

RAJ 8



No Mineralization detected.

Anglo American Exploration (India) Pvt. Ltd.  
Tej Kunj, Ambavgarh  
UDAIPUR, Rajasthan  
PIN- 313 004

8<sup>th</sup> August 2005

Reg-10

- To,
1. The Controller General,  
Indian Bureau of Mines,  
Indira Bhawan, Civil Lines  
NAGPUR - 440 001
  2. The Director General  
Geological Survey of India,  
27, Jawaharlal Nehru Road  
KOLKATA - 700 016
  3. The Director Mines and Geology  
Government of Rajasthan  
Khaniz Bhawan,  
Shastri Circle  
UDAIPUR - 313 001

Sub: Final Report of Reconnaissance Work Done  
(Under rule 7 (iii) & 7 (vii) of MCR, 1960)

Ref: Bhilwara - Agucha RP-7/2001 (453 sq km)

Mineral(s): Copper, Lead, Zinc, Silver, Gold, Precious metals and Associated minerals

Dear Sir,

Please find enclosed herewith the Final Report of Reconnaissance Work Done over the above Reconnaissance Permit as required under rule under rule 7 (iii) & 7 (vii) of MCR, 1960. All data and information acquired during the reconnaissance operations are attached.

We request you that the contents of the report are kept confidential under Rule 7(viii) of MCR, 1960.

Yours faithfully,

667  
 Date: 22/8/05  
 Signature: Kamalendra  
 Name in full: Kamalendra S Jhala  
 Designation: Manager, India Projects

Place: UDAIPUR  
Date: 8<sup>th</sup> August 2005

Enclosure 1: Reconnaissance Report  
Enclosure 2: Data in Compact Disc

RAJ 8

Sg M & I / G. M. M. W. 09/16/05

Dr. Anurag

22/8/05

Office of the  
 महानियंत्रक भारतीय खान ब्यूरो  
 Controller General Indian Bureau of Mines  
 निका संख्या / Dy. No. .... 88118

Anglo American Exploration (India) Private Limited  
 Regd Office: 214, South Ex Plaza-1, 389, Masjid Moth, South Extension, PT-II, NEW DELHI -110 049  
 Tel: (011) 2625 8172, 2625 1711 Fax: (011) 2625 0551



Anglo American Exploration (India) Pvt. Ltd.  
Tej Kunj, Ambavgarh  
UDAIPUR, Rajasthan  
PIN- 313 004  
8<sup>th</sup> Aug 2005

**FORM-BB**

(See rule 7 (iii) & 7 (vii) under MCR, 1960)

Progress report of reconnaissance survey in respect of **Copper, lead, zinc, silver, gold, precious metals and associated minerals** [the name of the mineral(s)] for the **year ending July 2005** (**Abandonment of reconnaissance permit**).

**IMPORTANT**

This Form fully filled-in must reach the Concerned authorities within thirty days after expiration of one year from the date of execution of reconnaissance permit or the expiry of reconnaissance permit or abandonment of reconnaissance permit, whichever is earlier.

- To,
1. The Controller General,  
Indian Bureau of Mines,  
Indira Bhawan, Civil Lines  
NAGPUR - 440 001
  2. The Director General  
Geological Survey of India  
27, Jawaharlal Nehru Road,  
KOLKATA - 700 016
  3. The Director Mines and Geology  
Government of Rajasthan  
Khaniz Bhawan,  
Shastri Circle  
UDAIPUR - 313 001

**RP No: Agucha RP - 7/2001 of BHILWARA (453 sq km)**

1.	Name of the permit holder	Anglo American Exploration India Pvt. Ltd.
2.	Nature of the firm	A private limited company registered under Companies Act, 1956
3.	Address of the firm	Anglo American Exploration India Pvt. Ltd. 214, South Ex Plaza - I 389, Masjid Moth, South Ext Pt II New Delhi - 110 049
4.	Area under permit	Original area: 453 sq km; 263 sq km of area

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		relinquished on 5 <sup>th</sup> July 2004; 190 sq km of area relinquished on 5 <sup>th</sup> July 2005
5.	<b>Location:</b> (i) Topo sheet No. (s) (ii) Co-ordinates of corner points (iii) District (s) (iv) State	45K/9, 45K/10, 45K/13 and 45K/14 Given in Figure 1 in the attached report Bhilwara and Ajmer Rajasthan
6.	Date of grant of permit	8 <sup>th</sup> July 2002
7.	Period of permit	3 years, from 08.07.2002 to 07.07.2005.
8.	<b>Reconnaissance survey work done</b> (A brief description of the work involved along with particulars of the machines and instruments used would be given against each of the following items) (i) Regional Survey (ii) Aerial / Photogeological work (iii) Geological mapping including area covered and scale (iv) Geophysical (v) Geochemical (vi) Test drilling: Number, area of influence meterage and sampling.	Please refer to report attached for the details. Please refer to report attached for the details. None Please see attached report under heading: Reconnaissance survey work done - Geological Please see attached report under heading: Reconnaissance survey work done - Geophysical Please see attached report under heading: Reconnaissance survey work done - Geochemical Please see attached report under heading: Reconnaissance survey work done - Drilling
9.	Nature and structure of the ore body	No mineralisation intersected ✓
10.	Analysis of the ores or minerals	Not applicable

11.	<p><b>If abandonment</b></p> <p>(i) <b>Date of abandonment</b></p> <p>(ii) <b>Reasons for abandonment</b></p>	<p>Original area: 453 sq km; 263 sq km of area relinquished on 5<sup>th</sup> July 2004 and 190 sq km of area relinquished on 5<sup>th</sup> July 2005</p> <p>5<sup>th</sup> July 2005</p> <p>Exploration activities completed</p> <p>Signature: <i>Kamalendra</i></p> <p><b>KAMALENDRA SINGH JHALA</b> (Full name of the Signatory)</p> <p>Designation: <b>Manager, India - Projects and</b></p> <p>Address: <b>Anglo American Exploration (India) Pvt. Ltd.</b> Tej Kunj, Ambavgarh UDAIPUR, Rajasthan PIN- 313 004</p> <p>Date of despatch: 8<sup>th</sup> Aug 2005</p>
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Report by Anglo American Exploration (India) Private Limited

**Final Report of Reconnaissance Work Done**  
(See Rule 7 (iii) & 7 (vii) under MCR, 1960)

**A. INTRODUCTION -**

In July 2002, Anglo American Exploration (India) Private Limited (AAEIPL) executed Reconnaissance Permit (RP) over an area of 453 sq km (Agucha RP) in Bhilwara and Ajmer districts of Rajasthan. The area has been granted for prospecting of Copper, Lead, Zinc, Silver, Gold, Precious metals and Associated minerals.

This final report describes the reconnaissance work accomplished in the Reconnaissance permit area and data and information collected during reconnaissance operations.

**B. AREA OF RECONNAISSANCE -**

The RP (see Figure 1) constitute an area of 453 sq km in Rajasthan, covering parts in Bhilwara and Ajmer districts in the state of Rajasthan.

Location, area and date of execution of the RP are tabulated below and depicted in Figure- 1.

RP Block	Falls in Districts	Date of execution	Original Area (sq km)	Area Relinquished (sq km)	Present Area (sq km)
RP-7/2001	Bhilwara and Ajmer	08/07/2002	453.00	453.00	0.00

**C. GEOLOGY OF THE AREA -**

**Regional Geology:**

Regionally, the rocks of the area belong to Mangalwar group of rocks of Proterozoic age. Mangalwar complex hosts two big Zn-Pb deposit namely Rampura Agucha and Rajpura Dariba. The current RP surrounds the world class Rampura Agucha deposit. The characteristic rock in the area is feldspar-quartz-biotite-garnet-sillimanite gneiss. Graphite is a common accessory mineral, with Zn-Pb mineralisation. Other important rock types in the area are layered calc - silicate, marble, mylonites, granite gneiss pegmatites, aplites, amphibolites and mafic rocks. Many of the mafic rocks are layered and intimately associated with calc-silicates and are probably meta-sedimentary rocks. Metamorphic grade varies from middle amphibolite to upper granulite facies.

The abundance of quartz-K feldspar-plagioclase bearing pegmatitic – aplitic bodies and their association with sillimanite bearing metapelites over vast region of the Mangalwar complex indicate melt formation during high-grade metamorphism.

Structurally the area has seen complex deformation history. In general four phases of deformation has been reported from the area. The earliest recognisable deformation structures include mylonitic foliations. Regionally, the entire area is dissected by a number of linear NE-SW trending dislocation/shear zones.

The area has been mapped by GSI in general but geological information is restricted as most of the area lies under cover with very few outcrops. Prof A.B.Roy et al., also mapped the area but their mapping area was also limited to Agucha mine and near by areas.

AAEIPL carried out geological mapping based on regional traverses and interpretation of available datasets including ground magnetics to come up with interpreted geological map for the entire area, which is shown in Figure 2. AAEIPL used consultants from outside to help in preparing the geological map of the area, as the area is too complex metamorphically and structurally to interpret.

#### **D. RECONNAISSANCE WORK DONE –**

##### **GENERAL:**

The area has been covered by airborne geophysical surveys previously at least two times. Therefore, there is no plan to conduct aerial survey. Instead detailed ground magnetic survey was done to get better resolution data for geological interpretation.

The current RP surrounds the world class Rampura Agucha deposit. The area has seen exploration by other companies (BHP Minerals & Hindustan Zinc Limited) but their main exploration tool was airborne geophysics. AAEIPL has taken a different approach in exploration by taking up big regional soil survey to screen the permit area for possible Zn – Pb mineralisation. This is the first time any company has carried such a big geochemical survey in the entire permit area.

##### **1. Geology:**

Regional geological traverses were taken to understand the litho package and structure of the area. As the exposures are limited in the permit area so information was collected from well spoils for geological information. Mostly granite gneiss and carbonates are exposed being more resistive to weathering compared to psammopelites which occur as recessive units mainly seen in well spoils.

AAEIPL carried out geological mapping based on regional traverses and interpretation of available datasets including ground magnetics to come up with interpreted geological map for the entire area, which is shown in Figure 2. AAEIPL used consultants from outside to help in preparing the geological map of the area, as the area is too complex metamorphically and structurally to interpret.

## 2. Geophysics:

### a. Ground magnetics:

Ground magnetic survey was conducted to use different approach in exploration compared with what other companies have done in the past.

Approximately, 3900 line km of ground mag survey was carried out using GSM-19 (V6.0) overhauser magnetometers which is having inbuilt GPS. The data quality with the overhauser is higher as it has an inbuilt GPS that records the position of each reading and a better quality sensor. The specifications of the survey is given below:

Total No. of Line km: 3900 (approx)  
 Line spacing : 100m  
 Line Direction : EW  
 Station Spacing : 0.5m (approx.)

Another magnetometer (G-856) was used to measure the readings for every 120 Sec as a base to apply the diurnal corrections.

The ground magnetics data has given much better resolution than the aeromagnetics data. A number of major structures not previously interpreted can now be seen.

Data interpretation has picked number of anomalies, which are shown in Fig 3.

### b. Ground EM surveys:

Ground EM surveys were done over number of geophysical and geochemical anomalies. Ground EM was also carried over structurally and geologically interesting areas. Approximately, 250-line km ground EM data was collected in this block using the following configurations.

Total No of line km : 235  
 Line spacing : 200m (it varies depends on the size and priority of the anomaly)  
 Line Direction : 130 or EW  
 Station spacing : 100m initially, if any conductor is there it reduces to 50m  
 Loop size : 2x100m turns  
 Rr area : 400 sq.m for most of the survey, but few anomalies were followed with RVR which has 10,000 sq.m area  
 Survey Type : Moving Loop TEM

The SMARTem system was used for ground electromagnetic surveys. This instrument was developed by Electromagnetic Imaging technology – Australia in 1995 to over come the problems of small power line effects.

Figure 4 shows location of ground EM lines and conductor picked. Raw data is given in attached CD.

### **3. Geochemistry:**

Details of the geochemical activities undertaken in the area are listed below:

#### **a. Soil Sampling:**

Regional soil sampling was carried over entire RP area. Samples were collected at 1000 x 200m grid over EW lines (Figure 5). The proposed site of sampling was reached with the help of a handheld GPS and the topsoil was scraped. Soil samples, approximately 160gms from  $-250\mu\text{m}$  fractions, were collected from a depth of 20-30cm.

Data interpretation from the regional soils identified over 40 geochemical anomalies which are shown in Figure 6. Site visit was done to check each anomalies and most of the anomalies were explained on ground based on lithology or due to cultural responses. 4 anomalies (AG9, AG2, AG12 and AG34) were prioritized for further follow up work.

Geochemical samples were analyzed for a large number of major and trace elements using ultra-trace analytical methods and ICP-MS / ICP-AES at ACME Laboratories, Vancouver (Canada).

Infill soil sampling at 200 x 50 m grid at AG34 did not show any significant anomalism in Pb Zn to carry out further work. At anomalies AG9 and AG2 infill soils were bit positive and detail rock sampling and mapping was carried out.

Soil results for the key elements are attached in table 2 and results for all the elements are given in attached CD.

#### **b. Regolith Mapping:**

Regolith mapping was done over the entire permit area using Landsat image and field observation. Major part of the area lies within residual environment while two big rivers namely Mansi and Khari flowing through the permit area affects considerable amount of area close to the river channel making it difficult for regional soil geochemistry. The geochem signature gets masked due to transported nature of soil close to active river channel and over paleochannels which was taken care off while interpreting the results of regional soils.

#### **c. Rock Sampling:**

Besides systematic soil sampling, several rock chip samples were collected from well-spoils and outcrops during the process of mapping and sampling. Samples are being analyzed for 53 elements.

Rock chip samples were taken from geochemical and geophysical anomalies and were analyzed for 53 elements. Results of the samples were used to upgrade or downgrade the anomaly. Figure 7 shows the location of samples that were sent for geochemical analysis. Rock results for key elements are attached in table 1 and results for all the elements are given in attached CD.



#### **4. Test drilling (Drill testing of AG9, AG2& BHL35 anomalies):**

Interpretation of geochemical, geophysical and geological datasets resulted in number of anomalies, which were followed on ground, but only 3 anomalies (**AG9, AG2& BHL35**) were selected for drilling.

Anomaly AG9 was targeted to test coincident strong EM, weak mag, anomalous geochem at right stratigraphical level along strike of Agucha. Drilling failed to intersect any significant Pb Zn mineralisation. (Anomaly was tested by 5 Percussion holes with total drilling of 1064m).

Anomaly AG2 was mainly a geological target with support from geophysics and geochemistry. Drilling failed to intersect any significant Pb Zn mineralisation. (Anomaly was tested by 3 Percussion holes with total drilling of 694m).

Anomaly BHL35 was picked as geophysical anomaly sitting in good structural position (close to fold closure) with not much support from geochemistry. Drilling failed to intersect any significant Pb Zn mineralisation. (Anomaly was tested by 1Percussion hole with total drilling of 155m).

The location of target drill test is shown in figure 8 and summary of drilling at all anomalies is shown in summary table1. Detailed drill logs and drill assays are given in attached CD.

#### **E. PERSONS ENGAGED FOR THE WORK -**

Geological mapping and geochemical sampling programmes were carried out by a number of geologists working for the company as well as consultants from abroad were used for mapping and data interpretation. Field assistants were hired locally to assist the field teams.

The company geophysicist undertook most of the ground geophysical surveys. Several field assistants, as per requirement, were hired locally to carry out the surveys.

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