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Final Relinquishment Report for the Mahasamund Reconnaissance Permit Raipur and Mahasamund District, Chhattisgarh, India.

Chhattisgarh
C

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Submitted: Secretary, Department of Commerce & Industries, Government of Chhattisgarh, Raipur.
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1 EXECUTIVE SUMMARY

This is a report on the exploration for diamond and other mineral commodities carried out on the Mahasamund Reconnaissance Permit between November 2002 and May 2005.

The Mahasamund RP area totaling 3,000 km^2 was granted to ACC Rio Tinto on the 9th September 2002 and subsequently executed on 23rd November 2002. 2335 km^2 area was relinquished at the end of first two-year period on 22nd November 2004.

A sampling program incorporating approx. 574 sites at a nominal spacing of 1 sample 15 – 10km^2 was carried out. These sites were subsequently prioritized based on a geological and structural analysis of the region.

Exploration incorporating indicator mineral sampling on second and third order streams, -80# stream sediment sampling for lithophile, chalcophile and precious metal element geochemistry and field mapping was initiated on 28th November, 2002. To date 574 gravel samples and 552 corresponding –80# stream sediment geochemistry samples have been collected within the MahasamundRP.

2 INTRODUCTION

The Mahasamund RP area totaling 3,000 km^2 was granted to ACC Rio Tinto on the 9th September 2002 and subsequently executed on 23rd November 2002. In compliance with the requirements of the MMDR limiting the term of reconnaissance permits to a maximum of three years,

This final relinquishment report details all exploration completed within the RP's as summarized in table 1. Complimentary periodic data and maps are further reported in the previous biannual and relinquishment reports including:

- ACC Rio Tinto Exploration Limited (August, 2003); 1st Bi-annual Progress Report for Exploration of the Mahasamund Reconnaissance Permits For the period November 2002 and May 2003.
- ACC Rio Tinto Exploration Limited (February, 2004); 2nd Bi-annual Progress Report for Mahasamund Reconnaissance Permits For the period May 2003 and November 2003.
- ACC Rio Tinto Exploration Limited (August, 2004); 3rd Bi-annual Progress Report for Exploration of Mahasamund Reconnaissance Permits For the period November 2003 and May 2004.
- ACC Rio Tinto Exploration Limited (February, 2005); 4th Bi-Annual Progress and partial relinquishment report for exploration of Mahasamund Reconnaissance Permits for the period May 2004 to November 2004.
- ACC Rio Tinto Exploration Limited (August, 2005); 5th Bi-Annual Progress Report for Exploration of the Mahasamund Reconnaissance Permits for the Period November 2004 and May 2005.

All the above reports have been submitted with the relevant government institutions and are further archived with ACC Rio Tinto in Bangalore.

ARTE maintained a strong focus on health, safety, environment and community relations in its Chhattisgarh diamond exploration projects. No lost time injuries and relatively few high-risk health and safety incidents were reported during the exploration period.

Name (District)	Granted RP Area km^2	Date of RP Execution	Indicator Mineral samples	Geochemical samples	Geophysics
Mahasamund RP (Raipur and Mahasamund)	3000	23.11.2002	574	552 (Stream) 597 (Soil) 58 (Loam) 7 (Rock)	1130 line km ground magnetics 4.2-line km Electro magnetics

Table 1: Summary of Exploration work completed by ARTE Ltd within the Mahasamund RP's

3 REGIONAL GEOLOGY

The region is part of Bastar Craton of the Peninsular Indian Shield. The Mahasamund RP area is entirely underlain by Neoproterozoic Platformal sediments of Chhattisgarh Super group. The lithostratigraphy of Chhattisgarh Super group of rocks given the table 2 was established by the Geological Survey of India and given by Murthy (1987). Chhattisgarh sediments are underlain by Achaean granite gneiss - greenstone rocks which have been classified as part of Sonakhan Group and Baya Gneisses. Achaean Bundeli Granitoid plutons have intruded the Sonakhan and Baya Gneisses. Meso- and Neoproterozoic dolerite dykes are also present. Nearest known kimberlitic rocks are at Kalmidadar (50 km SE) in Orissa and Mainpur Kimberlite Field (105 km SSE). These kimberlites are undated, but assumed to be post Neoproterozoic sediments in age.

Table 2: Generalized Lithostratigraphic Succession of Chhattisgarh Basin

(After Murthy, K.S., 1987)

Supergroup	Group	Formation	Lithology
CHHATTISGARH SUPERGROUP (UPPER PROTEROZOIC)	RAIPUR	Tarenga	Pink and purple shale (+180m)
		Chandi	Purple and grey stromatolitic limestone (670m)
		Gunderdehi	Pink and purple shale / grey shale (430m)
		Charmuria	Grey limestone, white to buff clays
		UNCONFORMITY	
	CHANDERPUR	Kansapather	
		Kondkera	White sandstone (+125m)
		Charpodih	Reddish brown and olive green sandstone (15 m)
		Lohardih	White pebbly sandstone (240 m)
NONCONFORMITY			
ARCHEAN TO LOWER PROTEROZOIC	CHILPI AND SONAKHAN GROUP OF ROCKS		Granite – greenstone complexes

The main lithologies mapped in the Mahasamund RP area are predominately undifferentiated shales, limestone and dolomite that broadly correlate with the Gunderdehi, Chandi and Tarenga Formations of the Raipur Group. Towards the east of the permit area the Raipur Group is underlain by the clastic sediments of the Chandrapur Group that in turn unconformably overlie the Achaean gneissic and granitoid basement. A system of moderately strong NE-SW lineaments and faults are evident from interpreted Landsat imagery of this area.

The Mahanadi River forms part of the western boundary of the Mahasamund RP. Pairi is the main tributary to the Mahanadi River. The area is mostly flat having low energy dendritic drainage. Irrigation channels divert the drainage throughout the permit and in particular in the vicinity of the Mahanadi River. Intense agricultural activities throughout have frequently diverted or converted to paddy fields most first order and often second order streams such that these streams are no longer mappable on the ground. In general, the topography within the area varies from low, rugged hills fringed by colluvium, grading from scree to coalesced alluvial fans and open, gently sloping sheet wash plains to broadly undulating areas of gently rolling peneplains.

4 RESULTS OF EXPLORATION

4.1 Indicator Mineral Sampling

Gravel sampling for kimberlitic indicator minerals was initiated in the area on 28th November, 2002, and till date total of 574 samples sieved to –1mm and weighing an approximate 30-kg have been collected from carefully selected trap sites on the 1st to 4th order streams. The Location of indicator mineral sampling is shown in Plan NDbg0531.

Stream Sediment Geochemistry

Approximately 552 stream sediment samples sieved at -80# have been collected at each of the indicator mineral sample sites. Elements and detection limits for each are as follows: Au (1 ppb); Pt (5 ppb); Pd (1 ppb); Ag (0.1 ppm); Al (10 ppm); As (0.5 ppm); Ba (10 ppm); Ca (10 ppm); Cd (0.1 ppm); Co (2 ppm); Cr (2 ppm); Cu (2 ppm); Bi (0.1 ppm); Fe (100 ppm); K (10 ppm); Mg (10 ppm); Mn (5 ppm); Mo (0.1 ppm); Na (10 ppm); Nb (0.2 ppm); Ni (2 ppm); P (5 ppm); Pb (0.5 ppm); Sb (0.5 ppm); Sr (2 ppm); Th (20 ppm); Ti (10 ppm); U (0.02 ppm); V (2 ppm); W (0.1 ppm); Zn (2 ppm); Zr (10 ppm).

4.2 Geology

Geological traversing in combination with other exploration activities has found the regional 1:250,000 geological mapping of the GSI to be accurate and sufficient for the interpretation of most of the regional and prospect datasets. A compilation geological plan has been presented in Ndbg0530.

Analysis of remote sensed data has not identified any kimberlites or any features that could be attributed to kimberlites intrusion in the RP area.

4.3 Reconnaissance Heavy Mineral (Gravel and Loam) Sampling

A total of 574 gravel samples were collected from second and third order streams at a nominal spacing of 1 sample per 5 square kilometers effectively sampling all active drainage areas over the entire RP. This method is considered more effective than airborne geophysical techniques especially in areas of active drainage with minimal laterite development or cover such as mapped in the Mahasamund RP.

Each gravel sample comprised approximately 30kg of –1mm sand collected by hand from heavy mineral concentration zones within the active stream sediment bed load.

58 loam samples each 30 kg of –1mm was collected over the identified anomalies. All samples are processed at the company's specialist processing facilities by dense media separation, magnetic and heavy liquid techniques with mineral concentrates manually observed for any potential kimberlitic indicators.

Analysis of observation and major oxide SEM mineral chemistries (table 3 and table 4) identified only 2410 potentially kimberlitic indicator mineral grains from 27,520 selected and probed heavy mineral grains. Notably gravel samples from the Mahasamund contain only minor pyrope garnet with 32 samples (6%) returning a maximum of 13 grains. Ranking of samples based on presence of kimberlitic indicators identifies a total of 43 (8%) samples with definitive kimberlite sourced indicator minerals.

	Pyrope	Kimberlitic Chromite	Picro Ilmenite	Chrome Diopside
No of grains	82	2300	25	0
Maximum grain count	13	158	13	0
No of positive samples	32	157	10	0
% of positive samples	6%	29%	2%	0

Table 3 Summary of kimberlitic indicator minerals and positive samples base on major element oxide SEM data.

	(Definite kimberlitic indicator minerals present)	(Not Definitive – minor grains with kimberlitic chemistries)	Not Definitive – dominant crustal overlapping into kimberlite chemistries)	(Negative sample or Non kimberlitic chemistry of all probed heavy mineral grains)
Grand Total	42	127	67	301
% of Total	8%	24%	12%	56%

Table 4: Summary sample rankings based on observation and probe results.

Gravel, loam sample location and SEM major oxide results for all heavy mineral indicators are listed in Appendix 1 Appendix 2 and 5 respectively. Note that for clarity and data management issues, all listed probe data has been screened and only includes chemistry of the potentially kimberlitic minerals.

4.3.1 Heavy Mineral Sample Diamond Results

No diamonds were identified from observation of heavy mineral concentrates.

4.3.2 Gravel Sample Garnet Results

Over 4300 garnet grains from 210 samples were tested by probing returning 82 kimberlitic pyropes in 32 samples. Kimberlitic pyropes are dominantly G9 lhzerolitic and G1, G3 and G4 eclogitic with minor wehrite and megacryst and trace harzburgitic pyrope. The remaining garnets are dominated by almandine, spessartine, grossular and minor uvarovite garnet.

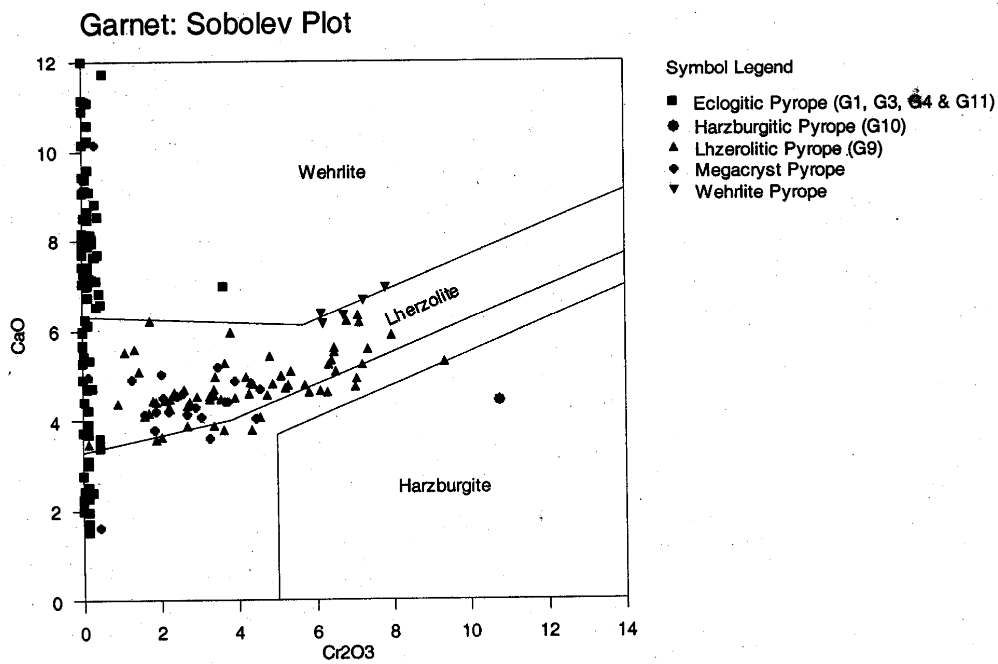

Figure 1 Garnet Sobolev plot (Cr2O3 vs. CaO) for gravel samples from the Mahasamund reconnaissance permit.

4.3.3 Gravel Sample Chromite Results

Chromite populations are dominated by non-kimberlitic sourced species with 35-65% Cr2O3 and 0-20% MgO almost completely overlapping the mineral chemistry fields of kimberlitic chromite species (see figure 2). Estimated 2300-chromite grains in 157 samples are considered to be potentially sourced from kimberlite.

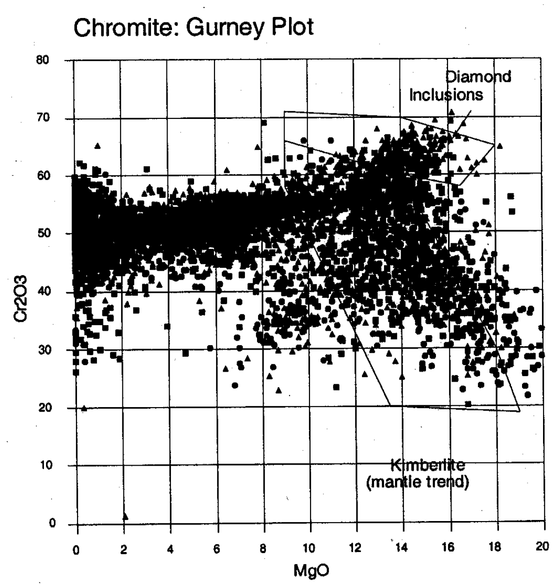

Figure 2: Gurney plot (MgO vs Cr_2O_3) of all chromite grains recovered from gravel samples in the Mahasamund RP. Note the strong overlap of non-kimberlitic species with 35-65% Cr_2O_3 and 0-20% MgO and the kimberlite chromite mineral species fields.

4.3.4 Gravel Sample Ilmenite Results

Ilmenite populations are dominated by non kimberlitic sourced species with <8% MgO and typically <1% Cr2O3. Only 25 grains in 10 samples are considered to be potentially kimberlitic.

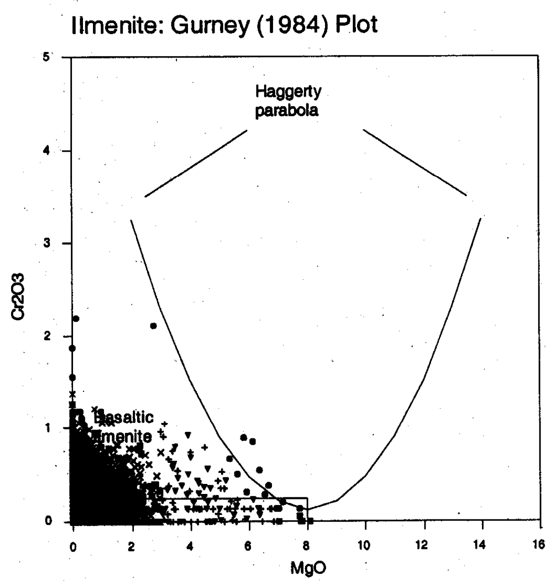

Figure 3: Gurney Cr2O3 vs. MgO plot for ilmenite recovered from gravel samples in the Mahasamund reconnaissance permit area. Red symbols are possibly kimberlite sourced.

4.4 Geochemical Exploration:

A total of 552 stream sediment, 597 soil and 7 rock samples, have been collected and assayed from within the permit area. Summary statistics of geochemical samples collected are given in table 5 - 7. Full data including sample locations and assay results for all samples collected are listed in Appendix 3, 4 and 6 respectively.

Stream sediment samples were collected at the same sample site as the reconnaissance indicator minerals. Each sample consists of approximately 100-150gm of –80# (-180□m) silt collected from the active streambed in the centre or lowest part of the stream. Soil samples consist of approximately 100-150 grams of –80#, C – horizon soil typically collected from a shallow 10 - 30 cm deep hole or at the bottom of an auger hole. Soil samples have been variably sampled either in a nominal 150 –100 meter line spacing and 50m sample spacing grid or as crosshair or single line traverses with sample spacing varying from 25 – 100metres. Rock samples are mainly as floats or from a chip of an outcrop.

Standard sample analysis is for a suite of 37 elements by mixed acid digest with ICP–MS or ICP–OES detection. Elements analysed with individual detection limits in brackets include: Ag (0.1ppm); Al (10ppm); As (0.5ppm); Ba (10ppm); Bi (0.1ppm) Ca (10ppm); Cd (0.1ppm); Ce (2ppm); Co (2ppm); Cr (2ppm); Cs (0.1ppm); Cu (2ppm); Fe (100ppm); K (10ppm); La (1ppm); Mg (10ppm); Mn (5ppm); Mo (0.1ppm); Na (10ppm); Nb (0.2ppm); Ni (2ppm); P (5ppm); Pb (0.5ppm); Rb (2ppm); Sb (0.5ppm); Se (0.5ppm); Sr (2ppm); Ta (1ppm); Te (0.5ppm); Th (20ppm); Ti (10ppm); V (2ppm); W (0.1ppm); Y (1ppm); Zn (2ppm) and Zr (10ppm). For stream sediment samples, further analysis by 10-gram fire assay with ICP-OES finish was conducted for Au (1ppb), Pt (5ppb) and Pd (1ppb).

4.4.1 Stream Sediment Geochemical Results

Stream sediment geochemistry indicates only limited potential for precious and base metal mineralization with several point sources returning maxima of 3.4ppm Ag, 162ppm Cu, 94.21ppm Pb and 130ppm Zn. The combination of point sources, lack of continuity and lack of multi element signatures suggest associated mineralization to be minor or the anomalies themselves to be not associated with mineralization. Stream sediment geochemistry assay by Au, Cu, Pb, Zn are given in Plan NDbg0401a - d. Basic statistics of all elemental geochemistry is tabulated below.

	Ag ppm	Al%	As ppm	Ba ppm	Bi ppm	Ca%	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cs ppm	Cu ppm
Mean	0.81	5.14	4.01	1019.72	0.42	0.70	0.18	111.38	16.30	102.44	3.14	15.11
Median	0.68	5.26	2.42	1022.50	0.10	0.59	0.10	87.36	13.00	86.00	3.13	13.00
Mode	0.05	0.00	0.50	0.00	0.10	0.00	0.10	0.00	7.00	0.00	0.00	8.00
Standard Deviatior	0.61	1.67	4.27	397.08	0.51	0.60	0.17	122.82	13.54	62.27	1.53	10.72
Sample Variance	0.37	2.79	18.24	157671.04	0.26	0.35	0.03	15085.14	183.41	3877.09	2.34	114.91
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3.43	12.28	21.84	2801.00	3.77	4.32	1.43	2107.58	158.00	381.00	10.36	162.00

	Fe%	Ga ppm	In ppm	K%	La ppm	Mg ppm	Mn ppm	Mo ppm	Na%	Nb ppm	Ni ppm	P ppm	Pb ppm
Mean	2.45	32.43	0.04	3.24	53.99	2193.24	754.66	2.10	0.70	31.40	19.43	226.95	14.09
Median	1.97	16.30	0.05	3.42	40.70	1490.50	535.00	1.36	0.69	19.65	16.00	195.00	13.15
Mode	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00
Standard Deviatior	2.23	28.96	0.03	1.13	71.25	2466.17	848.98	2.41	0.39	34.82	14.02	200.93	10.51
Sample Variance	4.98	838.41	0.00	1.28	5075.86	6082009.96	720767.21	5.83	0.15	1212.27	196.66	40372.68	110.48
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	30.05	119.00	0.75	6.91	1319.09	26408.00	11190.00	23.59	2.30	280.23	159.00	2146.00	94.21

	Rb ppm	Sb ppm	Se ppm	Sr ppm	Ta ppm	Te ppm	Ti%	Tl ppm	V ppm	W ppm	Y ppm	Zn ppm	Zr ppm
Mean	104.45	0.71	0.40	117.40	2.86	0.16	0.64	0.30	38.83	1.02	51.18	28.10	421.15
Median	100.86	0.50	0.50	107.00	1.85	0.20	0.35	0.25	35.00	0.64	34.85	25.00	235.50
Mode	0.00	0.50	0.50	0.00	0.00	0.20	0.00	0.10	35.00	0.00	0.00	18.00	0.00
Standard Deviatior	47.71	1.62	0.14	74.95	3.67	0.06	0.96	0.22	20.92	1.16	61.89	16.93	568.84
Sample Variance	2276.37	2.63	0.02	5617.66	13.45	0.00	0.93	0.05	437.78	1.34	3829.86	286.53	323578.59
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	284.34	12.52	0.50	603.00	52.26	0.20	13.88	2.00	168.00	10.51	910.13	130.00	5484.00

Table 5: Basic statistics of –80# stream sediment geochemistry.

4.4.2 Soil and Rock Geochemical Results

A total of 597 soils and 7 rock samples were collected on ground magnetic targets during the RP period. No soil geochemistry anomalies akin to a typical kimberlite signature were returned from the soil-sampling program. Basic statistics of all elemental geochemistry is tabulated below.

	Ag ppm	Al%	As ppm	Ba ppm	Bi ppm	Ca%	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cs ppm	Cu ppm
Mean	0.81	5.14	4.01	1019.72	0.42	0.70	0.18	111.38	16.30	102.44	3.14	15.11
Median	0.68	5.26	2.42	1022.50	0.10	0.59	0.10	87.36	13.00	86.00	3.13	13.00
Mode	0.05	0.00	0.50	0.00	0.10	0.00	0.10	0.00	7.00	0.00	0.00	8.00
Standard Deviatior	0.61	1.67	4.27	397.08	0.51	0.60	0.17	122.82	13.54	62.27	1.53	10.72
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3.43	12.28	21.84	2801.00	3.77	4.32	1.43	2107.58	158.00	381.00	10.36	162.00

	Fe%	Ga ppm	In ppm	K%	La ppm	Mg ppm	Mn ppm	Mo ppm	Na%	Nb ppm	Ni ppm	P ppm	Pb ppm
Mean	2.45	32.43	0.04	3.24	53.99	2193.24	754.66	2.10	0.70	31.40	19.43	226.95	14.09
Median	1.97	16.30	0.05	3.42	40.70	1490.50	535.00	1.36	0.69	19.65	16.00	195.00	13.15
Mode	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00
Standard Deviation	2.23	28.96	0.03	1.13	71.25	2466.17	848.98	2.41	0.39	34.82	14.02	200.93	10.51
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	30.05	119.00	0.75	6.91	1319.09	26408.00	11190.00	23.59	2.30	280.23	159.00	2146.00	94.21

	Rb ppm	Sb ppm	Se ppm	Sr ppm	Ta ppm	Te ppm	Ti%	Tl ppm	V ppm	W ppm	Y ppm	Zn ppm	Zr ppm
Mean	104.45	0.71	0.40	117.40	2.86	0.16	0.64	0.30	38.83	1.02	51.18	28.10	421.15
Median	100.86	0.50	0.50	107.00	1.85	0.20	0.35	0.25	35.00	0.64	34.85	25.00	235.50
Mode	0.00	0.50	0.50	0.00	0.00	0.20	0.00	0.10	35.00	0.00	0.00	18.00	0.00
Standard Deviation	47.71	1.62	0.14	74.95	3.67	0.06	0.96	0.22	20.92	1.16	61.89	16.93	568.84
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	284.34	12.52	0.50	603.00	52.26	0.20	13.88	2.00	168.00	10.51	910.13	130.00	5484.00

Table 6: Basic statistics of soil geochemistry.

	Ag ppm	Al%	As ppm	Au ppm	Ba ppm	Bi ppm	Ca%	Cd ppm	C ppm	Co ppm	Cr ppm	Cs ppm	Cu ppm	Fe%
Mean	0.51	4.43	28.10	0.00	393.57	0.33	6.15	0.03	40.28	35.00	529.43	2.59	51.29	4.15
Median	0.33	4.92	1.48	0.00	249.00	0.25	2.34	-0.10	48.47	22.00	435.00	1.37	33.00	4.51
Mode	-0.10	#N/A	-0.50	0.00	#N/A	-0.10	#N/A	-0.10	#N/A	#N/A	#N/A	#N/A	33.00	#N/A
Standard Deviation	0.71	1.77	65.85	0.00	306.85	0.39	10.37	0.38	21.48	30.77	480.58	2.67	31.23	2.82
Minimum	-0.10	1.63	-0.50	0.00	67.00	-0.10	0.02	-0.50	0.80	4.00	37.00	0.00	27.00	0.50
Maximum	1.64	6.45	177.00	0.00	887.00	0.89	29.28	0.55	61.01	91.00	1247.00	7.67	109.00	7.76

	Ga ppm	In ppm	K%	La ppm	Mg%	Mn ppm	Mo ppm	Na%	Nb ppm	Ni ppm	P ppm	Pb ppm	Pd ppm	Pt ppm
Mean	10.27	0.02	1.05	27.21	3.27	860.00	0.61	0.50	11.04	205.00	271.43	13.96	0.00	0.00
Median	9.78	-0.05	1.05	28.35	0.99	874.00	0.46	0.40	5.21	55.00	305.00	11.46	0.00	0.00
Mode	#N/A	-0.05	#N/A	#N/A	#N/A	#N/A	0.32	#N/A	#N/A	#N/A	#N/A	#N/A	0.00	0.00
Standard Deviation	6.23	0.11	0.64	18.81	3.87	623.54	0.55	0.44	13.82	226.40	172.42	7.82	0.00	0.00
Minimum	0.00	-0.05	0.39	0.50	0.07	53.00	0.19	0.09	-0.50	29.00	40.00	6.50	-0.01	0.00
Maximum	17.80	0.18	1.93	60.43	9.48	1982.00	1.80	1.22	40.10	636.00	499.00	26.29	0.00	0.01

	Rb ppm	Sb ppm	Se ppm	Sr ppm	Ta ppm	Te ppm	Ti ppm	Tl ppm	U ppm	V ppm	W ppm	Y ppm	Zn ppm	Zr ppm
Mean	43.41	-0.31	-0.43	101.90	5.82	-0.17	2840.00	0.17	0.01	97.00	1.43	13.85	46.71	60.71
Median	34.73	-0.50	-0.50	104.00	1.03	-0.20	3062.00	0.00	0.00	80.00	0.77	13.65	46.00	63.00
Mode	#N/A	-0.50	-0.50	#N/A	#N/A	-0.20	#N/A	-0.10	0.00	#N/A	#N/A	0.00	#N/A	#N/A
Standard Deviatior	32.33	0.49	0.19	65.08	8.62	0.08	1791.83	0.34	0.04	45.20	1.67	17.39	23.31	31.71
Minimum	0.00	-0.50	-0.50	9.30	-0.50	-0.20	310.00	-0.10	0.00	33.00	-0.10	0.00	14.00	3.00
Maximum	90.73	0.80	0.00	209.00	20.69	0.00	5547.00	0.75	0.10	160.00	4.45	48.61	82.00	102.00

Table 7: Basic statistics of rock geochemistry.

4.5 Geophysical Survey

Ground Geophysics

Ground geophysical surveys were undertaken on identified anomalous kimberlitic indicator catchments. Ground geophysical survey were done in preference to airborne geophysics due to the limited anomalous area defined by indicator mineral and geochemical surveys and the higher sensitivity of ground based surveys in detecting subtle changes in the magnetic and electromagnetic intensity.

Within the RP, a total of 9 ground magnetic grids, totaling 1130 line kilometers (75 km^2), at a nominal line spacing of 75 - 100meters were surveyed covering the anomalous catchments defined on the basis of highest priority anomalous indicator mineral results. An index map showing the all the ground geophysics grids is attached as NDbg0533.

Surveys were completed using Scintrex Envimag magnetometers operating in "walkmag" mode. Survey lines, oriented north south, were spaced at nominal 75-100m, with a sampling rate of 2 seconds equating to a sample interval of 2-3 meters along the line. Navigation was by hand-held GPS, providing a positional accuracy of +/- 10 meters. A magnetic base station, positioned central to the individual grids, measured diurnal variations at 20-second intervals.

Raw field data were corrected for diurnal variations and filtered to remove "movement noise" inherent to the Envimag "walkmag" system. The filtered data were then reduced to magnetic pole to remove the effects of geomagnetic inclination and declination on the anomaly geometry. Anomalies were selected and prioritised based on their profile form, size and proximity to anomalous samples. The following grids are covered by ground geophysics.

Max-Min Electro magnetics

4.2-line kms of orientation horizontal loop (Max-Min) electro magnetics surveys were completed to ascertain background conductivities in the area. The Max-Min survey was carried out using 100m transmitter-receiver spacing with readings taken every 25m along the survey line. In-phase and quadrature response was measured for the frequencies: 200, 880, 1760, 3520 and 7040Hz.

The electro magnetics signature was relatively noisy, reflecting the variable conductive surface cover and moisture content within cultivated paddy/drainage systems. (Plan NDbg0534)

Grid 1039A

The 1039A grid is characterised by a highly variable magnetic background, typical of the Archaean granites. Low priority discrete magnetic targets were followed up with geological traversing and soil geochemistry. Several linear features are apparent in the grided data, including a NNW-trending linear mag high in the SW of the grid, a NE-trending linear mag low in the SE of the grid and a NS-curvilinear magnetic low bisecting the grid. (Plan NDbg0534)

Grid 1039B

Two distinct magnetic domains characterize 1039B grid. The southwestern half of the grid has a relatively quiet magnetic background whereby the northeastern half has a highly variable magnetic background. Discrete magnetic anomalies were followed up by geological traversing and soil geochemistry surveys. (Plan NDbg0534)

Grid 1036

The 1036 grid exhibits a moderately active magnetic background, characteristic of the gneissic terrain. Several targets have been identified within the grid, although all remain a low priority considering the possibility of other, non-kimberlitic, sources producing a similar response in this type of terrain. (Plan NDbg0534)

961 Grid:

The 961 grid is characterised by a moderately active magnetic background showing a general NE-trending fabric manifested as linear RTP mag lows. There is no apparent coincidence with any cultural features in this area. (Plan NDbg0534)

1007 Grid:

The 1007 grid is dominated by a broad wavelength RTP high in the western portion. Low amplitude surficial noise dominates in the eastern half of the grid, and is predominantly sourced by cultural features. (Plan NDbg0534)

1007 West Grid:

The 1007W grid was established over an area, which had been under-sampled, due to the lack of any defined drainage system in the local area. The grid is dominated by a broad wavelength RTP high in the western portion. Low amplitude surficial noise dominates in the eastern half of the grid, and is predominantly sourced by cultural features. (Plan NDbg0534)

1008 Grid:

The 1008 grid is dominated by a broad wavelength RTP high in the eastern portion. There is no apparent coincidence with any cultural features in this area. (Plan NDbg0534)

1034 Grid:

The 1034 grid is characterised by two distinct magnetic domains: a relatively noisy background in the North and a smoothly varying local N-S magnetic gradient in the northern half of the grid. The differing magnetic domains reflect a lithological change. (Plan NDbg0534)

1034N Grid:

The 1034N grid is characterised by two distinct magnetic domains: a relatively noisy background in the south and a smoothly varying local N-S magnetic gradient in the northern half of the grid. The differing magnetic domains reflect a lithological change. (Plan NDbg0534)

1034W Grid:

The 1034 grid is characterised by a moderately active background exhibiting a regional WNW trending fabric. The dominant feature on the grid is a discrete high amplitude elongate dipolar RTP anomaly located in the eastern area of the grid. (Plan NDbg0534)

1035 Grid:

The 1035 grid is characterised by an active magnetic background crosscut by NW and NE-trending lineaments. (Plan NDbg0534)

3083 Grid:

A moderately active background, crosscut by NW-trending lineaments, characterizes the 3083 grid. (Plan NDbg0534)

Grid 1016

The 1016 targets are the usual RTP magnetic highs / linears and lows. As seen in the picture, also the background is quite active magnetically. (Plan NDbg0534)

4.5.1 Anomaly Selection and Follow-up Process

Anomaly selection was based on the integration of all data sources including gravel and loam indicator mineral distribution, geology and structure, Landsat TM and IRS remote sensed data, airborne HEM and magnetic data. A total of 95 anomalies were identified for follow-up using various combinations of geological mapping, ground magnetic surveying, ground gravity, soil and rock geochemistry, loam kimberlitic indicator mineral sampling. No drilling was carried out in Mahasamund RP.

5 HEALTH, SAFETY, ENVIRONMENT AND COMMUNITY

Rio Tinto recognizes that excellence in managing health, safety, environment and community responsibilities is essential to long-term success. Through effective management practices the Group aims to ensure the health and safety of its employees, to minimize any adverse impacts its activities may have on the environment and to make a positive contribution to local community life.

The policies apply to all Rio Tinto subsidiaries and managed by the concerned company including ARTE and the Mahasamund reconnaissance project. A summary of Rio Tinto's HSEC and other policies are summarized in "The Way We Work", a copy of which is provided in appendix 7.

5.1 Health and Safety

Rio Tinto Group policies on Health and Safety are designed to minimize the risk of injury or occupation illnesses. A minimum management requirement at all of the company-managed operations is to ensure full compliance with the Rio Tinto Standards. The goal is for zero work related injuries or occupation illnesses.

Minimum prerequisites require that all work activities be based on risk assessments ensuring that effective controls and safe work procedures exist for all hazardous activities. Further the standards require a system for ensuring that employees are trained, equipped and where applicable, certified to carry out their work according to the applicable safe work procedures, and that their competence has been tested. On the Chhattisgarh project the major hazardous activities were assessed to incorporate vehicles and driving, manual handling and electrical work. Risk assessments and selective standard operating procedures have been developed for specific tasks associated with each of these and for many other potentially hazardous activities. Safety training and other initiatives have focused mainly on these higher risk areas including but not restricted to the following:

- Employment of dedicated drivers for all company vehicles.
- Training of a staff supervisor as an accredited defensive and 4 – wheel driver instructor.
- Annual competency based defensive and 4 wheel driving training for all drivers including for all licensed technical and support staff. All three training programs to date have been undertaken by accredited and experienced Australian based driver training companies.
- Annual first aid, accident management and emergency response training to all senior staff. Professional paramedical instructors sourced from various accredited international companies have undertaken four programs.
- Selected personnel have been trained in managing "work at height", "confined spaces" and in "manual handling" issues by accredited International companies. Knowledge gained from this training has been utilised by the individuals in minimising exposure to such risks and by coaching other personnel to be able to recognise the risk and where appropriate, designed and implemented safe operating procedures.

- Hire of designated field accommodation and office facilities each upgraded to meet company standards including electrical which required significant rewiring and installation of specialised equipment. Local private electrical contractors were identified and trained to maintain the electrical system to international standards.

The corporate systems have a requirement for all employees, including staff and contractors, to report hazards and incidents and for management to have a system for review and analysis of higher risk incidents and for the implementation of appropriate mitigating measures. The objective of having incident reporting system is to avoid the repetitions of any incident through out-group operations and improve up on the safety culture.

Numerous frontline management and three annual Rio Tinto corporate safety audits have been conducted on the exploration groups operations in India. Audits in all cases have found the Indian operations to be of a high standard and compliant with only minor exceptions that have subsequently been rectified. In 2004 and 2005 into Exploration –Australasia region, including the Indian operations that contributed significantly, was awarded a Rio Tinto Group Chief Executive Safety award. Over 85 Rio Tinto managed companies from all over the world were reviewed with only three receiving the award in recognition of the excellent safety performance over the proceeding three years. A commendation for the same was received in 2003.

5.2 Environment

Rio Tinto Environmental Policy aims to prevent or otherwise minimize, mitigate and rehabilitate any harmful effects that the group's operations have on the environment. Although exploration activities including those completed in ARTE Mahasamund reconnaissance permits is essentially non-invasive to the environment, the same rigor and level compliance to the standards, systems and procedures is applicable.

For the Mahasamund reconnaissance permits an Environmental Management Plan was devised prior to the initiation of field activities and subsequently updated as the program developed. The plan evaluated potential environmental impacts associated with the activities and provided procedures to prevent or minimize impacts. In case where an impact was unavoidable or accidental, appropriate rehabilitation procedures were in place. Relevant exploration personnel including those of contractors were inducted and trained in these procedures. Otherwise a competent person supervised the work to ensure minimal environmental impact. Control systems included incident reporting and annual environmental reporting to first-line management and corporate audits.

Identified areas for potential environmental impact on the Mahasamund permits for which procedures were designed and implemented include the following:

- Ground disturbance due to access tracks: No access tracks were constructed for exploration in the permit areas. Access in all cases was achieved by using the existing infrastructure or during the dry season and when no crops were present, by driving cross-country. In the latter case, care was taken to ensure minimal compaction of ground and minimal potential for soil erosion.

- Sampling: Sampling operations had minimal to zero environmental impact. Gravel and stream sediment samples were in all cases taken from the active streambed load and care was taken to avoid any damage to the stream banks. For soil sampling and auger sampling excess soil was filled back into the excavated hole. In all cases sample sites were accurately located by GPS thus eliminating the need for flagging tape or other tags to mark the sample sites. All sample site photos are incorporated in to the database and a few representative photos are published in annual environmental report.

- Ground Geophysical Surveys; All geophysical surveys were carried out without cutting any trees or bushes with the GPS facility. Access along prognostic grid lines was by foot and wherever possible trees and other obstacles were avoided by diverting the line.

- Regular internal audits are conducted to ensure compliance to internal standards.

Most of the forest in the area of operations is dry (arid) deciduous thorny type with dominantly Sal flora. Limited surface sampling was conducted within the forest areas with the permission and cooperation of the relevant forest authorities. No significant environmental incidents were experienced during the period of this survey.

5.3 Community Relations

There are more than 300 villages within the RP areas with a total population estimated to be over 75000. Agriculture is the main occupation for over 80% of the population. Industrial activity is mainly agrarian. Agriculture is mostly single crops restricted to the monsoon season with less than 5% under irrigation.

During the term of the exploration specific community relations policy applications included:

- Brief sheet: About 2500 community brief sheets were distributed among the local community to share with them the exploration process and the results so far. The brief sheet would be revised once in six months and up dated with latest results of our activities.

- Employment: Employment to a number of local people to work in various roles in the organisation including geologists, field supervisors, community relations staff, drivers technical assistants, cooks and housekeeping staff and others. In total up to 30 employees, the majority sourced locally were employed in the field based out of our operational bases at Mahasamund, Saraipali, Sitapur and Pathalgaon.

- Established preferred supplier/service relationships with several local businesses for the purchase and supply of most of the required field consumables, notably for food, water and fuel and for service and repair of field equipment.

- Undertook various community initiatives including erection of environmental awareness boards along NH Roads with the support of the State Forest Department. The initiatives were participatory with the community providing labour and the company the equipment, finance and supervision Total direct costs for these programs to date amount to INR 40000.

- Conducted over 1000 consultations with stakeholders including village elders, village leaders teachers, individual landowners and others. The main focus of these consultations was to request access and to keep the community informed of our presence and activities.

- Developed internal systems to record, report and monitor community activities and devised strategies to address impacts. All front-end field personnel were oriented and inducted prior to interaction with the community. Two community relation specialists were employed and were available during negotiations and consultations with the local community.

- Briefing sheets in vernacular summarising the exploration activities were distributed to the community in the RP area. The purpose of these sheets was to keep the community informed of the exploration activities and to minimize rumours and misinformation.

Village	**Initiative**	**Stakeholders**	**Participatory Contributors**	**Total cost (Rs)**
Mahasamund	Cleaning of the Trimurthy Colony in Mahasamund	Residents of colony	ARTE	5000
Mahasamund District	Construction of 10 environment awareness boards	Community in the District	Forest Department, Mahasamund Circle	35000

Table 8 List of community initiatives undertaken by ARTE on the Mahasamund reconnaissance permit.

7 REFERENCES

K.S Murthy (1987) Memoir Geological Soc. India

Keywords

India, Bastar Diamond Exploration, Kimberlitic Indicators, Geochemical-Soil Sampling, Geophysics, Magnetics.

Locality

Mahasamund 64 K, 64 L, 1:250 000 sheets

Descriptor

Final report of all exploration for diamond and other mineral commodities completed in the Mahasamund districts of Chhattisgarh by ARTE during the term of RP Feb 2003 to Feb 2006.