepada agensi-agensi kerajaan dan pihak industri.

Sebanyak 321 sampel batuan telah diterima manakala sebanyak 471 ujian telah dijalankan dengan nilai kerja sebanyak RM 16,161.00.

The Engineering Geology Laboratory provides tests to determine mechanical and physical properties and strength of rock aggregates and soil. It provides geotechnical support services to the activities of engineering geology, mining, quarrying and other activities of the department. This laboratory also offers geotechnical test services to other government agencies and private sectors.

The Engineering Geology Laboratory received a total of 321 rock samples and carried out a total of 471 tests with the work value of RM 16,161.00.

Senarai terperinci kerja yang dijalankan oleh Makmal Geologi Kejuruteraan, Semenanjung Malaysia Details of work carried out by the Engineering Geology Laboratory, Peninsular Malaysia

Ujian agregate / tanah Aggregate / soil test	Untuk industri / For the industry		Untuk agensi kerajaan / For government agencies	
	Bilangan unit / Number of unit	Nilai kerja / Work value (RM)	Bilangan unit / Number of unit	Nilai kerja / Work value (RM)
Specific gravity	85	1700	0	0
Water absorption	17	425	0	0
Soundness value	20	1600	0	0
Flakiness index	15	450	0	0
Elongation index	4	120	0	0
Impact value	18	720	0	0
Crushing value	12	600	0	0
Ten % fines value	3	150	0	0
Los angeles abrasion	12	720	0	0
Sieve analysis	128	6400	0	0
Cube test	126	2394	0	0
Plasticity index	0	0	0	0
Mechanical sieving	9	252	0	0
Crush to Size	5	250	0	0
Fractured Face (flakiness) *	0	0	0	0
Bulk density (SG)*	2	40	3	60
Clay silt dust content (SA)*	2	100	0	0
Hardness number test	0	0	0	0
Porosity	2	60	0	0
Crushing strength	0	0	0	0
Moisture content	8	120	0	0
Gradation (Hydrometer & SA)	0	0	0	0
Sieve analysis (soil)	0	0	0	0
Atterberg Limits	0	0	0	0
Moisture content	0	0	0	0
Specific gravity	0	0	0	0
Linear limit	0	0	0	0
Sub-total	468	16,101	3	60
			Total no. of unit	Total work value (RM)
			471	16,161

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Photo: Ling Nan Ley

Pancaran cahaya matahari turun melalui lubang besar di bumbung gua di bahagian ruang besar yang dikenali sebagai Padang, Gua Niah, Sarawak. / *Shafts of sunlight stream down from large holes in the cave roof of a large chamber known as the Padang in Niah Cave, Sarawak.*

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Terengganu

• Sumber Mineral / Mineral Resources

1. Muhammad Azfar Kamaruddin, Abdul Hadi Abdul Rahman, Abdul Haziq Yusuf & Ideris Muhammad: **Laporan statistik pengeluaran mineral perindustrian dan industri yang berasaskannya serta direktori pengeluaran bagi Terengganu, 2011.** *JMG.TGG(MPI)01/2012.*

2. Abdul Hadi Abdul Rahman: **Sumber silika di Terengganu: Cirian, penilaian dan kepelbagaian sumber.** *JMG.TGG(MPI)02/2012.*
3. Muhammad Azfar Kamaruddin & Abdul Hadi Abdul Rahman: **Kajian sumber batuan silika di Sungai Mas, Kemaman Terengganu.** *JMG.TGG(MPI)03/2012.*
4. Muhammad Azfar Kamaruddin & Abdul Hadi Abdul Rahman: **Kajian sumber ilmenit di kawasan Tanggul dan Penghulu Diman, Hulu Terengganu, Terengganu.** *JMG.TGG(MPI)04/2012.*
5. Hamzah Zakaria & Abdul Hadi Abdul Rahman: **Penilaian semula timah plaser di Sungai Tebak, Kemaman, Terengganu.** *JMG.TGG(MBL) 01/2012.*
6. Hamzah Zakaria & Abdul Hadi Abdul Rahman: **Penilaian semula timah plaser di Sungai Cenderung, Kemaman, Terengganu.** *JMG.TGG(MBL) 02/2012.*

• Geosains / Geoscience

1. Razaidi Shah Abdul Kadir & Hamlee Ismail: **Laporan pemetaan geologi syit 73 dan 85, Kemaman, Terengganu.** *JMG.TGG(PGN)01/2012.*
2. Zahidi Hamzah & Hamlee Ismail: **Pemantauan air bawah tanah Terengganu tahun 2006-2010.** *JMG.TGG(SAT) 01/2012.*
3. Zahidi Hamzah & Hamlee Ismail: **Laporan siasatan sumber air bawah tanah kawasan Kemaman.** *JMG.TGG(SAT) 02/2012.*
4. Hamlee Ismail: **Pemetaan geologi terain, Blok 635, Bukit Kor Marang, Terengganu.** *JMG.TGG(GBN) 01/2012.*
5. Hamlee Ismail: **Siasatan geologi kejadian tanah mendap di kawasan Felda Selasih, Setiu Terengganu.** *JMG.TGG(GBN) 02/2012.*
6. Jabatan Mineral dan Geosains: **Pemetaan geologi terain, Blok 684, Bukit Kor, Marang, Terengganu.** *JMG.TGG(GBN) 03/2012.*

Pahang

• Geosains / Geoscience

1. Mazlan Mohamad Zain: **Pemetaan geologi terain, geologi kejuruteraan permukaan dan inventori cerun potongan yang meliputi kawasan Bandar Raub, Pahang, Daerah Raub, Negeri Pahang Darul Makmur.** *JMG.PHG.(GBN) 3/2012.*
2. Mohd Asnizam Ayub: **Statistik pengeluaran air mineral Negeri Pahang 2011.** *JMG.PHG. (SAT) 1/2012.*

Sarawak

• Sumber Mineral / Mineral Resources

1. Freddy Heward Chinta & Tennent Ahai: **Eksplorasi geokimia kawasan Miri, Sarawak Utara (tinjauan) RMK Ke-9.** *JMG.SWK.(SGR)06/2010.*
2. Freddy Heward Chinta & Tennent Ahai: **Eksplorasi geokimia kawasan Miri-Baram, Sarawak Utara (tinjauan) RMK Ke-9.** *JMG.SWK.(SGR)07/2010.*
3. Freddy Heward Chinta & Tennent Ahai: **Eksplorasi geokimia kawasan Baram, Sarawak Utara (tinjauan) RMK Ke-9.** *JMG.SWK.(SGR)08/2010.*
4. Freddy Heward Chinta & Tennent Ahai: **Eksplorasi geokimia kawasan Limbang, Sarawak Utara (tinjauan) RMK Ke-9.** *JMG.SWK.(SGR)09/2010.*
5. Freddy Heward Chinta, Khairul Nazri Abd. Ghani & Tennent Ahai: **Eksplorasi geokimia kawasan Lawas, Sarawak Utara (tinjauan) RMK Ke-9.** *JMG.SWK.(SGR)10/2010.*
6. John Joseph Jinap, Freddy Heward Chinta & Tennent Ahai: **Laporan bersepadu projek geokimia rantau Sarawak.** *JMG.SWK.(SGR)11/2010.*

• Geosains / Geoscience

1. Mohd. Yusop Ramli, Thomson Galin, Anuar Ishak, Mohd. Dahlan & Abdul Razak Zainal Abidin: **Geologi kawasan Nanga Budu, Sarawak, Malaysia.** *JMG.SWK.(PGN)01/2010.*
2. Thomson Galin: **Geologi dan sumber mineral kawasan Nanga Mujong, Sarawak.** *JMG.SWK.(PGN)3/2010.*
3. Redzuan Ahmad Banjar: **Geologi kawasan Lawas-Kuala Lawas Sarawak, Malaysia (RMK Ke-9).** *JMG.SWK.(PGN)4/2010.*
4. Mohd. Yusop Ramli: **Laporan bersepadu projek pemetaan geologi Sarawak.** *JMG.SWK.(PGN)05/2010.*

• Mineral Tenaga / Energy Mineral

1. Paulus Godwin: **Laporan bersepadu projek penilaian sumber batu arang Sarawak RMK ke-9.** *JMG.SWK.(SAB)01/2011.*

Sabah

• Sumber Mineral / Mineral Resources

1. Jayawati Fanilla Sahih Montoi & Webster Wong: **Kesesuaian lempung kawasan Segama dan Silabukan, Lahad Datu, sebagai bahan mentah dalam pembuatan seramik.** *JMG.SBH(MPI) 04/2010.*
2. Jayawati Fanilla Sahih Montoi & Webster Wong: **Potensi sumber montmorilonit di kawasan Mansuli dan Silabukan, Lahad Datu, Sabah.** *JMG.SBH(MPI) 05/2010.*
3. Webster Wong, Jayawati Fanilla Sahih Montoi, Nor Effendy Norizan & Joanes Muda: **Laporan bersepadu projek penilaian sumber mineral perindustrian Sabah RMK-9.** *JMG.SBH(MPI) 07/2010.*
4. Jayawati Fanilla Sahih Montoi: **Laporan industri berasaskan mineral perindustrian Negeri Sabah tahun 2011.** *JMG.SBH(MPI)02/2012.*
5. Jayawati Fanilla Sahih Montoi & Webster Wong: **Potensi sumber pasir binaan di kawasan Sungai Papar, Daerah Papar, Sabah.** *JMG.SBH(MPI) 2/2012.*

• Geosains / Geoscience

1. Mohamed Asri Omar & Zamri Ramli: **Laporan penyiasatan awal pergerakan tanah di Sekolah Kebangsaan Kauluan, Ranau, Sabah.** *JMG.SBH/GBN/01/2011.*
2. Mohamed Asri Omar & Zamri Ramli: **Laporan penyiasatan awal pergerakan tanah di Taman Indah Jaya, Sandakan, Sabah.** *JMG.SBH/GK/02/2011.*
3. Mohamed Asri Omar, Bailon Golutin & Zamri Ramli: **Laporan penyiasatan awal pergerakan tanah di Sekolah Kebangsaan Sri Tanjung Papat 1, Sandakan, Sabah.** *JMG.SBH/GBN/03/2011.*
4. Bailon Golutin, Joanes Muda, Nightingale Lian, Chung Pit Soon & Zamri Ramli: **Engineering geological assessment of resort/hotels sites in the Kundasang area, Sabah.** *JMG.SBH(GBN)1/2012.*
5. Tungah Surat: **Projek Warisan Geologi Negara, Kompleks Gunung Kinabalu, Sabah.** *JMG.SBH(WGN)/01/2010.*

• Geosains / Geoscience

1. Fredolin Javino & Ibrahim Amnan: **Isotope and hydrogeochemical investigations for Tawau geothermal prospects, Sabah, Malaysia.** *JMG.SBH(GS)/04/2010.*

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Photo: Ling Nan Ley

Kilim Geoforest Park, Langkawi. Fitur pada puncak singkapan menyerupai pandangan sisi muka seorang lelaki.
Kilim Geoforest Park, Langkawi. The feature near the top of the outcrop resembles the side view of a man's face.

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Berdiri dari kiri / **Standing from left** : Tan Tiong Meng (Ketua Pegawai Teknologi Maklumat), Ling Nan Ley (KPP, Unit Penyuntingan & Perpustakaan)

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1	Sumber Manusia / Human Resource (bil. / no.)	
	Pegawai profesional / Professional officers	46
	Kakitangan Sokongan / Supporting staff	141
2	Peruntukan /Allocation (RM)	
	Mengurus / Operation	12,444,960
	Pembangunan / Development	1,963,000
3	Perkhidmatan Makmal Geokimia / Geochemical Laboratory Services (bil. / no.)	
	Analisis kimia / Chemical analyses	56,930
	Kajian mineralogi dan petrologi / Mineralogical and petrological examinations	3,896
4	Perkhidmatan Geosains / Geoscience Services	
	a. Penggerudian untuk kajian saintifik/Drilling for scientific study (bil. / no.)	3
	b. Geologi Marin / Marine Geology	
	Permohonan lesen melombong pasir laut / Applications for offshore sand mining license (bil. / no.)	25
	Analisis sampel sedimen marin / Marine sediment samples analysis (bil. / no.)	149
	c. Perkhidmatan geofizik / Geophysical services	
	Elektromagnet Transient / Transient Electromagnet(stesen/station)	71
	Survei keberintangan 2D / 2D Resistivity survey (m)	17,700
	Survei Seismos / Seismic Survey (m)	780
	Pengelogan geofizik / Geophysical logging (bil./no.)	6
	d. Perkhidmatan fotogeologi & penderiaan jauh / Photogeology & remote sensing services	
	Peta pentafsiran fotogeologi / Photo-geological interpretation map (km ²)	6,366
	Pemetaan fotogeologi / Photogeological mapping (km ²)	1,875
5	Perkhidmatan Pembangunan Lombong dan Kuari / Mine and Quarry Development Services (bil. / no.)	
	Pengukuran kualiti udara / Air quality measurements	62
	Ujian geoteknik / Geotechnical tests	471
	Ujian kompetensi pembedil / Shot-firer competency tests	26
6	Pengurusan Maklumat / Information Management (bil. / no.)	
	Peta didigitkan / Maps digitized	10
	Gambarajah disediakan / Diagrams prepared	1,275
	Penerbitan Jabatan dijual / Departmental publications sold	83
	Peta dijual / Maps sold	77

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1	Sumber Manusia / Human Resource (bil. / no.)	
	Pegawai profesional / <i>Professional officers</i>	26
	Kakitangan sokongan / <i>Supporting staff</i>	92
2	Peruntukan / <i>Allocation</i> (RM)	
	Mengurus / <i>Operation</i>	5,515,900
	Pembangunan / <i>Development</i>	1,020,000
3	Aktiviti Pembangunan & Penyelidikan Mineral / <i>Mineral Research & Development Activities</i> (bil. / no.)	
	R&D penghasilan jubin kaca seramik tersinter menggunakan kaca kitar semula / <i>R&D on production of sintered glass ceramic tiles using recycled glass</i>	1
	R&D penghasilan kaca lembut daripada pasir silika tempatan / <i>R&D on production of soft glass from local silica sand</i>	1
	R&D penghasilan bebola seramik berasaskan lempung tempatan / <i>R&D on production of ceramic balls bodies using local clay</i>	13
	R&D penghasilan jasad tembikar putih menggunakan lempung tempatan / <i>R&D on production of whiteware bodies using local clay.</i>	8
	R&D penghasilan ingot gigi restoratif menggunakan pasir silika dan feldspar tempatan <i>R&D on production of dental restorative ingots using local silica sand and feldspar</i>	1
	R&D penghasilan bahan biokomposit diopsid-wollastonit dengan mineral tempatan <i>R&D on production of biocomposite diopside-wollastonite using local minerals</i>	1
	R&D kalsium karbonat termendak (PCC) berstruktur terkawal / <i>R&D on production of controlled structures of precipitated calcium carbonate (PCC)</i>	1
	R&D penyediaan kertas menggunakan PCC dengan bantuan bahan retensi / <i>R&D on the preparation of paper using PPC with aid of retention agents</i>	1
4	Aktiviti Pembangunan dan Penyelidikan Pembangunan Sumber Mineral Secara Mapan <i>Research and Development Activities on Sustainable development of Mineral Resource</i> (bil. / no.)	
	R&D teknologi hijau dalam pemprosesan mineral / <i>R&D on green technology in mineral processing</i>	2
	R&D penyokong aerogel silika / <i>R&D on aerogel silica support</i>	1
	Penyelidikan kontrak untuk industri / <i>Contract research for industry</i>	2
	Kajian potensi Saliran Asid Lombong (AMD) di kawasan lombong aktif / <i>Study on AMD potential at active mine sites</i>	2
	Kajian peneutralan hampas loji pemprosesan lombong timah menggunakan batu kapur melalui ujian Net Acid Generation (NAG) <i>Study on neutralising tin mill tailing with limestone by using NAG tests.</i>	1
	Kajian Rawatan Arsenik dalam air sisa lombong emas / <i>Treatment of Arsenic from gold mine wastewater</i>	2
	Pembangunan Indeks Pencemaran Partikulat Kuari dan perisian / <i>Development of Quarry Particulate Pollution Index (QPPI) and software.</i>	1
	Kajian maklumat geospasial tanah bekas lombong Malaysia / <i>Study of geospatial information of ex-mining land in Malaysia</i>	4

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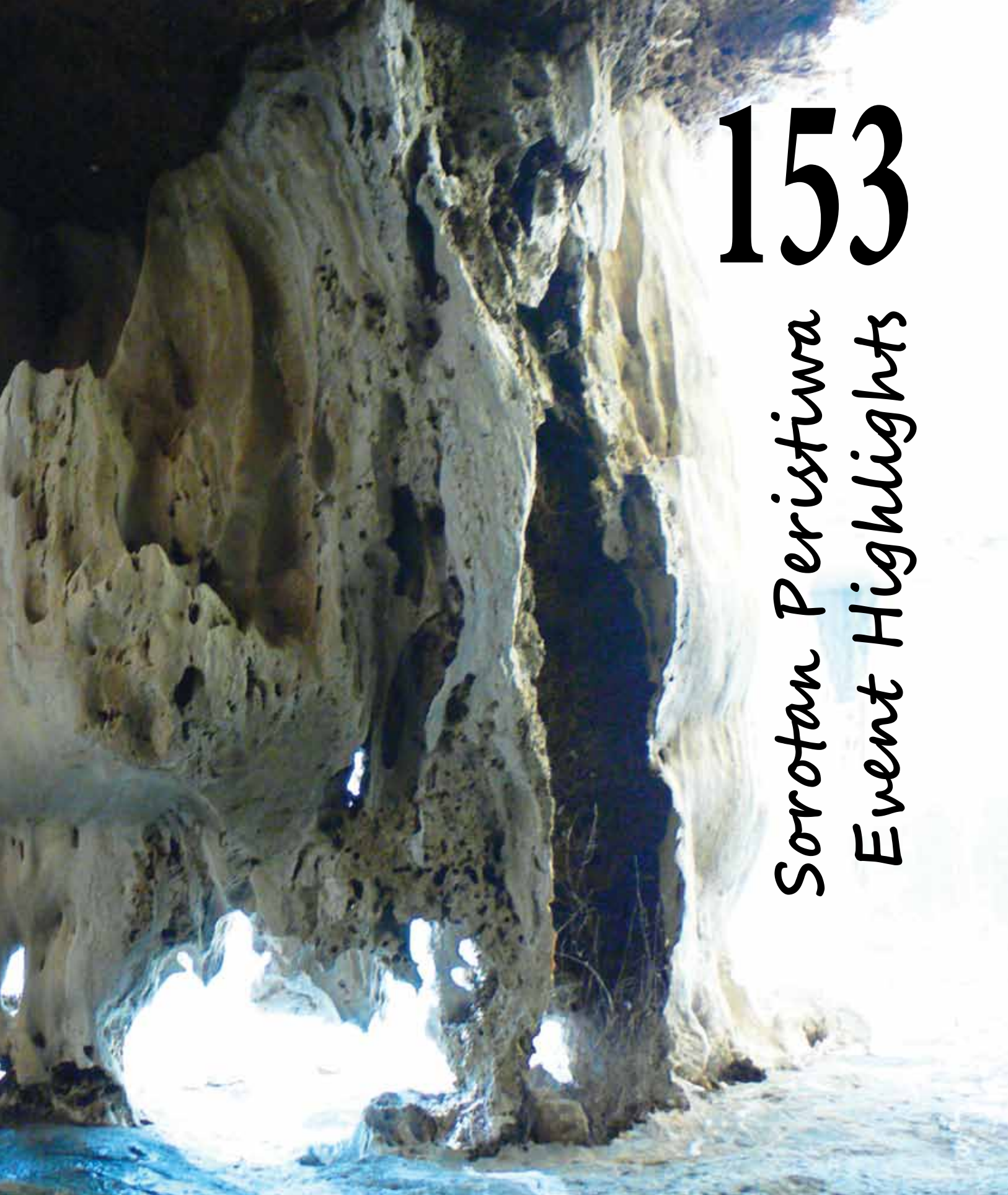
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Kakitangan sokongan / Supporting staff (bil. / no.)	35	33	35	42	34	36	33	35	98	60	441
2 Peruntukan Tahunan / Annual Allocation											
Mengurus / Operation (RM)	1,954,600	1,889,420	2,670,090	2,427,600	2,033,100	1,922,820	1,963,360	2,491,700	8,047,870	5,782,320	31,182,880
Pembangunan / Development (RM)	426,000	432,000	661,000	603,000	528,000	480,000	382,000	819,000	16,432,000	1,021,000	21,784,000
3 Menjalankan Eklorasi dan Menyediakan Maklumat Sumber Mineral / Mineral Resources Exploration and Information											
Sumber mineral berlogam dikenal pasti / Metallic mineral resources identified (juta tan metrik / million tonnes)	19,100	-	100	6,400	-	7,250	8,114	24,561	1,500	2,771	69,796
Sumber mineral perindustrian dikenal pasti / Industrial mineral resources identified (juta tan metrik / million tonnes)	306,267	3,179,791	2,481,800	3,104,598	2,137,779	8,221,404	835,343	3,874,540	16,267,022	70,041,914	110,450,459
Sumber mineral tenaga dikenal pasti / Energy mineral resources identified (juta tan metrik / million tonnes)	-	-	-	-	-	-	-	-	599,050	360,950	960,000
4 Menyediakan Maklumat dan Khidmat Geosains / Provide Geoscience Information and Services											
Liputan pemetaan geologi/ Geological mapping coverage (km ² (%))	18,985 (100%)	8,304 (100%)	5,401 (100%)	17,175 (82%)	11,253 (100%)	11,931 (80%)	12,955 (100%)	27,960 (78%)	37,320 (30%)	20,536 (28%)	171,820 (52%)
Liputan pemetaan geologi terrain Terrain geological mapping coverage (km ²)	340	722	1,558	300	840	634	345	358	330	340	5,767
Liputan pemetaan geologi tanah gambut dan tanah lembut / Peat and soft soil geological mapping coverage (km ²)	200	850	-	-	-	-	-	450	60	-	1,560
Telaga eksplorasi dan pembangunan air bawah tanah / Groundwater exploration and development well (bil. / no.)	26	49	280	22	44	72	25	8	87	111	724
Pemantauan telaga air bawah tanah Groundwater monitoring well (bil. / no.)	40	45	38	45	31	63	50	22	67	26	427
Telaga air bawah tanah di kawasan kebakaran gambut Groundwater well in fire prone peat area (bil. / no.)	4	-	4	-	-	3	-	8	9	3	31
Penilaian sumber geoterma/ Geothermal resource assessment (km ²)	-	-	-	-	-	50	-	-	-	150	200
Penaratan Geotapak / Geosite characterisation (bil. / no.)	31	2	4	18	13	12	23	12	52	15	182
5 Penguatkuasaan dan Kawalselaian Aktiviti Lombong dan Kuari / Enforcement and Supervision of Mining and Quarrying Activities											
Lombong beroperasi / Operating mines (bil. / no.)	18	3	-	25	8	34	16	74	11	0	189
Kuari beroperasi / Operating quarries (bil. / no.)	42	30	20	59	38	13	16	31	43	28	320
Skim Pengendalian Melombong dikeluarkan/ Mining Operation Schemes issued (bil. / no.)	18	0	1	17	7	23	15	74	4	-	159
Surat Kebenaran Pengkuarian dikeluarkan/ Letters of Authorisation to Quarrying issued (bil. / no.)	-	2	17	69	-	10	14	31	-	-	143
6 Perkhidmatan Makmal Geokimia / Geochemical Laboratory Services											
Analisis/Analyses (bil. / no.)	-	-	-	-	-	-	-	-	4,840	12,700	17,540
Nilai kerja / Work value (RM)	-	-	-	-	-	-	-	-	133,691	338,680	472,371



Photo: Mohd Pauzi Abdullah

Gua Bewah, Kenyir, Terengganu. / [Bewah Cave, Kenyir, Terengganu.](#)



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*Sorotan Peristiwa
Event Highlights*

Sorotan Peristiwa Event Highlights

06-07.01.2012

- Lawatan kerja rombongan Timbalan Ketua Setiausaha (Sumber Asli) NRE Dato' Dr. Mohd Ali bin Mohamad Nor ke JMG Sabah.
Working visit by Deputy Secretary General (Natural Resources) NRE Dato' Dr. Mohd Ali bin Mohamad Nor to JMG Sabah.



17-19.02. 2012

- Program "Annual NRE Management Work Camp Programme, Langkawi" anjuran bersama NRE dan JMG Malaysia.
Annual NRE Management Work Camp Programme, Langkawi – jointly organised by NRE and JMG Malaysia.



08-09.02.2012

- Program Pemimpin Muda Prihatin Air Kebangsaan – Zon Utara, di Pendang Lake Resort, Pendang, Kedah.
National Water Watch Programme for Young Leaders – North Zone, at Pendang Lake Resort, Pendang, Kedah.



Program dirasmikan oleh Pengarah JMG KPP.
Opening by the Director of JMG KPP.



Pembinaan model air bawah tanah oleh peserta program.
The participants constructing a groundwater model.

13.03.2012

- Seminar Kesedaran Risiko Batu Runtuh Bukit Batu Kapur di Lembah Kinta.
Seminar on Awareness of Rockfall Risk at Limestone Hills in Kinta Valley.



Photo: Safaruddin b. Sirim

1. Peserta-peserta seminar anjuran bersama JMG Malaysia dan Majlis Bandaraya Ipoh (MBI) di Dewan Azlan Shah, MBI, Ipoh.
The participants at the seminar which was jointly organised by JMG Malaysia and Ipoh City Hall (MBI) at Dewan Azlan Shah, MBI, Ipoh.
2. Perasmian penutup oleh YBhg. Dato' Haji Abu Bakar b. Haji Said, Pengarah Unit Perancang Ekonomi Negeri Perak.
Closing ceremony officiated by YBhg. Dato' Haji Abu Bakar b. Haji Said, Director of Perak State Economic Planning Unit.

20-22.03.2012

- Kem Pemimpin Muda Prihatin Air Peringkat Kebangsaan Anjuran UNESCO-IHP di Pusat Eko Pelajaran Hutan Paya Laut, Kuala Sepetang, Taiping, Perak. *National Water Watch Programme for Young Leaders organised by UNESCO-IHP at Pusat Eko Pelajaran Hutan Paya Laut, Kuala Sepetang, Taiping, Perak.*



Photo: Mohd. Rodzi b. Mat Saman

1. Penerangan kepada pelajar yang melawat pameran jabatan. *Briefing to the students visiting the department's exhibition booth.*
2. Demonstrasi penggerudian menggunakan kaedah pengejetan kepada pelajar. *Demonstration of drilling by the jetting method to the students.*

26.03.2012

- Seminar Perubahan Aras Laut Kuno – Kefahaman Terhadap Sejarah Pembentukan Bumi anjuran bersama JMG Malaysia, Institut Penyelidikan Hidraulik Kebangsaan Malaysia (NAHRIM) dan Universiti Kebangsaan Malaysia (UKM) di Mini Auditorium, NAHRIM, Serdang, Selangor. / *Seminar on Paleo Sea Level Changes – Understanding the Earth Formation History jointly organised by JMG Malaysia, National Hydraulic Research Institute of Malaysia (NAHRIM) and Universiti Kebangsaan Malaysia (UKM) at the Mini Auditorium, NAHRIM, Serdang, Selangor.*

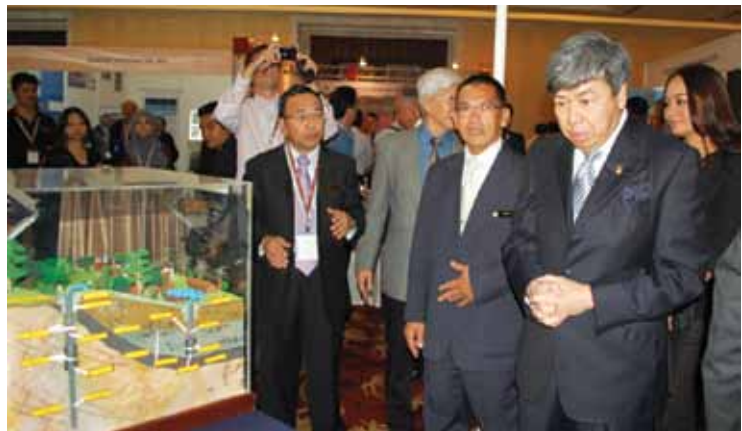


1. Kertas Ucaptama oleh Prof. Emeritus Dr. H. D. Tjia. *Keynote Paper by Prof. Emeritus Dr. H. D. Tjia.*
2. Peserta-peserta seminar. *The seminar participants.*

Program IGM Outreach 2012-2013 – “Conference on Groundwater - Who, Why, Where & How” / IGM Outreach Program 2012-2013 – “Conference on Groundwater - Who, Why, Where & How”

08-09.05.2012

- Majlis Perasmian Program IGM Outreach 2012-2013 oleh Duli Yang Maha Mulia Sultan Sharafuddin Idris Shah Ibni Almarhum Sultan Salahuddin Abdul Aziz Shah, Sultan Selangor di One Word Hotel, Kuala Lumpur.
Launching of the IGM Outreach Program 2012-2013 by His Royal Highness Sultan Sharafuddin Idris Shah ibni Almarhum Sultan Salahuddin Abdul Aziz Shah, the Sultan of Selangor at One Word Hotel, Kuala Lumpur.



12.04.2012

- Pelancaran Media oleh YB Dato' Sri Douglas Uggah Embas, Menteri NRE.
Media Launching by YB Dato' Sri Douglas Uggah Embas, Minister of NRE.



Program Kembara Bersama Media NRE 2012

NRE Media Adventure Programme 2012



17-20.05.2012

- Kembara Bersama Media NRE Siri 3 & 4 tahun 2012 di Pulau Tanjung Dendang, Kilim Geoforest Park, Langkawi.
NRE Media Adventure Programme 3rd & 4th series 2012 at Pulau Tanjung Dendang, Kilim Geoforest Park, Langkawi.

12-15.10.12

- Kembara Bersama Media NRE Siri ke-7 & ke-8/2012 di kawasan tapak Warisan Geologi Tanjung Balau, Tanjung Balau-Desaru, Johor.
NRE Media Adventure Programme 7th & 8th series 2012 at Tanjung Balau Geoheritage Site, Tanjung Balau-Desaru, Johor.



Batu Layar



Tanjung Balau

27.05.2012

- Majlis perasmian telaga tiub di Kg. Biah Skim 1, Keningau telah disempurnakan oleh Timbalan Menteri Sumber Asli dan Alam Sekitar; Y.B Tan Sri Datuk Seri Panglima Joseph Kurup bersama Pembantu Menteri Pelancongan, Kebudayaan dan Alam Sekitar Negeri Sabah, Y.B. Datuk Ellron Angin.

Tube well commissioning ceremony in Kg.Biah Skim1, Keningau, officiated by the Deputy Minister of Natural Resources And Environment, Y.B Tan Sri Datuk Seri Panglima Joseph Kurup together with the Assistant Minister of Tourism, Culture and Environment Ministry of Sabah, Y.B. Datuk Ellron Angin.



19.06.2012

- Majlis Anugerah Perkhidmatan Cemerlang (APC) 2011 di Pullman Hotel, Kuching Sarawak
JMG 2011 Excellent Service Award Ceremony at Pullman Hotel, Kuching, Sarawak



Majlis dirasmikan oleh Yang Berhormat Datuk Amar Hj Awang Tengah bin Ali Hassan, Menteri Perancangan Sumber dan Alam Sekitar II Sarawak.
The Honourable Datuk Amar Hj Awang Tengah bin Ali Hassan, Minister of Resources Planning and Environment II Sarawak officiating the ceremony.



20-21.06.2012

- Persidangan JMG 2012 di Pullman Hotel, Kuching Sarawak.
2012 JMG Conference at Pullman Hotel, Kuching Sarawak.



22.06.2012

- Kerja lapangan pasca Persidangan JMG dan Pra-Persidangan Geosains Kebangsaan di kawasan Bau.
Post JMG Conference and Pre-National Geoscience Conference Fieldwork at Bau area.



23-24.06.2012

- Persidangan Geosains Kebangsaan 2012 di Pullman Hotel, Kuching Sarawak dianjurkan bersama oleh JMG dan Persatuan Geologi Malaysia.
National Geoscience Conference at Pullman Hotel, Kuching, Sarawak jointly organised by JMG and Geological Society of Malaysia.



27. 06.12

- "Seminar dan Dialog Pembangunan Tapak Warisan Geologi Pesisir Wilayah KEJORA" anjuran bersama KEJORA, JMG dan UKM.
"Seminar and Dialogue on the Development of Coastal Geological Heritage Site in KEJORA Region" jointly organised by KEJORA, JMG and UKM .



Photo: Asrul Sani Abdullah

30.06.2012

- Program Rakan Alam Sekitar mengenai pemuliharaan warisan geologi di Tanjung Tuan, Melaka.
Friends of Environment Programme on the conservation of geological heritage at Tanjung Tuan, Melaka.



20.09.2012

- Majlis Perasmian dan Penyerahan Telaga Air Tanah di Institut Pertanian Ayer Hitam, Johor oleh Timbalan Menteri Sumber Asli dan Alam Sekitar, YB Tan Sri Datuk Seri Panglima Joseph Kurup.
Inauguration and handing over of tube well at Ayer Hitam Institute of Agriculture, Johore by the Deputy Minister of Natural Resources and Environment, YB Tan Sri Datuk Seri Panglima Joseph Kurup.



Photo: Mohd Khairani Othman

25.09.2012

- Majlis menandatangani memorandum persefahaman antara UMT-JMG di Universiti Malaysia Terengganu, Terengganu. / *Signing ceremony of Memorandum of Understanding between UMT-JMG at University of Malaysia Terengganu, Terengganu.*



Naiib Canselor UMT, Prof. Emeritus Dato' Dr. Ibrahim Komoo dan Ketua Pengarah JMG Dato' Yunus Abd Razak menandatangani MOU. / *Vice chancellor of UMT, Prof. Emeritus Dato' Dr. Ibrahim Komoo and Director General of JMG Dato' Yunus Abd Razak signing the MOU.*



23.10.2012

- Perasmian telaga tiub di SMA Nahdhah Hasanah, Melele, Kodiang, Kedah. *Opening ceremony of SMA Nahdhah Hasanah tiub well, Melele, Kodiang, Kedah.*





4 -10.11. 2012

➤ CCOP 2012 : 48th CCOP Annual Session and 59th CCOP Steering Committee Meeting di Holiday Villa Beach Resort & Spa, Langkawi. / CCOP 2012 : The 48th CCOP Annual Session and 59th CCOP Steering Committee Meeting at Holiday Villa Beach Resort & Spa, Langkawi.



23.11.2012

- Lawatan kerja Ketua Setiausaha Kementerian Sumber Asli dan Alam Sekitar Malaysia, Y.Bhg. Dato' Seri Zool Azha Yusof ke telaga artesian, Permyjaya, Miri, Sarawak / Official visit by the Secretary-General, Ministry of Natural Resources and Environment Malaysia, Dato' Seri Zool Azha Yusof to the artesian tube well in Permyjaya, Miri, Sarawak



04.12.2012

- Dialog Bersama Pengusaha Kuari Negeri Perak di Dewan Granit, JMG Malaysia / Dialog with the Quarry Operators in Perak State at Dewan Granit, JMG Malaysia



Photo: Mohd Khairani Othman



17.12.2012

- "Seminar Kajian Geoterma Sebagai Sumber Tenaga Boleh Diperbaharui" di Marriott Hotel, Putrajaya - anjuran bersama JMG Malaysia dan SEDA Malaysia
"Seminar on Geothermal as Renewable Energy Study" at Marriott Hotel, Putrajaya
- jointly organised by JMG Malaysia and SEDA Malaysia



Photo: Abd. Razak Ismail



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*Senarai Pegawai Profesional
List Of Professional Officers*

Senarai Pegawai Profesional List of Professional Officers

Ibu Pejabat / Headquarters		
Ketua Pengarah, JUSA B Director General	Dato' Yunus bin Abd Razak	BSc(Hons)(Geology)(UKM); MSc(Eng. Geology)(London), DIC
Timbalan Ketua Pengarah, JUSA C Deputy Director General	Mustapha bin Mohd Lip	BEng(Hons)(Mining)(NSW Australia); MSc(Environment Resources)(Saltford)
	Mohammed Hatta bin Abd. Karim	BSc(Hons)(Geology)(UM); MSc(Eng. Geology)(Leeds)
Pengarah, C54 Director	Wahid bin Abdul Rahman	BSc(Hons)(Geology)(UKM)
	Zakaria bin Hussain (from 9.2.2012)	BSc(Hons)(Geology)(UKM); MSc(Mineral Exploration)(UKM)
	Hamadi bin Che Harun	BSc(Hons)(Applied Geology)(UM)
	Ismail bin Iman (until 15.04.2012)	BSc(Hons)(Geology)(UM); MSc(Quaternary Geology)(VUB Brussels)
	Mohamad Pauzi bin Abdullah (from 16.04.2012)	BSc(Hons)(Geology)(UKM)
Timbalan Pengarah, C54 Deputy Director	Mohd Za'im bin Abdul Wahab	BSc(Hons)(Mining Eng.) (Newcastle-Upon-Tyne); DESS(Econ. Evaluation of Mining Project) (Paris School of Mines)
Timbalan Pengarah, C52 Deputy Director	Ab Halim bin Hamzah	BSc(Hons)(Geology)(UKM); MSc(Mineral Resources Eng.)(USM)
	Mohd Zukeri bin Abd Ghani (until 27.04.2012)	BSc(Hons)(Geology)(UKM)
	Kamal bin Daril (from 23.04.2012)	BSc(Hons)(Geology)(UKM); MS(Mineral Economics)(Michigan)
Ketua Penolong Pengarah Kanan, C52 Senior Principal Assistant Director	Ubayratna Wadu Aracy Sirisena (until 31.12.2012)	BSc(Hons)(Physics)(USM); MSc(Applied Geophysics)(Birmingham); LLB(Hons)(London)
	Kamuradin bin Md Slar	BSc(Hons)(Geology)(UKM)
	Ir. Azman bin Abdul Majid	BSc(Hons)(Mining Eng.) (Leeds), PE
Ketua Pegawai Kajibumi Kanan, C52 Senior Principal Geologist	Zulkipli bin Che Kasim	BSc(Hons)(Geology)(UM); MSc(Mineral Exploration & Mining) (Leicester)
	Yusoff bin Ismail (passed away on 29.12. 2012)	BSc(Hons)(Geology)(UKM)
Ketua Penolong Pengarah, C48 Principal Assistant Director	Dr. Mohd Suhaili bin Ismail (until 28.04.2012)	BSc(Hons)(Geology)(UM); MEcon(UPM); PhD(Economics)(Scotland)
	Mohammad Roston bin Zakaria	BSc(Hons)(Geology)(UKM); MBA(UKM)
	Ling Nan Ley	BSc(Hons)(Earth Sciences)(UKM); MSc(Engineering Geology)(Durham)
	Mohd Badzran bin Mat Taib	BSc(Hons)(Geology)(UKM)
	Azemi bin Haji Eki (from 23.04.2012)	BSc(Hons)(Geology)(UKM); MSc(Materials Eng.)(USM)
	Siti Aminah binti Abdul Sarif	BSc(Hons)(Applied Geology)(UM)
	Mohd. Zulkiflee bin Che Soh	BSc(Hons)(Geology)(UKM)
Ketua Pegawai Teknologi Maklumat, F48 Principal IT Officer	Tan Teong Ming	BSc(Information Technology)(UKM)
Ketua Pegawai Tadbir, M48 Principal Administration Officer	Meor Shahibul Fadilah bin Zainuddin (until 15.01.2012)	Ijazah Pertama Pengajian Islam(Bahasa Arab) (Al-Azhar, Mesir)
	Marlia binti Mamat (from 16.01.2012)	BSc(Information Technology)(UKM); Master of International Relations(Monash)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Azizan bin Ali	BSc(Hons)(Applied Geology)(UM); MSc(Engineering Geology)(UKM)
	Habibah binti Tahir	BSc(Hons)(Geology)(UKM); MSc (Environment) (UPM)
	Zaidi bin Daud	BSc(Hons)(Geology)(UM)
	Yusari bin Basiran	BSc(Hons)(Applied Geology)(UM); MSc(Mineral Industry)(UKM)
	Norsham binti Samsudin	BSc(Hons)(Geology)(UKM)
	Nurzaiddi bin Abdullah	BSc(Hons)(Geology)(UKM); MSc(Remote Sensing)(UPM)
	Abd Rahim bin Harun (study leave: 24.06.2008-23.06.2012)	BSc(Hons)(Geology)(UKM)

	Basharuddin bin Ismail	BSc(Hons)(Geology)(UKM)
	Ummi Daeimah binti Hussin	BSc(Hons)(Applied Geology)(UM); MSc (Environment) (UPM)
	Brendawati binti Ismail	BSc(Hons)(Geology)(UM)
	Shari bin Ismail	BSc(Hons)(Applied Geology)(UM)
	Dorsihah binti Mohamad Jais	BSc(Hons)(Geology)(UM)
	Mohamad bin Abd. Manap	BSc(Hons)(Geology)(UKM); MSc(Remote Sensing & GIS)(UPM)
Pegawai Kajibumi, C41 Geologist	Yusuf bin Imbun (<i>until 02.12.2012</i>)	BSc(Hons)(Geology)(UKM)
	Mohd Anuar bin Ishak	BSc(Hons)(Geology)(UKM)
Pegawai Galian, C41 Mines Officer	Maziadi bin Mamat	BEng(Hons)(Mineral Resources Eng.)(USM)
	Mat Wadi bin Ab Satar	BEng(Hons)(Mineral Resources Eng.)(USM)
	Zahari bin Mohamed (<i>unpaid leave:21.01.2012-02.03.2015</i>)	BEng(Hons)(Mineral Resources Eng.)(USM)
Bahagian Perkhidmatan Teknikal / Technical Services Division		
Pengarah, JUSA C Director	Mior Sallehuddin bin Mior Jadid	BSc(Hons)(Geology)(UKM); MSc(Env. & Ecological Sciences)(Lancaster)
Timbalan Pengarah, C54 Deputy Director	Zakaria bin Hussain (<i>until 8.2.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Mineral Exploration)(UKM)
	Ismail bin Iman (<i>from 16.4.2012</i>)	BSc(Hons)(Geology)(UM); MSc(Quaternary Geology)(VUB Brussels)
	Chin Siew Yee	BSc(Hons)(Chemistry)(USM); MSc(Environmental Analysis and Assessment) (London), AMIC
Timbalan Pengarah, C52 Deputy Director	Hisamuddin b Termidi	BEng(Hons)(Mining)(Laurentian)
Ketua Pegawai Kimiabumi, C52 Principal Geochemist	Mohd Ariff bin Omar	BSc(Hons)(Chemistry)(Nottingham), AMIC
	Abdul Kadir bin Ahmad	BSc(Hons)(Chemistry)(UKM), AMIC
	Chan Fook Onn	BSc(Hons)(Chemistry)(UM); MSc(Analytical Chemistry and Instrumentation) (Loughborough), AMIC
Ketua Pegawai Kajibumi, JUSA C Principal Geologist	Dr. Vijayan a/l V.V. Rajan	BSc(Hons)(Applied Geology)(UM); MSc(Geophysics)(UM); MSc(Marine Geophysics)(Mississippi); PhD(Marine Geology)(Mississippi)
Ketua Pegawai Kajibumi, C52 Principal Geologist	Mohd Zaidi bin Mohd Hasan	BSc(Hons)(Geology)(UKM)
	Noor Bakri bin Endut	BSc(Hons)(Geology)(UKM)
	Azahari bin Ahmad	BSc(Hons)(Geophysics)(USM)
Ketua Pegawai Kajibumi, C48 Principal Geologist	Dzazali bin Ayub	BSc(Hons)(Geophysics) (USM)
	Jontih Enggihon	BSc(Hons)(Earth Science)(UKM); Dip(Computer Science)(UKM)
	Ismail bin C. Mohamad	BSc(Hons)(Geology)(UKM); MSc(Geology)(UKM)
	Mohamad Hussein bin Jamaluddin	BSc(Hons)(Geology)(UKM)
	Abdullah bin Sulaiman	BSc(Hons)(Applied Geology)(UM); MSc (Oceanography) (Southampton)
Ketua Pegawai Galian, C48 Principal Mines Officer	Wan Zulasmin bin Wan Ibrahim	BEng(Hons)(Mining Eng.) (Newcastle-Upon-Tyne)
Ketua Pegawai Kimiabumi, C48 Principal Geochemist	Hazan Maheran binti Mohd	BSc(Hons)(Chemistry)(UKM), AMIC
	Sabtuyah binti Hj. Suut	BSc(Hons)(Chemistry)(UKM), AMIC
Ketua Pegawai Tadbir, M48 Principal Administrative Officer	Munirah binti Mohd Akib	BEng(Hons)(Biotechnology Engineering)(UIAM)
Pegawai Kajibumi, C44 Geologist	Ahmad Zulkifli bin Kamaruzaman	BAppSc(Hons)(Geophysics)(USM)
	Mohd Rais bin Ramli	BAppSc(Hons)(Geophysics)(USM)
	Hairani Sham binti Manas	BAppSc(Hons)(Geophysics)(USM)
	Hamid bin Ariffin	BSc(Hons)(Applied Geology)(UM)
	Mohd Anuar bin Md Razali	BAppSc(Hons)(Geophysics)(USM)
	Halim bin Darahim	BAppSc(Hons)(Geophysics)(USM)
	Mat Niza b Abd Rahman	BSc(Hons)(Geology)(UKM)

Pegawai Kimiabumi, C44 Senior Geochemist	Thangavelu a/l Ramen	BSc(Hons)(Chemistry/Mathematic)(USM); MSc(IT)(Nottingham), AMIC
	Mohamad bin Kasim	BSc(Hons)(Chemistry)(USM), AMIC
	Pauline Dusyanthi a/p Paul Nesaraja (study leave 25.8.2008- 27.12.2012)	BSc(Hons)(Chemistry)(UM); MSc(Hydrogeology)(Birmingham), AMIC
	Mohd. Saad bin Samsudin	BSc(Hons)(Chemistry)(UKM), AMIC
	Mohd Fauzi bin Muhammad Said	BSc(Hons)(Chemistry)(UKM), AMIC
	Wan Ibrahim bin Wan A Rahman	BSc(Hons)(Chemistry)(UKM), AMIC
Pegawai Teknologi Maklumat Kanan, F44 Senior IT Officer	Syamilah bt Samsudin @ Murad	BSc(Hons)(Information Technology)(UUM)
Pegawai Kajibumi, C41 Geologist	Noran Alwakhir bin Shaarani (study leave 25.9.2012 – 24.9.2013)	BSc(Hons)(Geology)(UM)
Pegawai Galian, C41 Mines Officer	Hairul bin Mohamed Shaharudin	BEng(Hons)(Mineral Resources Eng.)(USM)
Pegawai Kimiabumi, C41 Geochemist	Yusril A'mali bin Mohd Yusuf @ Hamid	BSc(Hons)(Chemistry)(UPM), AMIC
	Sharizan bin Ibrahim	BAppSc(Hons) Applied Chemistry UiTM; MSc(Mechanical Eng.)(UNIMAP)
	Mohd Fahami bin Abas	BAppSc(Hons)(Analytical Chemistry)(USM)
	Mohd Fuzi bin Hashim	BSc(Hons)(Chemistry)(UM)
	Noor Akhmar bin Kamarudin	BSc(Hons)(Chemistry)(UPM)
	Halime bin Azahari @ Adnan	BSc(Hons)(Applied Chemistry)(UiTM)
	Mohd Zahar bin Ibrahim	BSc(Hons)(Chemistry)(USM)
	S. Pasupathi a/l Subramaniam	BSc (Hons)(Chemistry)USM
	Azrul bin Arifin	BSc(Hons)(Applied Chemistry) (UiTM)
	Nurul Husna binti Ismayatim	BSc(Hons)(Chemistry)(UKM)
Pusat Penyelidikan Mineral / Mineral Research Centre		
Pengarah, JUSA C Director	Dato' Zulkifly bin Abu Bakar	BSc(Hons)(Mining Eng.)(Cardiff); MSc(Mineral Production Management)(London), DIC
Timbalan Pengarah, Q52 Deputy Director	Ir. Khor Peng Seong	BSc(Hons)(Physics)(UM); MSc(Mining)(Leeds); EC(Mining), Professional Engineer
Pegawai Penyelidik Kanan, Q52 Senior Research Officer	Abd Rahman bin Abd Aziz	BSc(Hons)(Geology)(UKM); MSc(Mineral Resources)(Cardiff)
	Md Muzayin bin Alimon	BSc(Hons)(Chemistry)(UKM); MSc(Mineral Processing)(Pennsylvania State)
	Nasharuddin bin Isa	BAppSc(Hons)(Mineral Technology)(USM); MSc(Mineral Processing)(Exeter), MCSM
	Mahadi bin Abu Hassan	BSc(Hons)(Geology)(UKM)
	Kori bin Mohammad	BSc(Hons)(Geology)(UKM); MSc(Eng. Geology)(Leeds)
	Aminudin bin Mahmud	BSc(Hons)(Geology)(UKM); MSc(Eng. Geology)(Leeds)
	Abdul Rois bin Abdul Moiss	BAppSc(Hons)(Mineral Technology)(USM); MSc(Ceramic Eng.)(Sheffield)
	Ramli bin Mohd Osman	BSc(Hons)Applied Geology(UM); MSc(Environment Science & Eng.)(Colorado)
Pegawai Penyelidik Kanan, Q48 Senior Research Officer	Malek bin Selamat	BEng(Hons)(Mineral Resources Eng.)(USM); MPhil(Ceramics)(Leeds)
	Mohamad Haniza bin Mahmud	BEng(Hons)(Mineral Resources Eng.)(USM); Adv.Dip(Environmental Eng.)(Manchester); MSc(Materials Engineering)(USM)
	Salmah binti Baharuddin	BSc(Hons)(Computer Science)(USM); MSc(Image Processing)(USM)
	Dr. Ismail bin Ibrahim	BEng(Hons)(Mineral Resources Eng.)(USM); MSc(Mineral Resources Eng.)(USM); PhD(Mineral Processing)(USM)
	Dr. Izhar Abadi bin Ibrahim Rais	BEng(Hons)(Mineral Resources Eng.)(USM); MSc(Mineral Resources Eng.)(USM); PhD(Mineral Resources Engineering)(USM)
	Abdullah bin Hussin	BSc(Land Survey)(ITM); Adv. Dip(Land Survey)(ITM)
	Dr. Shamsulkamal bin Sulaiman	BSc(Hons)(Mining)(Alabama); MSc(Mineral Resources Eng.)(USM); PhD(Advanced Material)(Leeds)
	Dr. Nazwin binti Ahmad	BEng(Hons)(Mining)(Nova Scotia); PhD(Advanced Material)(Leeds)
	Rashita binti Abd Rashid	Dip(Chemical Eng.)(UTM); BEng(Hons)(Chemical Eng.)(UTM); MSc(Mineral Resources Eng.)(USM)

Pegawai Penyelidik, Q44 Research Officer	Marlinda binti Daud	BEng(Hons)(Material Eng.)(USM)
	Siti Mazatul Azwa binti Saiyed Mohd Nurddin	Dip(Science)(ITM); BAppSc(Hons)(Industrial Chemistry)(USM); MSc(Advanced Materials Engineering) (UPM)
	Dr. Rohaya binti Othman	Dip(Textile Technology)(ITM); BSc(Hons)(Textile Technology)(UiTM); PhD(Materials Engineering)(UKM)
Pegawai Penyelidik, Q41 Research Officer	Hamdan bin Yahya	BSc(Hons)(Material Science)(UKM)
	Mohd Syahrir bin Mohd Rozi	BEng(Hons)(Chemical Eng.)(UTM)
	Mohd Idham bin Mustaffar	BEng(Hons)(Chemical Eng.)(UTM); MEng(Bioprocess Eng.)(UTM)
	Norinsafrina binti Mustaffa Kamal	BEng(Hons)(Environmental Eng.)(Melbourne)
Sarawak		
Pengarah, JUSA C Director	Alexander Unya ak Ambun	BSc(Hons)(Geology)(UM); Dip(Mineral Exploration)(ITC); MSc(Applied Structural Geology & Rocks Mechanics)(London), DIC
Timbalan Pengarah, C52 Deputy Director	Dr. Richard Mani ak Banda	BSc(Hons)(Geology)(UM); PhD (Adv. Industrial Tech.)(Tsukuba)
	Rushtom bin Rushdi	BSc(Hons)(Mining Eng.) (Newcastle-Upon-Tyne)
	Baharuddin bin Wanik	BSc(Hons) Chemistry USM; AMIC
	Enggong ak Aji	BSc(Hons)(Earth Sciences)(UKM); MSc(Exploration Mineral)(UKM)
Ketua Pegawai Kajibumi, C52 Principal Geologist	Tennent ak Ahai	BSc(Hons)(Earth Science)(UKM); MSc(Hydrogeology)(London), DUCL
	Sulong ak Enjop	BSc(Hons)(Earth Science)(UKM); MSc(Exploration Mineral)(UKM)
	Henry Litong Among (<i>from 16.8.2012</i>)	BSc(Hons)(Geology)(UKM)
	Tungah Surat (<i>from 16.9.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Economic Geology)(UMS)
	Joanes Muda (<i>from 16.4.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Eng. Geology)(UMS)
Ketua Pegawai Kajibumi, C48 Principal Geologist	Mohd Yusop bin Ramli (<i>until 13.8.2012</i>)	BSc(Hons)(Geology)(UKM)
	Che Abdul Rahman bin Jaafar	BSc(Hons)(Earth Sciences)(UKM)
	Paulius Godwin	BSc(Hons)(Geology)(UKM)
	Yusuf bin Bujang	BSc(Hons)(Geology)(UKM); MSc(Hydrogeology)(London)
	Richard Batoi @ Lipai ak Jantau	BSc(Hons)(Geology)(UM)
	Siti Faridah binti Yusuf (<i>from 25.4.2012</i>)	BSc(Hons)(Geology)(UM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Ajon Winnie	BSc(Hons)(Geology)(UKM)
	Hilary Muyan ak Nicholas Thomas (<i>until 15.04.2012</i>)	BSc(Hons)(Geology)(UM)
	Hussein bin Mohd Juni	BSc(Hons)(Geology)(Texas, USA)
	Setebin @ Roslan bin Rajali	BSc(Hons)(Applied Geology)(UM); MSc(Environmental Hydrogeology)(Cardiff)
	Jaithish John (<i>from 1.4.2012</i>)	BSc(Hons)(Applied Geology)(UM);MSc(Applied Geology)(Univ. of Pennsylvania)
	Edward ak Muol	BSc(Hons)(Applied Geology)(UM)
	Zamzuri bin Ghazalee	BSc(Hons)(Geology)(UM)
	Japri bin Bujang	BSc(Hons)(Geology)(UKM)
	Rengga ak Gendang	BSc(Hons)(Geology)(UM)
	Manggon ak Abot	BSc(Hons)(Geology)(UKM); Dip. Ed.(IPGBL); MSc(Geology, Min. & Pet.)(Oregon)
	Joseph Jubin ak Aruh @ Aro	BSc(Hons)(Geology)(UM); MSc(Sustainable Resources Management)(UPM)
	Freddy ak Heward Chinta	BSc(Hons)(Earth Sciences)(UKM)
	Pegawai Kimiabumi Kanan, C44 Senior Geochemist	Segar a/l Velayutham
Azzudin bin Shebli		Adv. Dip(Applied Chemistry)(UiTM), AMIC; MSc(Hons) (Chemistry) (UNIMAS)
Mohd Aswandi bin Ariff		BSc(Hons)(Industrial Chemistry)(UPM)

Pegawai Kajibumi, C41 Geologist	Mohamad Tarmizi bin Mohamad Zulkifley (<i>study leave</i>)	BSc(Hons)(Geology)(UM); MSc (Geologi Kejuruteraan)(Agregat Batuan) (UM)
	Dana ak Badang	BSc(Hons)(Geology)(UKM); MSc(Environment Conservation)(UKM)
	John ak Joseph Jinap (<i>until 15.4.2012</i>)	BSc(Hons)(Applied Geology)(UM)
	Julia ak Kaya	BSc(Hons)(Geology)(UKM)
	Luqman bin Hj. Kaluni	BSc(Hons)(Geology)(UKM)
	Thomson ak Galin (<i>study leave</i>)	BSc(Hons)(Geological Science)(Leeds)
	Lee Beng Huat	BSc(Hons)(Geology)(UKM); MSc(Geology)(UKM)
	Kennedy bin Mohd Imran	BSc(Hons)(Geology)(UM)
	Mohd Shahrizal bin Mohamed Sharifodin	BSc(Hons)(Geology)(UKM)
	Mazuan bin Roslan	BSc(Hons)(Geology)(UMS)
	Mohamad Zahir bin Che Amad	BSc(Hons)(Applied Geology)(UM)
	Abdul Razak bin Zainal Abidin	BSc(Hons)(Applied Geology)(UM)
	Shahrul Ridzuan bin Zainal Rashid	BAppSc(Hons)(Geophysics)(USM)
	Mison bin Ajum	BSc(Hons)(Geology)(UMS)
	Redzuan bin Ahmad Banjar	BSc(Hons)(Geology)(UM)
	Khairul Nazri bin Hj. Yaakub	BSc(Hons)(Geology)(UKM)
	Nik Mohd Nishamuddin bin Nik Rahimi	BSc(Hons)(Geology)(UKM)
	Clarence Anyau ak Tibu	BSc(Hons)(Geology)(UKM)
	Nazirrahmat bin Suleiman	BSc(Hons)(Geology)(UKM)
	Ledyhernando Taniou	BSc(Hons)(Geology)(UMS)
Zaidulhair bin Jasmi	BSc(Hons)(Geology)(UKM)	
Mohd Farid bin Abdul Kadir	BSc(Hons)(Geology)(UKM)	
Pegawai Galian, C41 Mines Officer	Muhamad Suhaimi bin Nordin (<i>until 15.4.2012</i>)	BSc(Hons)(Mining Eng.) (Newcastle-Upon-Tyne); MSc(Rock Mechanics and Excavation Eng) (Newcastle-Upon-Tyne)
	Salehuddin bin Mohamad (<i>from 1.5.2012</i>)	BSc (Hons)(Mineral Resources Engineering) (USM)
Pegawai Kimiabumi, C41 Geochemist	Hermawati binti Tambeng	BSc(Hons)(Applied Chemistry)(UiTM)
	Balachandar a/l Subramaniam (<i>study leave</i>)	BSc(Hons)(Applied Chemistry)(UM)
	Intan Shazwani bin Abd Ghani	BSc(Hons)(Applied Chemistry)(UM)
Pegawai Teknologi Maklumat, F41 IT Officer	Silvia Joseph	BSc(Hons)(Computer Science)
Sabah		
Pengarah, C54 Director	Alexander Yan Sze Wah	BSc(Hons)(Applied Geology)(UM); MSc(Structural Geology and Rock Mechanics) (London), DIC
Timbalan Pengarah, C52 Deputy Director	Ibrahim bin Amnan (<i>until 05.09.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Micropaleontology) (Wales)
	Dr. Mohd Suhaili bin Ismail (<i>from 01.05.2012</i>)	BSc(Hons)(Geology)(UM); MEcon(UPM); PhD(Economics)(Scotland)
	Kamal bin Daril (<i>until 22.04.2012</i>)	BSc(Hons)(Geology)(UKM); MS(Mineral Economics)(Michigan)
	Ismail bin Hanuar	BSc(Hons)(Chemistry)(USM), AMIC
Timbalan Pengarah, C48 Deputy Director	Kamaruddin bin Abdullah	BEng(Hons)(Mineral Resources Eng.)(USM); MSc(Occupational Safety & Health) (Murray State of University, USA)
Ketua Pegawai Kajibumi, C52 Principal Geologist	Henry Litong Among (<i>until 15.08.2012</i>)	BSc(Hons)(Geology)(UKM)
	Tungah bin Surat (<i>until 15.09.2012</i>)	BSc(Hons)(Geology)(UM); MSc(Eng. Geology)(UMS)
Ketua Pegawai Kajibumi, C48 Principal geologist	Joanes Muda (<i>until 15.04.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Economic Geology)(UMS)
	Zamri bin Ramli	BSc(Hons)(Applied Geology)(UM); MSc(Environment)(UPM)
	Hillary Muyan ak Nicholas Thomas (<i>from 16.04.2012</i>)	BSc(Hons)(Geology)(UM)
	Che Aziz bin Che Soh (<i>from 10.09.2012</i>)	BSc(Hons)(Geology)(UKM)

Pegawai Kajibumi Kanan, C44 Senior Geologist	Wong Vui Chung @ Webster	BSc(Hons)(Applied Geology)(UM); MSc(Environmental Management)(UMS)
	Sia Say Gee (<i>study leave</i>)	BSc(Hons)(Geology)(UM)
	Jaithish John (<i>until 31.03.2012</i>)	BSc(Hons)(Applied Geology)(UM); MSc(Geological and Earth Science) (Pennsylvania, USA)
	Ferdaus bin Ahmad (<i>study leave</i>)	BSc(Hons)(Geology)(UM); MSc(Eng. Geology)(Leeds)
	Frederick Francis Tating	BSc(Hons)(Earth Science)(UKM); MSc(Environment)(Kumamoto University)
	Jenneth Cyril @ Liliana	BSc(Hons)(Geology)(UKM)
	Fredolin Javino	BSc(Hons)(Applied Geology)(UM)
	Syed bin Omar (<i>until 31.01.2012</i>)	BSc(Hons)(Applied Geology)(UM); MSc(Eng.Geology)(Newcastle-Upon-Tyne)
	Daulip @ Dee Dee Langkait	BSc(Hons)(Earth Science)(UKM)
	Norul Ashikin binti Hj. Ab Karim (<i>from 27.08.2012</i>)	BSc(Hons)(Geology)(UM)
Pegawai Kimiabumi Kanan, C44 Senior Geochemist	Rokiah binti Abdullah	BSc(Hons)(Chemistry)(UKM); AMIC
	Morius Bantas (<i>study leave</i>)	BSc(Hons)(Chemistry)(UKM); MSc(IT Management)(UTM)
Pegawai Kajibumi, C41 Geologist	Jayawati Fanilla Sahih binti Montoi	BSc(Hons)(Geology)(UM)
	Jaineh Lingi	BSc(Hons)(Applied Geology)(UM)
	Cleafos Totu	BSc(Hons)(Earth Science)(UKM)
	Bailon Golutin	BSc(Hons)(Geology)(UMS)
	Faye Donna Edmund (<i>study leave</i>)	BSc(Hons)(Geology)(UKM)
	Arthur Clement Makulin	BSc(Hons)(Geology)(UMS)
	Eddie Affandy bin Mohd Yuslee	BSc(Hons)(Geology)(UMS)
	Mohamad Asri bin Omar (<i>until 26.12.2012</i>)	BSc(Hons)(Geology)(UKM)
	Nor Effendy bin Norizan	BSc(Hons)(Geology)(UMS)
	Farid bin Zainudin	BSc(Hons)(Geology)(UMS)
	Alvyn Clancey Mickey	BSc(Hons)(Geology)(UMS)
	Muhammad Umar bin Sarimal (<i>from 10.12.2012</i>)	BAppSc(Hons)(Geophysic)(USM)
	Chung Pit Soon bin Chung Chung Loi	BSc(Hons)(Geology)(UMS)
	Muhamad Safid bin Saad (<i>until 26.12.2012</i>)	BAppSc(Hons)(Geophysic)(USM)
	Mohd Shafiq Farhan bin Mohd Zainudin	BSc(Hons)(Geology)(UM)
	Norzuhairil bin Zubir	BSc(Hons)(Geology)(UM)
	Nightingale Lian Marto	BSc(Hons)(Geology)(UKM)
Mazrali bin Alway	BSc(Hons) (Applied Geology)(UM)	
Pegawai Galian, C41 Mines Officer	Adha Syuraini bin Abdul Ghani	BEng(Hons)(Mineral Resources Eng.)(USM)
Pegawai Kimiabumi, C41 Geochemist	Khairun Nasir bin Mokhtar	BSc(Hons)(Chemistry)(UM)
Pegawai Teknologi Maklumat, F41 IT Officer	Azlan bin Ahmad	BSc(Hons)(Computer Science)
Pahang		
Pengarah, C54 Director	Dato' Rohimi bin Che Wan	BSc(Hons)(Geology)(UKM); MSc(Mineral Production Management)(London), DIC
Timbalan Pengarah, C52 Deputy Director	Abdul Rahman bin Mohd Yusoff	BSc(Hons)(Earth Science)(UKM)
	Dato' Zainal Abidin bin Md Nor	BSc(Hons)(Mining Eng.)(London); MSc(Mining Eng.) (Pennsylvania)
Timbalan Pengarah, C48 Deputy Director	Wan Saifulbahri bin Wan Mohammad	BSc(Hons)(Geology)(UKM)

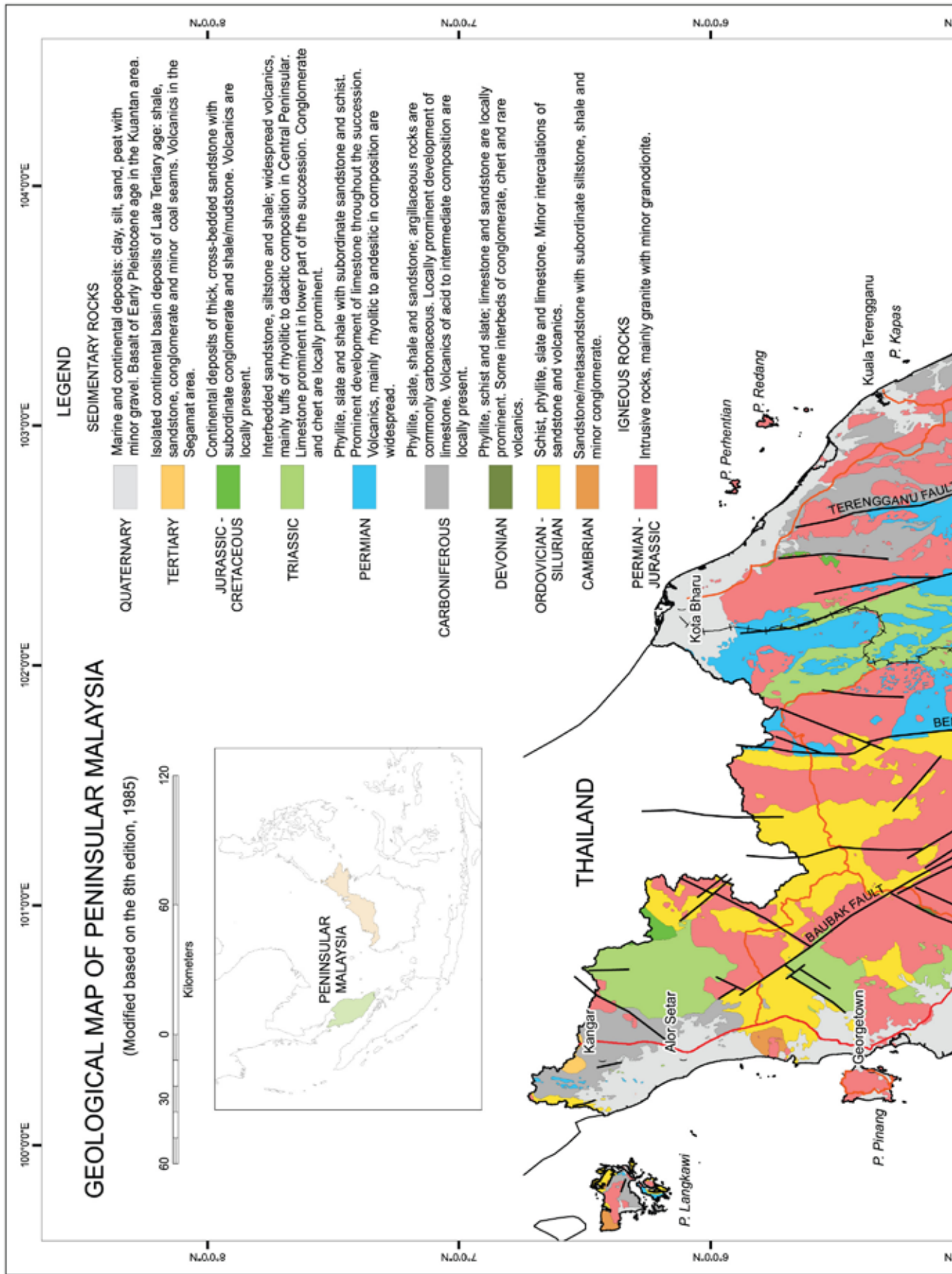
Pegawai Kajibumi Kanan, C44 Senior Geologist	Razimi bin Ahmad	BSc(Hons)(Geology)(UKM)
	Afandi bin Muda	BSc(Hons)(Applied Geology)(UM)
	Mazlan bin Mohamad Zain	BSc(Hons)(Geology)(UM); MSc(Eng. Geology)(UKM)
	Fathullah bin Abu Naim (until 05.09.2012)	BSc(Hons)(Geology)(UM)
	Mohammad Aznawi bin Mat Awan	BSc(Hons)(Geology)(UKM)
Pegawai Kajibumi, C41 Geologist	Zainal Abidin bin Jamaluddin (study leave)	BSc(Hons)(Geology)(UKM)
	Amin Nooraid bin Abdul Jalil	BSc(Hons)(Geology)(UMS)
	Yusuf bin Imbun (from 03.12.2012)	BSc(Hons)(Geology)(UKM)
	Mohd Asnizam bin Ayub	BSc(Hons)(Geology)(UKM)
	Zaki bin Alias	BSc(Hons)(Applied Geology)(UM)
Pegawai Galian, C41 Mines Officer	Salmiah binti Nawi @ Muhammad	BEng(Hons)(Mineral Resources Eng.)(USM)
Perak		
Pengarah, C54 Director	Dr. Kamaludin bin Hassan	BSc(Hons)(Geology)(UM); MSc(Palynology)(Sheffield); PhD(Quaternary Environment Change)(Durham)
Timbalan Pengarah, C48 Deputy Director	Azemi bin Haji Eki (until 22.04.2012)	BSc(Hons)(Geology)(UKM); MSc(Materials Eng.)(USM)
	Mohamad Sari bin Hasan (from 15.05.12)	BSc(Hons)(Geology)(UKM)
	Ahmad Zukni bin Ahmad Khalil	BEng(Hons)(Mineral Resources Eng.)(USM)
	Tuan Rusli bin Tuan Mohamed	BSc(Hons)(Geology)(UKM); MSc(Eng. Geology)(UKM)
Pegawai Galian Kanan, C44 Senior Mines Officer	Faizal bin Arshad	BEng(Hons)(Mineral Resources Eng.)(USM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Othman bin Kangsar (study leave)	BAppSc(Hons)(Geophysics)(USM)
	Nor Azian bin Hamzah	BSc(Hons)(Geology)(UKM)
	Norul Ashikin binti Hj. Ab Karim (until 26.08.2012)	BSc(Hons)(Geology)(UM)
Pegawai Kajibumi, C41 Geologist	Mahat bin Sibon (until 31.03.2012)	BSc(Hons)(Geology)(UM)
	Suzannah binti Akmal	BSc(Hons)(Geology)(UM)
	Mohd Irwan bin Ariff	BSc(Hons)(Geology)(UKM)
	Azmi bin Abu Bakar	BSc(Hons)(Applied Geology)(UM)
	Azizan anak Juhin	BSc(Hons)(Geology)(UMS)
	Ahmad Khairut Termizi bin Mohd Daud	BSc(Hons)(Geology)(UMS)
	Saiful bin Abdullah	BSc(Hons)(Geology)(UKM)
Pegawai Galian, C41 Mines Officer	Zaiton binti Abdullah	BEng(Hons)(Mineral Resources Eng.)(USM)
	Aidil bin Arnolous Rema	BEng(Hons)(Mineral Resources Eng.)(USM)
Johor		
Pengarah, C54 Director	Shahar Effendi bin Abdullah Azizi	BSc(Hons)(Mining Eng.) (Leeds); DESS (Econ. Evaluation of Mining Projects) (Paris School of Mines)
Timbalan Pengarah, C52 Deputy Director	Abdullah Sani bin Hj. Hashim	BSc(Hons)(Geology)(UKM)
Timbalan Pengarah, C48 Deputy Director	Nizarulikram bin Abdul Rahim	BSc(Hons)(Geology)(UM)
	Nurul Huda bin Romli	B.Eng(Hons)(USM); MSc(OSH)(UMSW)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Noorazhar bin Ngatimin	BSc(Hons)(Geology)(UM)
	Nor Asmah binti Abd Aziz	BSc(Hons)(Geology)(UKM)
	Mohd Fauzi bin Rajimin @ Jeman (study leave)	BSc(Hons)(Geology)(UKM)
	Khairul Zaman bin Ibrahim (study leave)	BSc(Hons)(Geology)(UKM)
	Hasnida binti Zabidi @ Zainudi	BSc(Hons)(Earth Science)(UKM)

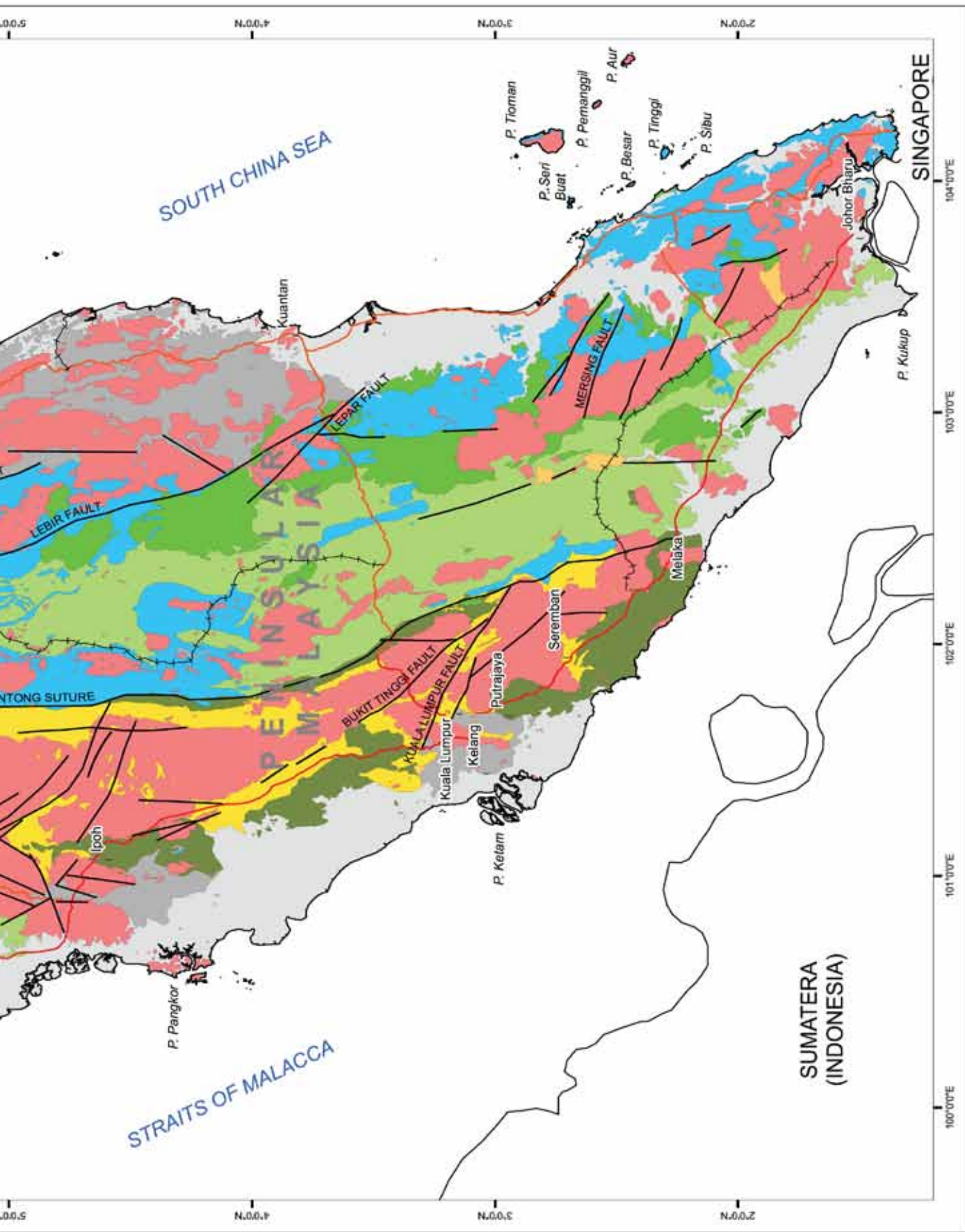
Pegawai Kajibumi, C41 Geologist	Muhammad Hazli bin Mohamed Hanapi	BSc(Hons)(Applied Geology)(UM)
	Mohammed Syahrizal bin Zakaria	BSc(Hons)(Geology)(UKM)
	Noraini binti Basiri	BSc(Hons)(Geology)(UKM)
	Norhazidi bin Masrom	BSc(Hons)(Geology)(UKM)
	Fadzirul Hafidh bin Margono	BSc(Hons)(Geology)(UKM)
Pegawai Galian, C41 Mines Officer	Mohd Hisham bin Md Nawi (<i>from 16.04.2012</i>)	BEng(Hons)(Mineral Resources Eng)(USM)
	Salehuddin bin Mohamad (<i>until 30.04.2012</i>)	BSc(Hons)(Mineral Resources Engineering)(USM)
Selangor / Wilayah PersekutuanSelangor / Federal Territories		
Pengarah, C54 Director	Dato' Zakaria bin Mohamad	BSc(Hons)(Geology)(UKM); MSc(Applied Quaternary Geology) (Free University of Brussel)
Timbalan Pengarah, C52 Deputy Director	Mohd Sidi bin Daud	BSc(Hons)(Geology)(UKM)
Timbalan Pengarah, C44 Deputy Director	Ir. Tony Chew	BEng (Hons)(Mineral Resources Eng. (USM); MBA(USM)
	Siti Faridah binti Yusuf (<i>until 24.4.2012</i>)	BSc(Hons)(Geology)(UM)
	Che Ibrahim bin Mat Saman	BSc(Hons)(Geology)(UKM)
Ketua Pegawai Kajibumi, C52 Principal Geologist	Mahisham bin Ibrahim	BSc(Hons)(Geology)(UKM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Mahat bin Sibon (<i>study leave</i>)	BSc(Hons)(Geology)(UKM)
Pegawai Kajibumi, C41 Geologist	Qalam A'zad bin Rosle (<i>study leave</i>)	BSc(Hons)(Geology)(UM)
	Iszaynuddin bin Abd Hamid	BSc(Hons)(Geology)(UKM)
	Mazatul Akmar binti Aros	BSc(Hons)(Applied Geology)(UM)
	Muhamad Ezwan bin Dahlan	BSc (Hons)(Geology)(UKM)
	Mohd Shukri bin Ramlan	BSc (Hons)(Geology)(UMS)
	Mohd. Firdaus bin Noor Azman (<i>Contract Officer</i>)	BSc(Hons)(Geology)(UMS)
Pegawai Galian, C41 Mines Officer	Mustaza bin Mustafa	BEng(Hons)(Mineral Resources Eng.)(USM)
	Safura binti Alias	BEng(Hons)(Mineral Resources Eng.)(USM)
Kelantan		
Pengarah, C52 Director	Mohd Badarudin bin Hasan (<i>until 01.07.2012</i>)	BSc(Hons)(Geology)(UKM)
	Ibrahim bin Amnan (<i>from 03.09.2012</i>)	BSc(Hons)(Geology)(UKM); MSc(Micropaleontology) (Wales)
Timbalan Pengarah, C44 Deputy Director	Ab Rashid bin Ahmad	BSc(Hons)(Geology)(UKM)
	Hamdan bin Ariffin (<i>until 4.7.2012</i>)	BSc(Hons)(Applied Geology)(UM)
	Mohamad Hizam bin Abdul Kadir	BEng(Hons)(Mineral Resources Eng.)(USM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Mohd Lazim bin Mohamed	BSc(Hons)(Geology)(UKM)
	John ak Joseph Jinap (<i>from 16.4.2012</i>)	BSc(Hons)(Applied Geology)(UM)
	Mohamad Yusof bin Che Sulaiman	BSc(Hons)(Geology)(UM)
Pegawai Kajibumi, C41 Geologist	Mohd Yuzlan bin Yusoff	BSc(Hons)(Applied Geology)(UM)
	Ahmad Rosli bin Othman	BSc(Hons)(Applied Geology)(UM)
	Ropidah binti Mat Zin (<i>study leave</i>)	BSc(Hons)(Applied Geology)(UM)
	Muhammad Umar bin Sarimal (<i>until 09.12.2012</i>)	BSc(Hons)(Geology)(UMS)
	Mohamad Asri bin Omar (<i>from 27.12.2012</i>)	BSc(Hons)(Geology)(UKM)
	Amir Mizwan bin Mohd Akhir	BSc(Hons)(Geology)(UKM)
Negeri Sembilan / Melaka		
Pengarah, C52 Director	Mustafar bin Hamzah	BSc(Hons)(Geology)(UKM); Dip(GIS)(Leicester)
Timbalan Pengarah, C44 Deputy Director	Asminah binti Rajuli	BSc(Hons)(Geology)(UKM); MSc(Environment)(UPM)
	Haniza binti Zakri	BSc(Hons)(Geology)(UKM)

Pegawai Kajibumi, C41 Geologist	Mohd Hisham bin Md Nawi (<i>until 30.04.2012</i>)	BEng(Hons)(Mineral Resources Eng.)(USM)
	Muhamad Suhaimi bin Nordin (<i>from 16.4.2012</i>)	BSc(Hons)(Mining Eng.)(Newcastle-Upon-Tyne); MSc(Rock Mechanics & Excavation Eng.) (Newcastle-Upon-Tyne)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Azhar bin Ahmad Nazri	BSc(Hons)(Earth Sciences)(UKM)
Pegawai Kajibumi, C41 Geologist	Hisam bin Ahmad	BSc(Hons)(Geology)(UM)
	Mohd Nizam bin Mohd Noordin	BSc(Hons)(Geology)(UKM)
	Rosni binti Lokmannul Hakim	BSc(Hons)(Geology)(UM)
	Norhayati binti Mohd Nawi	BSc(Hons)(Geology)(UKM)
	Masrita binti Mohd Aras	BSc(Hons)(Geology)(UKM)
	Muhammad Fawwaz bin Zainal Abedin (<i>from 3.12.2012</i>)	BSc(Hons)(Geology)(UMS)
Terengganu		
Pengarah, C52 Director	Mohamad Pauzi bin Abdullah (<i>until 15.04.2012</i>)	BSc(Hons)(Geology)(UKM)
	Mohd. Zukeri bin Ab. Ghani (<i>from 28.04.2012</i>)	BSc(Hons)(Geology)(UKM)
Timbalan Pengarah, C44 Deputy Director	Hamlee bin Ismail	BSc(Hons)(Geology)(UKM); MSc(Industrial Mineral)(UKM)
	Tang @ Tan Hai Hong	BEng(Hons)(Mineral Resources Eng.)(USM)
	Abdul Hadi bin Abdul Rahman	BSc(Hons)(Geology)(UM); MSc (Industrial Mineral)(UKM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Suhaimizi bin Yusoff	BSc(Hons)(Earth Science)(UKM)
Pegawai Kajibumi, C41 Geologist	Zahidi bin Hamzah	BSc(Hons)(Geology)(UM)
	Muhammad Fadzli bin Deraman	BSc(Hons)(Geology)(UM); BEng(Hons)(Civil)(UiTM)
	Hamzah bin Zakaria	BSc(Hons)(Geology)(UKM)
	Muhamad Safid bin Saad (<i>from 27.12.2012</i>)	BAppSc(Hons)(Geophysics)(USM)
	Razaiddi Shah bin A. Kadir	BSc(Hons)(Geology)(UMS)
	Muhammad Azfar bin Kamaruddin	BSc(Hons)(Geology)(UMS)
Kedah / Perlis / Pulau Pinang		
Pengarah, C52 Director	Zainol bin Husin	BSc(Hons)(Geology)(UKM)
Timbalan Pengarah, C44 Deputy Director	Hamdan bin Ariffin (<i>from 05.07.2012</i>)	BSc(Hons)(Applied Geology)(UM)
	Mohamad Sari bin Hasan (<i>until 14.05.12</i>)	BSc(Hons)(Geology)(UKM)
	Juna Azleen bin Abdul Ghani	BEng(Hons)(Mineral Resources Eng.)(USM)
	Che Aziz bin Che Soh (<i>until 09.09.2012</i>)	BSc(Hons)(Geology)(UKM)
	Badrol bin Muhammad (<i>from 06.09.2012</i>)	BSc(Hons)(Earth Sciences)(UKM)
Pegawai Kajibumi Kanan, C44 Senior Geologist	Fathullah bin Abu Naim (<i>from 06.09.2012</i>)	BSc(Hons)(Geology)(UM)
Pegawai Kajibumi, C41 Geologist	Ahmad Zamani bin Samat	BSc(Hons)(Applied Geology)(UM)
	Nur Susila binti Md Saaid (<i>study leave 06.09.2011 until 04.09.2013</i>)	BSc(Hons)(Applied Geology)(UM)
	Wan Salmi bin Wan Harun	BSc(Hons)(Applied Geology)(UM)
	Zamila binti Abd Rahman	BSc(Hons)(Geology)(UKM)
	Muhammad Mustadza bin Mazni	BSc(Hons)(Geology)(UMS)
	Fakhrudin Afif bin Fauzi	BSc(Hons)(Geology&Geophysics)(University of Adelaide)
Pegawai Galian, C41 Mines Officer	Azihan bin Mat Arshad	BEng(Hons)(Mineral Resources Eng.)(USM)

Jawatan Kader di Agensi luar Cader Posts in other Agencies

Jabatan Kerja Raya Public Works Department		
Cawangan Kejuruteraan Cerun Slope Engineering Branch		
Ketua Pegawai Kajibumi, C52 Principal Geologist	Mohd Anuar bin Mohd Yusof	BSc(Hons)(Geology)(UKM); MSc(Industrial Mineralogy)(Leicester)
	Mohd Nazan bin Awang	BSc(Hons)(Geology)(UKM)
	Saffeen bin Baharuddin	BSc(Hons)(Geology)(UKM)
	Abdul Rashid bin Bachik	BSc(Hons)(Geology)(UKM)
Cawangan Kejuruteraan Jalan & Geoteknik Road & Geotechnique Engineering Branch		
Pegawai Kajibumi Kanan, C44 Senior Geologist	Nicholas Jacob a/l T. Jacob	BSc(Hons)(Geology)(UKM); MSc(Environment)(UPM)
Kementerian Tenaga, Teknologi Hijau & Air Ministry of Energy, Green Technology & Water		
Pasukan Projek Penyaluran Air Mentah Pahang-Selangor		
Pegawai Kajibumi Kanan, C44 Senior Geologist	Kamarulbahrin bin Hashim	BSc(Hons)(Applied Geology)(UM)
Jabatan Bekalan Air		
Pegawai Kajibumi, C41 Geologist	Mohamed Fadzli bin Rahman	BSc(Hons)(Geology)(UM);

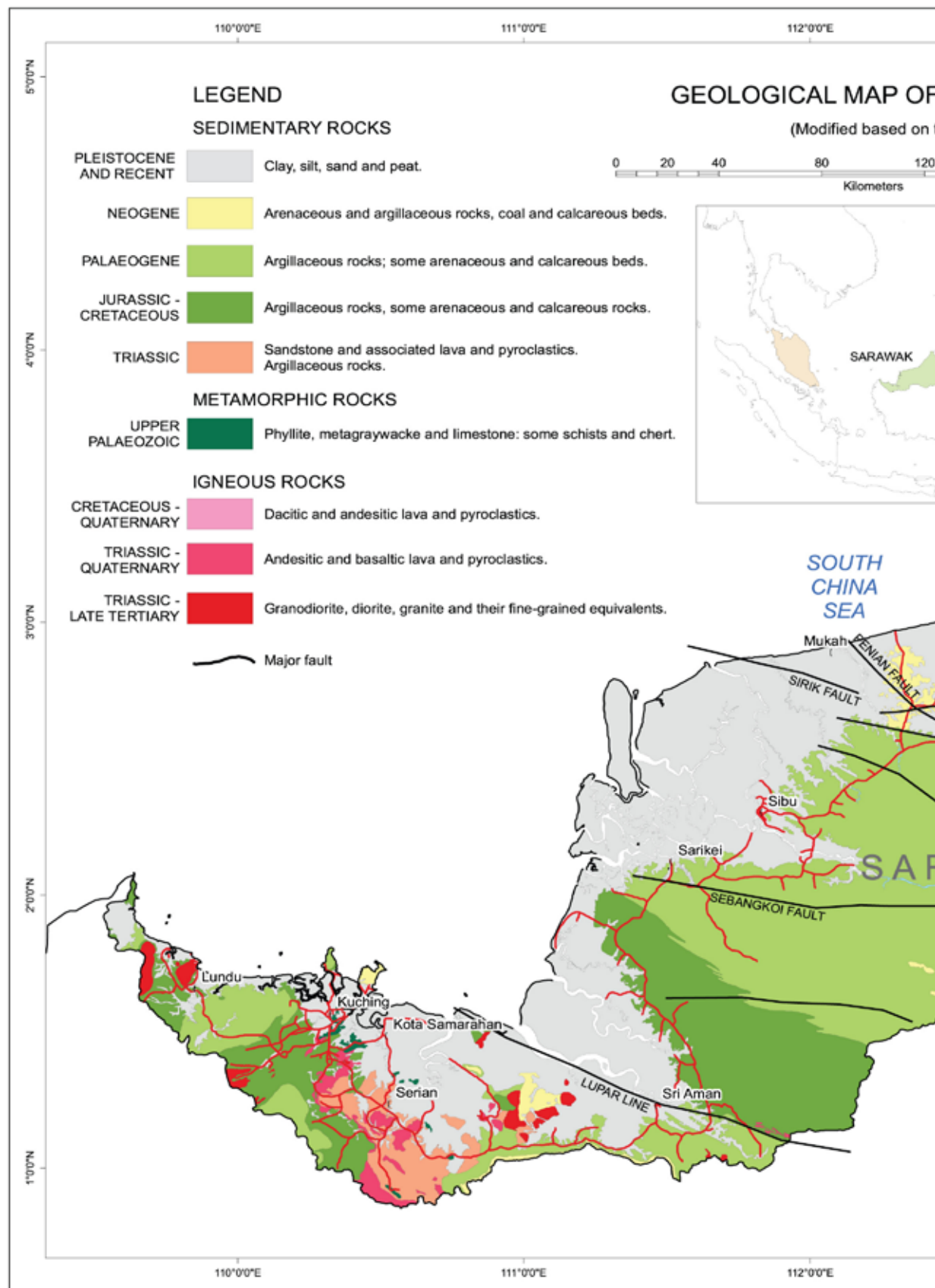




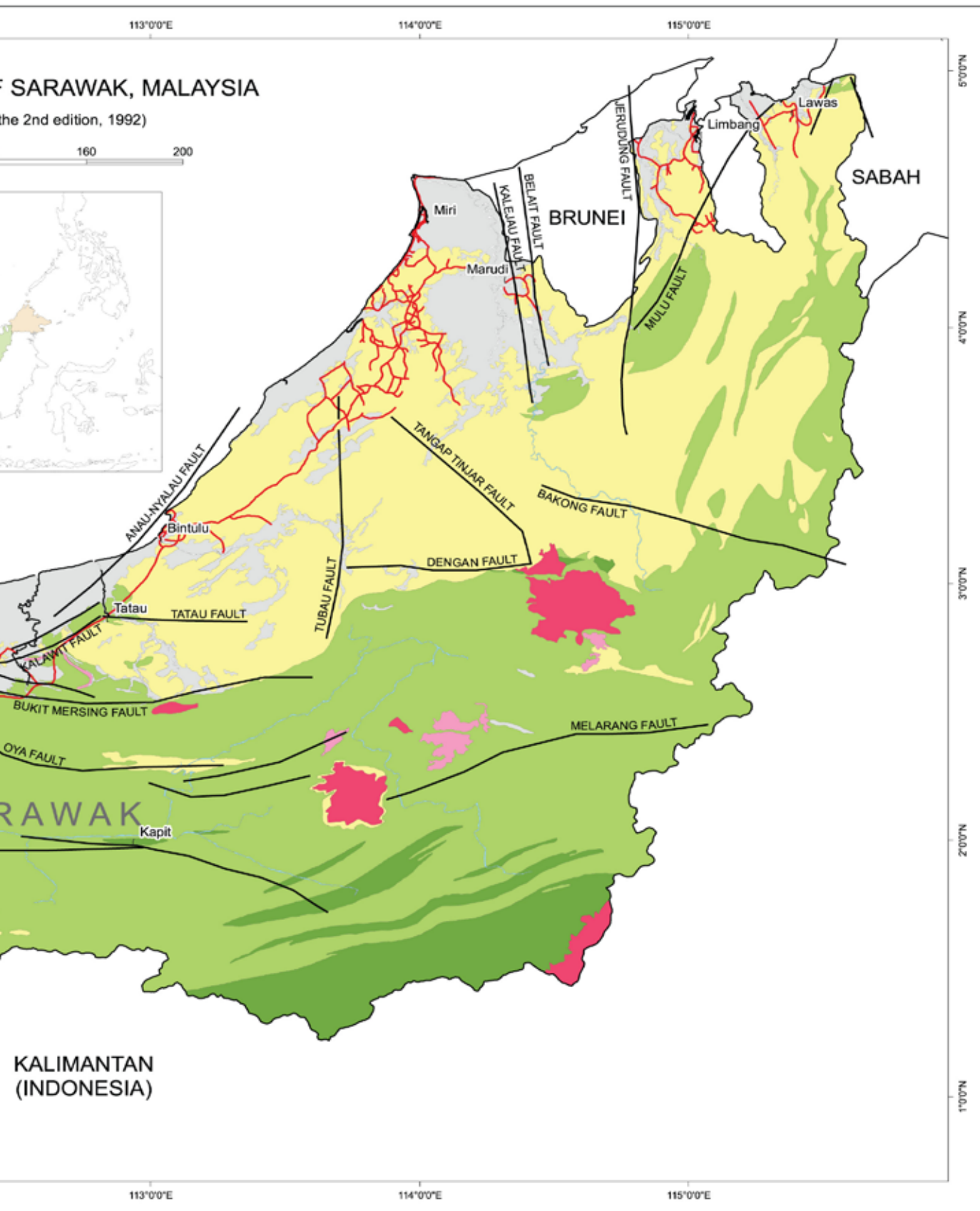
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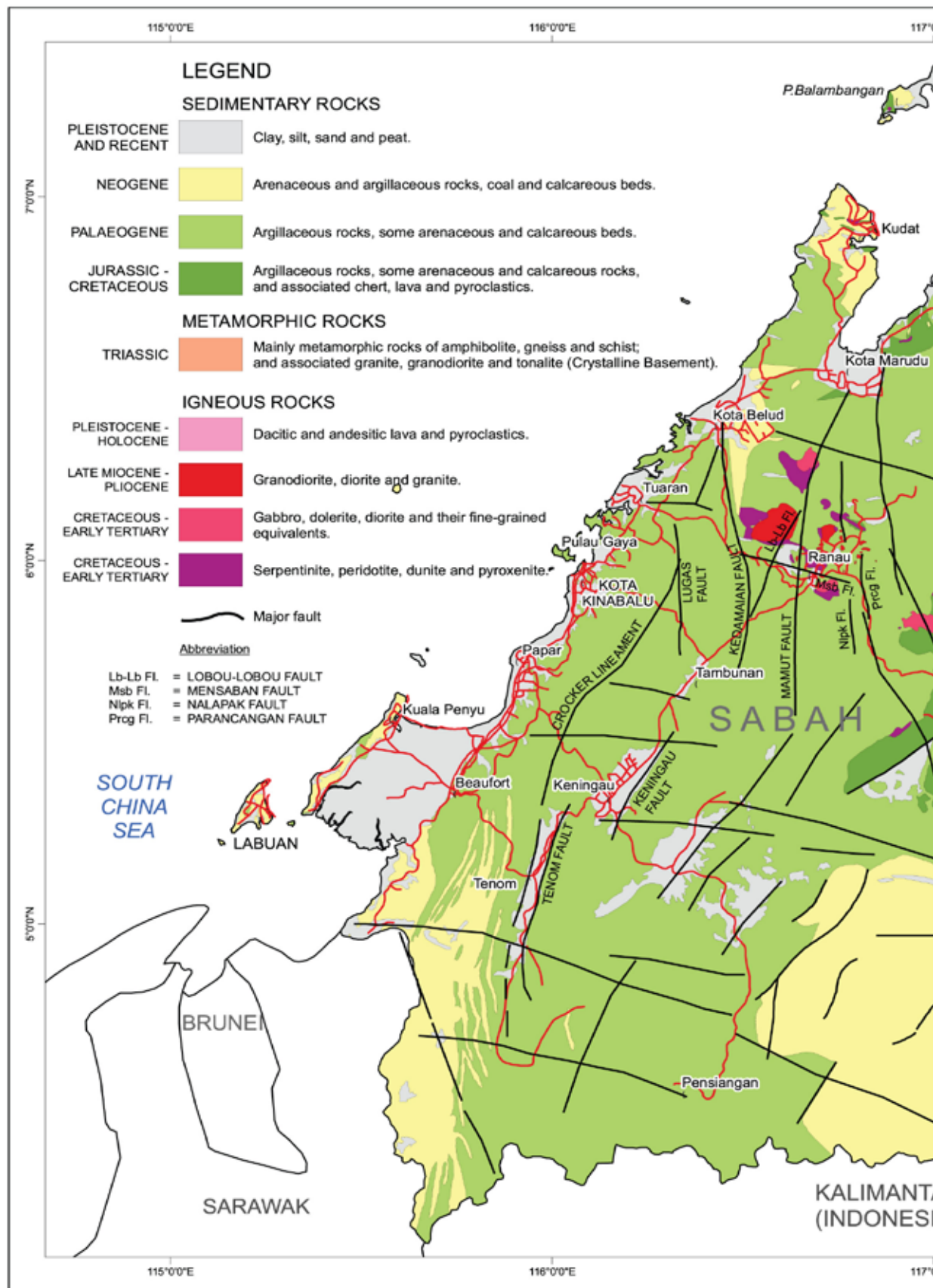


Geological Map of Peninsular Malaysia



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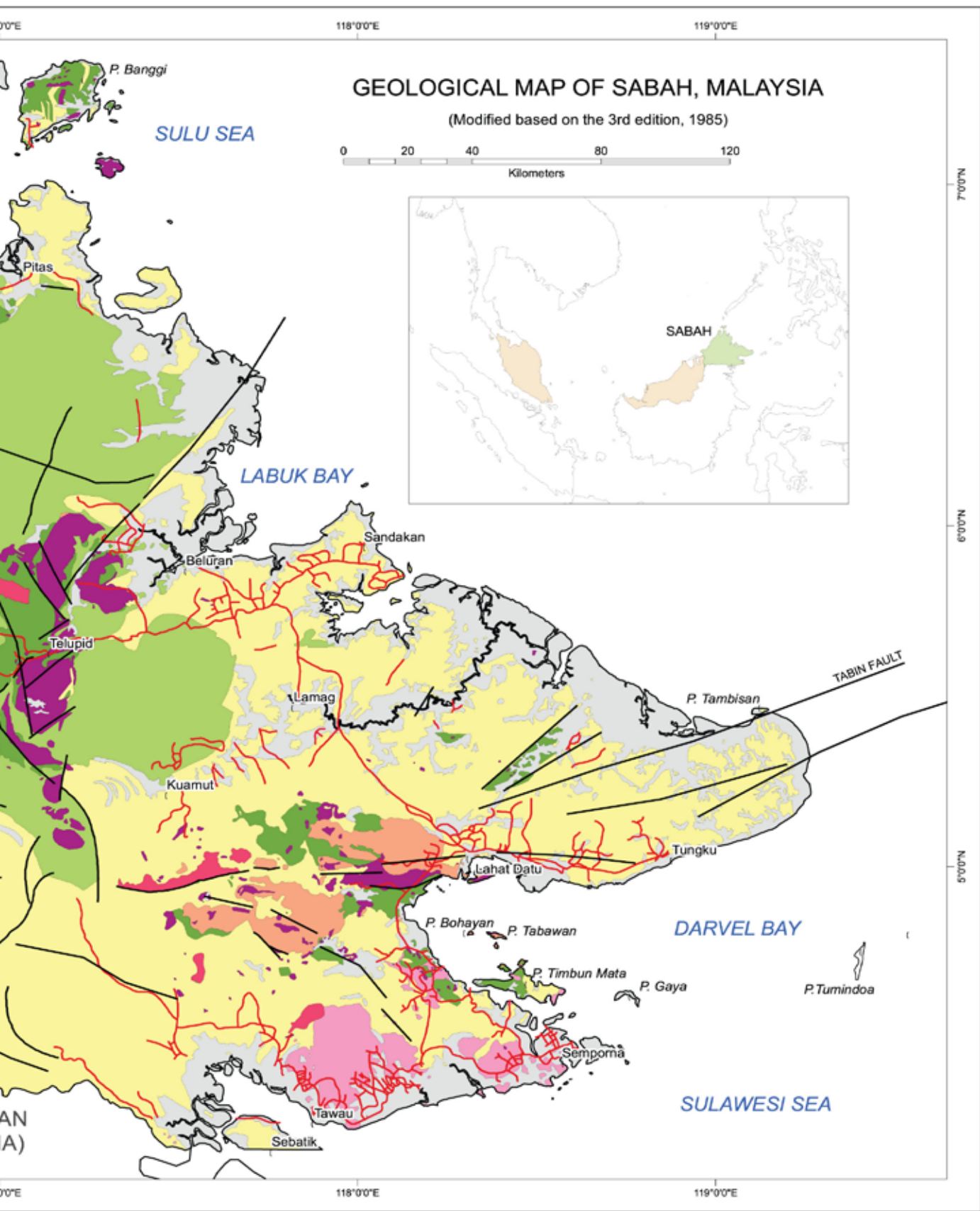




Photo: Ling Nan Ley

Terletak berdekatan Bukit Larut (Bukit Maxwell), Perak, Taman Tasik Taiping yang masyhur ini dahulunya ialah sebuah lombong bijih timah sebelum ia diwartakan sebagai taman awam dalam tahun 1880.

The famous Taiping Lake Gardens located near Bukit Larut (Maxwell Hill), Perak was originally a tin mining ground before it was established as a public garden in 1880.

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ISSN 0127-055009



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