

Special Issue of First International Conference on Innovations in Engineering Sciences (ICIES 2020)
**Geological Controls of Mineralization of Corundum at Gobbagurthi,
Khammam Telangana India**

Dr. Narayan Sangam

¹Professor, Vignan Institute of Technology & Science, Hyderabad. Telangana. India.

sangam.narayan.narayan@gmail.com

Abstract

Industrial grade Corundum and gem variety, (ruby and abrasive variety) occurs in and around Lakshmpuram and Gobbagurthi areas of Khammam District of Andhra Pradesh. The area is within the Khammam Schist Belt., which is the northern extension of the Nellore Schist Belt of the Indian Peninsular Shield. Local entrepreneurs extract corundum based on certain faiths and beliefs since a long time. The nature of occurrence of corundum in these areas represents in-situ, float, and placer concentrations. Corundum occurs along with biotite gneisses, amphibolites and sillimanite-cordierite-diopside- bearing rocks, and magnesium-aluminium rich pelitic granulites. Tonalitic gneisses, cordierite- corundum rock and sillimanite schists form small lenticular bodies. The host rocks of corundum are intruded younger pegmatite veins that also have cut through the Precambrian suite of rocks. Distinct controls of corundum mineralisation manifested in geomorphology, structure and lithology are observed in an area that have proved to be very useful guides for understanding the various controls of corundum mineralization at Gobbagurthi as well as in surrounding areas of corundum occurrences in Khammam district.

Keywords: Corundum, Mineralization, Controls, Gobbagurthi, Khammam

1. Introduction

1.1 Controls of Mineralization of Corundum

- Corundum mineralization is essentially manifested by lithology and structure. The structurally controlled drainage in prime mineralized areas carry considerable quantities of transported corundum.
- The association of corundum both with pelitic schists and with tonalities exhibits lithological control. The chemically depleted rocks with SiO₂ and the well-defined planes of structural weakness is the loci of mineralization.
- The gullied land with moderate slopes in continuation of the known corundum lithological signatures forms an important area for prospecting.
- The N-S structures are important and

significant which facilitated the emplacement of felsic intrusions. They also form the loci of mineralization.

- Distinct controls of corundum mineralization manifested in geomorphology, structure and lithology is observed in this area.

2. Geomorphologic Controls

The geomorphologic controls are manifested in structural hills, denudation hills, residual hills and pediment areas. The elevated reaches are occupied by thick thorny and bushy vegetation and sometimes inaccessible. The available map on land use/land cover studies indicated built-up land, forest, gullied land and water bodies. The gullied land with moderate slopes in continuation of the known corundum lithological signatures forms an important area for prospecting. The study area

possesses dendritic to sub dendritic drainage. 1. Majority of the streams drain along NW-SE and N-S trending major stream and enter into the pediment area and finally discharge into the Wyr Lake. They lose their velocity as they approach the lower reaches and thus help in continuous deposition of their content in the meanders and confluence points of different nallas. They carry along with them colluvial corundum and all the culverts are the focal points for active exploitation of placer accumulations in this area. Felsic intrusions are observed along the Nagarjunasagar Right Canal.



Fig.1. Exploration Pit for Corundum Extraction



Fig.2. Insitu extraction of Corundum

3. Structural Controls

The Structural controls are envisaged in three major prominent trends along the directions NW-SE to N 35° W-S35° E, N-S with few degrees variations towards E-W and NE-SW to N 30° E-S30° W. The NNW-SSE or NW-SE trend generally coincides with the plane of schistosity of the amphibolites, which seldom possess mineralization of corundum. The N-S structural feature is the important and significant structure in the amphibolites that facilitated the emplacement of granite / pegmatite / aplitic intrusions. They form the loci of mineralization of corundum. The

NE-SW (joints) structures indicate the post-mineralized effects in the formation of en-echelon lensoidal occurrences in this area. In addition to the above, WNW-ESE and ENE-WSW trends are also observed which also localize corundum.



Fig.3. Gobbagurti Hills and lower reaches

4. Lithological Controls

Lithology plays a protracted and dominant role in the mineralization of corundum. The contact zones between the felsic intrusions with schistose amphibolites localized the rich concentrations of corundum. Generally, the quartzo-felsic rocks do not enclose corundum. Perhaps, the tectonic elements, which facilitated the emplacement of quartzo-felsic and related rocks such as aplites, pegmatites and tonalities must have also acted as carriers of corundum and localized them with desilicified rocks along the contact zones as insitu occurrences in the study area. The garnetiferous amphibolites along their contacts with the felsic and pelitic schists enclose rich occurrences of corundum. However, the amphibolites as such do not exhibit mineralization of corundum. Occurrences of sillimanite-corundum and kyanite-corundum rocks in the study area only substantiate the contact zones where sillimanite schists and kyanite schists as a contact rock with the quartzo-felsic intrusive (Pegmatite, tonalities, Cordierite-corundum gneiss) hosting mineralization of corundum. Kasipathi, and Bhaskara Rao, 1998 studied variety of corundum from different areas within the vicinity of Wyr, at Pallabhavi, Kodaratimetta, Lakshmipuram, Mekalkunta and Pallipadu areas and based on XRD studies, they were identified as potential resource for abrasive industry. The XRD data confirmed their potentiality.

Table 1 Xrd Data of Very Coarse, Platy, Xlline, Opaque, Light Pinkish Corundum (after Kasipathi, and Bhaskara Rao, 1998)

Sampl e	2 θ	d(A)	L	hkl	Remarks
KH-1	25.505	3.4895	96.1	12	Abrasive variety
KH-2	35.05	2.558	37	104	Abrasive variety
KH-3	43.24	20,906	100	113	Abrasive variety
KH-4	52.545	17,402	46.4	24	Abrasive variety
KH-5	57,450	16,027	42.9	116	Abrasive variety
KH-6	61,160	15,141	3.4	122	Abrasive variety
KH-7	66,650	14,021	10.2	124	Abrasive variety
KH-8	66,650	14,056	10.2	124	Abrasive variety
KH-9	68,050	13,766	22.1	30	Abrasive variety
KH-10	70,340	13,373	1	125	Abrasive variety
KH-11	74,255	12,762	0.4	208	Abrasive variety
KH-12	77,195	12,378	7.5	1.0.1 0	Abrasive variety
KH-13	77,425	12,347	4.2	119	Abrasive variety
KH-14	80,775	11,888	6.4	220	Abrasive variety
KH-15	83,155	11,607	0.4	306	Abrasive variety
KH-16	84,125	11,498	3.5	223	Abrasive variety
KH-17	86.285	11,264	3.3	312	Abrasive variety
KH-18	89.14	10,976	8	0.0.1 2	Abrasive variety



Fig.4. Panning of Corundum

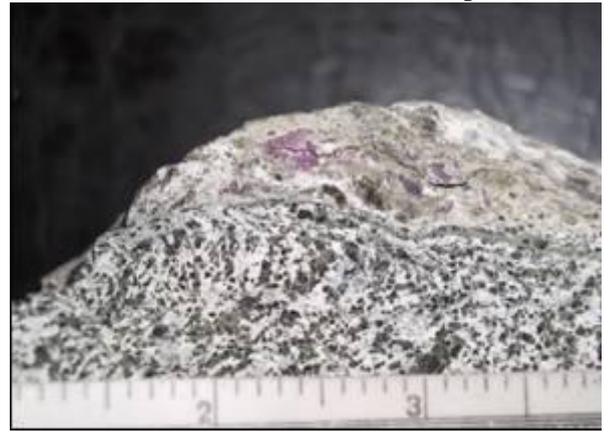


Fig.5. Corundum in metamorphic Rock

References

- [1]. Kasipathi, C., Bhaskara Rao, A. (1998) "Potentiality of Gem Resources of Andhra Pradesh, India" Unpublished Research Article, Andhra University, Vishakhapatnam.
- [2]. Appavadhanulu, K etal (1976) "Report on Corundum and Garnet deposits of Khammam District, Andhra Pradesh India" Memoir, Geol. Survey, India.
- [3]. Kazimi, S.M.K (1994) "Preliminary assessment of Semi-precious corundum occurrences of Anantapur District, Andhra Pradesh". Misc.Publ. Southern Region. Geol. Survey. India
- [4]. Narayan Sangam. & Pavanaguru, R. (2005) "Exploitation of Corundum at Lakshmipuram, Khammam District". Proceedings Map India International Conference, February, 2005.New Delhi.
- [5]. Narayan Sangam. (2004) "Remote Sensing studies on Corundum mineralization at Gobbagurthi, Khammam District". Proceedings ISRS, Jaipur, India.
- [6]. Narayan Sangam. (2002) "Geo-scientific Evaluation of Corundum in & around Konijerla Mandal, Khammam District". Proc. ISPRS, NRSA, India.