Laboratory Services

A Centre of Excellence

Central Mine Planning and Design Institute Limited

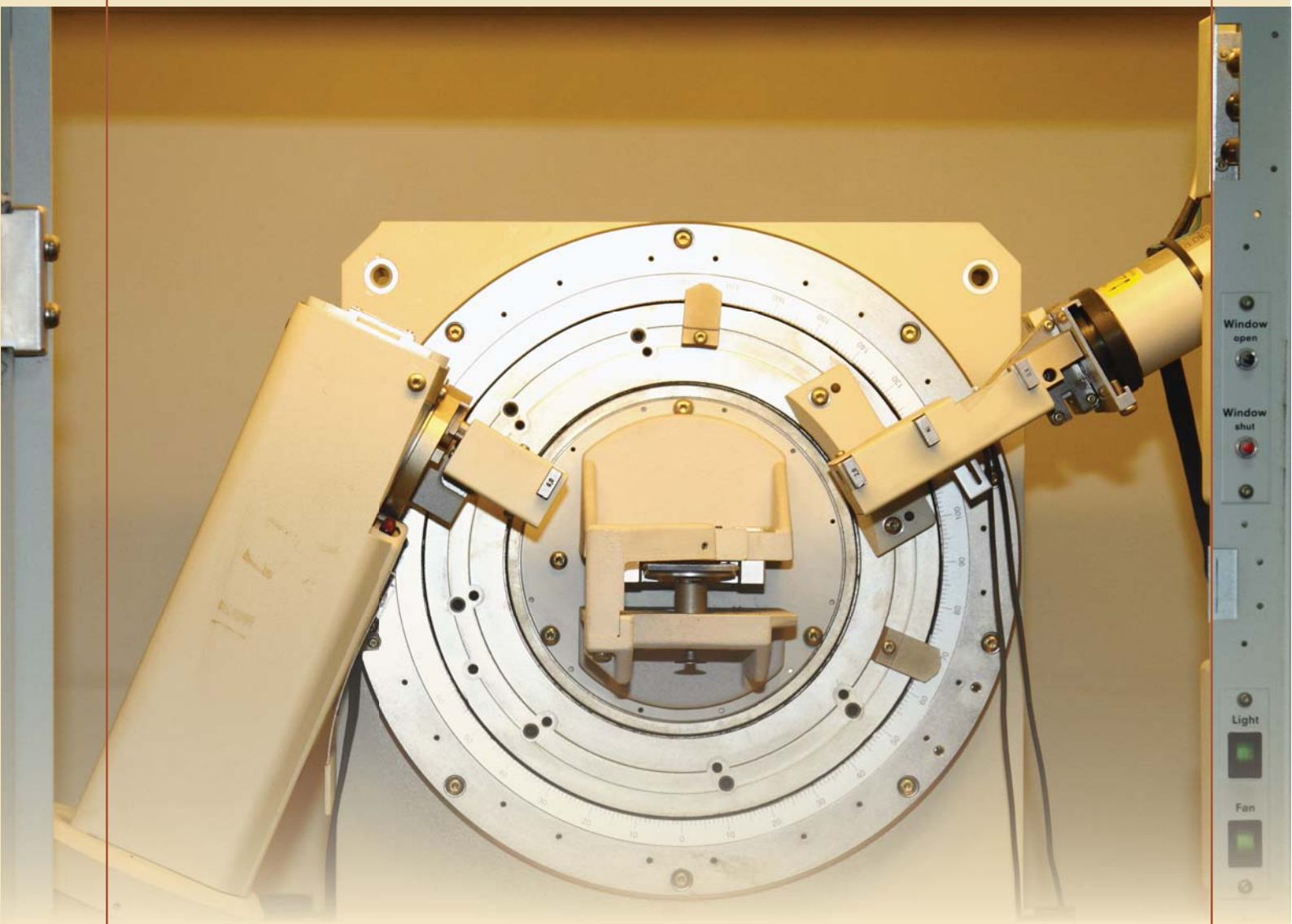
Unearthing mineral resources begins with us

A centre for Excellence

Highly Equipped Laboratory Services with State-of the-Art Technology

- Geo-Chemical Laboratory
- Coal Petrography Laboratory
- Mining Technology Laboratory
- Resin Capsule and Cement Capsule Testing Laboratory
- CBM Laboratory
- Washery Laboratory
- Environment Laboratory
- Geo-Physical Laboratory

Sample Code	SampleName	Analyser	TestDate	Gas Condition	DT	ST	HT	FT	SendDate
STANDARD	GBW11125	BINHA	12/1/2011	Envelop Carbon	1258	1292	1310	1342	12/1/2011
MSCA-45	I(IN-B)I30	BINHA	12/1/2011	Envelop Carbon	1395	>1400	>1400		12/1/2011
DO	I(IN-B)I30	BINHA	12/1/2011	Envelop Carbon	1378	>1400	>1400		12/1/2011
DO	OV.(C13)	BINHA	12/1/2011	Envelop Carbon	1193	>1400	>1400		12/1/2011
DO	IV(BCS)	BINHA	12/1/2011	Envelop Carbon	>1400	>1400	>1400		12/1/2011
MSCA-45	I(IN-B)I30	BINHA	1/2/2012	Envelop Carbon	>1400	>1400	>1400		1/2/2012
DO	I(IN-B)I30	BINHA	1/2/2012	Envelop Carbon	>1400	>1400	>1400		1/2/2012
DO	OV.2(C13)	BINHA	1/2/2012	Envelop Carbon	>1400	>1400	>1400		1/2/2012
DO	OV.2(C13)	BINHA	1/2/2012	Envelop Carbon	1375	>1400	>1400		1/2/2012
DO	IV(BCS)	BINHA	1/2/2012	Envelop Carbon	>1400	>1400	>1400		1/2/2012

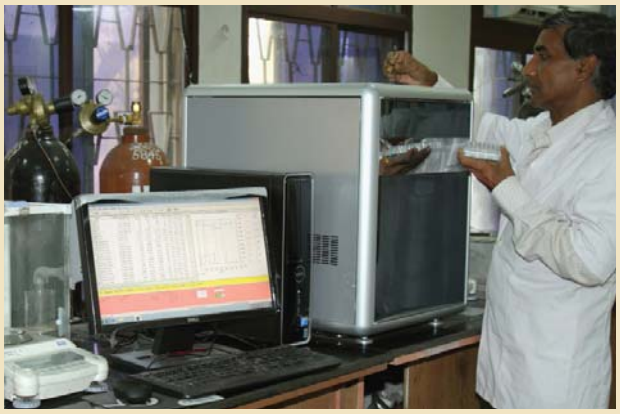

Window
open
Window
shut
Light
Fan

Chemical analysis of coal is a tool to measure the particular physical and chemical properties of coals. Chemical analysis of coal is essential for characterization, utilization, commercial grading and marketing purposes. For utilization of coal in different industries such as power, steel, cement, fertilizer, railways, domestic consumption, brick kiln, textile, sugar, tea, glass, pottery, refractory, carbon industries and other chemical industries, characterization of coal is essential. The Geo-chemical Lab of CMPDI was established in the year 1981 and is engaged in carrying out routine analysis on coal and lignite from different exploration blocks.

The broad activity of the chemical laboratory starts from collection of coal samples from different sources viz. coal core, ROM samples, channel samples etc to analyze various parameters.

Testing Facilities

- Coal core logging and sample preparation.
- Band by band analysis (Ash+ Moisture)
- Proximate analysis (both conventional & microprocessor based equipments)
- Determination of Gross CV
- Ultimate analysis , Carbonate CO2
- Moisture% at 60% RH & 40ºC
- Phosphorus
- Ash Analysis
- AFT range (IDT,ST, HT&FT)
- HGI
- Free Swelling Index
- LTGK Coke Type
- Plastometric test
- Reactivity test



Serial no.	Name of equipment	Utilisation
1.	Microprocessor based automatic coal analyzer	Proximate analysis of coal/coke/lignite
2.	Microprocessor based automatic calorimeter	Determination of gross calorific value of coal & lignite
3.	Automatic computer controlled C,H,N&S determination apparatus	Determination of C,H,N & S
4.	Automatic computer controlled AFTR determination instrument	Ash fusion temperature range (IDT,ST,HT & FT) of coal & lignite
5.	Reactivity test apparatus	Reactivity of coal towards CO_2
6.	Plastometer	Determination of plasticity of coal

Petrography Laboratory

Petrographic analysis of coal is the microscopic study of the constituents (both organic and inorganic) present in coal. This study is done to determine the type and maturity of the sample for coal, coke, source rock evaluation for hydrocarbons, oil shales, coal bed methane and shale gas assessment. The Petrography Lab of CMPDI was established in the year 1980.

Advance diagnostic tests for determining mineral phases in coal through X-ray Diffractometer. Micro-cleat analyses for CBM through Scanning Electron Microscope are also being undertaken. All the petrographers from Petrography Laboratory have been accredited by International Committee of Coal and Organic Petrology (ICCP).

Testing Facilities

- Maceral composition determination
- Random reflectance of vitrinite(Rr%)
- Mean maximum reflectance of vitrinite (Rv max %)
- Mineral phase analysis(qualitative and quantitative)
- Micro-cleat study.

Serial no.	Name of equipment	Utilisation
1.	Advanced Polarizing Microscope with Photometer Attachment for reflectance measurement and with other accessories.	Maceral analysis and Reflectance measurement of coal & lignite
2.	X-Ray Diffractometer	Mineralogical phase analysis
3.	Scanning Electron Microscope with Energy Dispersive Spectrometer	Elemental analysis and micro area analysis, cleat study for CBM
4.	Grinding and polishing machine	Preparation of coal pellets for Petrographic studies
5.	Abrasive cutting machine	Precision cutting of coal and rock
6.	Hot mounting press	Preparation of mounts for Petrographic studies

Mining Technology Laboratory

Physico-mechanical properties of rock from drill cores are determined which form design inputs for mine planning and other technical services being rendered by CMPDI. It also undertakes testing of roof supports . Rock Mass Rating(RMR) of roof strata is determined for designing support systems for underground working. Determination of Cavability Index of underground mines and Subsidence Prediction for a mine is also done.

Testing Facilities

- Bulk Density
- Unconfined Compressive Strength
- Tensile Strength
- Shear Strength
- Protodyakonov Strength Index
- Young's Modulus of Elasticity
- Point Load Test
- Slake Durability Index
- Poisson's Ratio
- Triaxial Strength
  - a) Angle of Internal Friction
  - b) Cohesion

Serial no.	Name of equipment	Utilisation
1.	Universal Testing Machine with Confining Pressure Machine. (capacity – 200 tonnes)	Determination of : Unconfined compressive strength; Tensile strength; Shear strength; Triaxial strength (angle of internal friction and cohesion)
2.	Stiff Compression Machine (Capacity – 2000KN)	Determination of : Unconfined compressive strength; Tensile strength; Shear strength; Young's Modulus of Elasticity; Poisson's ratio
3.	Rock cutting machines	Cutting rock/coal cores to standard size as per ISRM norms. To cut samples of immediate roof of underground mines for Slake Durability and Point Load test for RMR determination
4.	Protodyakonov Strength index testing machine	Determination of protodyakonov strength index of core samples
5.	Point Load Tester	Determination of Point Load Index of core samples as well as immediate roof samples of underground mines
6.	Slake durability Index machine	Determination of slake durability of rock/coal samples
7.	Electronic balance	Determination of Specific Gravity/ Bulk Density of core samples by water displacement method
8.	Electric Oven	Electric oven is used to dry the core samples for Slake Durability Test

The Cement and Resin Capsule Testing Laboratory is accredited with ISO-9001 certification and approved by DGMS. This laboratory is well equipped with sophisticated equipment and instruments to carry out Physico-Mechanical and chemical properties of both Cement and Resin Capsules used in underground mines for grouting.

Testing Facilities

- Compressive Strength of Resin Capsules (Slow Set) and Cement Capsules
- Anchorage Strength of Cement Capsules and Bond Strength of Resin Capsules
- Shear Strength of Resin Capsules
- Shrinkage Test of Resin Capsules (Slow Set) and Cement Capsules
- Expansion Test of Cement Capsules
- Gel Time and Setting Time of Resin Capsules
- Soaking Time, Initial Setting Time and Final Setting Time of Cement Capsules
- Reaction Temperature of Resin Capsules
- Thermal Stability of Resin Capsules
- Flammability Test of Resin Capsules
- Chloride Test of Cement Capsules
- Sulphuric Anhydrite Test of Cement Capsules

CBM Laboratory

Coalbed Methane (CBM) in recent years has established itself as a major source of clean energy. Methane is also a potent greenhouse gas and its mitigation and gainful utilization is beneficial both in terms of environment protection and making future coal mining safe. CMPDI/CIL has taken commercial development of CBM on priority.

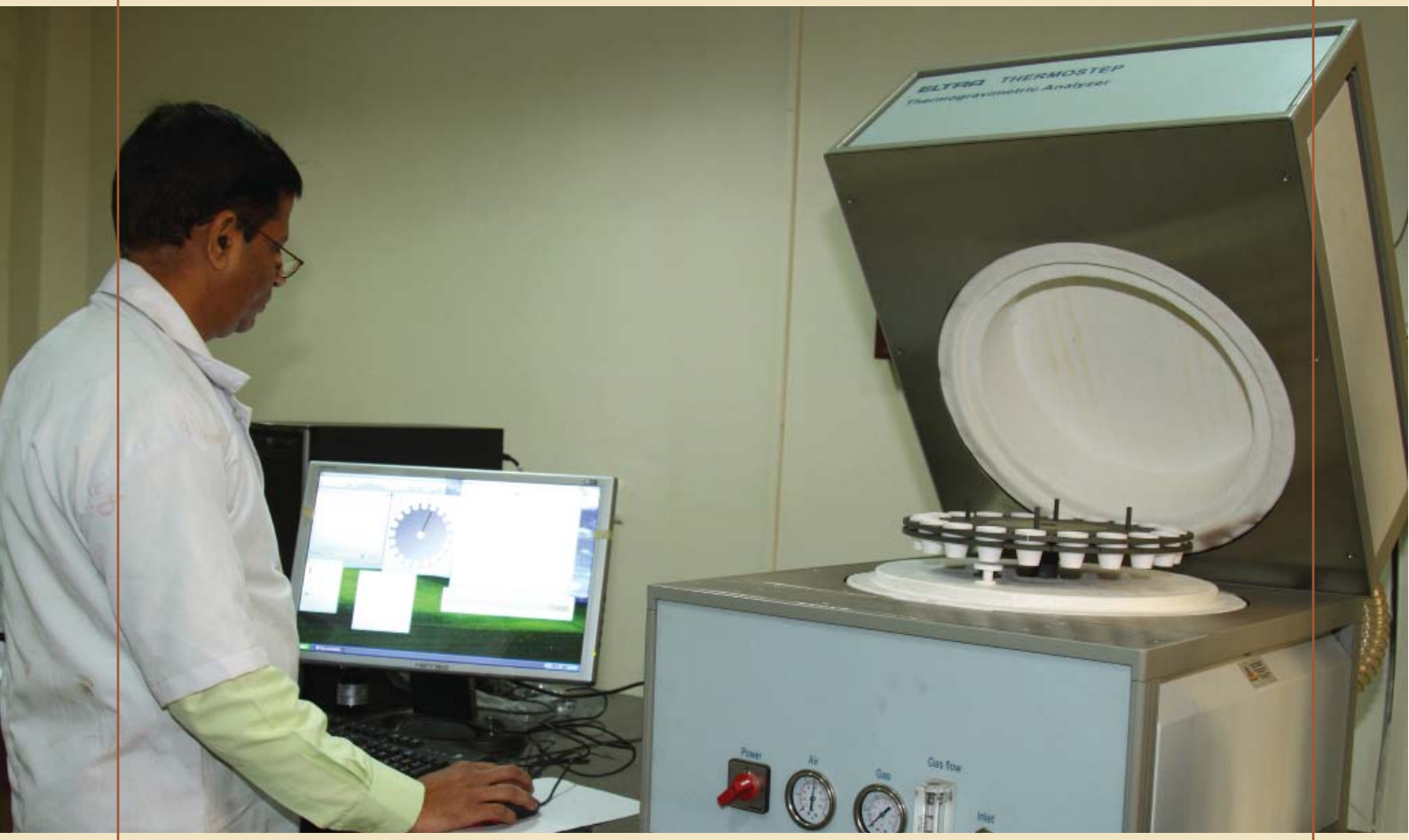
To facilitate assessment of CBM resource for its commercial development, a CBM lab was established in CMPDI during 2008. This state of art lab is capable of conducting all the requisite tests for assessment of CBM resource.

Recently the CBM lab has equipped itself with an Adsorption Isotherm (AI) setup which is capable in measuring methane adsorption capacity of coal samples up to a pressure as high as 20MPa (approx strata pressure at about 2000m depth) and temperature conditions. This AI set up is only of its kind in the country.

The lab is also undertaking analysis of mine air which is providing important inputs related to the safety of the mine.

Serial no.	Name of equipment	Utilisation
1	Desorption Assembly with temperature control device	To measure the desorbed and residual gas for assessment of total gas content
2	Fully Automatic Gas Chromatograph	To determine composition of Desorbed gas Mine air samples
3	Adsorption Isotherm (AI) setup - (A unique 4-in-one adsorption isotherm set-up in India. 16 channel data acquisition system and software for data analysis)	To measure gas adsorptive capacity of coal samples at different pressure to construct AI curves. The study of AI curve in conjunction with desorption data indicates the gas saturation level which is an important input for predicting producibility.

Washery Laboratory



Coal Preparation Laboratory is a state-of-the-art laboratory facility engaged in washability testing of coal samples from different coal fields spread all over India. It comes under Coal and Mineral Preparation Division of CMPDI Head Quarter. Washability testing is done not only for ROM coal samples but also bore hole coal core samples. The laboratory can handle both coking coal as well as non-coking coal and provide accurate washability test results along with other relevant tests. This kind of versatility is achieved through the technical expertise of the dedicated team as well as the latest and cutting edge equipment of the laboratory.

Testing Facilities

- Sampling of ROM coal
- Size Analysis
- Washability (float & sink) Study
- Determination of Characteristics of Fine Coal (-0.5mm)
- Drum Tumbler Test

Serial no.	Name of equipment	Utilisation
1	Jaw Crushers (Feed size : 200mm Final product size : -13mm)	Crushing of the ROM coal
2	Impact crusher (Feed size : 13mm Final product size : -6 mm)	Crushing of the ROM coal
3	Screens: Manual(200mm,150mm,75mm,50mm,25mm) Vibrating(13mm,6mm,3mm,0.5mm)	Screening samples into various size fractions
4	Pulveriser (Feed size : 6mm Final product size : -72 mesh)	a) Proximate analysis b) Gross calorific value test c) Ash determination by Microwave Ashing system
5	Balance (Capacity:– 500kg,300kg,10kg,6kg,205gms,220gms)	Weighing of different size fractions
6	Proximate Analyzer	Determination of Moisture%, Volatile Matter%, Ash% of coal samples
7	HGI machine	Determination of Hardgrove Grindability index
8	Flotation machine	Fine Coal Beneficiation
9	Automatic Bomb Calorimeter	Determination of Gross Calorific value of Coal & Lignite

nvironment Laboratory

Testing Facilities

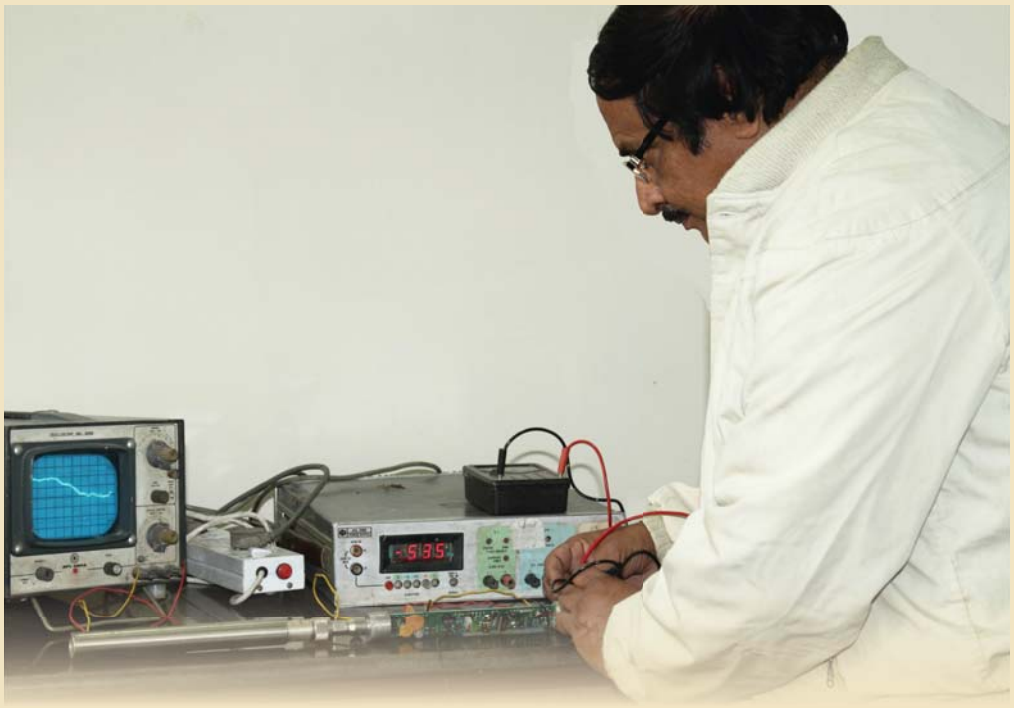
Environmental quality monitoring

- Air and water quality
- Noise level
- Micro-meteorological studies
- Soil quality
- Stack monitoring
- Base line data generation work for EIA/EMPs.
- Analysis of samples of effluents (industrial & domestic) for designing of effluent treatment plants.

Serial no.	Name of equipment	Utilisation
1	a) Atomic Absorption Spectrophotometer b) Inductively Coupled Plasma Spectrometer. c) Microprocessor based Spectrophotometer d) Visible Spectrophotometer e) pH meter f) D.O. meter g) Conductivity Meter h) Turbidity Meter i) BOD Incubator j) COD Reactor k) Deep Freezer k) Microwave Digestor l) Microwave Ash Furnace m) Electronic Balance n) Respirable Dust Sampler (RDS) 0) Visible Spectrophotometer	Air/Water analysis instruments
2	Sound Level Meter	Noise monitoring instruments
3	Micro Meteorological Data Logger	Meteorological data Monitoring
4	a) Laminar Flow Chamber b) Microbial Incubator c) Microscope	Biological testing Instruments
5	Toxicity Characteristic Leaching Procedure (TCLP) Equipment	Leaching of Coal Ash

Geophysical Laboratory

Testing Facilities



Serial no.	Name of equipment	Utilisation
1	Multiparametric Geophysical Loggers (Capacity – 1500m & 500m)	For geophysical logging
2	48 channel Digital Seismograph	For identification of seam structure
3	Mechanical hammer device	Used as seismic source for energisation of ground
4	Proton procession magnetometer	For carrying out magnetic survey for detection of dyke etc.
5	Resistivity imaging system	Used for deep resistivity survey for delineation of incrop,fault etc.
6	Electrical resistivity meters	Used for incrop and ground water survey
7	Aluminium/Plexi glass blocks	Used as calibrator for density probe
8	Oscilloscopes, Function and pulse generators	For pulse monitoring and function generator

CMPDI

A Mini Ratna Company

ISO 9001 Company

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