# Indian Minerals Yearbook 2019

## (Part- I)

## 58th Edition

## STATE REVIEWS
## (Tamil Nadu)

### (ADVANCE RELEASE)

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# TAMIL NADU

## Mineral Resources

Tamil Nadu is the leading holder of country's resources of vermiculite, molybdenum, dunite, rutile, garnet, and ilmenite. The State accounts for the country's 79% vermiculite, 65% dunite, 48% garnet, 52% molybdenum, 25% sillimanite and 16% fire clay resources. As per AMD of the Department of Atomic Energy, Tamil Nadu accounted for 167.70 million tonnes of ilmenite resources and 7.85 million tonnes of rutile resources.

Important minerals that are found to occur in the State are: **bauxite** in Dindigul, Namakkal, Nilgiris & Salem districts; **dunite/pyroxenite** in Salem district; **felspar** in Coimbatore, Dindigul, Erode, Kanchipuram, Karur, Namakkal, Salem & Tiruchirapalli districts; **fireclay** in Cuddalore, Kanchipuram, Perambalur, Pudukottai, Sivaganga, Thiruvallur, Tiruchirapalli, Vellore & Villupuram districts; **garnet** in Ramanathapuram, Tiruchirapalli, Tiruvarur, Kanyakumari, Thanjavur & Tirunelveli districts; **granite** in Dharmapuri, Erode, Kanchipuram, Madurai, Salem, Thiruvannamalai, Tiruchirapalli, Tirunelveli, Vellore & Villupuram districts; **graphite** in Madurai, Ramnathapuram, Sivaganga & Vellore districts; and **gypsum** in Coimbatore, Perambalur, Ramnathapuram, Tiruchirapalli, Tirunelveli, Thoothukudi & Virudhunagar districts. Similarly, occurrences of minerals, such as, **lignite** deposits are located in Cuddalore, Ariyalur, Thanjavur, Thiruvarur, Nagapattinam, Ramnad, Shivganga & Ramanathapuram districts; **limestone** in Coimbatore, Cuddalore, Dindigul, Kanchipuram, Karur, Madurai, Nagapattinam, Namakkal, Perambalur, Ramnathapuram, Salem, Thiruvallur, Tiruchirapalli, Tirunelveli, Vellore, Villupuram & Virudhunagar districts; **magnesite** in Coimbatore, Dharmapuri, Karur, Namakkal, Nilgiri, Salem, Tiruchirapalli, Tirunelveli & Vellore districts; **quartz/silica sand** in Chennai, Coimbatore, Cuddalore, Dharmapuri, Dindigul, Erode, Kanchipuram, Karur, Madurai, Namakkal, Periyar, Perambalur, Salem, Thiruvallur, Thiruvarur, Nagapattinam, Tiruchirapalli, Villupuram, Virudhunagar & Vellore districts; **talc/steatite/soapstone** in Coimbatore, Salem, Tiruchirapalli & Vellore districts; **titanium minerals** in Kanyakumari, Nagapattinam, Ramanathapuram, Thiruvallur, Tirunelveli & Thoothukudi districts; **vermiculite** in Dharmapuri, Tiruchirapalli & Vellore districts; and **zircon** in Kanyakumari district have been established.

Other minerals that occur in the State are: **apatite** in Dharmapuri & Vellore districts; **barytes** in Erode, Madurai, Perambalur, Tirunelveli & Vellore districts; **bentonite** in Chengai-Anna district; **calcite** in Salem district; **china clay** in Cuddalore, Dharmapuri, Kanchipuram, Nilgiris, Sivaganga, Thiruvallur, Tiruvannamalai, Tiruchirapalli & Villupuram districts; **chromite** in Coimbatore & Salem districts; **copper, lead-zinc & silver** in Villupuram district; **corundum & gold** in Dharmapuri district; **dolomite** in Salem & Tirunelveli districts; **emerald** in Coimbatore district; **iron ore (magnetite)** in Dharmapuri, Erode, Nilgiris, Salem, Thiruvannamalai, Tiruchirapalli & Villupuram districts; **kyanite** in Kanyakumari & Tirunelveli districts; **molybdenum** in Dharmapuri, Dindigul & Vellore districts; **pyrite** in Vellore district; **sillimanite** in Kanyakumari, Karur & Tirunelveli districts; **tungsten** in Madurai & Dindigul districts; and **wollastonite** in Dharmapuri & Tirunelveli districts (Table-1). District-wise reserves/resources of lignite are provided in Table-2.

In addition to the above, petroleum and natural gas deposits are found to be located in Cauvery basin area.

## Exploration & Development

The details of exploration activities conducted by GSI & various agencies for lignite and other minerals during 2018-19 are furnished in Table - 3.

## Production

The principal minerals produced in the state were lignite, natural gas (utilised), bauxite, limestone, petroleum (crude), magnesite, garnet (abrasive), graphite (r.o.m.), and vermiculite in 2018-19.

The value of minor minerals' production was estimated at ₹ 261 crore for the year 2018-19.

The number of reporting mines was 101 in 2018-19 in case of MCDR minerals (Table-4).

## Table – 1 : Reserves/Resources of Minerals as on 1.4.2015: Tamil Nadu

| Mineral | Unit | Reserves | | | | Remaining Resources | | | | | | | | Total resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Proved STD 111 | Probable | | Total (A) | Feasibility STD211 | Pre-feasibility | | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| | | | STD121 | STD122 | | | STD221 | STD222 | | | | | | |
| Apatite | tonne | - | - | - | - | - | - | - | - | - | 240000 | - | 240000 | 240000 |
| Barytes | tonne | - | - | - | - | - | - | - | - | 500 | 221919 | - | 222419 | 222419 |
| Bauxite | '000 tonnes | 379 | - | - | 379 | - | 1141 | 3564 | 960 | 10084 | 8363 | - | 24112 | 24491 |
| Bentonite## | tonne | - | - | - | - | - | - | - | - | 3725333 | 5818519 | - | 9543852 | 9543852 |
| Calcite# | tonne | - | - | - | - | - | - | - | - | - | 116632 | - | 116632 | 116632 |
| China clay# | '000 tonnes | - | - | - | - | - | - | - | - | 327 | 56570 | - | 56897 | 56897 |
| Chromite | '000 tonnes | - | - | - | - | - | - | - | 7 | - | 276 | - | 282 | 282 |
| Copper | | | | | | | | | | | | | | |
| Ore | '000 tonnes | - | - | - | - | - | - | - | 200 | 590 | - | - | 790 | 790 |
| Metal | '000 tonnes | - | - | - | - | - | - | - | 1.08 | 2.73 | - | - | 3.81 | 3.81 |
| Corundum | tonne | - | - | - | - | - | - | - | - | - | 4000 | - | 4000 | 4000 |
| Dolomite# | '000 tonnes | - | - | - | - | - | - | - | 2010 | 135 | - | - | 2145 | 2145 |
| Dunite# | '000 tonnes | 7343 | - | 1450 | 8793 | - | - | 102190 | - | - | 5773 | 5044 | 113007 | 121800 |
| Felspar# | tonne | 738656 | 23386 | 7134 | 769176 | 1896213 | 620530 | 1101842 | 18870 | 69822 | 5465465 | - | 9172741 | 9941916 |
| Fireclay# | '000 tonnes | 2523 | 458 | 155 | 3136 | 3952 | 3971 | 1842 | 1561 | - | 102202 | - | 113528 | 116663 |
| Garnet | tonne | 225554 | 238067 | 1382194 | 1845815 | 21936 | 1342191 | 2378497 | 15000 | 1425996 | 19888574 | - | 25072194 | 26918009 |
| Gold | | | | | | | | | | | | | | |
| Ore (Primary) | tonne | - | - | - | - | - | - | - | - | - | 67000 | - | 67000 | 67000 |
| Metal (Primary) | tonne | - | - | - | - | - | - | - | - | - | 1.00 | - | 1.00 | 1.00 |
| Granite## | | | | | | | | | | | | | | |
| (Dim. Stone) | '000 cum | - | 1448 | 238 | 1686 | - | 45690 | 8234 | 7 | - | 503818 | - | 557749 | 559435 |
| Graphite | tonne | 2495188 | - | 810450 | 3305638 | 28708 | 39486 | 2486 | 29136 | 647500 | 3866390 | - | 4613707 | 7919345 |
| Gypsum# | '000 tonnes | 137 | - | 46 | 183 | 19 | 469 | 6786 | 25 | 249 | 19540 | 10 | 27099 | 27282 |
| Iron ore | | | | | | | | | | | | | | |
| (Magnetite) | '000 tonnes | - | - | - | - | - | - | - | - | 169388 | 110728 | 226921 | 507037 | 507037 |
| Kyanite | tonne | - | - | - | - | - | - | - | - | 167000 | 81359 | - | 248359 | 248359 |
| Lead-Zinc | | | | | | | | | | | | | | |
| Ore | '000 tonnes | - | - | - | - | - | - | - | 200 | 590 | - | - | 790 | 790 |
| Lead metal | '000 tonnes | - | - | - | - | - | - | - | 2.26 | 5.48 | - | - | 7.74 | 7.74 |
| Zinc metal | '000 tonnes | - | - | - | - | - | - | - | 11.76 | 24.76 | - | - | 36.52 | 36.52 |
| Limestone | '000 tonnes | 334445 | 82892 | 56572 | 473909 | 209632 | 99882 | 91350 | 92843 | 33440 | 598942 | - | 1126088 | 1599997 |
| Magnesite | '000 tonnes | 73499 | 40 | 38 | 73577 | 499 | 6224 | 11529 | 17 | 737 | 5643 | - | 24649 | 98226 |

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Table -1(concld)

| Mineral | Unit | Reserves | | | | Remaining Resources | | | | | | | | Total resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Proved STD 111 | Probable | | Total (A) | Feasibility STD211 | Pre-feasibility | | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| | | | STD121 | STD122 | | | STD221 | STD222 | | | | | | |
| Molybdenum Ore | tonne | - | - | - | - | - | 1500000 | - | 36000 | 569304 | 7777694 | 167800 | 10050798 | 10050798 |
| Contained $MoS_2$ | tonne | - | - | - | - | - | 1050 | - | 83 | 287 | 4459.33 | 50.34 | 5929.67 | 5929.67 |
| Pyrite | '000 tonnes | - | - | - | - | - | - | - | - | - | 24 | - | 24 | 24 |
| Quartz-Silica sand# | '000 tonnes | 25086 | 3493 | 1199 | 29778 | 28196 | 15176 | 2191 | 3387 | 95837 | 26931 | - | 171718 | 201496 |
| Silver Ore | tonne | - | - | - | - | - | - | - | - | 330000 | 460000 | - | 790000 | 790000 |
| Metal | tonne | - | - | - | - | - | - | - | - | 15.87 | 26.68 | - | 42.55 | 42.55 |
| Sillimanite | tonne | 140184 | - | - | 140184 | 4246 | 4000 | 13699981 | - | - | 3612154 | - | 17320381 | 17460565 |
| Talc/steatite/ soapstone# | '000 tonnes | - | - | - | - | 559 | 210 | 1762 | 27 | - | 553 | - | 3110 | 3110 |
| Tungsten Ore | tonne | - | - | - | - | - | - | - | - | - | - | 250000 | 250000 | 250000 |
| Contained $WO_3$ | tonne | - | - | - | - | - | - | - | - | - | - | 50 | 50 | 50 |
| Vermiculite | tonne | 1522014 | - | - | 1522014 | - | - | - | - | - | 343051 | - | 343051 | 1865065 |
| Wollastonite | tonne | - | - | - | - | - | - | - | - | - | 3533 | - | 3533 | 3533 |

*Figures rounded off*

***Note**:The Proved and Indicated balance recoverable reserves of crude oil and natural gas in the State as on 1.4.2019 are 9.21 million tonnes and 38.00 billion cu. m, respectively.*

*# Declared as Minor Minerals vide Gazette Notification dated 10.02.2015*

*## Minor Minerals before Gazette Notification dated 10.02.2015*

**Table – 2 : Reserves/Resources of Lignite as on 1.4.2019 : Tamil Nadu**

(In million tonnes)

| District | Proved | Indicated | Inferred | Total |
|---|---|---|---|---|
| **Total** | **4340.35** | **22496.63** | **9392.85** | **36229.83** |
| Cuddalore | 3436.12 | 2111860 | 1302.23 | 6850.21 |
| Ariyalur | 904.23 | 302.50 | 512.37 | 1719.10 |
| Thanjavur & Thiruvarur | – | 17248.06 | 3123.46 | 20371.52 |
| Thanjavur | – | 2306.17 | 156.33 | 2462.50 |
| Thanjavur & Nagapattinam | – | 359.21 | 926.62 | 1285.83 |
| Thiruvarur & Nagapattinam | – | – | 574.05 | 574.05 |
| Ramanathapuram | – | 168.83 | 1812.58 | 1981.41 |
| Ramanathapuram & Sivaganga | – | – | 985.21 | 985.21 |

***Source:*** *Coal Directory of India, 2018-19*

**Table –3 : Details of Exploration Activities in Tamil Nadu, 2018-19**

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| **GSI** | | | | | | | |
| **Lignite** | | | | | | | |
| Ramanatha-puram | Jharka block, southeast of Mahuwal | - | - | 10<br>05 | 5414.0<br>2189.0 | -<br>76 | G3 stage preliminary exploration for lignite was carried out in Kalari East Sector, Ramnad Sub-basin, district Ramanathapuram. A total of ten boreholes were completed since initiation of the work with cumulative drilling achievement of 5,414 meters. A total of 5 boreholes were completed with a total of 2,189 m drilling and 69 lignite samples for proximate analysis, 5 samples for trace element studies and 2 samples for Coal Petrography studies were collected. The Quaternary and Cuddalore Formation contact in the area was intersected between 99 to 138 m depth. The Cuddalore/Tittacheri Formation and Neyveli Formation contact were intersected between 369 m to 453 m depths. The lignite seam was intersected between 444 m to 534 m depth and individual seam thickness was found to vary from 1 to 22.40 m with cumulative thickness of lignite zone varying from 9.90 m to 23.75 m. Petrographic study of 2 lignite samples indicated that the lignite |

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Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | contained higher content of Huminite Group of macerals (varying from 65.06%-72%). Inertinite & liptinite content of analysed samples was found to vary from 3.65% to 11.80% & 1.83% to 2.43%, respectively. The quality of lignite in Ramnad sub-basin was found comparable to the overall lignite quality of the Neyveli and Mannargudi Lignite Fields. The weighted recalculated calorific value and fixed carbon content showed variations from 1,486 to 3,510 k.cal/kg & 14.9 to 34.8 %, respectively. Calorific value of most of the lignite samples (84 %) ranged between 2,000 Kcal/ Kg and 3,000 kcal/kg and belonged to Lignite – "B" grade. About 16 samples showed calorific value of less than 2000 k. cal/kg and were classified as Lignite – "C" grade. About 7 % samples were found belonging to Lignite – "A" grade as their calorific value was more than 3000 k. cal/kg. Lignite samples from BH TRKE-02 were analysed for REE and Ge. The analytical results of lignite samples from BH TRKE-02 showed that the total REE content ranged from 1.15 to 204.79 ppm with Germanium (Ge) values varying from 0.10 to 6.2 ppm. |
| **REE** | | | | | | | |
| Salem and Dharmapuri | Mechcheri and Perumbalai talukas | - | - | - | - | 110 | Reconnaissance survey for Rare-Metals (RM) and Rare Earth Elements (REE) was taken up in the southern extension of alkaline carbonatite complex in parts of Mechcheri and Perumbalai talukas, Salem and Dharmapuri Districts. Out of 110 bedrock samples (BRS) collected, 15 BRS from carbonatite body showed the average value of REE as 2,447.48 ppm. The total REE value was found ranging from |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | 465.46 to 3,941.40 ppm (0.05 to 0.39 %) which included LREE ranging from 438.79 to 3785.33 ppm and HREE ranging from 26.67 to 156.06 ppm. BRS (28 nos) collected from carbonated gneiss/calc silicate showed total REE value in the range from 3.76 ppm to 1,759.00 ppm which included LREE value ranging from 3.59 to 1,677.50 ppm and HREE value ranging from 0.17 to 81.49 ppm. BRS (10 nos) collected from pink syenite showed the total REE value ranges from 88.19 ppm to 431.28 ppm which include LREE value in the range from 81.55 to 391.51 ppm and HREE value in the range from 6.64 to 39.77 ppm. BRS (07 nos) of grey syenite showed total REE value ranging from 183.39 ppm to 434.82 ppm which included LREE value in the range from 169.32 to 399.68 ppm and HREE value in the range from 10.47 to 35.14 ppm. The analytical results of regolith samples (25 no) showed REE value ranging from 101.65 to 970.37 ppm which included LREE value in the range from 88.44 to 934.53 ppm and HREE value in the range from 13.21 to 35.84 ppm. Colluvial samples (25 nos.) showed REE value ranging from 84.59 to 1252.02 ppm which included LREE valuein the range from 75.60 to 1185.46 ppm and HREE value ranges from 9.00 to 66.56 ppm. Analytical results of two samples from pegmatite body (in vicinity of carbonatite) showed anomalous Nb value ranging from 172.44 ppm to 356.27 ppm, Ta value ranging from 1.34 ppm to 17.46 ppm and The total REE in the range from 741 to 2,301 ppm with Ce as most abundant among all the REEs. Reconnaissance survey for REE, RM and associated mineralisation was taken up in Thiruvallur and |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | Vellore districts. The investigation area forms a part of Chitoor terrain of northern Tamil Nadu. To the north of Palar lineament lies the granite gneiss terrain which was found traversed by number of dolerite dykes whereas to the south of it, the area showed high-grade granulite terrain. Banded magnetite quartzite was found to be present in the study area as patches within granitoids. Seven small syenite bodies were identified and mapped which were massive, coarse to medium-grained, pink in colour and occurred as small bouldery outcrops. Amphibolite was also found to be exposed at a very shallow level near Jambukulam. Syenites were massive, brick red to pink in colour and consisted of orthoclase, plagioclase and very small amount of quartz and specularite. |
| **Tungsten** | | | | | | | |
| Madurai | Kambalipatti– Rayarpatti– Rajanampatti areas of Melur taluka | 1:12500<br>1:1000 | 100.0<br>1.5 | - | - | 60 | Reconnaissance survey for tungsten and associated mineralisation in Kambalipatti– Rayarpatti– Rajanampatti areas of Melur taluk, Madurai district involved Large-Scale Mapping of 100 sq. km area on 1:12,500 scale and detailed mapping of 1.5 sq. km on 1:1,000 scale. To identify the mineralised zone in the preliminary stage, survey was carried out with the help of short wavelength ultraviolet ray. A total of 50 cu.m of pitting and trenching were carried out to establish the strike continuity. A total of six calc granulite bands I, II, III, IV, V and VI of cumulative strike length 11 km, 14 km, 3.5 km, 5 km, 3.5 km and 1 km with average width of 0.5 km, 0.6 km, 100 m, 150 m, 0.5 km and 0.5 km, respectively were delineated in the study area. Four prominent mineralised zones namely, Pulipatti-Karuppukoil, Kanmaypatti-Parakkudi, |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | Rayarpatti-Vanjinagaram and Kambilipatti areas were identified for Scheelite mineralisation. Scheelite occur within calc granulite as sporadic, fine specks, dissemination and thin veinlets. In Pulipatti-Karuppukoil, Kanmaypatti-Parakkudi, Rayarpatti-Vanjinagaram and Kambilipatti areas, the maximum tungsten value recorded was 331.79 ppm, 769.96 ppm, 1,000 ppm and 704 ppm, respectively. All the samples collected from other areas analysed W value below 100 ppm. One sample from Rayarpatti area recorded Sn value as 547.77 ppm. Concentrations of $WO_3$ and CaO were found to vary from: 79.2 to 80.7% and 19.9 to 20.4%, respectively. |
| Madurai | Melur, Terkutteru, Muthuvelpatti, Kulanipatti, Kidaripatti, Etimangalam, Arittapatti, Vallalappatti, Sillippyapatti, Chettiyarpatti, Nayakkarpatti areas of Melur taluk | 1:12500 | 100.0 | - | 50 | 112 | G-4 stage investigation taken up in and around this area comprised Large-Scale Mapping of 100 sq. km on 1:12,500 scale, pitting and trenching for 50 cu.m and collection of 50 PTS samples to assess the tungsten mineralisation in soil covered calc-granulite area. Night traverses using UV lamp to identify scheelite mineralisation were also carried out. Tungsten mineralisation in the area was in the form of scheelite ($CaWO_4$). Analytical results showed that 10 BRS samples assayed >200 ppm of W with highest value as 966 ppm. Apart from that 50 trench samples were collected. About 02 PTS samples recorded >200 ppm of W with highest value of 609 ppm. The Kulanipatti band and Muthuvelpatti band showed indication of mineralisation particularly one sample from SE part of Kulanipatti band recorded 966 ppm of W value in chemical analysis. |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| **Nickel** | | | | | | | |
| Madurai district | Arumanallur-Keeriparai area | 1:12500 | 100.0 | - | - | 100 | Reconnaissance survey for Ni-Cu-PGE in this area was taken up with an objective to delineate the potential zones of Ni-Cu-PGE mineralisation and to bring out the nature and control of mineralisation in the area. During investigation, an area of 100 sqkm was mapped on 1: 12,500 scale and 100 bedrock samples were collected to ascertain their potentiality for Ni-Cu-PGE mineralisation. SEM-EDX study revealed the presence of sulphide phases like pyrrotite, chalcopyrite, pyrite and sphalerite and the oxides like monazite, ilmenite, barite and tungsten. The Pt value was found to range from <5 to 64 ppb and Pd from <5 to 8 ppb while the trace element copper (Cu) ranges from 20 – 180 ppm, Nickel (Ni) was found to vary from 23 – 133 ppm. |
| **Gold** | | | | | | | |
| Tiruvann-amalai | Edathanur and Pudurnattam | 1:12500 | 100.0 | - | - | - | Reconnaissance survey for gold and associated mineralisation was taken up in this area. Large-Scale Geological Mapping (LSM) on 1:12,500 scale was carried out covering an area of 100 sq. km. The objective of the study was to identify and delineate the potential zones for gold mineralisation. The area comprised charnockite, pyroxene granulite and BIF (banded magnetite quartzite) of Charnockite Group, migmatite and pink granite gneiss of PGC-II, basic intrusive and younger granite. Basic dyke was found to traverse the country rocks along NW-SE to E-W direction. |
| **Limestone** | | | | | | | |
| Ariyalur | Puthuppalayam & Periyathirukonam block | 1:4000 | 3.1 | 18 | 633.4 | - | G2 stage general exploration for cement-grade limestone involved detailed mapping of 2.10 sqkm area in Puthuppalayam block and 1.0 sqkm area in Periyathirukonam block was carried out. Limestone found to occur in these areas was generally yellow colour, hard and compact with abundance of shells. |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | The presence of abundant shells and the calcareous binding medium made the limestone to be cement-grade. A total of 15 vertical boreholes were drilled for a cumulative drilling meterage of 491.35 m in Puthupalaiyam block. The limestone band of Kallankurichi Formation was found to occur at a depth of 0.90 m to 16.00 m below the ground level and up to a depth of 54.00 m. Thickness showed variations between 2.10 m and 33.00 m. Intercalations of calcareous sandstone were encountered at places. It was observed that the thickness of the limestone increased towards east and north while it was found to be thinning out to 0.30 m towards south. Analytical results indicated that the CaO content was found to vary from 41.01 to 53%. In Periyathirukonam block, three boreholes have been completed to a cumulative depth of 142 m. The limestone thickness was found to range from 14.25 m to 34.75 m and the over burden from 30.85 to 39.0 m. The study will continue in field season 2019-20. |
| Ariyalur | Puthuppalayam & Periyathirukonam block | 1:4000 | 3.1 | 18 | 633.4 | - | G4 stage reconnaissance survey for cement-grade limestone was taken up in Vellayapuram block. The exploration comprised Large-Scale Mapping, detailed mapping and pitting & trenching. The crystalline limestone band of Ayan Karisalkulam (AK) block was found to extend for a strike length of 1.8 km with average width of 4 m and was white to dirty white in colour. It was medium-grained with sarcoid texture and consisted of calcite (80-85%). The thickness of the limestone band showed variations from place to place. The chemical results of the AK band showed CaO content as 47 %, $Fe_2O_3$ as 1.5%, MgO as 3.6% and $Si_2O_3$ as 10%. In Mettilpatti block, a few thin calc-granulite bands as compared to AK |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | band were delineated with strike length of 30 to 200 m and average width of 0.5 to 2.5 m. The chemical analysis of these bands showed average CaO content of 33%, $Fe_2O_3$ - 3.2%, MgO - 2.8% and $Si_2O_3$- 18%. |
| **Heavy Minerals** | | | | | | | |
| off Chengalepattu | | - | - | - | - | 94 | A total of 1,590 sq. km were surveyed mainly by sampling and swath bathymetry for searching phosphorite in the continental shelf area off Chengalpattu, Tamil Nadu. The sampling was carried out in 5 km × 5 km grid by deploying grab, gravity corer, vibro corer and spade corer and a total of 94 core samples were collected to assess the resource potential of phosphorite. The samples with phosphorite content were restricted to 150 to 220 m water depth. The phosphatic materials were mainly found to occur on the seabed surface as concretions, nodules, xenophora studs and as replacements. $P_2O_5$ content in bulk samples ranged from 0.50 to 2.06% and 8.4 to nearly 15% in the concretions/ nodules. |
| off Point Calimere | | - | - | - | - | 51 | The study of Phosphorite was taken up in the Continental Shelf off Point Calimere, Tamil Nadu Coast. The cruise was taken up to assess the potential of Phosphorite in the east coast argin of India. During evaluation, an area of 1560 sq. km was covered with 1500 Lkm of gravity survey and collection of 09 vibro cores, 18 gravity cores, 44 box cores and 10 grab samples were completed. The continental shelf off Point Calimere has a maximum width of 32 km in the north. Surface and subsurface sediments showed the presence of glauconite sand and phosphatic materials. Phosphatic material from the study area consist of concretions, nodules, pellets, peloids and skeletal debris and occurs in association with sand, silt and abundant calcareous material which are mainly confined to the shallower |

(contd)

Table – 3 (contd)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | water depths (149-278 mts) and are concentrated in western part of study area at 100-300 mt water depths. A very strong positive correlation is observed between the occurrence of phosphatic material and glauconitic sand concentration in the sediment. |
| off Porto Nova | | - | - | - | - | 80 | During evaluation of placer mineral resource in the shelf area off Porto Nova, Tamil Nadu, a total of 60 sqkm area was covered for heavy mineral and sand resources estimation. A total 80 vibro core samples have been collected. The heavy minerals found in the surveyed area are sillimanite, ilmenite, garnet, mica, leucoxene, kyanite, zircon, monazite and rutile. The surface distribution values for CaO and $CaCO_3$ are found to vary from 3.59% to 12.19% and 5.10% to 19.45%, respectively with higher value towards southern side of the area. |
| **MECL** | | | | | | | |
| **Dunite** | | | | | | | |
| Namakkal & Tiruchirapalli | Andipatti-Jambumadai-Urakari sector | 1:12500 | 125.00 | - | - | 143 | The dunite samples showed mean value of 1,079.33 ppm on Ni and mean value of 124.66 ppm of nickel in pyroxinite samples. The analytical results indicated that the unltramafics particularly dunite was enriched with high Ni value, i.e., average 1,079 ppm and pyroxinite & dunite were slightly enriched with chromium values. Analytical results for PGE values were not encouraging as average total values in ultramafics, i.e., pyroxinite & dunite were 149.09 ppb (Pt+Pd - 130.43 ppb). Resources have not been completely estimated. |
| **Neyveli Lignite Company India Ltd** | | | | | | | |
| **Lignite** | | | | | | | |
| Cuddalor | Palayamkottai and Veeranam block | -<br>- | 32<br>150 | 23<br>80 | 2892<br>20319 | 236<br>249 | During 2018-19, exploration for lignite in this was continued from the previous field session through NMET scheme to bring the resources into Proved category. In Palayamkottai block (32.00 sqkm |

(contd)

Table – 3 (concld)

| Agency/ Mineral/ District | Location Area/ Block | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | area), 23 boreholes were drilled to a cumulative depth of 2,892.0 m and 236 samples were collected for chemical analysis. A total of 246.826 million tonnes of lignite resources were estimated under Measured catergory. In Veeranam block (150.00 sqkm area), 80 boreholes were drilled to a cumulative depth of 20,319 m and 249 samples were collected for chemical analysis. The drilling continuing at 400 m grid interval. |

**Table – 4 : Mineral Production in Tamil Nadu, 2016-17 to 2018-19 (Excluding Atomic Minerals)**

(Value in ₹ '000)

| Mineral | Unit | 2016-17 | | | 2017-18 | | | 2018-19 (P) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. of mines | Qty | Value$ | No. of mines | Qty | Value$ | No. of mines | Qty | Value$ |
| **All Minerals** | | **237** | | **10090594** | **129** | | **9165480** | **101** | | **9389014** |
| Lignite | '000t | - | 26204 | - | - | 23569 | - | - | 23041 | - |
| Natural Gas (ut.) | m c m | - | 983 | - | - | 1208 | - | - | 1167 | - |
| Petroleum(crude) | '000t | - | 284 | - | - | 345 | - | - | 395 | - |
| Bauxite | t | 3 | 7269 | 4812 | 3 | - | - | 3 | - | - |
| Garnet (abrasive) | t | 3 | 10612 | 85009 | 3 | 6813 | 73889 | 4 | 7341 | 109201 |
| Graphite (r.o.m.) | t | 2 | 95061 | 66744 | 1 | - | - | - | - | - |
| Limestone | '000t | 213 | 23670 | 6692906 | 116 | 20538 | 5994269 | 88 | 23863 | 6436394 |
| Limeshell | t | 1 | - | - | - | - | - | - | - | - |
| Magnesite | t | 14 | 223406 | 623084 | 5 | 122430 | 444771 | 5 | 50346 | 200828 |
| Marl | t | - | - | - | - | 98960 | 35922 | - | 95369 | 27812 |
| Vermiculite | t | 1 | 1690 | 5594 | 1 | 1264 | 4184 | 1 | 705 | 2334 |
| Minor Minerals @ | | - | - | 2612445 | - | - | 2612445 | - | - | 2612445 |

***Note:*** *The number of mines excludes fuel and minor minerals.*

*$ Excludes the value of Fuel minerals.*

*@ Figures for earlier years have been repeated as estimates because of non-receipt of data.*

## Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the important mineral-based industries in organised sector in the State are given in Table -5.

**Table – 5 : Principal Mineral-based Industries**

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| **Abrasives** | |
| Carborandum Universal Ltd, Chennai | NA |
| Cutfast Abrasives Tools Pvt. Ltd, Chennai | NA |
| **Asbestos Products** | |
| Hyderabad Industries Ltd, Kannigaiper | 100 |
| Ramco Industries Ltd, Arakkonam, Distt Vellore | NA |
| Southern Asbestos Cement Ltd, Arrakonam Distt Vellore | NA |
| Tamil Nadu Asbestos, Alangulam, Distt Virudhunagar | 28.5 |
| **Cement** | |
| ACC Ltd, Madukkarai, Distt Coimbatore | 1000 |
| Chettinad Cement Corpn. Ltd, Puliyar, Distt Karur | 1700 |
| Chettinad Cement Corpn. Ltd, Karikalli Distt Dindigul | 4500 |
| Chettinad Cement Corpn. Ltd, Ariyalur | 5500 |
| Dalmia Cements, Dalmiapuram, Distt Tiruchirapalli | 3400 |
| Dalmia Cements, Ariyalur | 3000 |
| Dhandhapani Cement Pvt. Ltd Thathamangalam,Manachanallur | 225 |
| India Cements Ltd, Sankarnagar, Distt Tirunelveli | 2050 |
| India Cements Ltd, Sankaridurg, Distt Salem (G) | 860 |
| India Cements Ltd, Dalavoi, DisttAriyalur | 2160 |
| India Cements Ltd, Vallur, Distt Chennai (G) | 1100 |
| India Cements Ltd, Panaiveedu, Thiruchengodu | 1400 |
| My Home Industries Ltd. Tuticor | 1500 |
| Ultra-Tech Cement Ltd, Reddipalayam, Distt Ariyalur | 1400 |
| Ultra-Tech Cement Works (ARCW), Arakkonam (G) | 1100 |
| Ramco Cement (formerly Madras Cement), R.S. Raja Nagar, Distt Virudhunagar | 2000 |
| Ramco Cement (formerly Madras Cement), Alathiyur Works, Distt Ariyalur | 3050 |
| Ramco Cement (formerly Madras Cement), Ariyalur Plant, Govindpuram, Distt Ariyalur | 3500 |

(contd)

Table - 5 (contd)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Ramco Cement (formerly Madras Cement), Chengalpet Grinding Unit, Uthiramerur, Distt Kanchipuram (G) | 500 |
| Ramco Cement (formerly Madras Cement), Valapady, Distt Salem (G) | 1600 |
| Tamil Nadu Cements, Alangulam, Distt Virudhunagar | 290 |
| Tamil Nadu Cements, Ariyalur, Distt Ariyalur | 500 |
| Tamil Nadu News -print & Paper Ltd. Kagithapuram, Manmangalam | 328.5 |
| Vijay Cements Trichy | 75 |
| Zuari Cements Ltd, Chennai Grinding Unit, Attipattu, Tiruvallur (G) | 900 |
| **Ceramics** | |
| Carborandum Universal Ltd, Hosur | NA |
| Murugappa Morgan Thermal Ceramics Ltd, Ranipet, Distt Vellore | 5.44 |
| Neycer India Ltd, Vadalur, Distt Cuddalore | 9.0 |
| Roca Bathroom Product Pvt Ltd, Ranipet, Distt Erode | 12.6 |
| Roca Bathroom Product Pvt Ltd, Perundurai, Distt Vellore | 24 |
| Spartek Ltd, Chennai | NA |
| **Copper Smelter** | |
| Sterlite Industries (I) Ltd, Thoothukudi | 400 (Cu smelting)<br>205 (Cu cathode)<br>90 (wire rods)<br>1050 ($H_2SO_4$) |
| **Chemicals** | |
| Tanfac Industries Ltd, Cuddalore | 16.5 (anhydrous HF),<br>16.5 ($AlF_3$)<br>67.5 ($H_2SO_4$)<br>14 (Hydrofluoric acid)<br>3.4 (speciality fluorides) |
| Tuticorin Alkali Chemicals & Fertilizers Ltd, Thoothukudi | 115 (soda ash)<br>105 (A/Cl) |
| Vaiyapuri Shanthi Ferric alum Sellipalayam, Namakal | 3.4(Ferric alum) |
| **Electrode** | |
| AVR Electrodes, No1, SIDCO,Indl.Estate, Rajapalyam, Virudhnagar | 250 |
| **Fertilizer** | |
| Coimbatore Pioneer Fertilizer Ltd, | 66 (SSP) |
| Muthugoundanpudur, Distt Coimbatore. | 30 ($H_2SO_4$)<br>3 (oleum) |
| Coramandal International Ltd, (Formerly EID Parry), Ranipet, Distt N. Arcot | 132 (SSP)<br>33 ($H_2SO_4$) |

(contd)

Table -5 (contd)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Corama0ndal International Ltd, Ennore, Distt Thiruvallur. | 330 (Complex) |
| Kothari Industrial Corp. Ltd, Ennore. | 66 (SSP) |
| Madras Fertilizer Ltd, Manali, Distt Thiruvallur. | 486.8 (Urea)<br>840 (NP/NPKs) |
| Greenstar Fertilizers Ltd, Guindy. | 115 (SSP) |
| Southern Petrochemical Industries Corpn. Ltd), Thoothukudi. | 620 (Urea) |
| **Ferroalloy** | |
| Electralloy Special Steel Casting Pvt. ltd. | 1.0 (alloy , Stainless steel casting) |
| **Synthetic Rutile** | |
| DCW Ltd, Sahupuram, Distt Thoothukudi. | 48 |
| **$TiO_2$ Pigment** | |
| VVTi Pigments (P) Ltd, (formerly, Kilburn Chemicals) Distt Thoothukudi | 18<br>36 (Ferrous Sulphate Heptahydrate) |
| **Iron & Steel** | |
| Salem Steel Plant (SAIL), Salem. | 180 (Crude/ Liquid steel) |
| JSW Steel Plant (acquired Southern Iron & Steel Co. Ltd), Salem. | 1180 (sinter)<br>1000 (pig iron)<br>1000 (specialised alloy steel)<br>18000 (Crude/Liquid steel) |
| **Sponge Iron** | |
| Akshara Industries Ltd, Eguvarpalayam, Distt Thiruvallur. | 100 |
| Kaushik Steel Industries Ltd, Pappen Kuppam Distt Thiruvallur. | 60 |
| Agni Steels Pvt Ltd, Olappalayam Road, Ingur, Distt Erode. | 36 |

(contd)

Table -5 (concld)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| **Refractory** | |
| ABREF Pvt. Ltd, Gummidipoondi, Distt Thiruvallur. | 1.3 |
| Sharda Ceramics Pvt. Ltd, Ambattur, Chennai. | 9.9 |
| Shri Natraj Ceramic & Chemical Industries Ltd, Dalmiapuram, Distt Tiruchirapalli. | 42 |
| VRW Refractories, Vanagaram. | 21.6 |
| Zirconium Complex, Pazhakayal, Thoothukudi. | 0.5 (Zr-Oxide)<br>0.25 (Zr sponge) |
| **DBM & Calcined Magnesite** | |
| SAIL Refractory Co. Ltd (formerly Burn Standard Co. Ltd), Salem | 13(calcined magnesite)<br>61 (DBM)<br>15 (refractory bricks )<br>45( Dunite fracton) |
| Dalmia Magnesite Corpn., Chettichavadi Distt Salem. | 72 (DBM) |
| Ramkrishna Magnesite Mines, Salem. | 3 (calcined) |
| Tamil Nadu Magnesite Ltd, Kurumbapatty, Distt Salem. | 19.5(calcined magnesite)<br>30(DBM) |
| Sri Pon Kumar Magnesite Ltd, Salem. | 26.5 (DBM) |
| **Silicon Carbide** | |
| Carborandum Universal Ltd, Tiruvottiyur. | NA |
| **Petroleum Refinery** | |
| CPCL, Manali, Dist. Thiruvallur. | 10500 |
| CPCL, Narimanam. | 1000 |

*(G): Grinding unit.*

***Note:*** *Data, not available for fertilizer and cement Industries on respective website, is taken from Indian Fertilizer Scenario, FAI Statistics, and Survey of Cement Industry & Directory, respectively.*