



## “Progress of Mineral Resource Evaluation system at Hindustan Zinc Ltd – A journey towards JORC”

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# Core Strengths

*Leading the way with fully integrated operations*

- 1 Sustainable Enterprise**

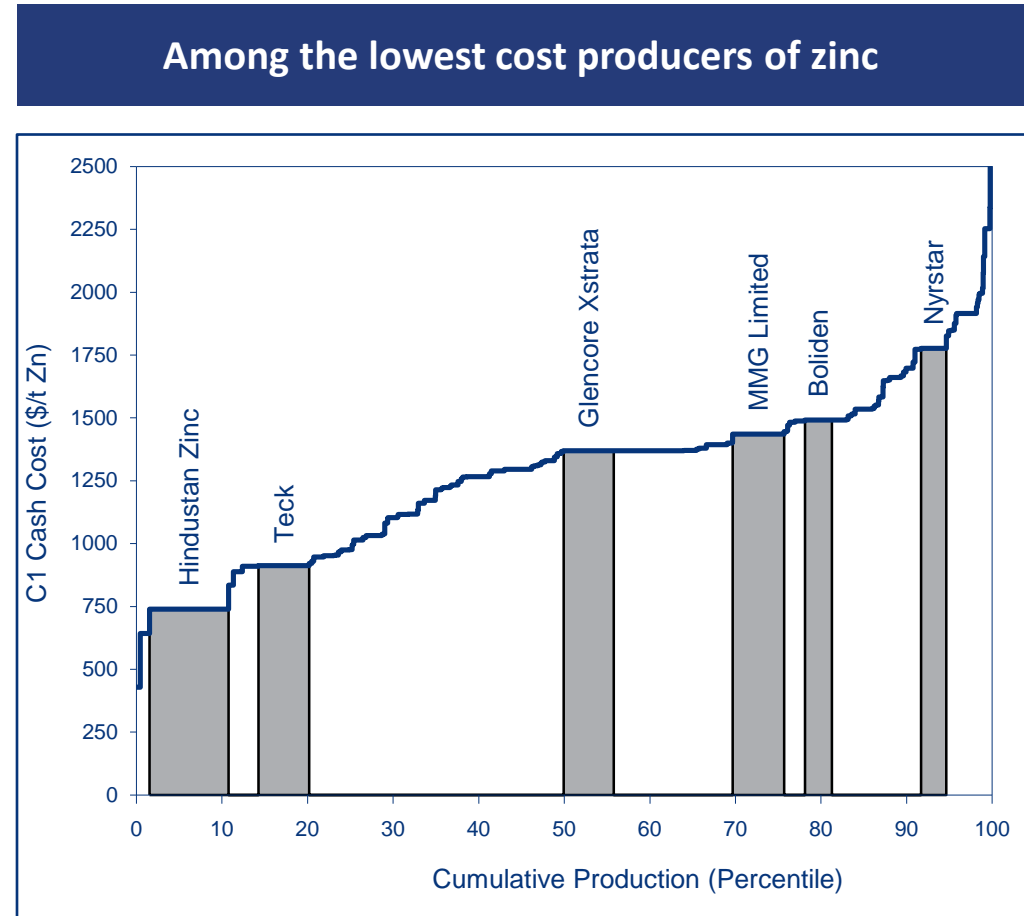
Zero harm to People, Positively Impacting 5 lakh people in nearby communities
- 2 R&R base 389.9 Mt**

Ensuring mine life of +25 years
- 3 High Scale of Operation**

11 million+ MT Ore Production Capacity
- 4 Fully Integrated Operation**

Raw Material & Power - Self sufficiency
- 5 High Domestic Market Share**

Large Customer Portfolio in India



# A world class mining portfolio

## Rampura Agucha Mine

Reserves : 51.1mt  
 Resources : 52.7mt  
 Reserve Grade : Zn 14.0%, Pb 1.8%  
 Current Ore Capacity : 4.63 mtpa

## Kayad Mine

Reserves : 3.9mt  
 Resources : 2.0mt  
 Reserve Grade : Zn 13.4%, Pb 1.8%  
 Current Ore Capacity : 1.0 mtpa

## Sindesar Khurd Mine

Reserves : 33.2mt  
 Resources : 76.3mt  
 Reserve Grade : Zn 4.7%, Pb 3.2%  
 Current Ore Capacity : 4.0 mtpa

## Rajpura Dariba Mine

Reserves : 9.3mt  
 Resources : 49.4mt  
 Reserve Grade : Zn 6.3%, Pb 1.6%  
 Current Ore Capacity : 0.84 mtpa

## Zawar Mining Complex

Reserves : 9.5mt  
 Resources : 82.3mt  
 Reserve Grade : Zn 3.4%, Pb 1.7%  
 Current Ore Capacity : 1.8 mtpa

## Chanderiya Smelting Complex

Pyrometallurgical Lead Zinc Smelter:  
 105,000 tpa Zinc and 85,000 tpa Lead  
 Hydrometallurgical Zinc Smelter: 420,000 tpa Zinc  
 Captive Power Plant: 234MW

## Dariba Smelting Complex

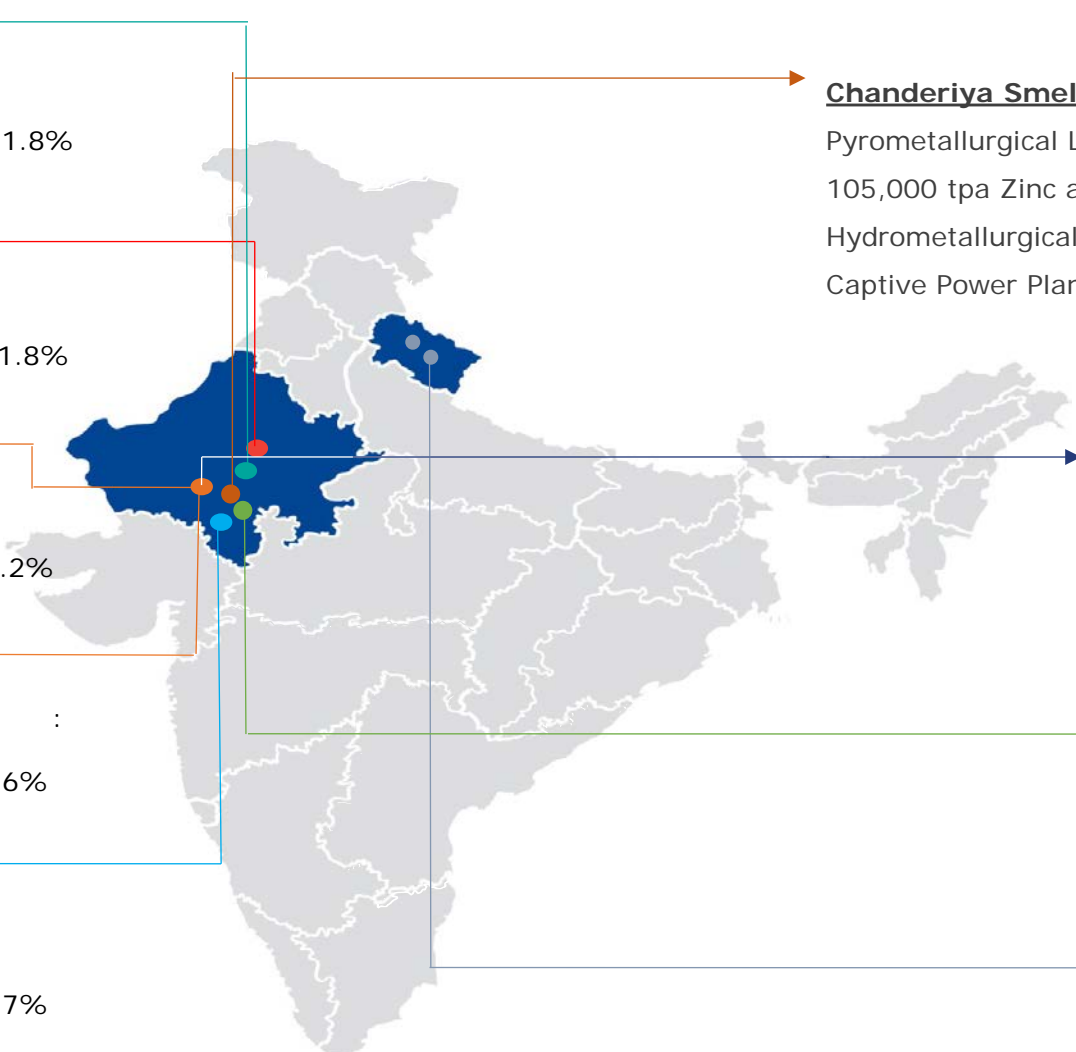
Hydrometallurgical Zinc Smelter:  
 210,000 tpa Zinc  
 Lead Smelter: 100,000 tpa Lead  
 Captive Power Plant: 160MW

## Zinc Smelter Debari

Hydrometallurgical Zinc  
 Smelter: 88,000 tpa Zinc

## Pantnagar & Haridwar

Processing & Refining of Zinc,  
 Lead & Silver



# Exploration Success

Strong track record of delivering organic R&R growth.

Annual Drilling  
**+1,00,000m**

Ground Penetration  
**+1,500m**

Exploration Time Gain  
**+50%**

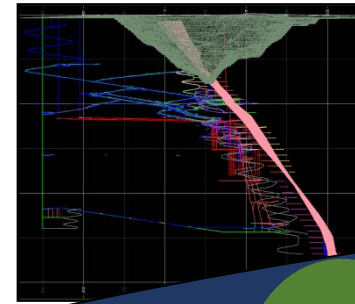
Annual Spending  
Rs. **+70 Cr**  
US\$ **+10.2 M**



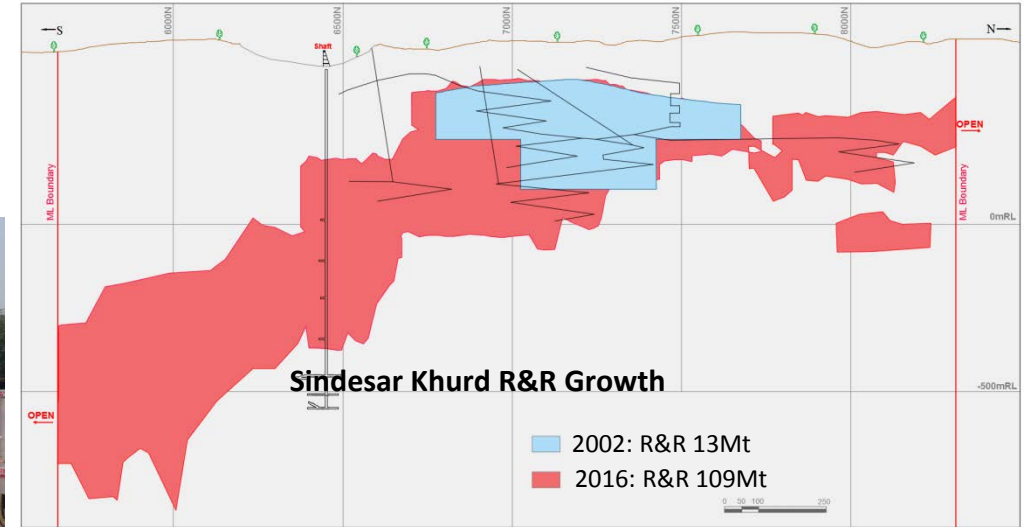
**2002:  
154Mt**



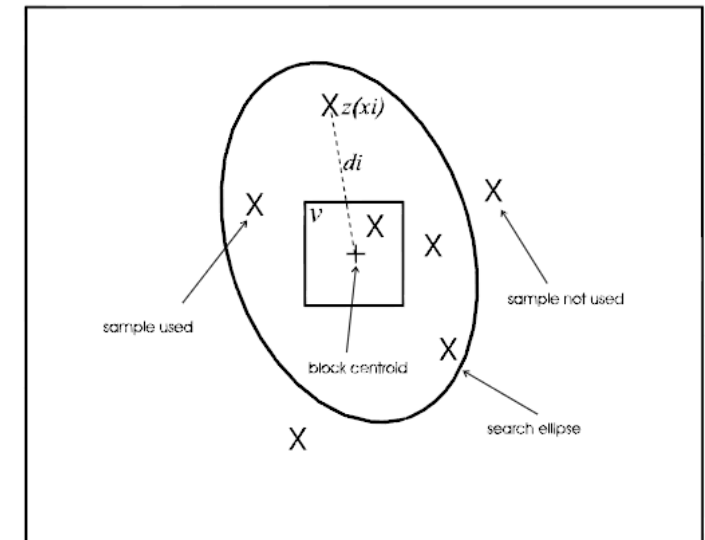
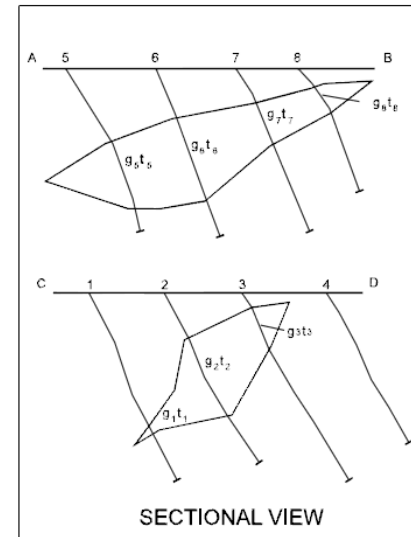
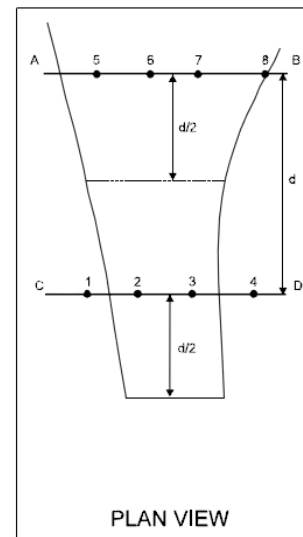
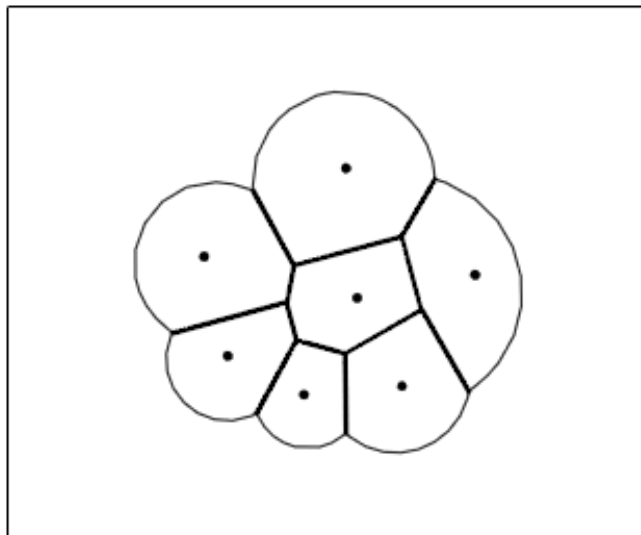
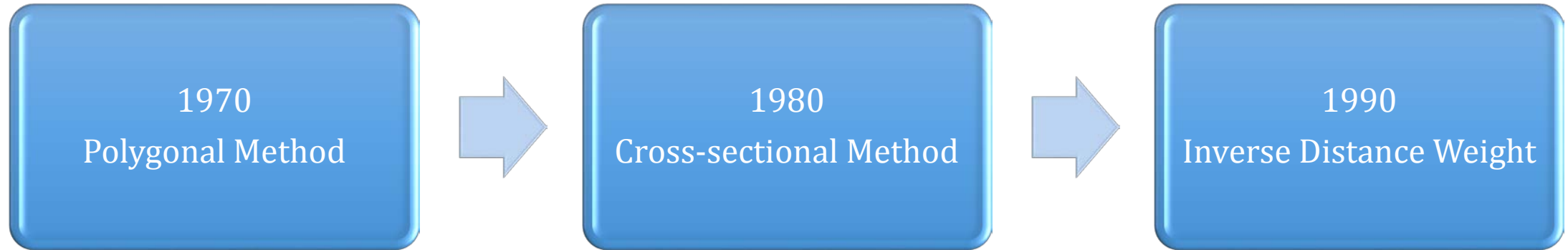
**2009:  
272Mt**



**2016:  
390Mt**

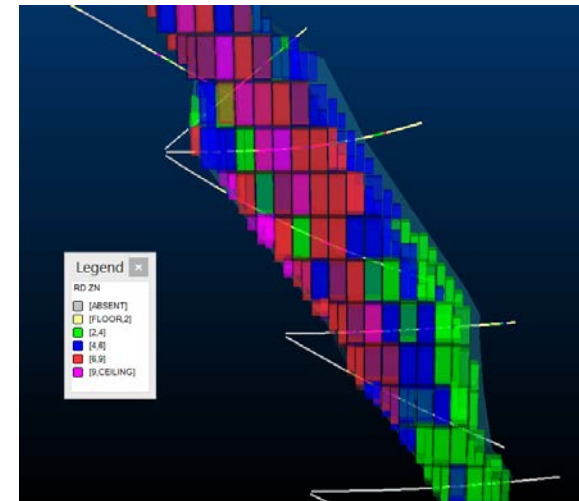
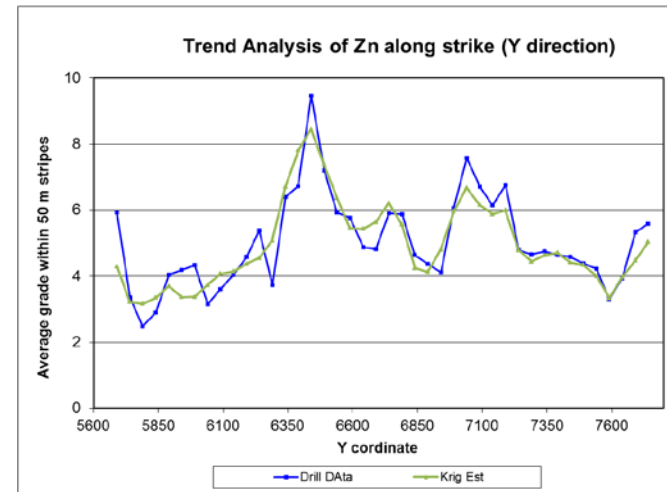
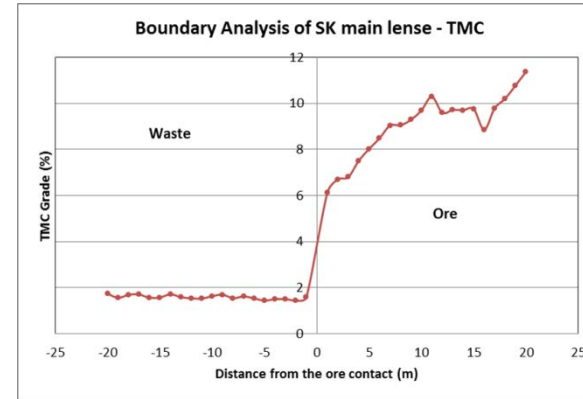
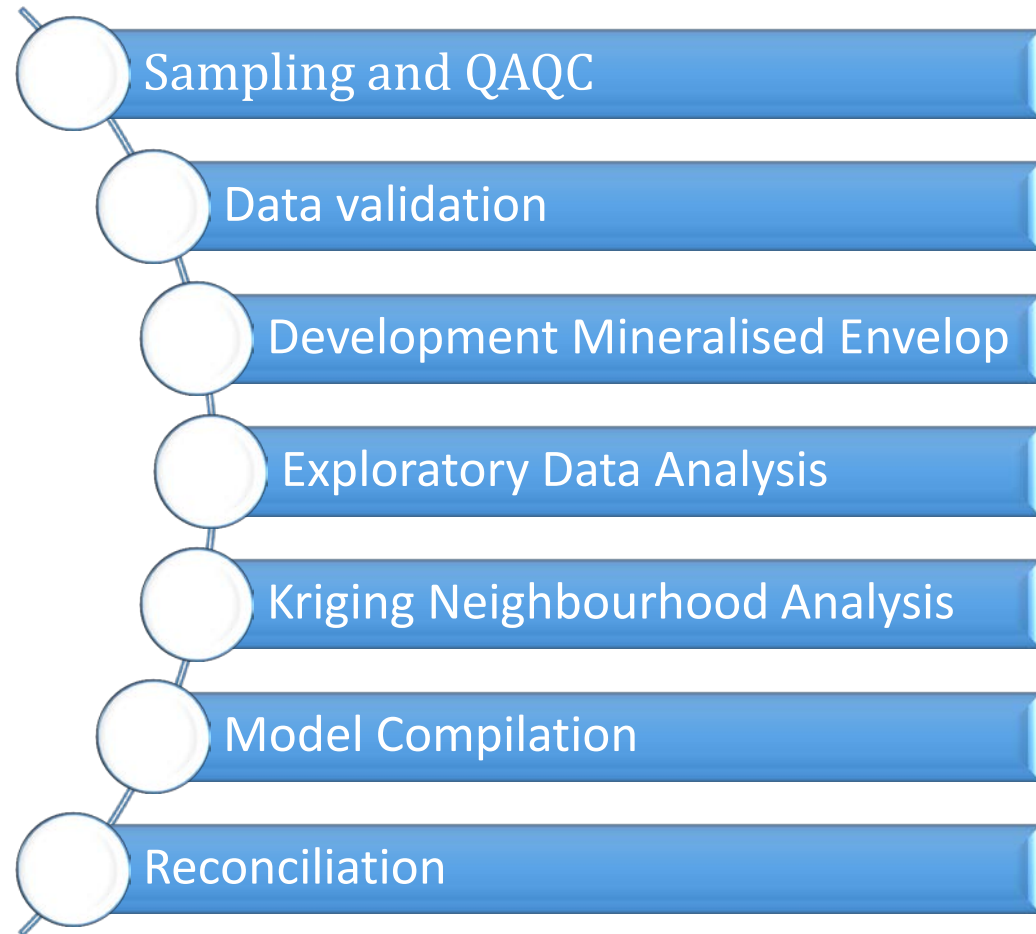


# Mineral Resource Evaluation

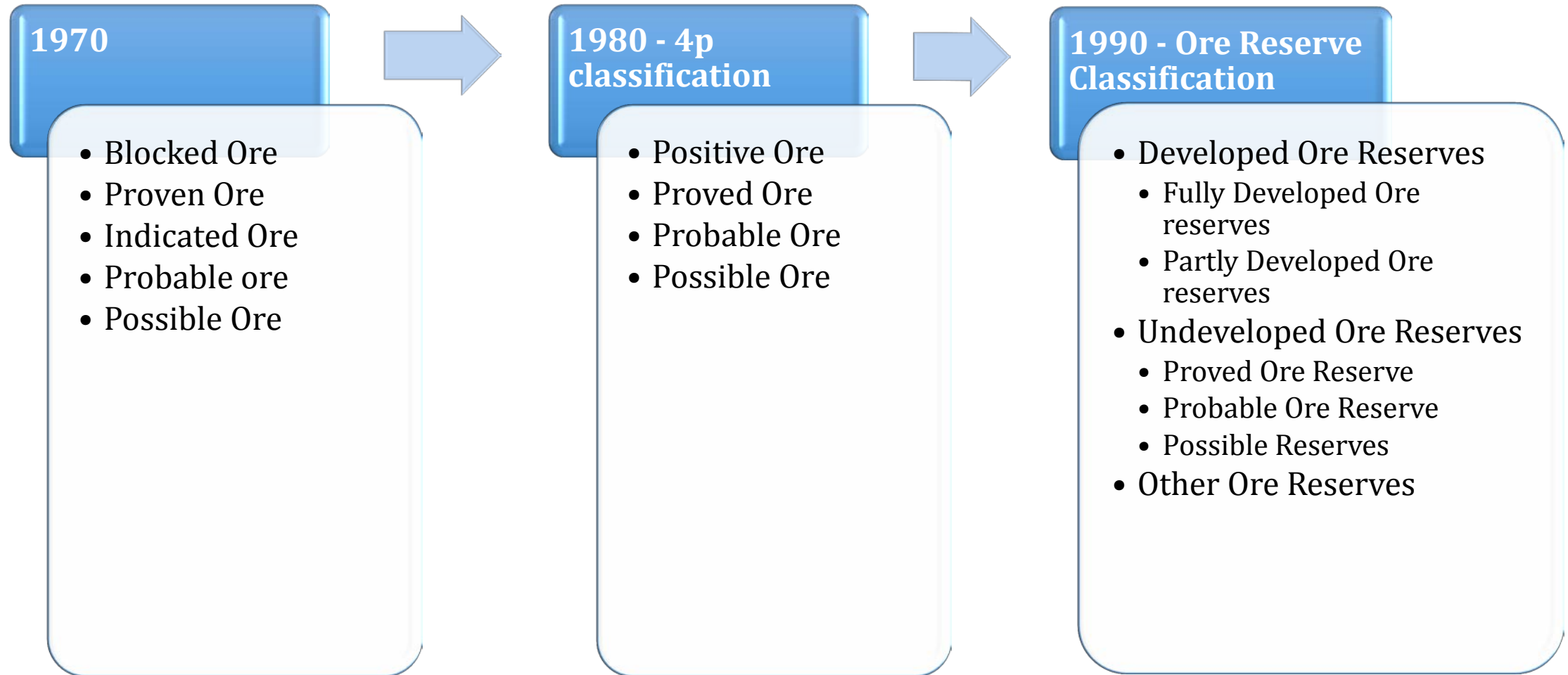


# Resource estimation methodology since 2004

In order to overcome the issues of IDW where in spatial correlation between the samples is not being taken into account. Kriging is adopted for resource estimation.



# Classification of ore reserves – A Journey



# Mineral Resource Classification since 2004

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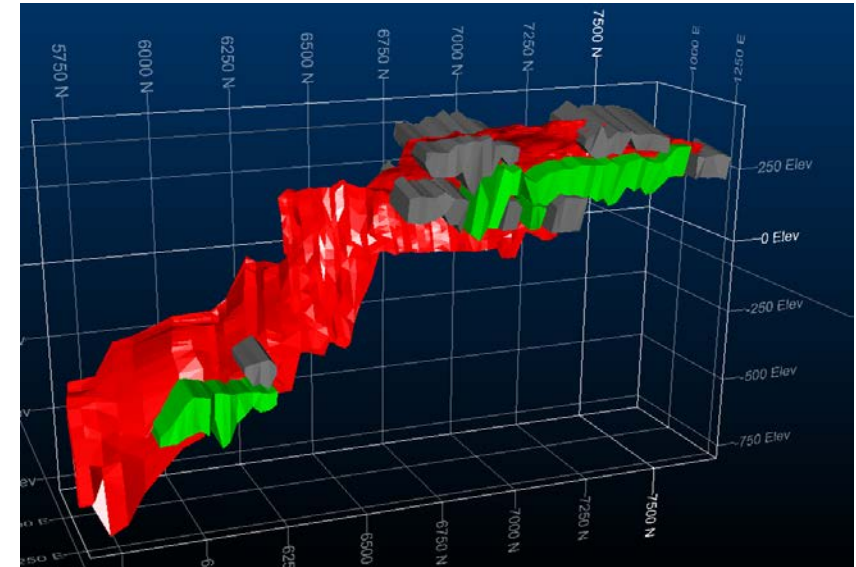
Since after disinvestment and our company got registered at London stock exchange JORC Code was adopted which is internationally accepted reporting standard and which is recognised and adopted world-wide for market-related reporting and financial investment.

- Resource models are compiled by geologist.
  - It is depleted against the production stope wireframe.
  - Resource numbers (measured, indicated & inferred) are declared on depleted model.
  - Life of mine plan (LOMP) is being prepared by mining engineers on depleted model.
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# Modifying Factors

- Modifying factors are derived based on past reconciliation for dilution and mining recovery.
- The criteria taken to define the factors include
  - Hanging wall Condition
  - Geological complexity of Orebody
  - Mine to metal Reconciliation
- The above criteria are coded into the resource model to derive modifying factors which are then applied to derive the reserves.



**Modifying Factors for Geological Complexity & Geotechnical Condition**

IF (COMPLEX==1 AND HWCOND==0) PDIL=5.3 UNPDIL=5.5 MRECOV=95
IF (COMPLEX==2 AND HWCOND==0) PDIL=11.1 UNPDIL=5.8 MRECOV=98
IF (COMPLEX==3 AND HWCOND==0) PDIL=17.6 UNPDIL=6.2 MRECOV=98
IF (COMPLEX==1 AND HWCOND==1) PDIL=11.1 UNPDIL=9.7 MRECOV=95
IF (COMPLEX==2 AND HWCOND==1) PDIL=17.6 UNPDIL=13.1 MRECOV=95
IF (COMPLEX==3 AND HWCOND==1) PDIL=33.3 UNPDIL=21.7 MRECOV=90

## Competent person signoff

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- The resource and reserves numbers are validated signed off internally by site geologist and mine planning engineer.
- SRK, UK has been assigned to undertaken Mineral Resource and Ore Reserve audits on an annual basis to review
  - Exploration drilling, sampling and QAQC.
  - Methodologies being used to estimate, classify and report Mineral Resources .
  - Life of Mine Plans (“**LoMP**”) and schedules.
  - Modifying factors
  - Concentrator and smelter facility capacity.

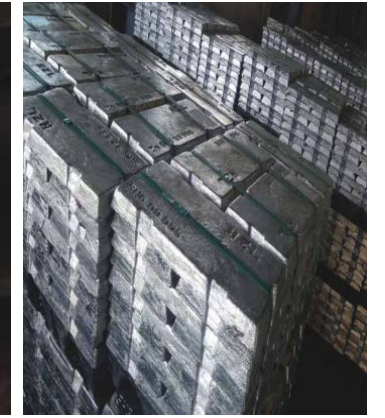
Mineral resource and Ore reserves of HZL are annually signed off by SRK,UK as competent person.

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## Way forward towards global best practises

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- At group level a “*Vedanta R&R Risk Management Committee*” is being formed.
  - The committee will prepare a company-wide Mineral Resource and Ore Reserve reporting guidelines which is in line with global best practices.
  - Conduct internal audit of the whole process and signoff on the R&R numbers.
  - A process has been initiated to have JORC compliant competent persons on each site of HZL.
  - Independent signoff on JORC complied R&R reports.
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Thanks