

## ANDALUSITE

### Introduction

Andalusite is an aluminium nesosilicate mineral with the chemical formula  $Al_2SiO_5$ . Andalusite is trimorphic with kyanite and sillimanite, being the lower pressure mid temperature polymorph. At higher temperatures and pressures, andalusite may convert to sillimanite. Thus, as with its other polymorphs, andalusite is an aluminosilicate index mineral, providing clues to depth and pressures involved in producing the host rock. Andalusite has a chemical composition of  $Al_2O_3 \cdot SiO_2$ . A clear variety first found in Andalusia, Spain can be cut into a gemstone. It is associated with mica schist which increases alkali content in ultimate product and so it has not been exploited economically so far. It is used in furnaces, Kilns and other industrial processes.

### Basis of Grade Classification

In the inventory as on 1.4.2015, the end-use grade classification of resources has been adopted based on  $Al_2O_3$  content. The entire estimation is broadly classified under low grade which contains an average of (-) 40%  $Al_2O_3$ .

### Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, the entire estimation of andalusite has been placed under inferred category (333) & reconnaissance (334) of remaining resources.

### Salient Features of the Inventory

The total resources of andalusite in the country as on 1.4.2015 are in freehold and have been estimated at 28.20 million tonnes in remaining resource category. Thus, there is an increase of 9.75 million tonnes in the resources from Uttar Pradesh as compared to the inventory as on 1.4.2010. The Salaidih-Harwariya area in Sonbhadra district, Uttar Pradesh constitutes the lion's share of the resources i.e. about 24.2 million tonnes (86 %) and the rest 4.0 million tonnes (14 %) are from Nagar-Untari area in Garwah district, Jharkhand. Occurrences of andalusite are also reported from Dantewara & Raipur district, Chhattisgarh, Malakangiri district, Odisha, Jhunjhunu, Nagaur and Tonk district, Rajasthan and Mirzapur & Sonbhadra district, Uttar Pradesh.

All India scenarios of andalusite resources as on 1.4.2015 vis-a-vis 1.4.2010 are given in Tables - 1 to 3. These tables give an idea about the significant changes if any in terms of increase or decrease of resources as per lease status, grade and state.

The entire resources of andalusite have been placed under inferred (333) & Reconnaissance (334) category, based on the preliminary exploration carried out by Directorate of Geology & Mining, Uttar Pradesh and Jharkhand. These deposits contain andalusite having (-) 40%  $Al_2O_3$  which is not suitable for refractory industry. Therefore, further detailed exploration in these areas to upgrade the confidence level of resources, may only be justified if the economics of utilisation of such materials are available. In the inventory as on 1.04.2015, a total of 2 deposits have been covered in Freehold areas and resources have been estimated.

**Table – 2 : Total Resources of Andalusite as on 1.4.2015 (P) vis-à-vis 1.4.2010 (By States)**

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
<b>All India : Total</b>	<b>28201</b>	<b>18450</b>	<b>(+) 9751</b>
Jharkhand	4001	4000	(+)1
Uttar Pradesh	24200	14450	(+)9750

*figures rounded off.*

**Table - 1 : Reserves/Resources of Andalusite as on 1.4.2015 (P) vis-à-vis 1.4.2010  
(By Lease Status/Grade)**

Lease status/Grade	(In '000 tonnes)								
	Reserves		Remaining resources		Total resources				
	1.4.2015	1.4.2010	Net change	11.4.2015	1.4.2010	Net change			
<b>All India : Total</b>	-	-	-	<b>28201</b>	<b>18450</b>	<b>(+) 9751</b>	<b>28201</b>	<b>18450</b>	<b>(+) 9751</b>
Low Grade	-	-	-	4000	18450	(-) 14450	4000	18450	(-) 14450
Unclassified	-	-	-	24201	-	(+)24201	24201	-	(+)24201
<b>Freehold</b>	-	-	-	<b>28201</b>	<b>18450</b>	<b>(+) 9751</b>	<b>28201</b>	<b>18450</b>	<b>(+) 9751</b>
Low Grade	-	-	-	4000	18450	(-) 14450	28200	18450	(-) 14450
Unclassified	-	-	-	24201	-	(+) 24201	24201	-	(+) 24201

2 *figures rounded off.*

**Table - 3 : District wise Reserves/Resources of Andalusite as on 1.4.2015 (P)**

State/District	(In '000 tonnes)		
	Reserves	Remaining Resources	Total Resources
<b>All India : Total</b>	-	<b>28200</b>	<b>28200</b>
<b>Jharkhand</b>	-	<b>4001</b>	<b>4001</b>
Garwah	-	4001	4001
<b>Uttar Pradesh</b>	-	<b>24200</b>	<b>24200</b>
Sonhadra	-	24200	24200

*figures rounded off.*