



Peer Reviewer (Dr. Arun Kumar Panda, Retd. GM Exploration, CMPDIL) On “Geological Report on Reconnaissance Survey (G-4 Stage) For Glauconite in Ambara West Block (Area-143.15 Sq Km), Tehsil- Lakhpat and Nakhatarana, District- Kachchh, Gujarat”

To

The General Manager (Exploration),
Mineral Exploration and Consultancy Limited (MECL),
Dr. Babasaheb Ambedkar Bhawan,
Seminary Hills, Nagpur — 440006

Subject: Peer Review of “GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITE IN AMBARA WEST BLOCK (Area-143.15 Sq Km), TEHSIL-LAKHPAT AND NAKHATARANA, DISTRICT- KACHCHH, GUJARAT”.

Ref: 1. NMET letter no. F.No.44/1/2017-NMET/01 dated 01.04.2026

2. MECL/EXPL/File/NMET/ P.R/ 2026-27/05 Date: 01.04.2026

Sir,

This has with reference to above letters, it was requested to review the report entitled as “GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITE IN AMBARA WEST BLOCK (Area-143.15 Sq Km), TEHSIL-LAKHPAT AND NAKHATARANA, DISTRICT- KACHCHH, GUJARAT” and the said report has been reviewed at this end and comments on text and annexures and plates are given at ANNEXURE-I for correction and incorporation in the final report. And a brief note on this report is given at Annexure-II for information. It is requested to release the honorarium at the earliest.

Thanking you.

Details for Honorarium:

1. DR. ARUN KUMAR PANDA
2. BANK A/C NO. 40101219384
3. IFSC code: SBIN0017948
4. Name of the Bank: State Bank of India
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Regards:

Dr. ARUN KUMAR PANDA
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ANNEXURE-XI/2 of 16

Copy to: The HOD, NMEDT Secretariat, Room No. 325 & 326, Wing-F, Udyog Bhawan,
Rafi Ahmed Marg, Rajpath Area, Central Secretariat, New Delhi.

ANNEXURE- I

Subject: Review Comments on “GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITE IN AMBARA WEST BLOCK (Area-143.15 Sq Km) , TEHSIL-LAKHPAT AND NAKHATARANA, DISTRICT-KACHCHH, GUJARAT”.

1. A draft report entitled “GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITE IN AMBARA WEST BLOCK (Area-143.15 Sq Km) , TEHSIL-LAKHPAT AND NAKHATARANA, DISTRICT-KACHCHH, GUJARAT” was reviewed as per request, vide 1. NMET letter no. F.No.44/1/2017-NMET/01 dated 01.04.2026 and MECL letter no. 2. MECL/EXPL/File/NMET/ P.R/ 2026-27/05 Date: 01.04.2026, comments thereof are detailed below, for correction and incorporation in the final report.
2. As per NMET guideline, MECL is requested to ensure that the geological report including annexures, images, shapefiles, text and pdf file adheres to the prescribed schema (as per the MERT format of NGDR), so that the report is complete in all respect for uploading in NGDR portal.
3. Mention owner's name Government of Gujarat on the Cover Page, as given at 3.1.0
4. Maintain unique Title of the report / Block name, terminology in Text, Annexures and Plates.
5. Maintain Unique symbology and Colour combination for same Physical features, Formations, Ore body etc..
6. All Photographs should be geodetic photograph and maintain the photo number as per chapter no.
7. In the content give details of Tables, Text Figures and Photos.
8. A plate showing boreholes location, pit and sample location with physical feature and villages may be included in the report
9. Adjacent defined block name surrounding to the block should be mentioned. Mudhan-Khatiya block is adjacent to northern block boundary.
10. Section lines are given in Plate-III have not been referred in the text. It seems lines were calculated for resource calculation. Hence, section line wise resources may be calculated.
11. All sub-paras are numbered, it is better not to number all. See Chapter- 7 heading 7.0.0 “Geology of the area”, it could have been 7.0, and 7.0.1” Regional geology of the area” and so on.. It is requested to see the style of the text, title Header, sub- header, para and sub-para numbering and font style and size of font for entire report.
12. It has been observed that page numbers either missing or repeated. This may be attended with due diligence for proper numbering of pages of text, Annexures, figures, photos and plates.

13. Run Spell check and grammar check for entire report and correction shall be made accordingly
14. At point 1.1.8 it is mentioned that geological report is being submitted in the month of March'26, the same may be changed to April'26.
15. At point 1.1.12 it is mentioned that cut-off grade of >3% K2O and At point 1.1.13 and avg. grade considered is 4.3% for resource calculation.
 - a. From chemical analysis result of BH 6 & 7 is more than 3% of k2O. Reason for leaving these two boreholes may be explained.
16. At point 1.11.13 Write the total area of Zone of Galuconite Minieralistion and reason for leaving the balance area.
17. In Chapter- 1, deliberate a para on field investigation, strike & dip and also on geological formation observations made during field visit.

Based on field investigation and geochemical analysis, a note on mineralisation of Glauconite and other important minerals mineralised in the block may be incorporated, in-term of percent with respect to area of the block.

18. In Chapter- 4, elaborate on block boundary delineation and mention the source of the cardinal points of the block in table 4.1.
19. Mention arrows of the exact block location inside the KACHCHH district, otherwise it implicates for entire block.
20. Text figure 1.1 may be corrected as 4.2 and also label cardinal point (ABCDE), and also Write Lat. & Long of the text figure.
21. At 4.2.1 elaborate land uses and mark villages.
22. Text figure 5.1 may be given in a plate with adjacent block boundary name.
23. See the numbering 5.8.1, 5.8.1, 5.8.3, 5.8.3 are repetitive and missing 5.8.2
24. Annual rainfall data for last 10 years may be collected from nearest meteorological station and include in the text at 5.8.3
25. Content of Chapter-6 can be explained in Chapter-5. No need of separate chapter.
26. In Chapter- 7, at Parar 7.1.4 and 7.4.6 it is mentioned that "GSI data is presented in table below" instead write that GSI data is presented at table No. 7.1 and 7.2 respectively.
27. Text figure 7.1 is not referred in the chapter-7 of the text.
28. In text define the difference between Basalt, Basalt(unclassified), and olivine Basalt and make different colour for different rock type.
29. Picture given at 7.3.3 may be included as text figure.
30. Photo 7.1 and 7.3 are near Paneli village, which is outside block boundary (Plate-I). Mention that photos are within or outside block boundary and include Geodetic photos only. Mention more villages in Plate-I.
31. Before 7.5.0: Detail description on field investigation may be made with travers line/path with photographs, under Field Study in the block heading.
32. 7.5.0 DESCRIPTION OF ROCK TYPES PRESENT IN THE BLOCK: and 7.5.1 for LITHOLOGIES BELONGING TO BHUJ FORMATION and 7.5.2 LITHOLOGIES BELONGING TO BHUJ FORMATION and subsequent sub-headings/paras. More geodetic photographs shall be included for rock types

present in the block under report. Photographs given in this chapter should be referred properly in the text.

33. Evidence against 7.5.02 may be included in the report under report.
34. 7.5.0.4 finding in the block geology is different from regional geology (plate-II) may be confirmed with geo chemical data along with field data. Elaboration on evidence of findings with geodetic photos may be included.
35. 7.5.0.9 – Elaboration on evidence of findings with geodetic photos may be included.
36. Text Figure- 7.3 is the copy of plate 03, shall be edited and delete plate details and give details of figure. Regenerate the text figure without any section line.
37. At 7.6.14 Interpretation of Bivariate Plots have been done. It is not clear from the description that the data considered for bivariate are discrete in nature or continuous in nature. What is distribution pattern of the data (normal, positive bell shaped or negative bell shaped curve)? As in general geological data set never be distributed normal with same mean and mode with proper normal curve distribution. Apart from mentioning correlation coefficient and maturity of chemical components, also mention the skewness and kurtosis of the data set and find out the factor which is responsible for mineralisation.
38. Pmg 1,2,3,4,5,6 may be mentioned in the content.
39. After detail field investigation and geochemical study of the block, it appears that there is a dis-continuity in Glauconite before eastern boundary of the block and may not be potential in the adjacent block. Eastern boundary is enriched with more of feldspathic sand stone. It differs from regional geology of the block. There are much more deviation from regional geology (PLATE-II) and Geology of the block (Plate- III). It shall be described in detail.
40. At 7.8.3- Mention percentage of total K₂O mineralisation area vis-à-vis total area. Resource is calculated for area of 18.44 sq.km as against total area of 143.15 sq.km which is 12.88%. Reason may be given for leaving 77.12% of the area.
41. NGCM- Geochemical anomaly map of K₂O data plotted and interpreted for the block under report in Chapter-8, the same may also be tabulated in the chapter.
42. Geochemical anomaly map of K₂O data of present Pits , bed rocks and boreholes shall be prepared and report with findings.
43. Details of Exploratory Work carried out by MECL in the Ambara west Block, Kachchh District, Gujarat given at table No 10.1. Deviation from approved quantum may be mentioned in the remark column of the table.
44. Include a map showing Field traverse line and prominent features and villages etc.
45. structural observations (strike and dip) are quite less as compared to area of the block (143.15 sq.km.) (ref. PLATE-III). It should have been much more than this.
46. The resource estimation for K₂O-rich glauconite mineralisation in the Ambara West Block has been carried out considering the bedded nature of the deposit and the level of geological confidence achieved through Reconnaissance Stage (G-4) exploration and the resources are classified as Reconnaissance Mineral Resources (UNFC 334), estimated at 212.11 million tonnes with an average



ANNEXURES

1. Maintain unique Title / Block name and terminology for all the Annexures.
2. ANNEXURE IA- Include source of the cardinal point co-ordinates.
3. ANNEXURE IB – In the header of the table mention title of each column or mention etc. after total depth. Angle of each borehole should be -90.0 as each boreholes drilled vertically, from surface to below the surface.
 - a. ANNEXURE II – Correct the header to ANNEXURE II, instead of ANNEXURE IIIA. Data provided under the column with heading “Thickness REC.” is same as true thickness/extrapolated thickness misleads with recovered thickness. May like to delete the column. Complete the page no. for all pages of annexure. Also see Annexure- III, IIIA
4. ANNEXURE IIA – correct to ANNEXURE- IVB
5. Some of the Annexures headings are written in hand, may be typed properly for final report.

PLATES

1. For all the plates, maintain Unique symbology and Colour Index for same Physical features, Formations, Ore body etc..
 2. All plates are not in one format, maintain same format (font style and font size, placement of plate detail) for all plates.
 3. Authenticate all plates by putting signature.
 4. Include Plate details at the bottom left corner of the plate and make a unique format for all the plate for example:
5. Customer/Owner :
 6. Title of the Report :
 7. Subject:
 8. Prepared by : Signature:
 9. Checked by : Signature:
 10. Approved by : Signature:
 11. Drawing No. Plate No.I/II/III/IV/V
12. In Plate-II, Basalt, Basalt Unclassified and Olivine Basalt are having same colour index, difficult to differentiate. It should be only Basalt and use only one colour. Give Plate details as mentioned above.

13. See SI.No. 4 of list of plates, RF is 1:4000 whereas, in the plate it is 1:10000, hence correct in the list of plate.

Review comments by:

Dr.ARUN KUMAR PANDA

RETD.GM(EXPLORATION), CMPDIL

ANNEXURE-II

This brief note is based on "GEOLOGICAL REPORT ON RECONNAISSANCE SURVEY (G-4 STAGE) FOR GLAUCONITE IN AMBARA WEST BLOCK (Area-143.15 Sq Km) , TEHSIL-LAKHPAT AND NAKHATARANA, DISTRICT- KACHCHH, GUJARAT"

Geological Significance of Glauconite in Kachchh Region

The report highlights the exploration of glauconite mineralization in Ambara West Block, Gujarat, emphasizing its potential as an alternative potassium resource for agriculture.

Location and Accessibility of Ambara West Block

The area is situated in Kachchh District, Gujarat, with good road connectivity and proximity to major transport hubs.

- Located in Lakhpatt and Nakhatrana Talukas, covering 143.15 sq km.
- Coordinates range from 23°30'45.975"N to 23°38'24.470"N latitude and 68°57'5.324"E to 69°5'35.282"E longitude.
- Accessible via National Highway NH-754K, about 1 km from the block.
- Nearest district headquarters: Bhuj, 100 km away.
- Nearest railway station: Bhuj Railway Station.
- Nearest airport: Bhuj Airport.

Physiography and Environmental Conditions

The terrain is gently undulating with moderate relief, seasonal drainage, and limited surface water resources.

- Elevation varies from 20 m to 155 m amsl.
- Drainage is dendritic to sub-dendritic, with ephemeral streams like Bhukhi Nadi, Nara Nadi, and Gajansar Nadi.
- Surface water mainly from village talavs, check dams, and rain-fed ponds.
- The region has semi-arid climate with seasonal water flow.

Land Use and Mineral Exploration

The land is primarily agricultural with some forested areas; exploration focused on glauconite mineralization.

- Land use: Agriculture dominant, small forest patches.
- Mineral under investigation: Glauconite a potassium-rich mineral in sandstone

- Glauconite occurs as green pellets/disseminations in shallow marine shelf deposits.
- Stratigraphy mainly from the Katrol Formation (Late Jurassic–Early Cretaceous).
- Glauconite development indicates slow sedimentation in low to moderate energy marine environments.

Demographics and Local Communities

The local population comprises mainly Maldhari pastoral communities and agrarian households.

- Population depends on livestock rearing, rainfed agriculture, and traditional crafts.
- Socio-economic conditions: Moderate to low literacy (33%-65%).
- Population is young, with 11%-18% aged 0–6 years.
- Settlement distribution influenced by road, water sources, and land-use.
- Villages include Amiya, Meghpar, Valka Nana, Valka Mota, Paneli, Ravapar.
- Population density is low to moderate, with sex ratios around 890 to 1,000 females per 1,000 males.

Geology and Mineralization Potential

The geological setting favours glauconite occurrence, with stratigraphic and structural features supporting mineralization.

- The area lies within the Kachchh Basin, characterized by marine sedimentary sequences.
- Glauconite occurs in the Katrol Formation, associated with shallow marine depositional environments.
- Extensive geological mapping and geochemical sampling were conducted.
- Drilling intersected glauconite-bearing zones, confirming mineral presence.
- Resource estimation: 212.11 million tonnes with an average grade of 4.30% K₂O over 18.44 sq km.
- Further exploration recommended for resource upgradation and potential auction.

Exploration Activities and Technical Details

The exploration involved geological mapping, pitting, drilling, and laboratory analysis.

- Field operations started on 1st April 2025, with drilling completed in January

- 10 boreholes drilled, totalling 273 m depth, confirming glauconite zones.
- Samples analyzed for chemical radicals, with quality control measures in place.
- Resource estimation used polygonal method, deducting 20% for uncertainties.
- Further studies like SEM–EDS and grain size analysis suggested for confirmation.

Ownership, Personnel, and Project Timeline

The project is owned by the Government of Gujarat, executed by MECL, with experienced personnel.

- Exploration agency: Mineral Exploration and Consultancy Limited, established in 1972.
- Key personnel include geologists and exploration managers with over 20 years of experience.
- Prospecting started on 1st April 2025, with the report scheduled for March 2026.
- The exploration program was initially for 12 months, extended by 3 months to March 2026.

Policy and Strategic Importance

Glauconite is recognized as a strategic mineral under national initiatives.

- India lacks domestic evaporite potash deposits, increasing reliance on imports.
- Glauconite exploration aligns with national goals to enhance fertilizer security.
- Over 3,000 million tonnes of glauconitic sandstone resources are reported in India.
- The mineral is included in policy frameworks for resource development and auctioning.
- Further exploration and resource assessment are prioritized for strategic use.

Socio-Demographic Profile of Ambara West Block

The region is predominantly rural with dispersed settlements, low to moderate population density, and a young demographic profile.

- Villages include Amiya, Meghpar, Valka Nana, Valka Mota, Paneli, Matana Madh, Ravapar (Navavas).
- Population varies from a few hundred to several thousand; Ravapar and Matana Madh are larger.
- Sex ratio ranges between 890 and 1,000 females per 1,000 males.
- Literacy levels are low to moderate, approximately 33% to 65%, lower in smaller

- Workforce participation includes main and marginal workers, mainly livestock rearing, rainfed agriculture, and allied activities.

Heritage Sites and Cultural Significance

The area is rich in archaeological monuments and places of worship, with regional heritage sites nearby.

- Siyot Caves date to 1st–2nd century AD, protected by ASI.
- Lakhpat Fort from the 18th century encloses the historic town of Lakhpat.
- Koteswar Temple near Narayan Sarovar is a major pilgrimage site.
- These sites are outside the block but are significant cultural assets.
- The region's religious practices are integrated with pastoral and agrarian lifestyles.

Basic Public Utilities and Infrastructure

The region has basic but functional utilities supporting rural life and exploration activities.

- Connected by State Highways and Major District Roads; nearest major road is through Dayapar.
- Bhuj–Naliya railway line provides rail connectivity; Bhuj Railway Station is 100–105 km away.
- Ports at Kandla and Mundra are 160–180 km away, supporting logistics.
- Electricity is available via district transmission lines; water sources include talavs, check dams, borewells.
- Limited surface water; reliance on rain-fed sources during dry periods.
- Basic healthcare through rural health centers; advanced facilities at Bhuj.

Ecological and Protected Areas

The region features semi-arid ecosystems with scattered scrub forests and saline flats.

- Falls under Desert Thorn Forests with species like *Prosopis juliflora*, *Acacia*, *Capparis*, *Salvadora*.
- Proximity to Narayan Sarovar Wildlife Sanctuary (~444 sq km) and Kachchh Desert Wildlife Sanctuary (~7,506 sq km).
- Sanctuary habitats support desert fauna such as Chinkara, Blackbuck, Nilgai, Indian Fox, Desert Fox, Hyenas, Caracal, Indian Wolf, and over 160 bird species.

Flora and Fauna in and Near the Area

The area supports xerophytic vegetation and desert-adapted wildlife.

- Vegetation includes Acacia, Prosopis juliflora, Salvadora, Euphorbia, Ziziphus, grasses.
- Wildlife includes Chinkara, fox, hare, porcupine, reptiles like spiny-tailed lizard, and resident birds.
- No critical habitats or protected species within the core prospecting zone.
- Nearby sanctuaries influence regional biodiversity.

Water Bodies and Climate Conditions

Drainage is ephemeral with seasonal streams and limited surface water.

- Drained by Bhukhi Nadi, Nara Nadi, Gajansar Nadi.
- Water sources include talavs, check dams, rain-fed ponds.
- Climate is arid to semi-arid; average temperature ~26.4°C.
- Summers reach 39–40°C; winters drop to 10–12°C.
- Annual rainfall is low (~300–400 mm), concentrated June–September.
- Humidity varies from 25–30% in summer to 65–75% during monsoon.

Physiographic and Social Environment

The terrain is undulating with calcrete crusts and ephemeral drainage.

- Rainfall averages 300–400 mm annually.
- Groundwater is often saline; seasonal water scarcity affects operations.
- The population is mainly Maldhari pastoralists and agrarian households.
- Livelihoods depend on grazing, rainfed agriculture, and traditional crafts.
- Disruption to grazing lands or water sources could impact local livelihoods.
- Cultural assets include Siyot Caves, Lakhpatt Fort, Koteswar Temple, Narayan Sarovar.

Regional Geology and Stratigraphy

The area is part of the Kachchh Basin, a rift basin with Jurassic–Cretaceous sediments.

- Located in the Late Jurassic–Early Cretaceous Katrol Formation.
- Basin features include hill ranges, plains, tidal flats, deltaic zones.

- Stratigraphy includes Pachchham, Chari, Katrol, Umia, Bhuj, and Rann formations.
- Katrol Formation contains glauconite-bearing sandstones, shales, and fossils.
- Deccan Traps volcanic rocks overlie some parts; mainly basaltic lava flows.
- Structural features include NW–SE to NE–SW trending faults; gentle dips.
- No major faulting within the block; strata are largely horizontal or gently dipping.

Mineralization and Geology of the Area

The region hosts strata- bound glauconite mineralization within the Katrol Formation.

- Glauconite occurs as stratiform, strata-bound horizons, laterally persistent.
- Mineralization is controlled by depositional environment, not faults.
- Bedrock K_2O values range from 2.0% to 5.1%; surface samples from 1.4% to 5.8%.
- Borehole K_2O values range from 0.3% to 6.0%, with some exceeding 3%.
- Mineralization formed under shallow marine, slow sedimentation, sub-oxic conditions.
- Geochemical signatures suggest autochthonous, early diagenetic formation.
- Stratigraphic continuity and lateral extent support a potential resource area of about 18.44 sq km.
- Exploration involved mapping, sampling, pitting, and boreholes; total mineralized zone thickness up to 17.5 m.

Geochemical and Exploration Overview of Ambara West

A comprehensive exploration and geochemical assessment of glauconite mineralization in the Ambara West Block, Kachchh District, Gujarat, involving surface, subsurface, and laboratory analyses.

Sediment Geochemistry and Anomaly Detection

The study analyzed 34 stream sediment samples, with K_2O values ranging from 0.84% to 3.05%. Values exceeding ~1.5% are considered anomalous, indicating potassium mineral enrichment. Samples from the block show elevated K_2O , suggesting glauconite-bearing lithologies. Adjacent northern areas also report similar K_2O ranges, indicating regional geochemical continuity. Data supports the presence and lateral persistence of glauconite mineralization, corroborating geological findings.

Exploration Program and Methodology

The exploration in Ambara West (143.15 sq km) was approved in late 2024, with field

exploration upgradation. Activities involved systematic geological mapping at 1:12,500 scale, bedrock sampling, pitting (75 pits, 150.30 m³ excavated), and core drilling (10 boreholes, 273 m total). Mapping identified lithologies such as glauconitic sandstone, shale, limestone, and basalt, with NE–SW strike and low-angle dips. Bedrock samples (100) and pit samples (91) analyzed for major oxides and trace elements; K₂O values ranged from 0.84% to 6.19%. Drilling confirmed widespread glauconitic strata with core recovery averaging 92.79%, with mineralized zones showing 94.27% recovery. Boreholes spaced ~1600 m, suitable for reconnaissance resource classification (UNFC Code 334). Exploration activities included detailed core logging, sampling, and laboratory analyses, with data used for resource estimation.

Geological Mapping and Structural Features

Large-scale geological mapping covered the entire block, identifying lithological units such as glauconitic sandstone, shale, limestone, and volcanic basalt. Structural data indicated NE–SW bedding strike with dips of 5°–10°, consistent with regional tectonics. Exposures revealed stratigraphic sequences from Jurassic to Cretaceous, with glauconitic beds interbedded with shale and limestone. Local volcanic exposures of Deccan Traps were also recorded. Mapping provided a detailed geological framework for further exploration and resource assessment.

Drilling and Sampling Techniques

Core drilling employed NQ size, with diamond impregnated bits, achieving ~92.79% recovery. Boreholes were vertical, spaced at 800–1600 m, with depths of 15–30 m. Core logging documented lithology, mineralization, and structural features; samples were split, crushed, and homogenized for analysis. Samples were taken at ~1 m intervals, adjusted as needed, and analyzed for major oxides and trace elements. External check analyses at NABL-accredited labs validated primary results, ensuring data reliability.

Data Accuracy and Quality Control

DGPS survey ensured high positional accuracy, with borehole coordinates fixed using SOI CORS base station. Sample security was maintained through systematic labeling, sealing, and chain-of-custody procedures. Laboratory analyses used WD-XRF and ICP-MS, with internal and external QA/QC measures, including Certified Reference Materials and NABL-accredited checks. Analytical results confirmed the quality and reliability of geochemical data.

Resource Estimation and Classification

The exploration results support classification of the glauconite resource as Reconnaissance Mineral Resources (UNFC Code 334). The data indicates consistent mineralization across the area, with K₂O grades from 1.5% to 6.19% in pit samples. Borehole data shows multiple mineralized zones with variable thickness and grade, suitable for initial resource estimation. Further detailed resource assessment is required based on the current data with potential for future development.

Overview of Glauconite Resource Estimation in Ambara West

The report details the exploration, resource estimation, and future prospects of glauconite deposits in the Ambara West Block, Gujarat, based on reconnaissance-stage (G-4) exploration data.

Cut-off Grade and Mineral Indicator

The study adopts a 3% K₂O cut-off grade for identifying glauconite-rich zones.

- K₂O content is the primary indicator of glauconite concentration.
- Zones with less than 3% K₂O were noted through lithological logging and megascopic study.
- The threshold aligns with Indian Bureau of Mines guidelines for glauconite-bearing sandstones.

Methodology for Resource Estimation

Resources were estimated using the Polygonal Method, considering geological assumptions and exploration data.

- 214 primary core samples analyzed; 10% checked at NABL-accredited lab.
- K₂O zones delineated based on primary analysis; zones with $\geq 3\%$ K₂O included.
- Minimum true thickness of 1.0 m for resource inclusion.
- Bulk density of 1.94 g/cm³ derived from five borehole samples.
- 20% deduction applied to gross resources to account for geological uncertainties.
- Resource calculation formula: $R = PA \times Th \times \text{Bulk Density}$.

Resource Estimation Results

The total in-situ geological resources are estimated at **212.11 million tonnes** with an average grade of **4.30% K₂O**.

- Resources classified as UNFC Category 334 (Reconnaissance Mineral Resources).
- Polygon-wise and borehole-wise data provided, with resource estimates summarized in tables.
- Resources in tonnes: approximately 265.13 million gross, 212.11 million net in-situ.
- Average resource grade: 4.30% K₂O.

Future Exploration and Development Strategy

Further detailed exploration is recommended to upgrade resource confidence.

- Closer-spaced drilling, detailed mapping, and sampling suggested.
- Mineralogical and beneficiation studies needed to assess economic viability.
- The deposit shows favourable geological attributes for potential future extraction.

Summary of Exploration and Geological Context

The Ambara West Block hosts bedded glauconite within the Late Jurassic–Early Cretaceous Katrol Formation.

- Exploration involved geological mapping, pitting, sampling, and 10 boreholes over 143.15 sq. km.
- Glauconite occurs as stratigraphically controlled horizons, deposited in shallow marine conditions.
- Structural and stratigraphic continuity supports potential for resource expansion.
- Geochemical and petrographic analyses confirm glauconite presence, with associated minerals like quartz, feldspar, and clay.
- The deposit's shallow depth, lateral continuity, and regional geology favour future economic extraction.