

3. Infrastructure-Facilities and charges

3.1 Chemical Laboratory

Chemical analysis facilities are available at the laboratories established at the head office and the regional offices. Conventional and trace element analysis is being carried out successfully at the laboratories that have led to, assess the grade of various mineral deposits and established several mineral based industries, in the State. Success of a few international collaborative projects and in-house projects are to the credit of the laboratories.

1. International Collaborative Projects:

1.1.1 United Nations Development Programme (for Mineral Exploration in M.P.) during year 1979-83

Minerals	Methods of analysis	Remarks
Lepidolite	AAS	Li, Rb, Cs
Tin Ore	AAS/ Spectrograph	Thrust Area (radical element) SnO ₂
Gold	AAS/ Spectrograph	Au, As
Carbonatite	Wet Classical Analysis	Major oxides, rare earths F & P ₂ O ₅
Base Metal	AAS/ Spectrograph	Cu, Co, Ni, Pb, Zn etc.

2. Facilities Available

Instruments/ Equipments	Analysis	Expertise
AAS – Varian Spectra 220	Base Metal (Partial & Mn, Cr and Gold)	Cu, Co, Ni, Pb, Zn, Ag, Cr, Au, Mn, Li, Rb, Cd, Fe, Al, Ca, Mg, Ga, Cs, Be, Ba, Sr, Ti, V, Se, Sb, Bi, As, Mo,
DMS – 90 UV- Visible Spectrophotometer	Colorimetric	Titanium and Phosphorus
Flame Photometer Microprocessor based Elico CL-361	Alkali and Alkaline earth metals	Sodium and Potassium
Spectrophotometer Systronics UV – Visible 117	Spectrophotometer	Titanium and Phosphorus

3.2 Remote Sensing

PHOTOGEOLOGY AND REMOTE SENSING (PGRS) DIVISION :

PGRS is established at the Head Office of DGM, and is involved in application of remote sensing techniques for mineral exploration projects of the Directorate. Since 1990, PGRS has potentiality to carry out natural resource management projects under approval of the Government.

Projects

International Collaboration

INDO-FGR Project Phase IV (1995-2000) For 'Development of Diamond Exploration Model.

Departmental

Preparation of remote sensing based regional geological maps of Chhattisgarh state on 1:250,000 scale (without field check) Preparation of Geological map and demarcation of potential zones for Gold mineralisation in Sonakhan area, of district Raipur (Now, Mahasamund district) with selective field check. Preparation of Geological map and demarcation of potential zones for location of kimberlites in Mainpur area of Raipur district with selective field check. Preparation of Geological map of South Central Bastar district (Presently Dantewara district) with selective field check. Preparation of geological map for demarcation of Ultramafic bodies and zones of gold mineralisation in Saraipali area of Mahasamund district. Selective ground check was followed by exploratory work. Demarcation of granite bocks in Kanker district and ground check to confirm its feasibility as dimension stone. Preparation of Geological map of Panari-Lormi area of Kawardha- Bilaspur districts to demarcate potential zones for polymetallic mineralisation.

Other Projects

Preparation of lineament, hydromorphic and drainage maps for mili watershed development under Rajiv Gandhi water shed mission.

Services available:

Interpretation of remote sensing data & aerial photographs for natural resources management especially geomorphic, hydromorphic, geological, structural, lineament, drainage maps of the terrain, supported by associated ground truth collection. landuse, land hazards zoning maps. Mineral targeting and exploration. Digital image analysis and GIS.

Logistics available:

Trained manpower from the national and international institutions in interpretation of aerial photographs and remote sensing data, digital image analysis and GIS Aerial photographic coverage of almost entire Chhattisgarh on approximately 1:50,000 scale. FCC data of various IRS series satellites, covering entire Chhattisgarh on 1:250,000 scale and on 1:50,000 scale of selected area. Instrument and equipment essential for visual interpretation of aerial photographs in lab and field. Instrument and equipment essential for visual interpretation and digital image analysis of remote sensing data. Facility for digitization of maps and GIS.

3.3 PETROLOGY

Megascopic and microscopic characterization and nomenclature of the rocks and minerals, based on their petrographic properties is being carried out at the petrology laboratory, which is established at the head office, Raipur. Petrological studies is being carried out successfully at the laboratories that have led to identify different types of rocks, mineral and ores to judge the potentiality of the mineral deposit and as an indirect tool to felicitate and encourage mining activities in the State. Success of the international collaborative projects and departmental projects are to the credit of this laboratory.

1. INTERNATIONAL COLLABORATIVE PROJECTS:

1.1 United Nations Development Programme (for Mineral Exploration in M.P.) during year 1979-1983

Minerals	Method of analysis
Tin Ore	Heavy and magnetic mineral separation
Gold	Heavy and magnetic mineral separation
Carbonatite	Thin section study under microscope
Base metals	Ore microscopy

1.2 INDO-FRG Project "Diamond Exploration" during year 1995-2000

◆ Petrochemistry, petrography, mineralogy, heavy and magnetic mineral separation and identification

2. DEPARTMENTAL PROJECTS:

1. Petrography and mineralogy of Limestone, Dolomite, Bauxite, Kimberlite, granulite, basic/ultrabasic and metamorphic rocks.
2. Mineralogical properties of Alexandrite, garnet, corundum, diamond, etc.
3. Heavy media and magnetic separation for gold, cassiterite and indicator minerals of diamond.
4. Ore microscopy of base-metal and tin ores.

3. EXPERTISE:

◆ Personnel working in petrology are trained from Geological Survey of India training institute, Indian diamond institute and Indian Institute of Gemology.

4. INFRASTRUCTURE:

◆ Petrology laboratory is engaged in various studies related to petrography of samples and equipped with a number of machines / instruments/ equipments. Details are as follows:

- i. **Polarizing microscopes:** Microscopic examination of slides of nonmetallic mineral/rock samples and attached camera for photography.

- ii. **Leica Polarizing microscopic attached with digital Camera:** for microscopic examination of slides of rocks and non metallic minerals with digital photography.
- iii. **Incident light binocular microscope:** Metallic minerals examination under reflected light and micro-hardness test.
- iv. **Binocular microscope:** Identification of mineral grains and gemstones with magnification up to 100 times.
- v. **Rock cutting machine (Volco):** Trimming or slabing of rocks, minerals, ores and core samples.
- vi. **Petrothin thin Sectioning System:** for preparation of the thin sectioning of rocks and minerals.
- vii. **Wards standard cut off machine:** Preparation of thin sections with capacity to cut the rock chips up to 3mm thickness.
- viii. **Frantz Isodynamic Separator:** Magnetic mineral separation.
- ix. **Ultraviolet lamp:** Study of fluorescence and Phosphorescence properties of minerals.
- x. **Modern balance:** Weighing of mineral grains/gemstones and determination of specific gravity.
- xi. **Walker steel yard balance:** Determination of specific gravity of rock and mineral samples.
- xii. **Electric agate mortar:** Mineral and rock pulverizing.
- xiii. **Duplex refractometer:** Determination of refractive index of polished minerals and gemstones.
- xiv. **Hand magnet:** Separation of magnetite and magnetic material.
- xv. **Pilot scale granite cutting and polishing machine:** Cutting and polishing properties of granite and dimension stones.

5. FACILITIES AVAILABLE FOR:

- ◆ Petrographic study of rocks, metallic minerals, non metallic minerals, gem stones, cutting & polishing and properties of dimension stones, etc, on payment basis. See Facilities & Charges.

3.4 Drilling Division

Most important feature of the mineral exploration is to include the knowledge of significant subsurface feature like, stratigraphic sequence, structure of the host rocks controlling the mineral/ore body, 3 dimensional shape, size, extent (depth persistence and variation), grade and reserves of the mineral/ore body. This is achieved through vertical and angular core drilling in the mineral/ore deposit. Drilling is executed by the Regional Offices and the operations are monitored and coordinated by the Head Quarter of the Directorate of Geology and Mining, Chhattisgarh. The Directorate possesses experience of vertical, angular core drilling, Banka drilling (in placer deposits) with measurements of deviation.

The Directorate has also experienced in drilling almost in all formations. So far, drilling operations have been conducted for estimation of reserves of Coal, Limestone, Dolomite, Bauxite, Kimberlite, Corundum, Gold, Tin, Quartzite, Iron ore etc under the international (United Nations Development Programme and INDO-FRG project), national (Coal India Limited) collaborative and domestic projects. The drilling activity have recovered the core up to the maximum 246 m depth for Gold, 282.80 m depth for coal, 206.40 m depth for diamond (kimberlite), 61.55 m depth for Corundum, 96 m depth for Tin ore (cassiterite) involving thousands of meters drilling for exploration on minerals.

Drilling in mineral deposits have resulted in establishment of a number of cement plants in Chhattisgarh. Drilling for coal exploration is being carried out for Central Mine Planning and Design Institute Ltd. (CMPDI) that has earned revenue for the department through guiding and tracing the extensions of coal beds in the existing mines as well as in opening new coal mines and fields. Drilling in limestone, coal and granites for percolation tests etc. is being carried out for government, semi-government and private parties.

The drilling division is equipped with trained and expert staff and following core drill machines:

Make Type of machine Capacity

Make of machine	Type of machine	Capacity (In Depth)
VOLTAS - 180	Heavy drill	400 m
VOLTAS - 90	Heavy drill	200 m
VOLTAS - 35	Medium drill	100 m
L&T	Heavy drill	400 m
Rock Drill-60 (WL)	Heavy drill	400 m
Longear (WL)	Heavy drill	400 m
Mincore (WL)Truck mounted	Heavy drill	400 m
Mincore LVC	Medium drill	100 m
Mincore skid mounted	Medium drill	100 m
CALYX	Light drill	60 m

Drilling operations can be carried on request for the government, semi-government, mining companies and private entrepreneurs on the scheduled rates approved by the Chhattisgarh Government and quoted in facilities and charges.

3.5 FACILITIES AND CHARGES

Government of Chhattisgarh has announced extension of the facilities available at the Directorate of Geology and Mining to the investors, mining companies, entrepreneurs and every willing individual for their benefit on payment basis. Following jobs can be taken up on advance payment of the charges shown as follows

1. Reconnaissance geological and geo-chemical surveys, sampling and mapping (@/km² in Indian Rupees)

S.No.	Items	Rate
1.	Remotely located unapproachable areas (Scale 1:50,000 or 1:10,000)	90,000
2.	Moderately high and approachable areas (Scale 1:50,000 or 1:10,000)	85,000
3.	Herb containing undulatory terrain (Scale 1:5,000 or 1:4,000)	80,000
4.	Forest free terrain (Scale 1:5,000 or 1:4,000)	70,000

2. Drilling Operations (@/m in Indian Rupees)

S.No.	Items	Rate
1.	Limestone/Dolomite	1,350
2.	Bauxite	1,500
3.	Coal (Excluding drilling for Coal India Limited)	1,850
4.	Iron Ore	4,000
5.	Other Minerals	Actual or as per mutual agreement

Note: 20% additional charge will be payable for angular drilling operations)

3. Chemical analysis of samples (@ / sample in Indian Rupees)

S.No.	Items	Rate
1.	Limestone, Dolomite, Marble, Calcite Complete Analysis (Six radicals)	600
2.	Bauxite and Laterite Complete Analysis (Five radicals)	600
3.	Iron Ore Complete Analysis (Seven radicals)	1,000
4.	Base Metals Complete Analysis (Eight radicals)	500
5.	Gold	400
6.	Coal Proximate Analysis	500
7.	Clay, Pyrophyllite, Kimberlite, Rock Complete Analysis (Nine radicals)	1,650

8.	Tin Element analysis	400
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4. Petrographic studies (@/ sample in Indian Rupees)

S.No.	Items	Rate
1.	Microscopic Study and Report	225
2.	Study and Report of Polished ore/mineral	225
3.	Study and Report of Rock/Mineral	140
4.	Granite tile cutting /polishing Each tile (30 cm X 30 cm)	100