PRODUCTIVITY ACCOUNTING

ON AN

OPERATING MINE

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A Project Report submitted to the Faculty of Engineering, University of the Witwatersrand, in partial fulfillment of the requirement for the degree of Master of Science in Engineering

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DECLARATION

I declare that this project is my own, unaided work. It is being submitted for the Degree of Master of Science in Engineering in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

D C COCKCROFT

EIGHTEENTH day of NOVEMBER 1996

ABSTRACT

Industry in South Africa, and in particular the Mining Industry is faced with unprecedented challenges to remain profitable. Commodity prices, and in particular gold have remained static for years. During this period the cost side of the equation has been driven higher by increasing costs, of which labour is a major component.

The purpose of this work is to review the causes of poor productivity within the mining industry and examine whether such factors are within the control of the industry.

Given that a large measure of control exists over these factors, a technique known as Determination Productivity Accounting has been examined as a tool for analysing changes in productivity between periods. The method is recommended for setting goals, and for monitoring progress.

Data from an operating mine has been analyzed in a practical way, and the technique demonstrated as an effective method in creating a framework for ensuring a sustained improvement in productivity.

ACKNOWLEDGEMENT

Thanks are due firstly to Clive Workman-Davies, Senior Lecturer, Department of Mining Engineering, University of the Witwatersrand for promoting the concept of productivity to both under and post graduate students.

Thanks to Basil van Loggerenberg for making time available and for his assistance.

Thanks are due to Anglovaal , and Roger Dixon for giving me permission to use data from one of the group mines.

Lastly to Gretta Mullen, for being so willing and helpful in preparing the documentation.

1. INTRODUCTION

The promotion of productivity concepts within South Africa is not new, and excellent work has been done by organisations such as the National Productivity Institute and by various individuals. The mining industry has not escaped the culture of low productivity growth which has developed in the economy in the last decade and a half, and the under-performance thereof has been well documented.

The impression might easily be created within the mining industry that the causes are external factors, over which the industry has little or no control. In examining the real causes, it is evident that the industry does in fact have a large degree of control over these causes, and is well positioned at this stage to change the environment in which it operates.

A continued and sustained productivity improvement is as vital to the mining industry, as it is to the economy. If the industry is to remain a vibrant employer of many thousands within this country, and to contribute towards the improvement of living standards within South Africa, this can best be achieved through productivity improvements.

The industry has done much to address the causes of poor productivity in recent years. We have trained people, tried to improve skills, improve educational standards, promoted productivity concepts, introduced new technology and trained our managers. However, the question needs to be asked, "how effective have we been, and what are the results?"

The above efforts, which deserve to be applauded, will in themselves not result in a sustained productivity improvement. It is much like treating the symptoms of a disease, without treating the root cause of the problem.

The industry will have to develop long term strategies aimed at a sustained productivity improvement, rather than focus on short term measures. Clear

productivity objectives need to be developed, with action plans detailing how these objectives will be met. The measurement of progress towards achieving these goals is essential to control progress. Fundamental to the implementation of these long term strategies is therefore a sound method of measuring productivity, which has not really been possible to date.

Deterministic Productivity Accounting as developed by B J van Loggerenberg (1), has been thoroughly examined in the light of the above needs, and is found to meet all requirements. The implementation of the theory has been demonstrated on results from a mining operation in which it demonstrates itself as a most effective tool in assisting management in posing the right questions in the endless quest to improve productivity.

2. WHY PRODUCTIVITY IMPROVEMENT IS IMPORTANT

2.1. The Link Between Productivity and Standard of Living

An individuals standard of living depends primarily on what goods and services he enjoys. Therefore the standard of living of any community depends on what goods and services it produces for itself or to exchange for goods and services it imports. Thus productivity is paramount, and the way to increase wealth in a society lies in increasing productivity

In the national context, there is a direct link between well-being of the population and productivity improvement. **In the words of Milton Friedman, "In the long run nothing is more important for the economic prosperity of a country than a continual improvement in productivity".**

Everything consumed as goods and services has to be paid for in the long term. We have limited reserves in terms of finances, skilled labour, etc., and the standard of living which can be afforded depends on what value of goods are produced.

What is true for the nation, is just as valid for any organisation. Everything consumed as resources, including labour has to be paid for. The sustainability and prosperity of the organisation depends on how productively the resources are used. Similarly, in the long term nothing is more important for the economic prosperity of an organisation than a continual improvement in productivity.

2.2. South Africa's productivity Performance

How far South Africa's productivity performance falls short of that of competing countries is evident by comparing figures with those of the UK and Japan. From 1981 to 1987 the GDP per head of the population in the UK increased at an average rate of 2.7 per cent per annum and in Japan at a rate of 3.2 per cent, but in South Africa it decreased at a rate of 1.7 per cent per year during the same

period. During this period the GDP per worker in the UK increased at a rate of 2.3% per year and in Japan at 2.9%, whilst in South Africa it increased by only 1.1% per year.

It is of particular importance to note that the productivity of capital in S.A.'s business sector gave cause for concern; in 1987 the production per unit of capital was only 68% of the level achieved in 1970. During the same period the productivity of labour increased in total by 39%, which means that total factor productivity increased by only 13% during this period. (2)

Whilst the figures are slightly outdated, it is certain that the picture has not changed for the better in the last few years. The South African economy has therefore slipped badly in the last decade and a half, with overall productivity barely increasing whilst significant gains are being made by our main trading partners. It may well be said that we have developed a culture of poor productivity achievement.

2.3. The consequence of poor productivity

The consequence has undoubtedly been a deterioration in the standard of living of the S.A. population year after year, as we fall further behind our major trading partners.

If the high expectations of people are to be realised in the new South Africa, considerable funds will have to be generated within the South African economy through high economic growth, or alternatively loaned on the international markets. Loans and aid are clearly not a long term solution, and there are always conditions attached.

Growth within the economy can arise from only two sources:

2.3.1. Doing more of the same thing

It stands to reason that if more industries and mines are created, that the overall contribution to the G.D.P. will increase and consequently the standard of living of the population. This however will require the investment of billions of rands, which will in turn require an attractive investment climate. This environment is at present sorely lacking for many reasons, not least of them being lower productivity, especially on investment capital. The likelihood of this option materialising must therefore be seen as remote.

2.3.2. Doing the same thing better, or improving productivity.

It is interesting to note that in Western European nations, that 60 - 70% of growth in the last decade has come from productivity improvements, rather than from increased capacity (3)

South Africa therefore has no option, but to systematically embark on the improvement of productivity across the economy if improvements to the standard of living of the population are to be sustained in the long term.

3. REASONS FOR POOR PRODUCTIVITY IN THE MINING INDUSTRY

From work done by the NPI, we see that the main reasons for poor productivity growth in the mining industry are very similar to reasons listed for the economy as a whole. The mining industry has therefore not escaped the national culture of low productivity growth which has developed during the last decade and a half. The fundamental causes therefore extend beyond the bounds of the industry, and the impression might easily be created that the cause is due to external factors, over which the industry has no control. This impression needs to be rigorously tested, and the industry needs to carefully assess what factors it can directly change in the long term interests for the survival of the industry.

3.1. Lack of Education and Training

The lack of education and training within the mining industry must be seen against the background of historical and political developments within the mining industry.

The labour intensive mining methods perfected during the decades since the turn of the century have traditionally sourced the lowest levels of educated and trained labour available, often from rural areas and neighbouring states(3). Labour was recruited on a short term contract basis, and consequently training reflected such policies. The system was also perpetuated and re-enforced by years of apartheid ideology.

The skilled labour pool from which the mines have drawn, whilst more stable has also been from the lower education and trained categories, with a certain negative stigma attached to "working on the mines".

However, the mining industry today has total freedom in selecting whom it wishes to employ, and what educational standards are acceptable. The level of training and course content of such training is also industry controlled, and the level and intensity of training to improve worker skills determined by the industry.

3.2. Poor Levels of Productivity Awareness

Productivity improvements hold tangible benefits for all concerned, the individual employee, the employer and employee organisations and the State if managed properly.

Poor levels of productivity awareness, or poor attitudes to productivity improvements can only be ascribed to ignorance and lack of understanding of the potential benefits.

Ignorance and misconceptions can be overcome by training, education and reinforcement, which are certainly within the control of the mining industry.

3.3. Poor Implementation of New Technology

The implementation of new technology within the mining industry has been notoriously slow, and met with very limited success. Many reasons and excuses can be given, but once again the trend is similar to the broad South African economy. S.A. is notoriously bad at investing in research and development, and lags way behind it's most important trading partners(3).

The reality of the global environment is that knowledge is expanding at an exponential rate with the total knowledge in the world doubling every 2½ years and with the time period to re-double shortening. Researched and developed knowledge is applied as new technology.

Whether we like it or not, the mining industry competes internationally and companies which can successfully implement relevant new technology will have a competitive advantage.

The responsibility for the implementation of new technology rests squarely on the shoulders of the mining industry itself.

3.4. A Lack of Management Skills

The lack of management skill is particularly disconcerting, since studies have shown that 85% of productivity improvement is related to management. This is because management's responsibility is to energetically allocate the production resources available in the organisation as profitably and productively as possible(3).

Our industry has become large, but not great, and unless a new course is embarked upon, our industry will gradually be overtaken.

One of the most striking features of the national culture of low productivity growth developed, is the focus on short term benefits. The mining industry within S.A. largely I believe due to our inheriting the same attitude as the colonial powers who controlled these assets for years, and due to the apartheid system, has focused on maximising short term gains and has totally neglected the long term well being of the industry.

Sustained productivity improvement must be seen as a long term strategy, with long term benefits. Effort and resources invested may take years to germinate and produce fruit. A fundamental change in outlook by the mining industry will be required if the productivity culture is to be changed for the better.

4. HOW TO IMPROVE PRODUCTIVITY

I do not believe that the mining industry has 'just sat back" and done nothing to improve productivity in the last couple of years. We have become more and more acutely aware of our overall poor productivity performance compared to the rest of the world. We have trained people, tried to improve skills, improve education, promoted productivity concepts, introduced new technology and trained our management.

All the above efforts have been good, but the question must be asked "how effective have they been?". In the words of Peter Drucker, "Without productivity objectives a business does not have any direction. Without productivity measurement it does not have control".

This brings us to two key words in improving productivity.

4.1. Productivity Objectives

Objectives are what keeps us focused, or gives us direction, and a vision of where we are going. Objectives must be simple, easy to understand and taken down to the lowest levels.

Objectives must be translated into a clear action plan or strategy of how to achieve the objective.

In most attempts to improve productivity we have either not had objectives, or objectives have been inadequate. An objective of a reduction in labour or working costs by 5% per annum in real terms is of no use if an action plan does not spell out how the objective will be achieved.

One of the main reasons why management has failed to set objectives and draw up action plans is due to a lack of understanding of productivity issues, or an inability to measure productivity effectively.

4.2. Productivity Measurement

Measurement gives management control of progress towards achieving the objectives. It is therefore obvious that ineffective measurement gives management no control over productivity improvement. Without control, even well meant productivity improvement measures quickly run out of steam, as benefits cannot be quantified.

4.3. Productivity Improvement Strategy

A sustained long term improvement in productivity can best be achieved by developing a long term strategy based on clear objectives related to all factors having an influence on productivity. Effective productivity measurement is a pre-requisite in setting these objectives and controlling progress.

4.3.1. Work Involvement

Increased worker involvement has become a reality. Workers, often through employee organization and unions are increasingly making more demands on employers relating to wages, conditions of employment and safety. Employers are being subjected to further pressure to assume a greater social responsibility in improving the standard of living of employees and the community at large.

To-date management has been on the receiving end, giving in to demands but without securing productivity gains in return. The focus of all negotiations must be on productivity improvement, with an understanding that benefits will be shared by both parties. A good relationship of mutual trust must be developed between workers and management. The achievement of this objective will only be possible if productivity concepts are understood by all, and if acceptable means of measuring productivity can be agreed to. Under these circumstances increased worker

involvement will be most positive and desirable. A trend has become evident in the mining industry of late where profit sharing bonus structures are being negotiated. This may lead to workers receiving completely the wrong signals as they have no control over the prices of the inputs and products. It is therefore quite feasible that workers could receive increased bonus payments based on increasing product prices whilst real productivity is declining or vice versa.

The question which must be answered is quite simply, "does the transfer of wealth from shareholders to workers result in an increase in productivity. If it does, then the measures envisaged may be economically justified.

4.3.2. New Technology

The successful implementation of new technology will require vastly more resources than committed previously. Relevant new technology must be identified, and successfully implemented.

Once again, the question which must be asked and answered is the same as above, in other words will the resultant increase in productivity justify the increased expenditure. It is obvious that this question can only be answered if productivity changes as a result of the new technology can be effectively measured.

4.3.3. Management

The successful implementation of a long term productivity improvement strategy rests largely with management, and the management skills and techniques employed.

The successful management of worker involvement and the implementation of new technology will require a clear understanding of productivity concepts, and the development of new skills.

New demands will be made on traditional organisational structures and on training and educational standards.

5. THE REQUIREMENTS FOR EFFECTIVE PRODUCTIVITY MEASUREMENT

Effective productivity measurement must measure productivity as it relates to profits, as business focuses on profits. The contributions to profits from productivity improvements must be measured, if the questions raised in the previous section are to be answered.

The whole picture must be looked at. By focusing on partial measures such as labour inputs only, we lose sight of the overall operation, not realising that a change to one input can affect other inputs as well.

Many well meaning productivity improvement drives have been launched focusing only on one input, such as labour/m², labour/t produced etc. Inevitably the total picture in terms of change in profits are not tracked, and whilst certain success is achieved in one area, the operation may regress in others. Unless the contribution of all inputs are assessed, the efforts may be in vain, merely taking the organisation in circles with no real productivity gains being made in the long term.

6. THEORY OF DETERMINISTIC PRODUCTIVITY ACCOUNTING

The theory developed by B J van Loggerenberg will be briefly covered below.

Productivity is defined as the rate of Product Quantity over Resource Quantity. Productivity between two periods has improved if the rate between the periods has improved and vice versa. It must be remembered that Productivity measurement always compares results from one period with another. In terms of the theory these are defined as the old and new periods.

In reality it is not only quantities which change between periods, but prices as well. This could be prices of inputs or products between the periods. Price Recovery is defined as the ratio of the product price over the resource price.

The relationship between Productivity and Profits can be intuitively understood, and it stands to reason that if the rate of Product Quantity over Resource Quantity is improved, that this will contribute positively to Profits. Similarly if the Price Recovery component has improved, this will also have a positive contribution to productivity.

The link between Productivity Profits, and Price Recovery is simple, with changes in Profits between two periods being the sum of changes in Productivity (quantities) and changes in Price Recovery (prices).

∴ Profit change = Productivity Variance + Price Recovery Variance.

For each resource used in producing a product the contribution to the overall change in Profit can be calculated and likewise, the contribution to this Profit change from the Productivity and Price Recovery variances. The term variance is defined as the deviation from a fixed linear relationship based on the old period Profits and Revenues.

6.1. Calculation of Productivity Variances and Price Recovery Variance.

For each resource, there exists a new and old price (Pn and Po) and likewise a new and old quantity (Qn and Qo). Diagrammatically, the theory may be presented as shown in Figure 6.1.

Calculation of the productivity variance
Y new = (Qnp - Qn)Pn.

where Qnr = Qo (1+ delta Q old (U)).
and delta Q old (U) = change in product quantity index.

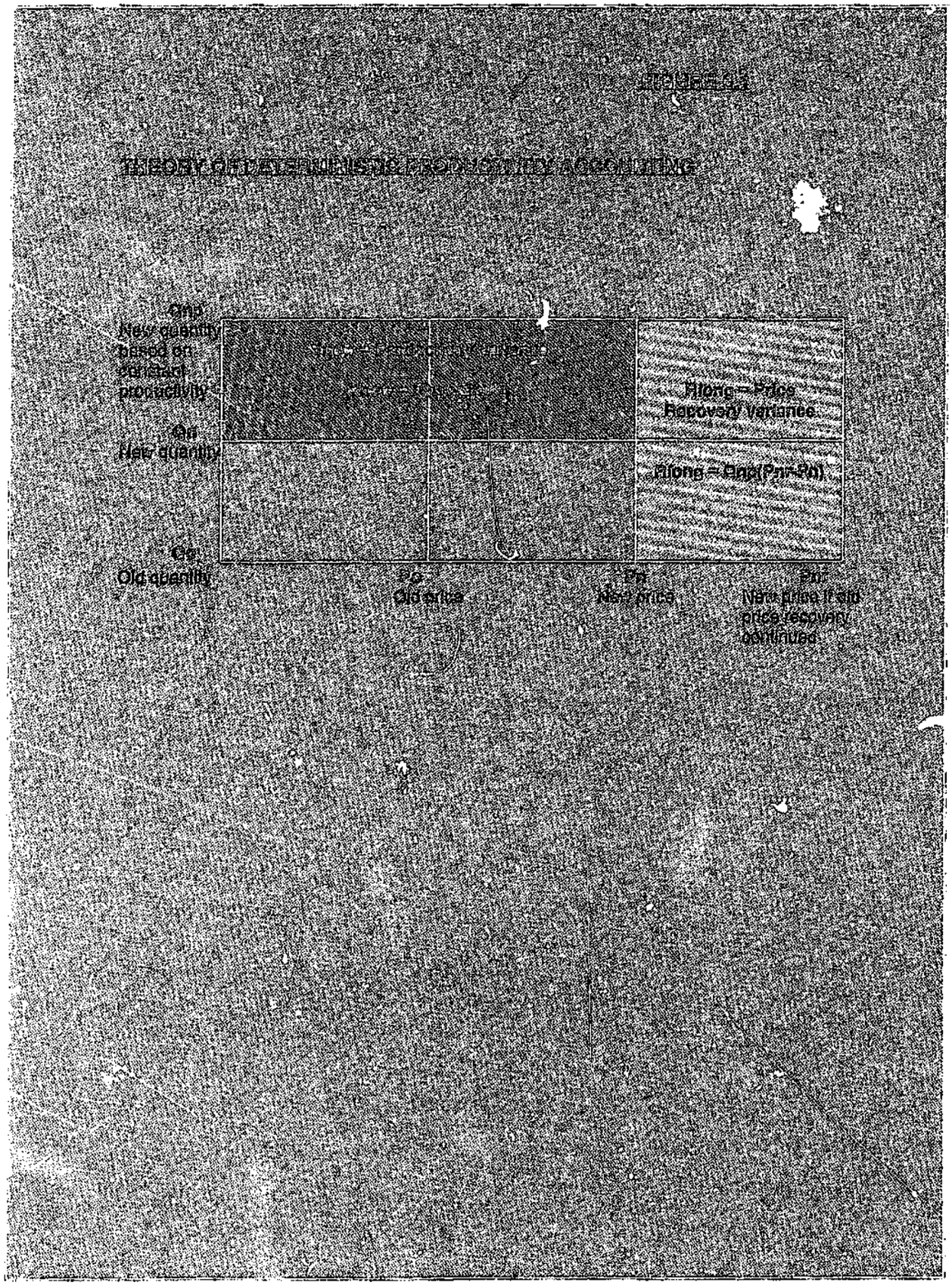
$$= \frac{Qun - Quo}{Quo}$$ where Qun = new product quantity .
and Quo = old product quantity in the case of a single product.

Calculation of the price recovery variance.
R long = Qnp (Pnr - Pn).

where Pnr = Po (1+ delta Pnew (U)).
and delta Pnew (U) = change in price index for products.

$$= \frac{Pun - Puo}{Puo}$$ where Pun = new product price
and Puo = old product price in the case of a single product.

The application of the theory is best illustrated by the worked example based on results from an operating mine.


Qnp
New quantity based on constant productivity
Qn
New quantity
Qo
Old quantity
Po
Old price
Pn
New price
Pn'
New price if all price recovery continued
Rlong = Price Recovery Variance
Rlong = Qnp(Pn'-Po)

7. DESCRIPTION OF THE MINE

The mine selected is a single product producer, but nevertheless includes all the important operations associated with mining.

The mine is located in the Western Transvaal, and an industrial mineral is mined. An orebody is developed along strike within the alumina rich shale band at the base of a banded ironstone ridge in the foothills of a mountain range.

Anglovaal took over the ownership and management of the mine a few years ago. Ore is exposed in a number of pits by stripping the topsoil, loading off the weathered overburden to a waste dump. The ore is shake blasted depending on how difficult it is to load and loaded with 3.5m³ shovels and transported to the plant by means of 35t dump trucks. Access to the pits is obtained by a series of ramps.

Ore is crushed, screened and separated in a heavy medium under the addition of ferro silicon. The material is then dried in an oil furnace, and the product cleaned by a magnetic separation process.

180 000 tpm is treated and approximately 9000 tpm of product is produced. The product is transported to the rail siding by truck and railed to Richards Bay for export or despatched to the domestic market. Marketing trends over the last few years show an increasing production being sold on the export market.

In order to apply the theory to the actual results of operations, it is necessary to model the overall operation by breaking it down into smaller operations. The output from one operation then becomes the input to the next, and the productivity variance and price recovery variance for each of these operations can be calculated. The level to which the overall operation should be broken up depends as to what detailed information is available and the desired results.

8. DESCRIPTION OF THE MODEL

8.1. Purpose of the Model

In order to apply the theory and calculate the contributions to changes in profit from the Productivity and Price Recovery Variances it is necessary to model the business into at least one operation where input quantities are transformed into some form of output quantities. In the simplest form, for a mining operation, all the inputs in terms of labour, stores, electricity, water etc. are input into one operation, with the output being tons of final product. In most mines, it is possible to clearly break down the business into a number of intermediate operations i.e. ore from the mining operation is passed on to the plant operation which in turn produces an output which may be the final product. The theory accommodates the calculation of Productivity and Price Recovery variances for each of these intermediate operations. The contributions to changes in Profit for the total business is therefore the sum of contributions for all the intermediate operations.

In theory there is no limit to the number of intermediate operations or the level to which one wants to apply the theory in terms of tracking input quantities, and the contribution to Profits from the last nut and bolt used is possible. In practice, the modelling of the business into operations depends on what the purpose is of the Productivity measurement exercise, and secondly by what information is available. The purpose may vary from broadly tracking the business as a whole, to a very detailed level tracking of each resource such as is being implemented by SAMANCOR. In general the availability of information should not present a problem, and is already available from the existing accounting systems. However, it is important to ensure a certain level of accuracy, or else results calculated may be questionable - a good example are discrepancies between survey, hoisted and plant tonnages.

8.2. Development of the Model

Broadly speaking, the most appropriate model is determined firstly by what objectives have been set for the productivity measurement exercise, in terms of

what is to be measured, and secondly by what information is available. Time and effort invested into this phase, will be well rewarded. and hopefully avoid later disappointments. In the following examples, a number of models developed within the industry have been examined and discussed.

During 1989 Escom commenced reporting in their Annual Report for the first time the impacts of productivity improvements achieved during the year in their stated objective of becoming a top utility internationally. (4)
To enable this to be done, a Productivity Accounting function was set up. The major objectives were firstly to measure, interpret and report on performance half yearly to the Board, and secondly to facilitate and support the development of productivity performance measures within the organisation at Group and Business Unit level.

The following general policies were adopted:

(1) Where outputs and inputs were readily definable and easily quantifiable in physical terms, the Total Productivity Measurement (TPM) method of determining productivity performance was used. The method determines a change in performance as a change in the relationship between total output quantity and total input quantity for two given periods of time. Both revenue and cost are broken down into a quantity element and a price element.

(2) In most of the service related functions where outputs are qualitative as well as quantitative, and tend to be more of a subjective nature, the Objective Matrix method was adopted.

Two types of TPM models were developed:
The Profit Model explains the changes in profit between two time periods in terms of what is attributable to a change in productivity and what is caused by a change in price recovery. The Cost Model explains the increase or decrease in total resource costs between two given time periods in terms of changes in productivity, resource prices and output volume. Both models use the same data.

Although at the time of publishing, the author states that productivity measurement had only been going for a short period of time, it appeared as though there were major benefits to Escom.

In the mining industry Productivity Accounting is being implemented at Vaal Reefs where it is known as Dynamic Productivity Analysis (DPA), by Iscor where the equivalent is called HUTOST according to Workman - Davies (5). The Chamber of Mines also publishes a gold mining productivity monitor in its regular newsletter which was developed by van Loggerenberg.

In 1987, van Loggerenberg and Workman Davies (6) developed a DPAC model for a major mining group based on the best theory at the time. The model showed twelve intermediate operations and on final operation as follows:

(See over).

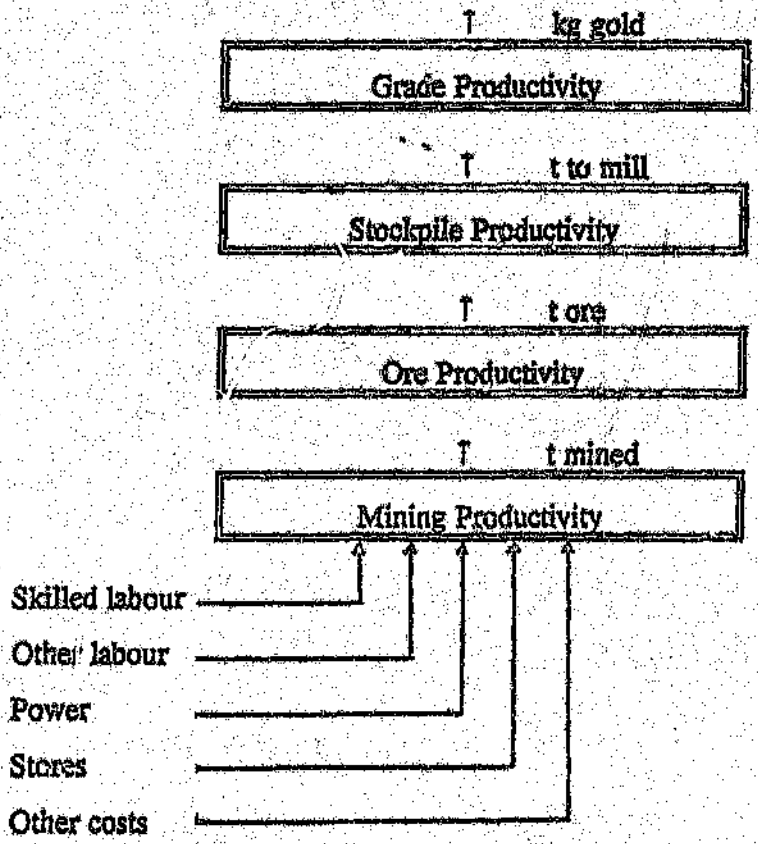
Twelve Operation, all-resource mine model

Intermediate Operations			Final Operation	
→	Development	t	→	
→	Stoping	t	→	
→	U/G Transport	t/km	→	
→	Hoisting	s	→	
→	Pumping	M ℓ	→	
→	Ventilation	m³/sec		
→	Refrigeration	m³ of coolth	→ G O L D	→kg
→	Sorting	t to recovery	→	
→	Recovery	kg gold	→	
→	Employee amenities	utilities	→	
→	Eng services	kWh	→	
→	Other expenses	weighted labour	→	

Total Resources including Capital

Two frequent and important questions have however been answered of late in the Chamber of Mines Productivity Monitor, and by further work done by Workman - Davies (7). The first has to do with the identification and separation of the influence of changes in the gold grade, and the second with the changing state of the surface stockpile and its contribution to productivity and profits.

The Productivity Monitor model has four identified operations in order of sequence, namely Mining, Ore, Stockpile and Grade. These four taken together constitute the total mine. The mining operation is considered further in terms of five classifications of resources: Skilled labour, other labour, power, stores and other costs.



An analysis of results published in the Chamber of Mines Productivity Monitor highlights the importance of monitoring the changes in profits due to changes in grade and stockpile movements, as the change in profits due to both these operations is numerically large.

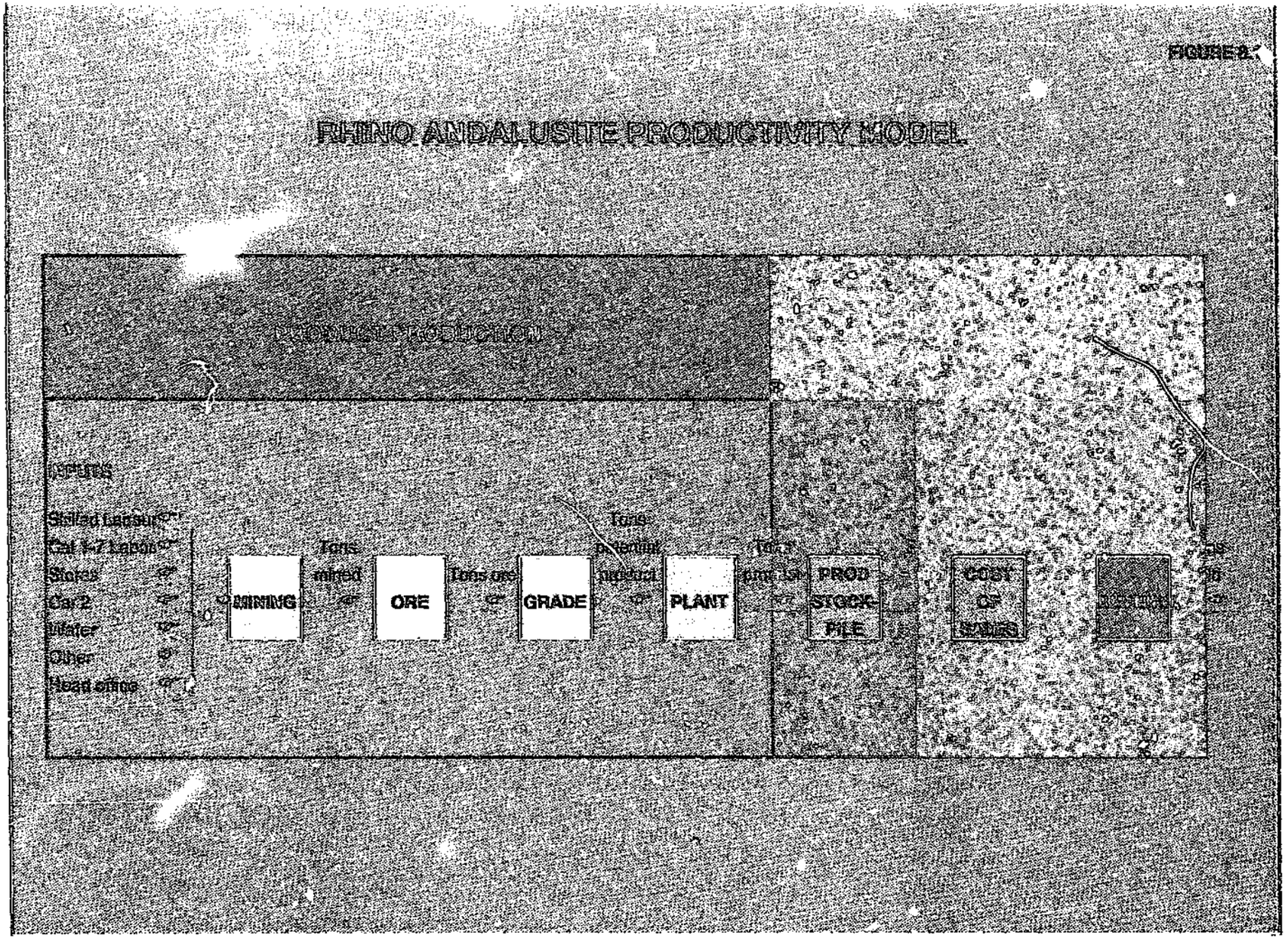
It is therefore essential that if the total mine picture is to be monitored, that these operations be included, and that due importance is attached to the accurate measurement and management of these two operations.

8.3. Description of Model

The overall operation has been split into 3 broad areas, namely Production, Product Stockpile and Sales. See Figure 8.1.

FIGURE 2.

RHINO ANDALUSITE PRODUCTIVITY MODEL



A number of operations are performed from the mining of the ore to the final sale of the product. These are mining, ore, grade, plant, product stockpile, cost of sales and revenue.

8.2.1. Mining

All the inputs for the entire mine have been included at this point, except for cost of sales (cost incurred in selling the product), into the tons of ore actually mined. This is due to a detailed breakdown of costs not being available for each operation. The productivity and price recovery contributions of each of these inputs has been calculated.

8.2.2. Ore

The ore operation takes account of the difference between tons of ore mined and the tons of ore to the plant. The same cost is carried through, and therefore a productivity gain or loss is calculated depending on whether tons are gained or lost i.e. if more tons report to the plant than are mined, then this is a positive productivity contribution.

8.2.3. Grade

Grade takes into account the difference between head grade of tons reporting to the plant between the two periods. An improvement in grade will be a positive productivity contribution.

8.2.4. Plant

The plant operation calculates the productivity contribution of the plant in terms of recoveries. Once again, an improvement in recoveries is a positive productivity contribution. The same costs are carried through.

8.2.5. Product Stockpile

The nature of the operation results in the product stockpile fluctuating tremendously, as not all tons are sold in the period produced. Tons produced at the cost of production are brought into this operation, and only the tons sold transferred to the next operation at the unit cost of production. The productivity contribution is calculated for Product Stockpile, being positive if more tons are sold off the stockpile than produced during the period.

8.2.6. Cost of Sales

In this operation the total costs incurred in selling the product are brought into the model. The input into this operation is sales tons at the unit cost of production, whilst the output is tons for sales at the unit cost of the cost of production plus the cost of sales. Since the tonnage is unchanged, only a price recovery term is calculated, monitoring the change to profit due to change in the cost of sales.

8.2.7. Revenue

The input to this operation is tons for sales at the cost of product plus the cost of sales, and the output is tons sold at the unit revenue received. Since the same tonnage is carried through, only a price recovery term is calculated monitoring the change to profits due to changes in revenue.

The input data for the model has been obtained from the monthly results of operations for the operating mine. Changes in quarters have been monitored, starting with quarter 1 in 1991 and extending to quarter 2 in 1994, in all a total of 14 quarters for which data was available. Actual quantities and prices were used for labour inputs, whilst a price index, the PPI - Mining and Quarrying plus electricity and gas has been used as a substitute price for all other inputs.

As mentioned, the duration between periods selected is 3 months. This duration should be determined with the overall objectives in mind. In this case it was felt that a monthly period would generate too much data, and likewise a 1 year period too few data to detect trends.

9. RESULTS OF MODEL

The model from the results of operations for Quarter 1/1994 and Quarter 2/1994 in back of Appendix 1 will be discussed as an example.

On page 1 of the model, all input data for the two quarters has been summarised for the different operations. The output quantities and prices from the one operation becomes the input quantities and prices for the next operation. From the bottom of page 1, the change in working profits between the two periods is -R2.764 million (R0.266 - R3.03 million). This change in profit can be explained as follows:

9.1. Mining

On page 2 the contribution for each resource in terms of Productivity and Price Recovery has been calculated. Using labour officials as an example, we see that the Productivity Variance is R159 370 and the Price Recovery Variance R520. The contribution to the change in profits from this resource is therefore the sum of these or R159 890.

9.2 Ore

On page 3 a zero productivity gain is calculated for Ore, as tons sent to the plant matched tons mined during the period.

9.3 Grade

The decrease in grade between the two periods is reflected in a Productivity loss of - R327 330. This operation does not contribute to Profits, as the loss is offset by an equal Price Recovery component.

9.4 Plant

The increase in recovery between the periods is reflected in a Productivity gain of R712 890 for this operation. As above, this operation has no effect on profits.

9.5 Product Stockpile

Product stockpile productivity reduced profits by R1,278 million due to more tons being added to the stockpile.

9.6 Cost of Sales

Price recovery on cost of sales is - R767 570 due to an increasing cost of sales.

9.7 Revenue

Price Recovery on reve ·e was - R854 160 due to falling product revenues.

9.8 Sources of Adjusted Changes in Working Profit

On page 4 the reconciliation for the total mine is shown, and has been cross checked by a second method.

The change in Profit of - R2 754 000 can now be seen to be made up of a negative Profit contribution of - R1 284 880 from the Stockpile operation and a negative Profit of - R1 479 120 from the Revenue Operation. From the table, it can be seen that:

Change in Profit = Productivity Variance + Price Recovery + Old Margin Variance.

The Old Margin Variance is the change in profit that will occur if the old relationship of Productivity and Price Recovery is maintained as a constant i.e. a target figure if the old relationship is to be maintained. It can be calculated as follows:

Old Margin Variance = Old Profit X % Change in Revenue.

As a second check, the change in Profit can be calculated as follows:

$\sum$Change in Profit = $\sum$New Profit - -$\sum$Old Profit

Where Old Profit = Old Revenue - Old Costs and

where New Profit = New Revenue - New Costs for each operation.

10. ANALYSIS OF LONG TERM TRENDS

The productivity and price recovery contributions have been calculated for each operation between quarters, allowing for an accurate contribution to the profits for each resource. By comparing successive quarters, changes in the productivity contributions for the resources can be tracked. This information will assist management in concentrating on the most important resources, and identify negative trends for closer scrutiny.

Not only have the productivity and price recovery contributions been calculated for each resource, but in this case and due to the way the model has been constructed, this information is also available for each operation.

Long term trends have been analyzed by plotting graphs of the productivity and price recovery contributions for successive changes in periods from 1991 to 1994. The graphs reflect Rand values plotted which is really current Rands in the quarters in which it is spent and have not been adjusted for inflation, and therefore the Rand values should not be directly compared. However, the long term trends are valid.

From the trend analysis, clear strategies can be developed for a long term sustained productivity improvement. Objectives can be set, clear action plans established, and most important of all, a clear measurement of results achieved has been established.

10.1. Overall Profits, Productivity and Price Recovery

This graph has been plotted in Figure 10.1. Profits have been generally positive, and are largely influenced by large stockpile productivity movements as sales tonnages swing between periods. A far clearer trend analysis can be made from the cumulative graph in Figure 10.2.

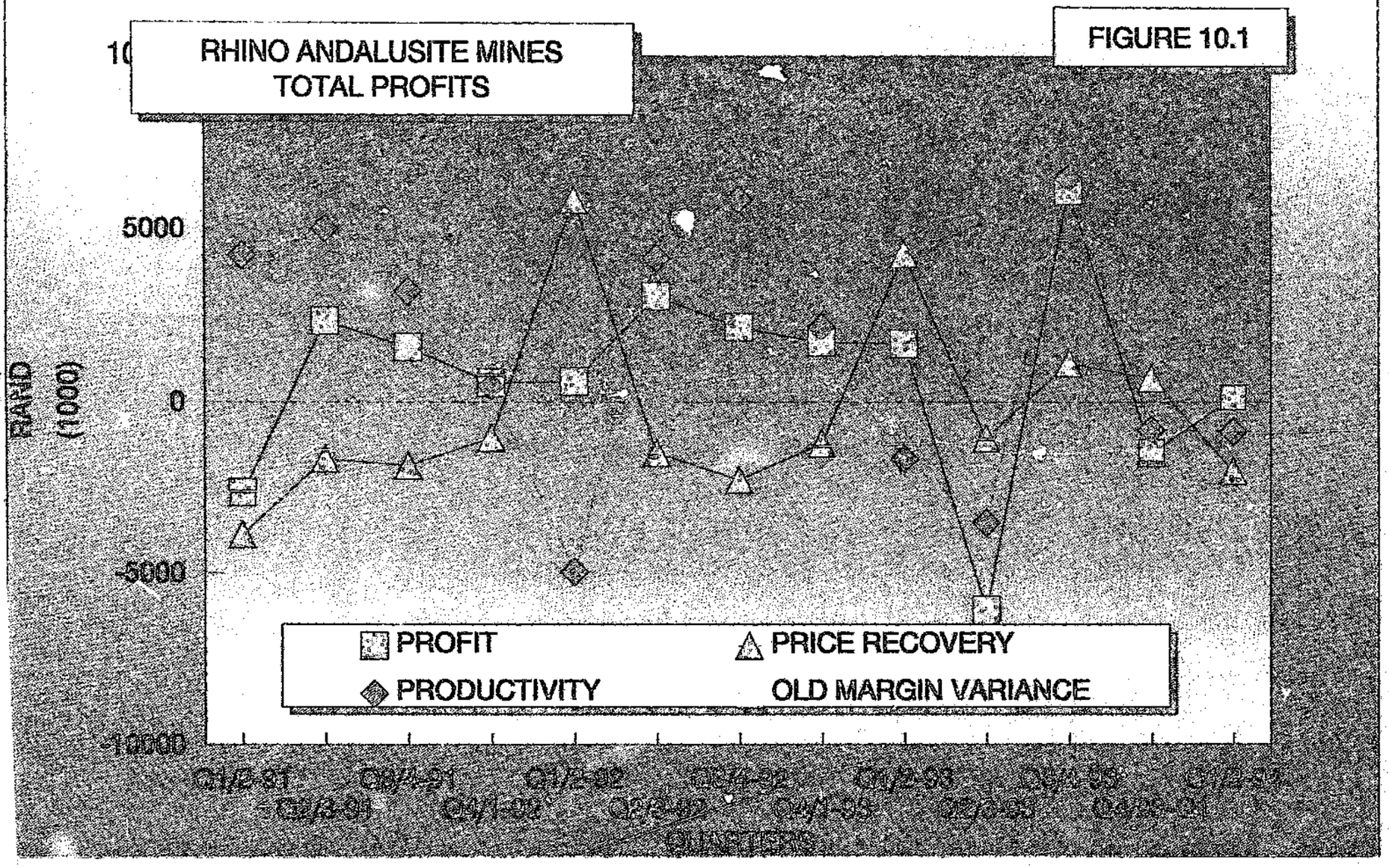
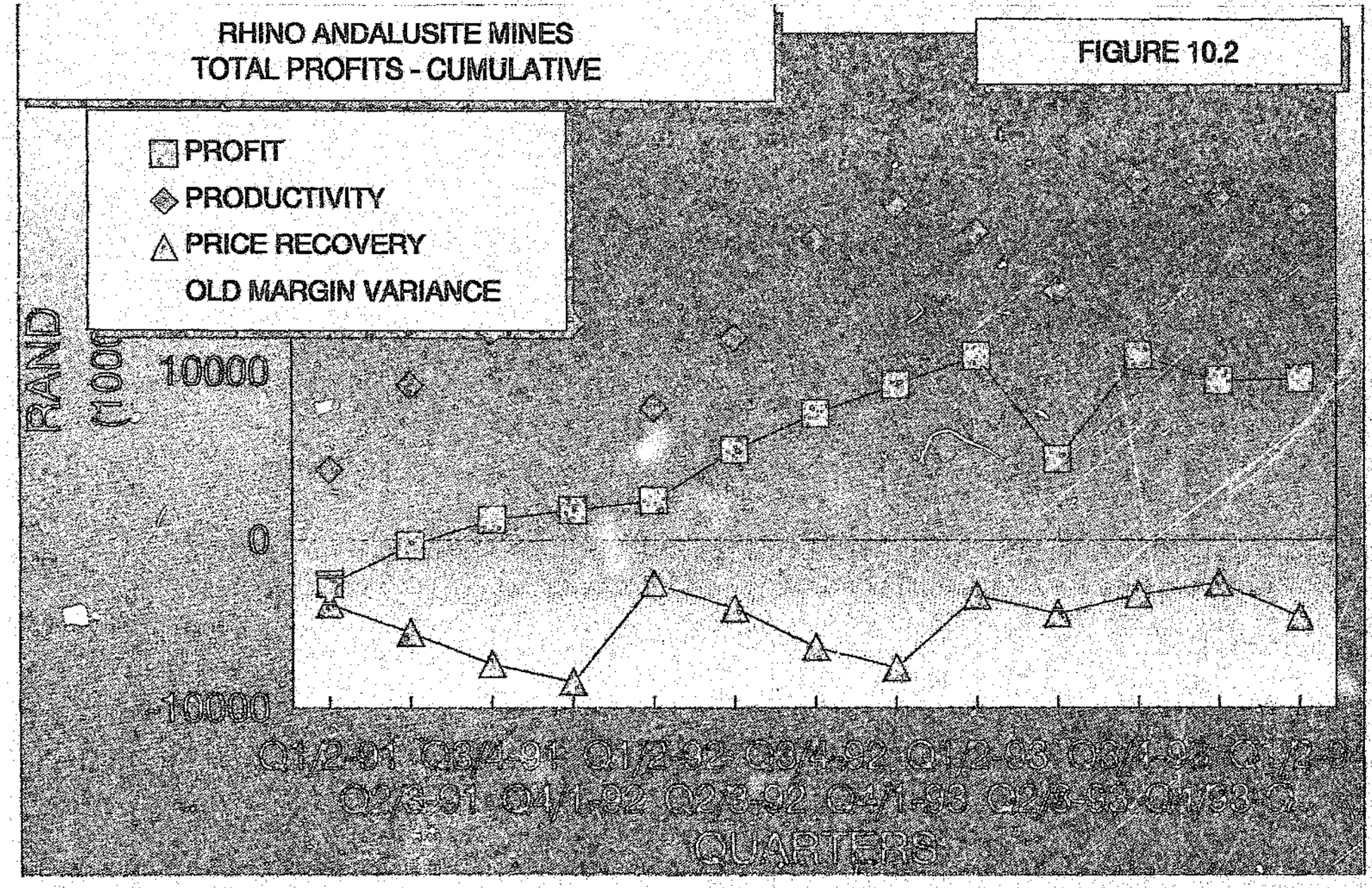


FIGURE 10.1
RHINO ANDALUSITE MINES
TOTAL PROFITS
5000
0
-5000
-10000
RAND (1000)
PROFIT
PRICE RECOVERY
PRODUCTIVITY
OLD MARGIN VARIANCE
Q1/2-91
Q3/4-91
Q1/2-92
Q3/4-92
Q1/2-93
Q3/4-93
Q1/2-94
Q3/4-91
Q1/4-92
Q2/3-92
Q4/1-93
Q2/3-94
Q4/1-94
QUARTERS

RHINO ANDALUSITE MINES
TOTAL PROFITS - CUMULATIVE

FIGURE 10.2



The graph shows overall cumulative profits steadily increasing, with the occasional negative result.

The cumulative profit gain for the 13 quarters is some R11 million.

What is of concern, is a flattening off of the curve for the last four quarters, in which the operation appears to be "holding its own". The individual operations will be analysed in an attempt to explain this phenomenon.

This profit increase is largely due to a sustained increase in productivity of some R16 million for the 13 quarters with once again, a poor contribution in the last 4 quarters. The contribution from the price recovery component seems reasonably constant for the period, but does cumulatively show a decrease of some R2 million. The cumulative profits are therefore accountable to the gain in productivity for the 13 quarters.

10.2. Production Operations

The production operations are mining, ore, grade, and plant. In Figure 10.3. the productivity contributions have been cumulated for these operations during the last 13 quarters.

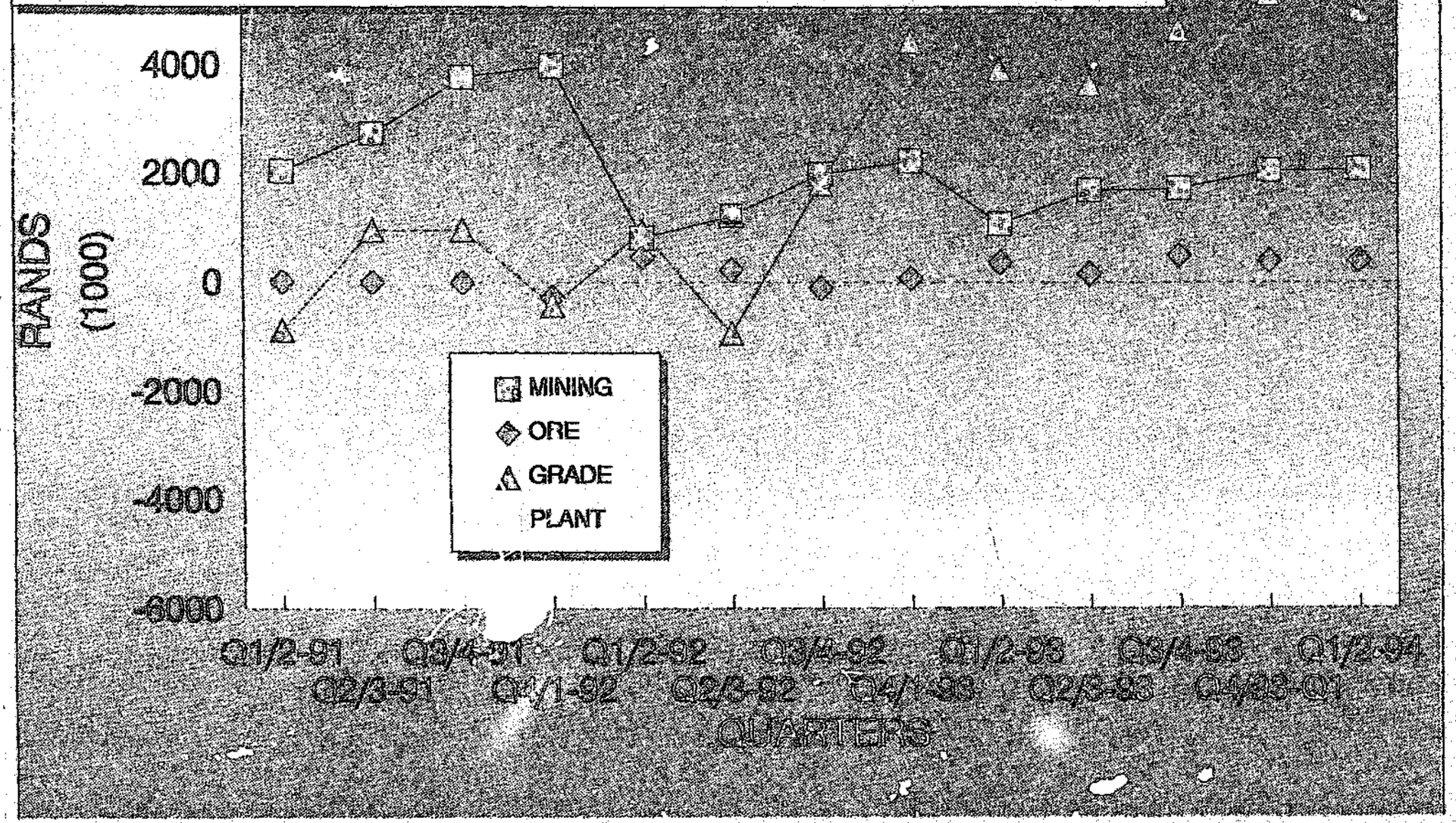
Mining productivity contributions seem to be showing a slight negative trend. This may well be due to the increased difficulty of the operation as more waste tons are being moved, and more blasting of the ore may be required. These aspects need to be investigated further.

Ore productivity is not very significant, as the contribution in value terms is small.

Grade productivity shows a dramatic improvement during the period, reflecting generally higher grades. The net contribution from grade productivity is some R5.5 million. However, an interesting trend is observed in that a definite inverse relationship seems to exist between the grade productivity curve and the plant productivity curve reflecting yields. When grade productivity improves, plant productivity declines and vice versa. The net contribution from plant productivity

RHINO ANDALUSITE MINES
PRODUCTIVITY OF PRODUCTION OPERATIONS - CUMULATIVE

FIGURE 10.3



productivity declines and vice versa. The net contribution from plant productivity is a negative R4 million. In Figure 10.4. a graph has been plotted of actual grades and yields for the quarters. The same trend is noted, but is not nearly as evident.

Assuming that all things remain equal, it may be said that the operation has pursued a policy of mining from higher grade areas, without obtaining the profit benefits due to a declining yield at higher grades.

The magnitude of the contribution from these two operations is the largest single most contributing factor to profits. and focus attention on the importance of grade and recoveries.

10.3. Contributions of Resources to Mining Productivity

The contributions of all the inputs for the quarters has been plotted in Figures 10.5. and 10.6. Skilled and category labour productivity contributions have remained static with little change. The nature of the operation is therefore one in which direct labour costs and productivity can make a limited contribution. Stores productivity contribution seems to be showing a negative trend, and is probably the reason for the overall negative trend of the mining operation as a whole.

The productivity contribution from "other" and head office charges shows a negative contribution.

10.4. Productivity of Product Stockpile

The productivity contribution of the product Stockpile operation has been plotted in Figure 10.7. Two things are noticeable, firstly the magnitude of the swings between quarters due to the nature of the operation, and secondly the cumulative trend should be zero unless the stockpile progressively shrinks or grows. The cumulative productivity contribution is a negative R4 million for the 13 quarters, and is explained in that progressively stockpile tonnages have been growing due to difficult marketing conditions.

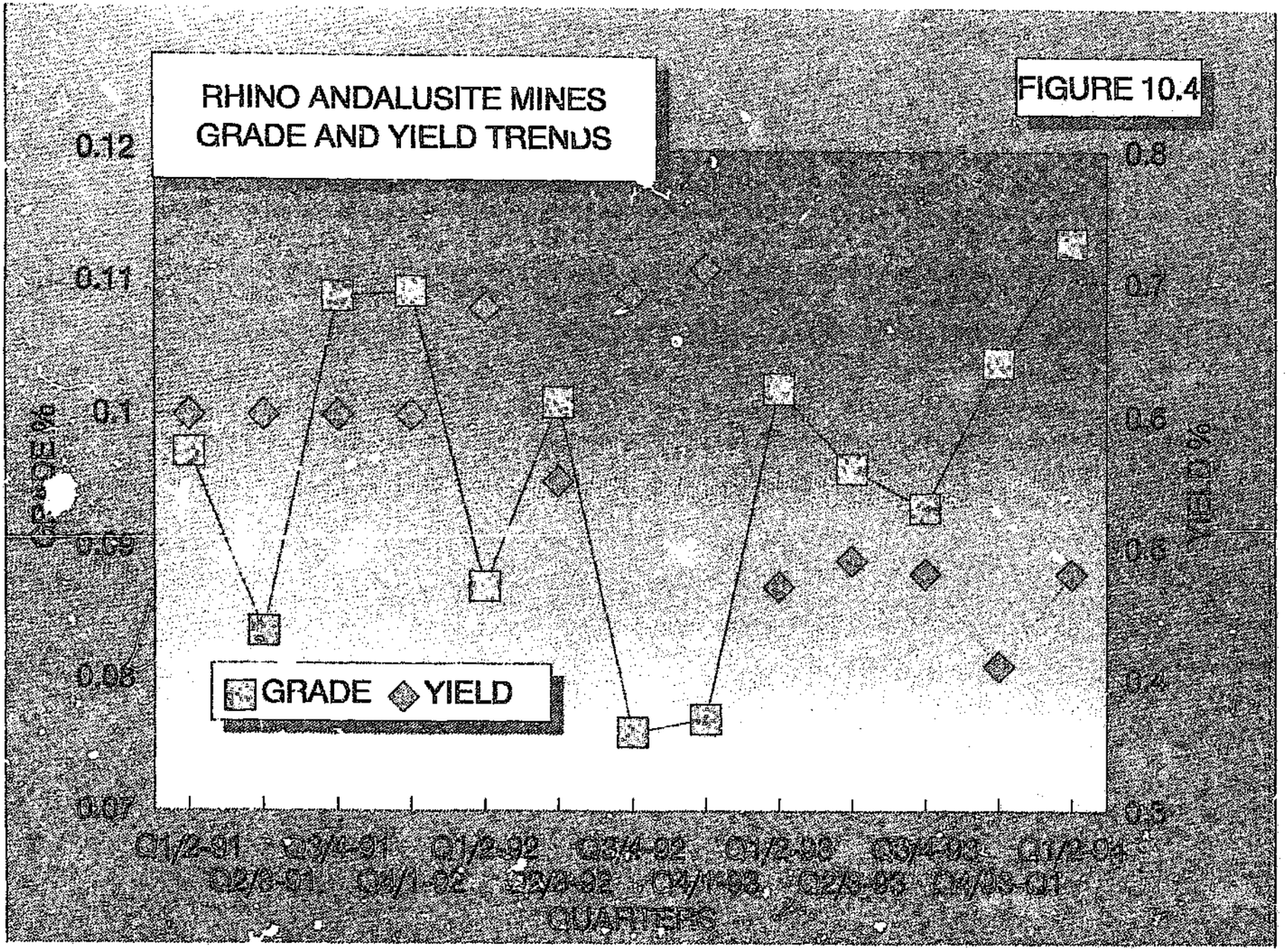
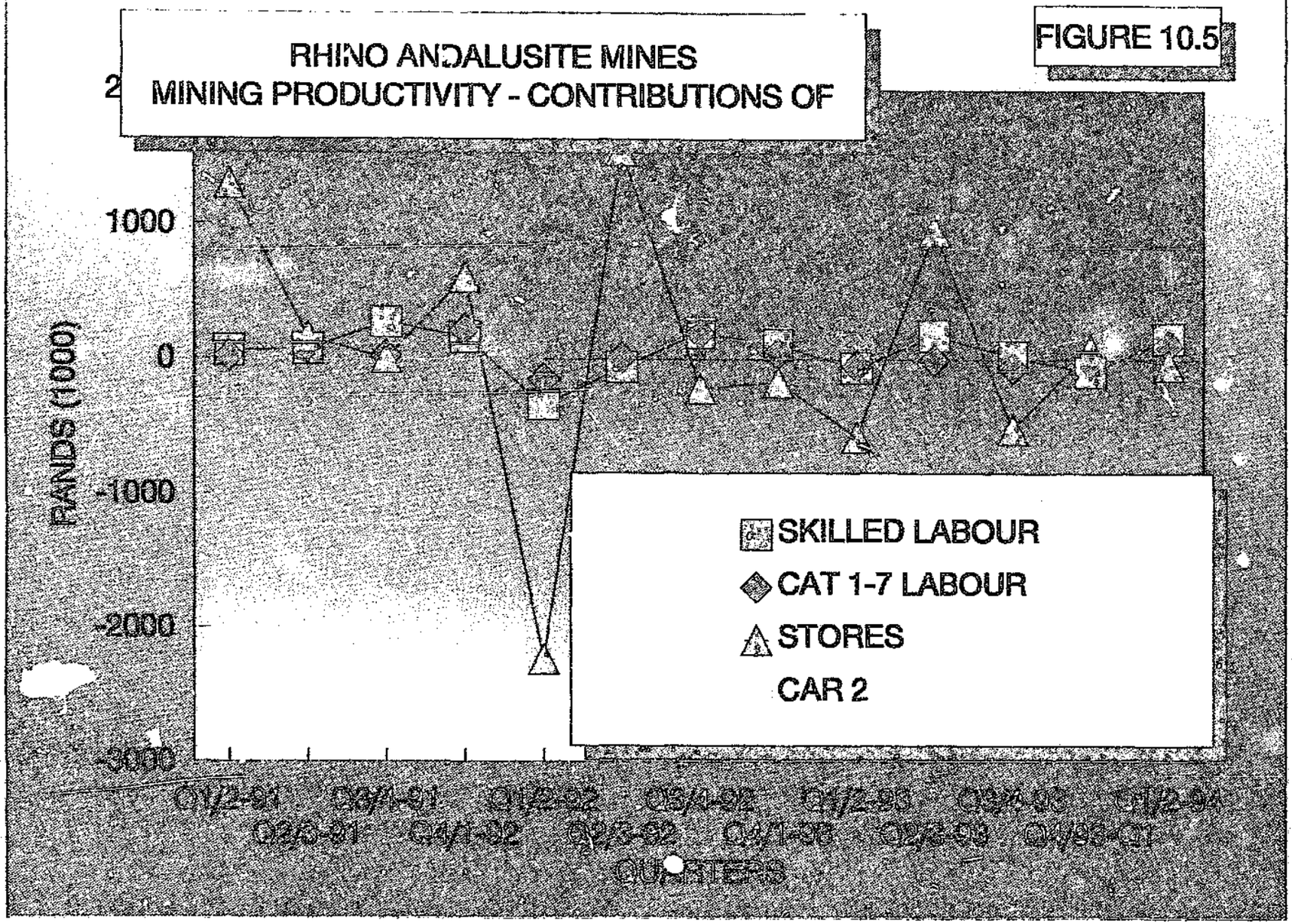

RHINO ANDALUSITE MINES
GRADE AND YIELD TRENDS
FIGURE 10.4
0.12
0.11
0.1
0.09
0.08
0.07
GRADE %
0.8
0.7
0.6
0.5
0.4
0.3
YIELD %
GRADE
YIELD
Q1/2-91
Q3/4-91
Q1/2-92
Q3/4-92
Q1/2-93
Q3/4-93
Q1/2-94
Q2/3-91
Q4/1-92
Q2/3-92
Q4/1-93
Q2/3-93
Q4/1-94
QUARTERS

FIGURE 10.5


RHINO ANDALUSITE MINES
MINING PRODUCTIVITY - CONTRIBUTIONS OF
2
1000
0
-1000
-2000
-3000
RANDS (1000)
SKILLED LABOUR
CAT 1-7 LABOUR
STORES
CAR 2
Q1/2-91
Q3/4-91
Q1/2-92
Q3/4-92
Q1/2-93
Q3/4-93
Q1/2-94
Q2/3-91
Q4/1-92
Q2/3-92
Q4/1-93
Q2/3-93
Q4/93-Q1
QUARTERS

RHINO ANDALUSITE MINES
MINING PRODUCTIVITY - CONTRIBUTIONS OF

FIGURE 10.6

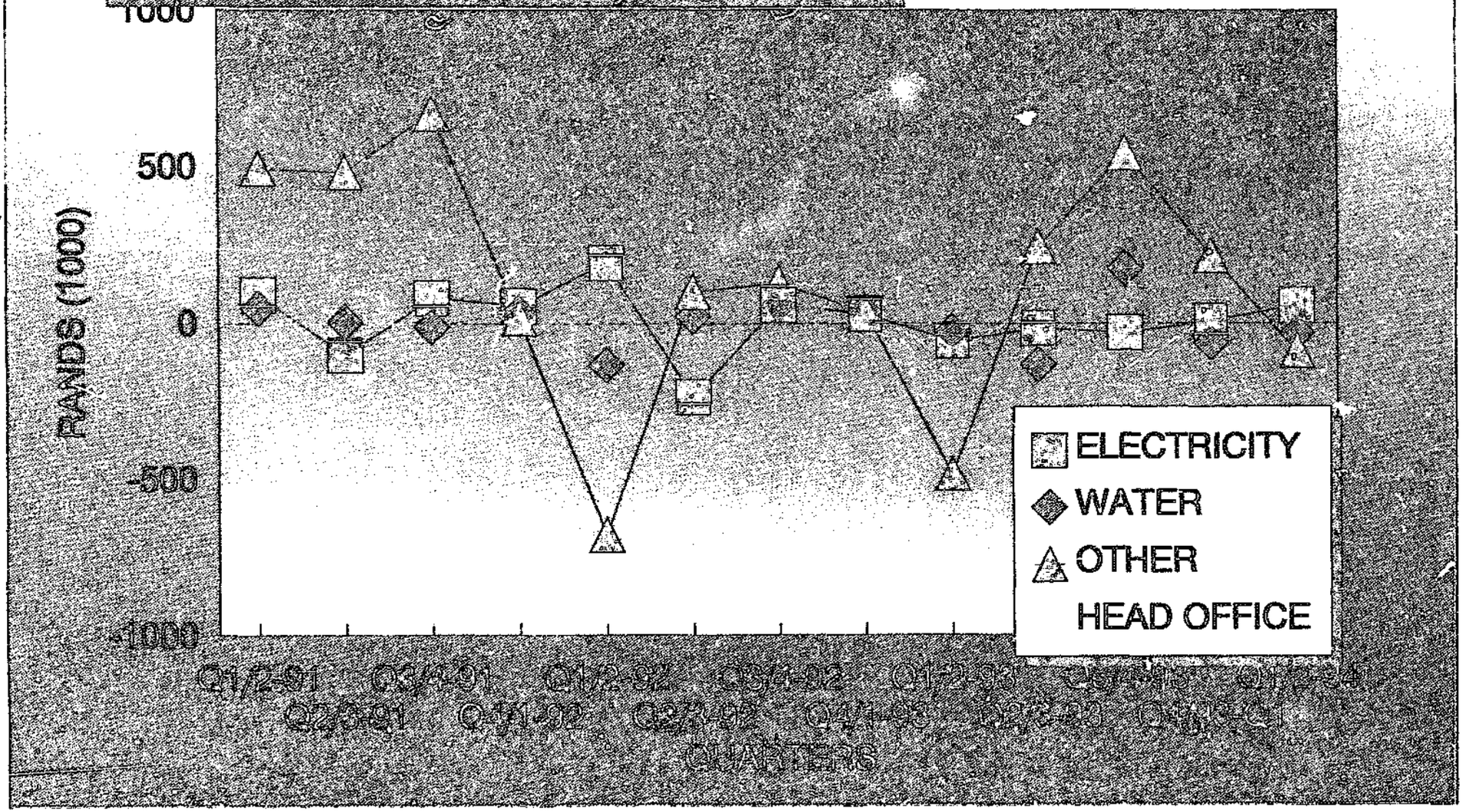
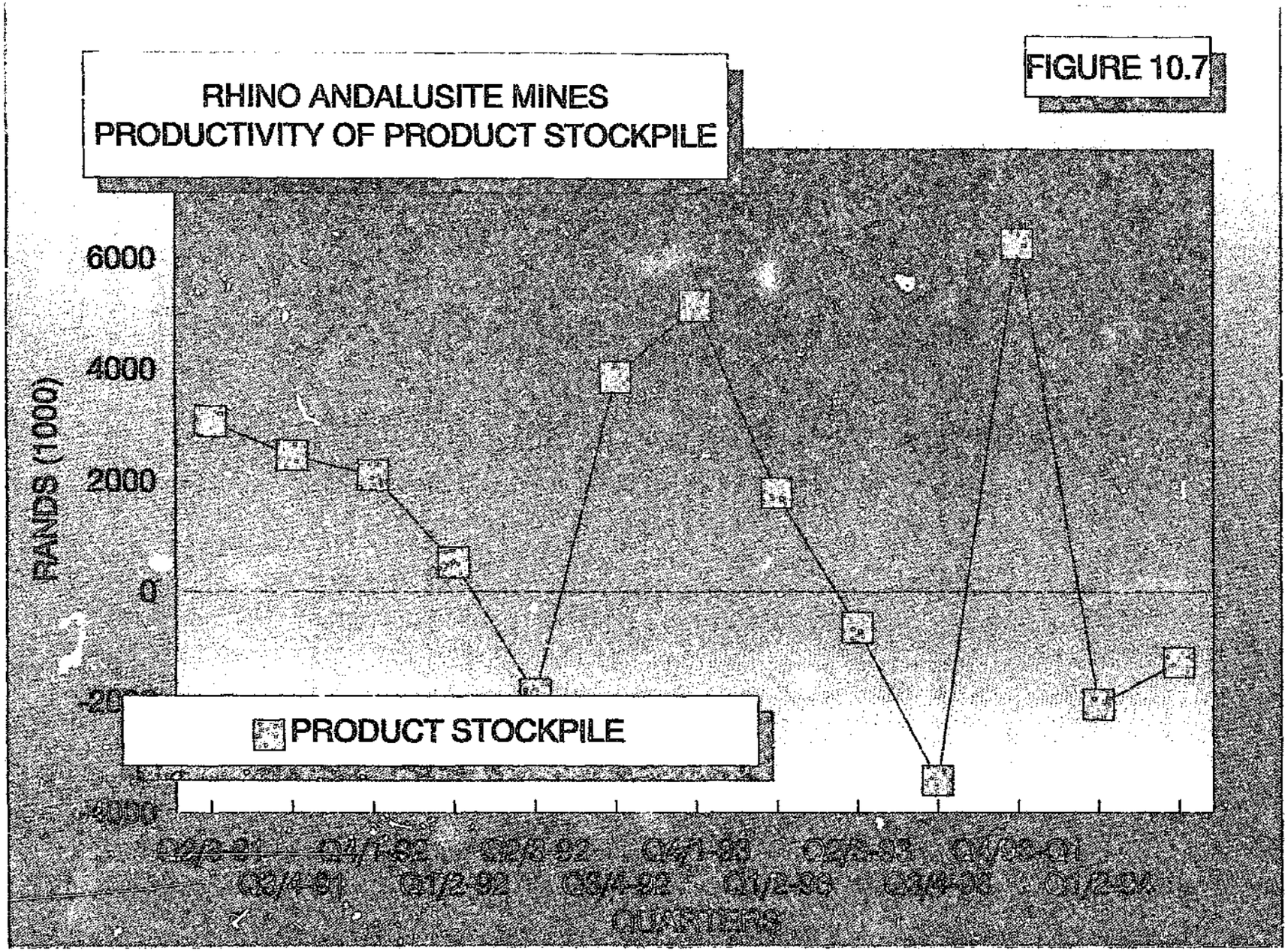


FIGURE 10.7


RHINO ANDALUSITE MINES
PRODUCTIVITY OF PRODUCT STOCKPILE
RANDS (1000)
6000
4000
2000
0
-2000
PRODUCT STOCKPILE
Q2/3-91
Q4/1-92
Q2/3-92
Q4/1-93
Q2/3-93
Q4/1-94
Q3/4-91
Q1/2-92
Q3/4-92
Q1/2-93
Q3/4-93
Q1/2-94
QUARTERS

10.5. Cost of Sales and Revenue

The price recovery contributions for cost of sales and revenue and the total price recovery for the operation have been plotted in Figure 10.8. The total price recovery for the 3½ year period has shown a negative contribution of some R2 million, whilst the price recovery contribution from revenue shows a small increase of R0.5 million. The price recovery contribution from cost of sales has remained constant. The contribution from revenue seems to be rising steadily in the last four quarters, after showing a cumulative negative trend. In Figure 10.9 the revenue/t sold and cost of sales/t sold has been plotted. The revenue trend reflects difficult trading conditions, with a slight recovery in the last quarters. Cost of sales is showing an increasingly upward trend due to increased efforts towards exporting more product on the international market.

10.6. Summary of Analysis

The mine has continued to operate making a cumulative profit of some R11 million over 13 successive quarters or 3¼ years. This is some R0.9 million per quarter, or some 12% of net expenditure.

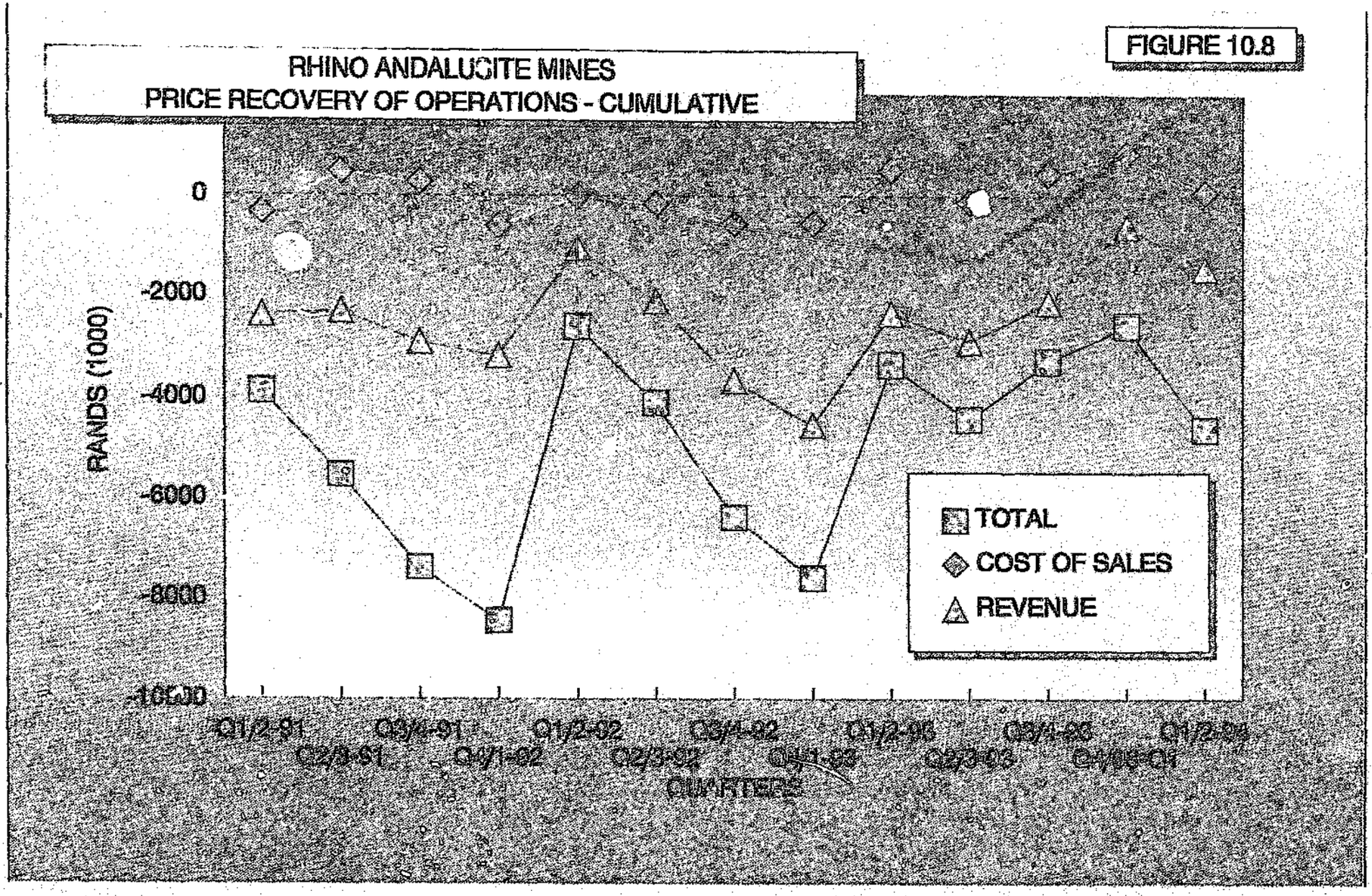
During the last few quarters, profits have been under pressure.

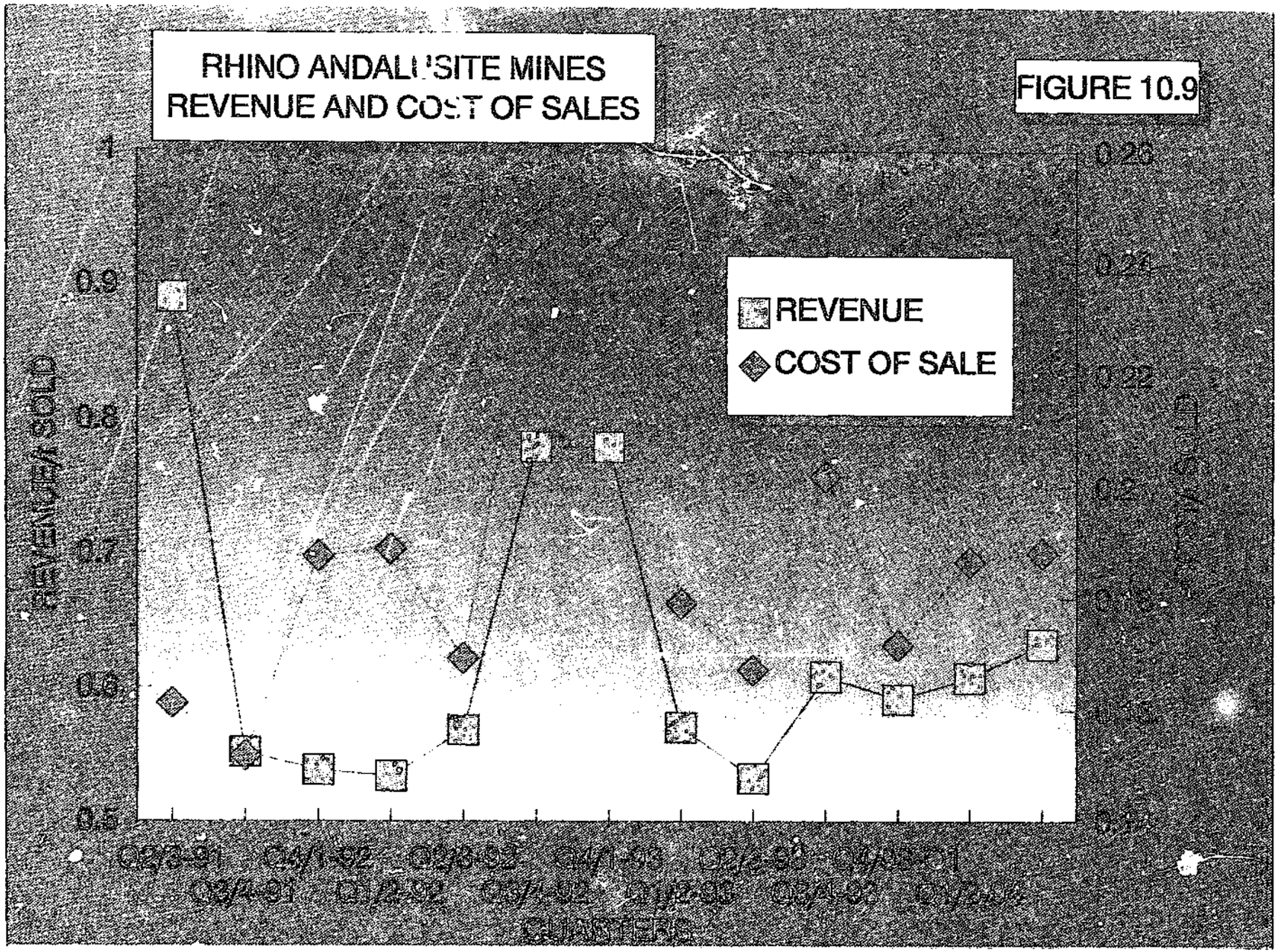
The profit has been made up of a positive productivity contribution of some R16 million whilst the price recovery over all the quarters has been cumulatively negative at some R2 million. An old margin variance of negative R3 million can be calculated as change in profit = productivity variance + price recovery + old margin variance.

Productivity contributions from the operation for the 3¼ year period may be summed up as follows:

(1) The mining operation, which in this model represents all the operation inputs, is showing a slightly negative trend. This negative trend is largely due to the inputs of stores, "other" and head office charges in that order of priority. Contributions from the other inputs, including labour are static.

FIGURE 10.8


RHINO ANDALUCITE MINES
PRICE RECOVERY OF OPERATIONS - CUMULATIVE
RANDS (1000)
0
-2000
-4000
-6000
-8000
-10000
TOTAL
COST OF SALES
REVENUE
Q1/2-91
Q3/4-91
Q1/2-92
Q3/4-92
Q1/2-93
Q3/4-93
Q1/2-94
Q2/3-91
Q4/1-92
Q2/3-92
Q4/1-93
Q2/3-93
Q4/1-94
QUARTERS


RHINO ANDALUSITE MINES
REVENUE AND COST OF SALES
FIGURE 10.9
REVENUE
COST OF SALE
REVENUE/t SOLD
1
0.9
0.8
0.7
0.6
0.5
0.26
0.24
0.22
0.2
Q2/3-91
Q4/1-92
Q2/3-92
Q4/1-93
Q2/3-93
Q4/1-94
Q2/3-94
Q4/1-95
Q2/3-95
Q4/1-96
Q2/3-96
Q4/1-97
Q2/3-97
Q4/1-98
Q2/3-98
Q4/1-99
Q2/3-99
Q4/1-00
Q2/3-00
Q4/1-01
Q2/3-01
Q4/1-02
QUARTERS

(2) The contribution from ore is small and insignificant.

(3) The mine has been mining from higher grade areas, and the net cumulative contribution from grade productivity is some R5.5 million.

(4) Unfortunately the increase in grade has not been matched by an adequate performance in recoveries. The increased grade resulted in lower recoveries with contributions from recoveries being a negative R4 million. A possible explination is that the operation produced higher grade products in an attempt to make its product more marketable in difficult operating conditions.

(5) The productivity contribution of the product stockpile shows a cumulatively negative contribution of R4 million due to progressively larger stockpiles as a result of negative market sentiments and an over-supply of product.

The negative price recovery of some R2 million for the entire operation for the 3½ years, is contributed to by the following operations:

(1) A negative price recovery of R0.5 million on revenue. This reflects the difficult trading conditions during the period. However there seems to be light at the end of the tunnel, with an increase in price recovery on revenue in the last 3 quarters, suggesting that a new phase of the economic cycle is being entered into.

(2) The price recovery on cost of sales is cumulatively static for the period, and this, despite increased efforts to market surplus product internationally.

A negative old margin variance of R3 million means that the old relationship of Productivity and Price Recovery could not be maintained as a constant. The target figure of the old relationship could therefore not be maintained.

11. STRATEGY FOR PRODUCTIVITY IMPROVEMENT

11.1. Selection of Model

Whilst the model and analysis of trends has revealed valuable insights with regard to the operation, and has allowed us to be able to prioritise operations in terms of their influence on productivity, certain shortcomings are evident. The model does not give enough clarity and more detail is required if issues are to be seriously addressed. The following changes are proposed:

(1) The operation of ore should be dropped as it has been found to be insignificant.

(2) All resources used should be allocated into the individual operations i.e. skilled labour, unskilled labour, spares etc. Overheads should likewise be allocated into these operations. This will allow the productivity contributions and price recovery contributions to profits to be calculated for each resource used in a particular operation.

(3) Consideration should be given to the inclusion of capital expenditure into the model.

11.2. Priority Operation

The priority operations in terms of improving profits are grade and plant. A high level of technical work is currently being done in terms of commissioning a computerised geological modelling and geostats system. Further problems identified within the plant are weightometer conveyor instrumentation, which are being upgraded. The accurate measurement of tonnage is vital to calculating meaningful contributions to profits.

The mine is aware of the poor correlation between head grade and plant recoveries, but cannot as yet explain the phenomenon. Outside help is being sought in trying to reach an explanation. This work should be persued as a matter of urgency due to the

large influence on bottom line profits. The level of technical staffing covering these operations should be reviewed and increased if necessary.

11.3. Involvement of Workforce

The model, once modified, presents the ideal tool for involving management and the workforce in improving productivity at the mine. Management and workers should be trained in understanding productivity concepts and the model.

Results should be made available monthly for all departments, and consideration should be given to drawing up departmental action plans and objectives. Bonus payments should be linked to results achieved.

The model should similarly be used for budgeting purposes, which will allow an analysis to be made of what the mine is relying on to achieve future profits i.e. productivity or price recovery gains.

11.4. Strategic Planning

The model can be used as a very effective strategic planning tool allowing for trends and cycles to be analysed, and the correct strategies to be adopted in response. Similarly, the model should be used as a tool for analysing the result that changes have on the operation and should be used to justify such changes. As an example, if the upgrade of plant weightometers and the lab would result in a closer correlation between grade and recoveries, this additional expenditure could be easily justified. The model, and parts of the model can be used in benchmarking the operation against similar types of operations internationally i.e. mining costs and trends against other open pits, plant recoveries etc.

12. CONCLUSION

As can be seen from the example, deterministic productivity accounting meets the requirements of a measuring system as set, and is a most effective tool in implementing a strategy for a long term improvement in productivity. Insights are gained into the operation which are obscured in the standard accounting reporting system, although the same input data is used, which eliminates additional work.

However, as with all things, "what you get out is what you put in", and this is certainly true of productivity measurement. The theory can be applied to tracking the last nut and bolt used as a resource, but obviously more effort is required. The level to which an organisation chooses to implement the theory depends on the commitment and motivation of senior management, as productivity measurement by definition is merely a tool to be used and can in itself not improve productivity.

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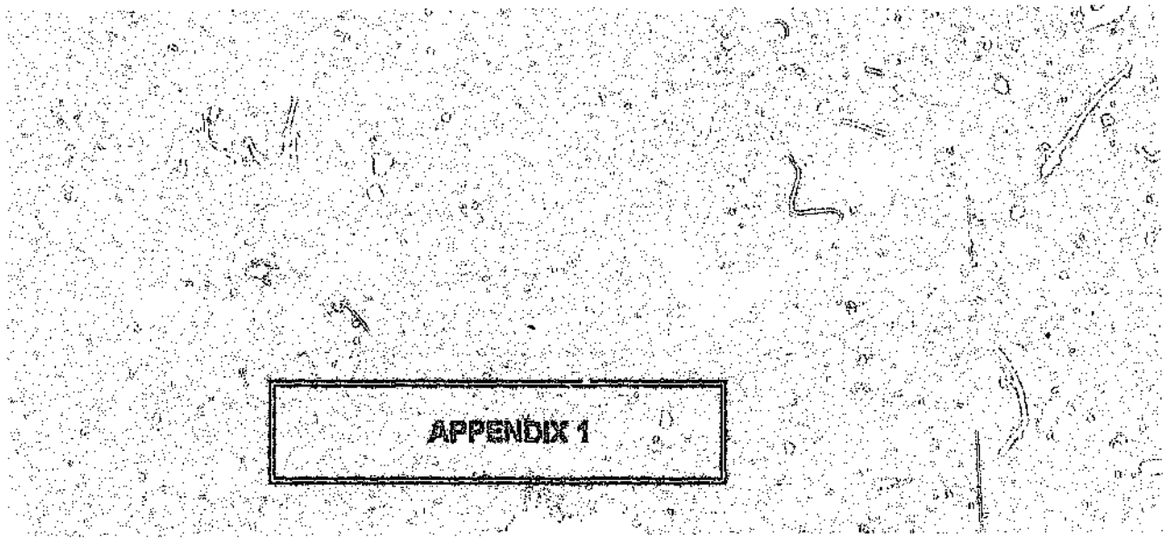
D C COCKCROFT


APPENDIX 1

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 1/91 Jan-March	Quarter 2/91 April-June
MINING	INPUT VALUES	Skilled Labour (R)	927.00	975.00
		Cat 1-7 Labour (R)	870.00	847.00
		Stores (R)	3572.00	2842.00
		Car 2 (R)		
		Electricity (R)	352.00	298.00
		Water (R)	193.00	164.00
		Other (R)	1631.00	1628.00
		Head Office (R)		
		TOTAL (R)	7545.00	6354.00
	QUANTITIES	Skilled Labour	70.00	70.00
		Cat 1-7 Labour	322.00	330.00
	PRICE INDEX	PPI - Mining & Quarrying	109.40	113.70
		plus electricity and gas	109.40	
			109.40	113.70
	OUTPUT VALUES	Tons Mined	541925.00	422767.00
ORE	OUTPUT VALUES	Tons Ore	541925.00	422767.00
GRADE		Grade %	0.19	0.08
	OUTPUT VALUES	Tons Potential Product	82678.33	35328.33
PLANT		Yield %	0.60	0.60
	OUTPUT VALUES	Tons Product	31607.00	21197.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	12009.00	12009.00
	OUTPUT VALUE	Sales tons at production costs(R000)	2566.70	3543.16
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	12009.00	12009.00
	OUTPUT VALUES	Production costs & Cost of Sales	4801.70	5365.16
		Cost of Sales (R000)	1935.00	1822.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	12009.00	12009.00
	OUTPUT VALUES	Revenue(R000)	10696.00	6822.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		1206.00	-1464.00
	CHANGE IN WORKING PROFIT (R000)			-2680.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	7545.00	0.01	541925.00	6254.00	0.01	422767.00
Inputs	Labour - Officials	927.00	70.00	13.24	975.00	70.00	13.93
	Labour - Cat 1-7	670.00	322.00	2.08	647.00	330.00	1.96
	Stores	3572.00	32.65	109.40	2642.00	23.24	113.70
	Car 2	0.00	0.00	109.40	0.00	0.00	113.70
	Electricity	352.00	3.22	109.40	298.00	2.62	113.70
	Water	193.00	1.76	109.40	164.00	1.44	113.70
	Other	1831.00	16.74	109.40	1528.00	13.44	113.70
	Head Office	0.00	0.00	109.40	0.00	0.00	113.70

deltaQold(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo -0.22

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 74.38
Pnr=Po(1+deltaPnew(U)) 10.33
Ynew=(Qnp-Qn)Pn 60.96
Rlong=Qnp(Pnr-Pn) -267.57

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 342.13
Pnr=Po(1+deltaPnew(U)) 1.62
Ynew=(Qnp-Qn)Pn 23.78
Rlong=Qnp(Pnr-Pn) -115.43

Stores
Qnp=Qo(1+deltaQold(U)) 34.69
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 1302.49
Rlong=Qnp(Pnr-Pn) -983.69

Car 2
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQold(U)) 3.42
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 90.71
Rlong=Qnp(Pnr-Pn) -98.94

Water
Qnp=Qo(1+deltaQold(U)) 1.87
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 49.13
Rlong=Qnp(Pnr-Pn) -53.15

Other
Qnp=Qo(1+deltaQold(U)) 17.78
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 493.94
Rlong=Qnp(Pnr-Pn) -504.24

Head Office
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 85.35
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	7545.00	541925.00	0.01	6254.00	422767.00	0.01
Inputs	Tons Mined	7545.00	541925.00	0.01	6254.00	422767.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.22

deltaPnew(U)=(Pun-Puo)/Puo 0.00

ORE
Qnp=Qo(1+deltaQold(U)) 422767.00
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -0.00

GRADE

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	7545.00	52678.33	0.14	6254.00	35328.33	0.18
Inputs	Tons Ore	7545.00	541925.00	0.01	6254.00	422767.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.33

deltaPnew(U)=(Pun-Puo)/Puo 0.24

GRADE
Qnp=Qo(1+deltaQold(U)) 383437.98
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -877.66
Rlong=Qnp(Pnr-Pn) 877.66

PLANT

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	7545.00	31607.00	0.24	6254.00	21197.00	0.30
Inputs	Tons Potential Product	7545.00	52678.33	0.14	6254.00	35328.33	0.18

deltaQold(U)=(Qun-Quo)/Quo -0.33

deltaPnew(U)=(Pun-Puo)/Puo 0.24

PLANT
Qnp=Qo(1+deltaQold(U)) 35328.33
Pnr=Po(1+deltaPnew(U)) 0.18
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

PRODUCT STOCKPILE

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	2868.70	12009.00	0.24	3543.16	12009.00	0.30
Inputs	Tons Product	7545.00	31607.00	0.24	6254.00	21197.00	0.30

deltaQold(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo 0.24

Cost of Sales
Qnp=Qo(1+deltaQold(U)) 31607.00
Pnr=Po(1+deltaPnew(U)) 0.30
Ynew=(Qnp-Qn)Pn 3071.38
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	4801.70	12009.00	0.40	5365.16	12009.00	0.45
Inputs	Sales Tons	2868.70	12009.00	0.24	3543.16	12009.00	0.30

deltaQold(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo 0.12

Sales Tons
Qnp=Qo(1+deltaQold(U)) 12009.00
Pnr=Po(1+deltaPnew(U)) 0.27
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -340.08

REVENUE

		Quarter 1/91			Quarter 2/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	10686.00	12009.00	0.89	8622.00	12009.00	0.55
Inputs	Tons for Sales	4801.70	12009.00	0.40	5365.16	12009.00	0.45

deltaQold(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo -0.38

Sales Tons
Qnp=Qo(1+deltaQold(U)) 12009.00
Pnr=Po(1+deltaPnew(U)) 0.25
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -2389.59

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 1/91 and 2/91

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-206.82		60.96	-267.67
Labour - Cat 1-7							-91.64		23.78	-115.43
Stores							318.81		1302.49	-983.69
Car 2							0.00		0.00	0.00
Electricity							-3.23		90.71	-93.94
Water							-4.02		49.13	-53.15
Other							-10.30		493.94	-504.24
Head Office							0.00		0.00	0.00
MINING	7545.00	6254.00	7545.00	6254.00	0.00	0.00	-0.00	0.00	2021.01	-2021.01
ORE	7545.00	6254.00	7545.00	6254.00	0.00	0.00	-0.00	0.00	0.00	-0.00
GRADE	7545.00	6254.00	7545.00	6254.00	0.00	0.00	0.00	0.00	-877.00	877.00
PLANT	7545.00	6254.00	7545.00	6254.00	0.00	0.00	0.00	0.00	0.00	0.00
STOCKPILE	2868.70	3543.16	7545.00	6254.00	-4676.30	-2710.84	1967.46	-1165.93	3971.30	0.00
COST OF SALES	2868.70	3543.16	2868.70	3543.16	0.00	0.00	0.00	340.00	0.00	-340.00
REVENUE	10686.00	8622.00	4801.70	5365.16	5884.30	1256.84	-4627.46	-2237.00	0.00	-2389.59
TOTAL LINE										

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 2/91 April-June	Quarter 3/91 Jul-Sep
MINING	INPUT VALUES	Skilled Labour (R)	976.00	921.00
		Cat 1-7 Labour (R)	647.00	579.00
		Stores (R)	2642.00	2726.00
		Car 2 (R)		0.00
		Electricity (R)	296.00	427.00
		Water (R)	164.00	176.00
		Other (R)	1528.00	1190.00
		Head Office (R)		
		TOTAL (R)	6254.00	6018.00
	QUANTITIES	Skilled Labour	70.00	70.00
		Cat 1-7 Labour	330.00	309.00
	PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	113.70	116.00
			113.70	116.00
	OUTPUT VALUES	Tons Mined	422767.00	376399.00
ORE	OUTPUT VALUES	Tons Ore	422767.00	376399.00
GRADE		Grade %	0.08	0.11
	OUTPUT VALUES	Tons Potential Product	35328.33	40988.33
PLANT		Yield %	0.60	0.60
	OUTPUT VALUES	Tons Product	21197.00	24593.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	12009.00	19851.00
	OUTPUT VALUE	Sales tons at production costs(R	3543.16	4808.67
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	12009.00	19851.00
	OUTPUT VALUES	Production costs & Cost of Sales	3543.16	5402.57
		Cost of Sales (R000)	3543.00	3684.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	12009.00	19851.00
	OUTPUT VALUES	Revenue(R000)	6822.00	10572.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		-1464.00	970.00
	CHANGE IN WORKING PROFIT (R000)			2334.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	6254.00	0.01	422767.00	6018.00	0.02	376399.00
Inputs	Labour - Officials	975.00	70.00	13.93	921.00	70.00	13.16
	Labour - Cat 1-7	647.00	330.00	1.96	579.00	309.00	1.87
	Stores	2642.00	23.24	113.70	2726.00	23.70	115.00
	Car 2	0.00	0.00	113.70	0.00	0.00	115.00
	Electricity	298.00	2.62	113.70	427.00	3.71	115.00
	Water	164.00	1.44	113.70	175.00	1.52	115.00
	Other	1528.00	13.44	113.70	1190.00	10.35	115.00
	Head Office	0.00	0.00	113.70	0.00	0.00	115.00

deltaQeld(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo -0.11

Labour - Officials
Qnp=Qo(1+deltaQeld(U)) 75.66
Pnr=Po(1+deltaPnew(U)) 12.40
Ynew=(Qnp-Qn)Pn 74.42
Rlong=Qnp(Pnr-Pn) -57.21

Labour - Cat 1-7
Qnp=Qo(1+deltaQeld(U)) 356.67
Pnr=Po(1+deltaPnew(U)) 1.75
Ynew=(Qnp-Qn)Pn 89.31
Rlong=Qnp(Pnr-Pn) -45.73

Stores
Qnp=Qo(1+deltaQeld(U)) 25.11
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn 162.13
Rlong=Qnp(Pnr-Pn) -345.83

Car 2
Qnp=Qo(1+deltaQeld(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQeld(U)) 2.83
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn -101.24
Rlong=Qnp(Pnr-Pn) -39.01

Water
Qnp=Qo(1+deltaQeld(U)) 1.56
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn 4.28
Rlong=Qnp(Pnr-Pn) -21.47

Other
Qnp=Qo(1+deltaQeld(U)) 14.52
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn 480.35
Rlong=Qnp(Pnr-Pn) -200.01

Head Office
Qnp=Qo(1+deltaQeld(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 101.23
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	6254.00	422767.00	0.01	6018.00	376399.00	0.02
Inputs	Tons Mined	6254.00	422767.00	0.01	6018.00	376399.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.11

deltaPnew(U)=(Pun-Puo)/Puo 0.00

ORE
Qnp=Qo(1+deltaQold(U)) 376399.00
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

GRADE

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	6254.00	35328.33	0.18	6018.00	40988.33	0.15
Inputs	Tons Ore	6254.00	422767.00	0.01	6018.00	376399.00	0.02

deltaQold(U)=(Qun-Quo)/Quo 0.16

deltaPnew(U)=(Pun-Puo)/Puo -0.17

GRADE
Qnp=Qo(1+deltaQold(U)) 490499.07
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 1824.27
Rlong=Qnp(Pnr-Pn) -1824.27

PLANT

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	6254.00	21197.00	0.30	6018.00	24593.00	0.24
Inputs	Tons Potential Product	6254.00	35328.33	0.18	6018.00	40988.33	0.15

deltaQold(U)=(Qun-Quo)/Quo 0.16

deltaPnew(U)=(Pun-Puo)/Puo -0.17

PLANT
Qnp=Qo(1+deltaQold(U)) 40988.53
Pnr=Po(1+deltaPnew(U)) 0.15
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

PRODUCT STOCKPILE

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	3543.16	12009.00	0.30	4808.67	19851.00	0.24
Inputs	Tons Product	6254.00	21197.00	0.30	6018.00	24593.00	0.24

deltaQold(U)=(Qun-Quo)/Quo 0.04

deltaPnew(U)=(Pun-Puo)/Puo -0.17

Cost of sales
Qnp=Qo(1+deltaQold(U)) 34545.04
Pnr=Po(1+deltaPnew(U)) 0.24
Ynew=(Qnp-Qn)Pn 2469.76
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	5365.16	12009.00	0.45	8492.67	19651.00	0.43
Inputs	Sales Tons	3543.16	12009.00	0.30	4808.67	19651.00	0.24

deltaQold(U)=(Qun-Quo)/Quo 0.64

deltaPnew(U)=(Pun-Puo)/Puo -0.03

Sales Tons
Qnp=Qo(1+deltaQold(U)) 19651.00
Pnr=Po(1+deltaPnew(U)) 0.29
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 799.90

REVENUE

		Quarter 2/91			Quarter 3/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	6622.00	12009.00	0.55	10572.00	19651.00	0.54
Inputs	Tons for Sales	5365.16	12009.00	0.45	8492.67	19651.00	0.43

deltaQold(U)=(Qun-Quo)/Quo 0.64

deltaPnew(U)=(Pun-Puo)/Puo -0.02

Sales Tons
Qnp=Qo(1+deltaQold(U)) 19651.00
Pnr=Po(1+deltaPnew(U)) 0.44
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 72.78

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 2/91 and 3/91

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Productivity Variance	Price Recovery Variance
Labour - Officials							17.21		74.42	-57.21
Labour - Cat 1-7							43.58		89.31	-45.73
Stores							-183.70		162.13	-345.83
Car 2							0.00		0.00	0.00
Electricity							-140.25		-101.24	-39.01
Water							-17.19		4.28	-21.47
Other							200.34		480.35	-280.01
Head Office							0.00		0.00	0.00
MINING	6254.00	6010.00	6254.00	6018.00	0.00	0.00	0.00	0.00	709.26	-709.26
ORE	6254.00	6018.00	6254.00	6018.00	0.00	0.00	0.00	0.00	0.00	0.00
GRADE	6254.00	6010.00	6254.00	6010.00	0.00	0.00	0.00	0.00	1024.27	-1024.27
PLANT	6254.00	6018.00	6254.00	6010.00	0.00	0.00	0.00	0.00	0.00	0.00
STOCKPILE	3543.16	4808.67	6254.00	6010.00	-2710.84	-1210.33	1501.52	-988.24	2489.76	0.00
COST OF SALES	3543.16	4808.67	3543.16	4808.67	0.00	0.00	0.00	-799.90	0.00	799.90
REVENUE	6622.00	10572.00	5365.16	8492.67	1256.84	2079.33	822.49	749.70	0.00	72.78
[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 3/01 Jul-Sep	Quarter 4/01 Oct-Dec
MINING	INPUT VALUES	Skilled Labour (R)	921.00	1018.00
		Cat 1-7 Labour (R)	576.00	576.00
		Stores (R)	2726.00	3036.00
		Cat 2 (R)	0.00	0.00
		Electricity (R)	427.00	395.00
		Water (R)	175.00	205.00
		Other (R)	1190.00	656.00
		Head Office (R)		
		TOTAL (R)	6016.00	5887.00
	QUANTITIES	Skilled Labour	70.00	60.00
		Cat 1-7 Labour	309.00	321.00
	PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	115.00	118.20
			115.00	118.20
	OUTPUT VALUES	Tons Mined	378399.00	339175.00
ORE	OUTPUT VALUES	Tons Ore	378399.00	339175.00
GRADE		Grade %	0.11	0.11
	OUTPUT VALUES	Tons Potential Product	40988.33	37053.33
PLANT		Yield %	0.60	0.60
	OUTPUT VALUES	Tons Product	24593.00	22232.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	19851.00	24136.00
	OUTPUT VALUE	Sales tons at production costs(R000)	4808.67	6391.18
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	19851.00	24136.00
	OUTPUT VALUES	Production costs & Cost of Sales	8492.67	10949.18
		Cost of Sales (R000)	3884.00	4558.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	19851.00	24136.00
	OUTPUT VALUES	Revenue(R000)	10572.00	12980.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		870.00	2435.00
	CHANGE IN WORKING PROFIT (R000)			1565.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	6018.00	0.02	376399.00	5887.00	0.02	339175.00
Inputs	Labour - Officials	921.00	70.00	13.16	1018.00	60.00	16.97
	Labour - Cat 1-7	578.00	309.00	1.87	576.00	321.00	1.79
	Stores	2728.00	23.70	115.00	3035.00	25.68	118.20
	Car 2	0.00	0.00	115.00	0.00	0.00	118.20
	Electricity	427.00	3.71	115.00	395.00	3.34	118.20
	Water	175.00	1.52	115.00	205.00	1.73	118.20
	Other	1190.00	10.35	115.00	658.00	5.57	118.20
	Head Office	0.00	0.00	115.00	0.00	0.00	118.20

deltaQoid(U)=(Qun-Quo)/Quo 0.09

deltaPnew(U)=(Pun-Puo)/Puo -0.10

Labour - Officials
Qnp=Qo(1+deltaQoid(U)) 76.59
Pnr=Po(1+deltaPnew(U)) 11.86
Ynew=(Qnp-Qn)Pn 271.32
Rlong=Qnp(Pnr-Pn) -388.37

Labour - Cat 1-7
Qnp=Qo(1+deltaQoid(U)) 335.45
Pnr=Po(1+deltaPnew(U)) 1.69
Ynew=(Qnp-Qn)Pn 25.93
Rlong=Qnp(Pnr-Pn) -35.53

Stores
Qnp=Qo(1+deltaQoid(U)) 25.73
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn 6.67
Rlong=Qnp(Pnr-Pn) -375.01

Car 2
Qnp=Qo(1+deltaQoid(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQoid(U)) 4.03
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn 81.45
Rlong=Qnp(Pnr-Pn) -58.74

Water
Qnp=Qo(1+deltaQoid(U)) 1.65
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn -9.74
Rlong=Qnp(Pnr-Pn) -24.07

Other
Qnp=Qo(1+deltaQoid(U)) 11.23
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn 669.80
Rlong=Qnp(Pnr-Pn) -163.71

Head Office
Qnp=Qo(1+deltaQoid(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 103.63
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	6018.00	376399.00	0.02	5887.00	339175.00	0.02
Inputs	Tons Mined	6018.00	376399.00	0.02	5887.00	339175.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo 0.00

ORE
Qnp=Qo(1+deltaQold(U)) 339175.00
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 0.00
Rieng=Qnp(Pnr-Pn) 0.00

GRADE

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	6018.00	40988.33	0.15	5887.00	37053.33	0.16
Inputs	Tons Ore	6018.00	76399.00	0.02	5887.00	339175.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo 0.00

GRADE
Qnp=Qo(1+deltaQold(U)) 340263.59
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 18.89
Rieng=Qnp(Pnr-Pn) -16.89

PLANT

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	6018.00	24593.00	0.24	5887.00	22232.00	0.26
Inputs	Tons Potential Product	6018.00	40988.33	0.15	5887.00	37053.33	0.16

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo 0.00

PLANT
Qnp=Qo(1+deltaQold(U)) 37053.33
Pnr=Po(1+deltaPnew(U)) 0.16
Ynew=(Qnp-Qn)Pn 0.00
Rieng=Qnp(Pnr-Pn) 0.00

PRODUCT STOCKPILE

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	4809.67	19851.00	0.24	5391.18	24136.00	0.26
Inputs	Tons Product	6018.00	24593.00	0.24	5887.00	22232.00	0.26

deltaQold(U)=(Qun-Quo)/Quo 0.23

deltaPnew(U)=(Pun-Puo)/Puo 0.00

Cost of sales
Qnp=Qo(1+deltaQold(U)) 30205.93
Pnr=Po(1+deltaPnew(U)) 0.26
Ynew=(Qnp-Qn)Pn 2111.48
Rieng=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	8492.67	19651.00	0.43	10949.18	24136.00	0.45
Inputs	Sales Tons	4808.67	19651.00	0.24	6391.18	24136.00	0.26

deltaQold(U)=(Qun-Quo)/ uo 0.23

deltaPnew(U)=(Pun-Puo)/Puo 0.06

Sales Tons
Qnp=Qo(1+del. Qold(U)) 24136.00
Pnr=Po(1+deltaPnew(U)) 0.26
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -191.60

REVENUE

		Quarter 3/91			Quarter 4/91		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	10572.00	19651.00	0.54	12880.00	24136.00	0.53
Inputs	Tons for Sales	8492.67	19651.00	0.43	10949.18	24136.00	0.45

deltaQold(U)=(Qun-Quo)/Quo 0.23

deltaPnew(U)=(Pun-Puo)/Puo -0.01

Sales Tons
Qnp=Qo(1+deltaQold(U)) 24136.00
Pnr=Po(1+deltaPnew(U)) 0.43
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -602.45

SOURCES OF ADJUSTED CHAN[illegible] IN UNIT WORKING PROFIT - Quarters 3/91 and 4/91

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delt[illegible] Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-117.00		271.32	-388.37
Labour - Cat 1-7							-0.00		25.83	-35.83
Stores							-368.34		0.67	-375.01
Car 2							0.00		0.00	0.00
Electricity							22.71		81.45	-58.74
Water							-33.31		-9.74	-24.07
Other							508.10		498.00	-163.71
Head Office							0.00		0.00	0.00
MINING	8018.00	8867.00	8018.00	8867.00	0.00	0.00	0.00	0.00	1046.43	-1046.43
ORE	8018.00	8867.00	8018.00	8867.00	0.00	0.00	0.00	0.00	0.00	0.00
GRADE	8018.00	8867.00	8018.00	8867.00	0.00	0.00	0.00	0.00	10.00	-10.00
PLANT	8 .00	8867.00	8018.00	8867.00	0.00	0.00	0.00	0.00	0.00	0.00
STOCKPILE	4808.67	6391.18	8018.00	8867.00	-1209.33	594.18	1713.50	-387.00	2111.43	0.00
COST OF SALES	4808.67	6391.18	4808.67	6391.18	0.00	0.00	0.00	191.00	0.00	-191.00
REVENUE	10572.00	12880.00	8492.67	10949.18	2079.33	1930.82	-120.50	293.00	0.00	-602.45

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 4/91 Oct-Dec	Quarter 1/92 Jan-Mar
MINING	INPUT VALUES	Skilled Labour (R)	1018.00	998.00
		Cat 1-7 Labour (R)	576.00	656.00
		Stores (R)	3035.00	2892.00
		Car 2 (R)	0	0.00
		Electricity (R)	395	400.00
		Water (R)	205.00	200.00
		Other (R)	659.00	741.00
		Head Office (R)		892.00
		TOTAL (R)	5887.00	6781.00
	QUANTITIES	Skilled Labour	60.00	59.00
		Cat 1-7 Labour	321.00	271.00
	PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	118.20	121.30
			118.20	121.30
	OUTPUT VALUES	Tons Mined	339175.00	347596.00
ORE	OUTPUT VALUES	Tons Ore	339175.00	333239.00
GRADE		Grade %	0.11	0.09
	OUTPUT VALUES	Tons Potential Product	37053.33	28991.79
PLANT		Yield %	0.60	0.68
	OUTPUT VALUES	Tons Product	22232.00	20900.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	24136.00	24482.00
	OUTPUT VALUE	Sales tons at production costs(R'000)	6391.18	7943.18
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	24136.00	24482.00
	OUTPUT VALUES	Production costs & Cost of Sales	10949.18	12086.18
		Cost of Sales (R000)	4558.00	4143.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	24136.00	24482.00
	OUTPUT VALUES	Revenue(R000)	12880.00	13913.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		2435.00	2989.00
	CHANGE IN WORKING PROFIT (R000)			554.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	5887.00	0.02	339175.00	6761.00	0.02	347586.00
Inputs	Labour - Officials	1018.00	60.00	16.97	998.00	58.00	17.21
	Labour - Cat 1-7	576.00	321.00	1.79	658.00	271.00	2.43
	Stores	3035.00	25.68	118.20	2892.00	23.84	121.30
	Car 2	0.00	0.00	118.20	0.00	0.00	121.30
	Electricity	395.00	3.34	118.20	400.00	3.30	121.30
	Water	205.00	1.73	118.20	200.00	1.65	121.30
	Other	658.00	5.57	118.20	741.00	6.11	121.30
	Head Office	0.00	0.00	118.20	892.00	7.35	121.30

deltaQold(U)=(Qun-Quo)/Quo 0.12

deltaPnew(U)=(Pun-Puo)/Puo 0.02

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 67.44
Pr. =Po(1+deltaPnew(U)) 17.39
Ynew=(Qnp-Qn)Pn 162.39
Rlong=Qnp(Pnr-Pn) 12.21

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 360.79
Pnr=Po(1+deltaPnew(U)) 1.84
Ynew=(Qnp-Qn)Pn 216.01
Rlong=Qnp(Pnr-Pn) -212.54

Stores
Qnp=Qo(1+deltaQold(U)) 28.86
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn 608.67
Rlong=Qnp(Pnr-Pn) -4.77

Car 2
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQold(U)) 3.76
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn 55.61
Rlong=Qnp(Pnr-Pn) -0.62

Water
Qnp=Qo(1+deltaQold(U)) 1.95
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn 36.45
Rlong=Qnp(Pnr-Pn) -0.32

Other
Qnp=Qo(1+deltaQold(U)) 6.26
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn 17.96
Rlong=Qnp(Pnr-Pn) -1.03

Head Office
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 121.13
Ynew=(Qnp-Qn)Pn -892.00
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	5887.00	339175.00	0.02	6781.00	333239.00	0.02
Inputs	Tons Mined	5887.00	339175.00	0.02	6781.00	347595.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.02

deltaPnew(U)=(Pun-Puo)/Puo 0.17

ORE
Qnp=Qo(1+deltaQold(U)) 333239.00
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -280.08
Rlong=Qnp(Pnr-Pn) 280.08

GRADE

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	5887.00	37053.33	0.16	6781.00	28991.79	0.23
Inputs	Tons Ore	5887.00	339175.00	0.02	6781.00	333239.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.22

deltaPnew(U)=(Pun-Puo)/Puo 0.47

GRADE
Qnp=Qo(1+deltaQold(U)) 285382.10
Pnr=Po(1+deltaPnew(U)) 0.03
Ynew=(Qnp-Qn)Pn -1380.80
Rlong=Qnp(Pnr-Pn) 1380.80

PLANT

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	5887.00	22232.00	0.26	6781.00	20900.00	0.32
Inputs	Tons Potential Product	987.00	37053.33	0.16	6781.00	28991.79	0.23

deltaQold(U)=(Qun-Quo)/Quo -0.06

deltaPnew(U)=(Pun-Puo)/Puo 0.23

PLANT
Qnp=Qo(1+deltaQold(U)) 34853.33
Pnr=Po(1+deltaPn ew(U)) 0.19
Ynew=(Qnp-Qn)Pn 1368.30
Rlong=Qnp(Pnr-Pn) -1368.30

PRODUCT STOCKPILE

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	6391.18	24136.00	0.26	7943.18	24482.00	0.32
Inputs	Tons Product	5887.00	22232.00	0.26	6781.00	20900.00	0.32

deltaQold(U)=(Qun-Quo)/Quo 0.01

deltaPnew(U)=(Pun-Puo)/Puo 0.23

Cost of sales
Qnp=Qo(1+deltaQold(U)) 22550.71
Pnr=Po(1+deltaPnew(U)) 0.32
Ynew=(Qnp-Qn)Pn 535.57
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	10949.18	24136.00	0.45	12086.18	24482.00	0.49
Inputs	Sales Tons	6391.18	24136.00	0.26	7943.18	24482.00	0.32

deltaQold(U)=(Qun-Quo)/Quo 0.01

deltaPnew(U)=(Pun-Puo)/Puo 0.09

Sales Tons
Qnp=Qo(1+deltaQold(U)) 24482.00
Pnr=Po(1+deltaPnew(U)) 0.29
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -866.32

REVENUE

		Quarter 4/91			Quarter 1/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	12880.00	24136.00	0.53	13913.00	24482.00	0.57
Inputs	Tons for Sales	10949.18	24136.00	0.45	12086.18	24482.00	0.49

deltaQold(U)=(Qun-Quo)/Quo 0.01

deltaPnew(U)=(Pun-Puo)/Puo 0.08

Sales Tons
Qnp=Qo(1+deltaQold(U)) 24482.00
Pnr=Po(1+deltaPnew(U)) 0.48
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -253.86

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 4/91 and 1/92

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							174.59		162.39	12.21
Labour - Cat 1-7							6.47		219.01	-212.64
Stores							603.90		609.67	-4.77
Car 2							0.00		0.00	0.00
Electricity							84.09		85.01	-0.02
Water							36.13		36.47	-0.32
Other							16.02		17.06	-1.03
Head Office							-992.00		-992.00	0.00
MINING	5887.00	6781.00	5887.00	6781.00	0.00	0.00	0.00	0.00	207.08	-207.08
ORE	5887.00	6781.00	5887.00	6781.00	0.00	0.00	-0.00	0.00	-280.00	280.00
GRADE	5887.00	6781.00	5887.00	6781.00	0.00	0.00	0.00	0.00	-1360.00	1360.00
PLANT	5887.00	6781.00	5887.00	6781.00	0.00	0.00	0.00	0.00	-1366.30	-1366.30
STOCKPILE	6391.18	7943.18	5887.00	6781.00	504.18	1162.18	658.00	122.43	536.57	0.00
COST OF SALES	6391.18	7943.18	6391.18	7943.18	0.00	0.00	0.00	806.32	0.00	-806.32
REVENUE	12880.00	13913.00	10949.18	12086.18	1930.82	1826.82	-104.00	184.06	0.00	-290.06

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 1/92 Jan-Mar	Quarter 2/92 Apr-Jun
MINING	INPUT VALUES	Skilled Labour (R)	996.00	1693.00
		Cat 1-7 Labour (R)	858.00	680.00
		Stores (R)	2892.00	4460.00
		Car 2 (R)	0.00	0.00
		Electricity (R)	400.00	116.00
		Water (R)	200.00	288.00
		Other (R)	741.00	1255.00
		Head Office (R)	892.00	532.00
		TOTAL (R)	6781.00	9326.00
	QUANTITIES	Skilled Labour	66.00	66.00
		Cat 1-7 Labour	271.00	279.00
	PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	121.30	121.20
			121.30	121.20
	OUTPUT VALUES	Tons Mined	347556.00	548847.00
ORE	OUTPUT VALUES	Tons Ore	333239.00	573310.00
GRADE		Grade %	0.09	0.10
	OUTPUT VALUES	Tons Potential Product	28991.79	57904.31
PLANT		Yield %	0.68	0.55
	OUTPUT VALUES	Tons Product	20100.00	31600.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	24482.00	28759.00
	OUTPUT VALUE	Sales tons at production costs(R000	7943.18	7577.45
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	24482.00	28759.00
	OUTPUT VALUES	Production costs & Cost of Sales	12096.18	12461.45
		Cost of Sales (R000)	4143.00	4884.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	24482.00	28759.00
	OUTPUT VALUES	Revenue(R000)	13913.00	16765.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		2966.00	3575.00
	CHANGE IN WORKING PROFIT (R000)			609.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	6781.00	0.02	347596.00	8326.00	0.02	548847.00
Inputs	Labour - Officials	998.00	58.00	17.21	1083.00	55.00	19.11
	Labour - Cat 1-7	659.00	271.00	2.43	590.00	278.00	2.12
	Stores	2892.00	23.84	121.30	4480.00	36.96	121.20
	Car 2	0.00	0.00	121.30	0.00	0.00	121.20
	Electricity	400.00	3.30	121.30	118.00	0.97	121.20
	Water	200.00	1.65	121.30	288.00	2.38	121.20
	Other	741.00	6.11	121.30	1255.00	10.35	121.20
	Head Office	892.00	7.35	121.30	532.00	4.39	121.20

deltaQold(U)=(Qun-Quo)/Quo -0.22

deltaPnew(U)=(Pun-Puo)/Puo 0.58

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 45.10
Pnr=Po(1+deltaPnew(U)) 27.17
Ynew=(Qnp-Qn)Pn -336.59
Rlong=Qnp(Pnr-Pn) 49.97

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 210.79
Pnr=Po(1+deltaPnew(U)) 3.83
Ynew=(Qnp-Qn)Pn -142.76
Rlong=Qnp(Pnr-Pn) 360.68

Stores
Qnp=Qo(1+deltaQold(U)) 18.54
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn -2232.98
Rlong=Qnp(Pnr-Pn) 1303.60

Car 2
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQold(U)) 2.56
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn 192.79
Rlong=Qnp(Pnr-Pn) 180.35

Water
Qnp=Qo(1+deltaQold(U)) 1.28
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn -132.60
Rlong=Qnp(Pnr-Pn) 90.17

Other
Qnp=Qo(1+deltaQold(U)) 4.75
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn -679.26
Rlong=Qnp(Pnr-Pn) 334.09

Head Office
Qnp=Qo(1+deltaQold(U)) 5.72
Pnr=Po(1+deltaPnew(U)) 191.53
Ynew=(Qnp-Qn)Pn 161.08
Rlong=Qnp(Pnr-Pn) 402.17

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	6781.00	333299.00	0.02	8326.00	573310.00	0.01
Inputs	Tons Mined	6781.00	347588.00	0.02	8326.00	548847.00	0.02

deltaQold(U)=(Qun-Quo)/Quo 0.72

deltaPnew(U)=(Pun-Puo)/Puo -0.29

ORE
Qnp=Qo(1+deltaQold(U)) 598010.03
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 745.80
Rlong=Qnp(Pnr-Pn) -745.80

GRADE

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	6781.00	28991.79	0.23	8326.00	57904.31	0.14
Inputs	Tons Ore	6781.00	333239.00	0.02	8326.00	573310.00	0.01

deltaQold(U)=(Qun-Quo)/Quo 1.00

deltaPnew(U)=(Pun-Puo)/Puo -0.39

GRADE
Qnp=Qo(1+deltaQold(U)) 665586.76
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 1339.82
Rlong=Qnp(Pnr-Pn) -1339.82

PLANT

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	6781.00	20900.00	0.32	8326.00	31600.00	0.26
Inputs	Tons Potential Product	6781.00	28991.79	0.23	8326.00	57904.31	0.14

deltaQold(U)=(Qun-Quo)/Quo 0.81

deltaPnew(U)=(Pun-Puo)/Puo -0.19

PLANT
Qnp=Qo(1+deltaQold(U)) 43834.48
Pnr=Po(1+deltaPnew(U)) 0.19
Ynew=(Qnp-Qn)Pn -2023.09
Rlong=Qnp(Pnr-Pn) 2023.09

PRODUCT STOCKPILE

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	7943.18	24482.00	0.32	7577.45	28759.00	0.26
Inputs	Tons Product	6781.00	20900.00	0.32	8326.00	31600.00	0.26

deltaQold(U)=(Qun-Quo)/Quo 0.17

deltaPnew(U)=(Pun-Puo)/Puo -0.19

Cost of sales
Qnp=Qo(1+deltaQold(U)) 24351.23
Pnr=Po(1+deltaPnew(U)) 0.26
Ynew=(Qnp-Qn)Pn -1857.22
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	12086.18	24482.00	0.49	12461.45	28759.00	0.43
Inputs	Sales Tons	7943.18	24482.00	0.32	7577.45	28759.00	0.26

deltaQold(U)=(Qun-Quo)/Quo 0.17

deltaPnew(U)=(Pun-Puo)/Puo -0.12

Sales Tons
Qnp=Qo(1+deltaQold(U)) 28759.00
Pnr=Po(1+deltaPnew(U)) 0.28
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 612.36

REVENUE

		Quarter 1/92			Quarter 2/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	13913.00	24482.00	0.57	16785.00	28759.00	0.58
Inputs	Tons for Sales	12086.18	24482.00	0.49	12461.45	28759.00	0.43

deltaQold(U)=(Qun-Quo)/Quo 0.17

deltaPnew(U)=(Pun-Puo)/Puo 0.03

Sales Tons
Qnp=Qo(1+deltaQold(U)) 28759.00
Pnr=Po(1+deltaPnew(U)) 0.51
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 2119.63

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 1/92 and 2/92

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							162.39		-336.59	498.97
Labour - Cat 1-7							217.92		-142.76	360.68
Stores							-929.08		-2232.98	1303.90
Car 2							0.00		0.00	0.00
Electricity							373.13		192.79	180.36
Water							-42.43		-132.60	90.17
Other							-345.17		-679.26	334.09
Head Office							663.24		161.08	502.17
MINING	6781.00	8326.00	6781.00	8326.00	0.00	0.00	0.00	0.00	-3170.34	3170.34
ORE	6781.00	8326.00	6781.00	8326.00	0.00	0.00	0.00	0.00	745.00	-745.00
GRADE	6781.00	8326.00	6781.00	8326.00	0.00	0.00	0.00	0.00	1338.82	-1338.82
PLANT	6781.00	8326.00	6781.00	8326.00	0.00	0.00	0.00	0.00	-2023.00	2023.00
STOCKPILE	7943.18	7577.45	6781.00	8326.00	1162.18	-748.55	-1910.73	-53.51	-1857.22	0.00
COST OF SALES	7943.18	7577.45	7943.18	7577.45	0.00	0.00	0.00	-312.30	0.00	612.36

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 2/92 Apr-Jun	Quarter 3/92 July-Sep
MINING	INPUT VALUES	Skilled Labour (R)	1083.00	1087.00
		Cat 1-7 Labour (R)	590.00	527.00
		Stores (R)	4480.00	2643.00
		Car 2 (R)	0.00	678.00
		Electricity (R)	118.00	346.00
		Water (R)	288.00	246.00
		Other (R)	1255.00	1074.00
		Head Office (R)	532.00	812.00
		TOTAL (R)	8326.00	7513.00
	QUANTITIES	Skilled Labour	68.00	64.00
		Cat 1-7 Labour	278.00	251.00
	PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	121.20	123.60
			121.20	123.60
	OUTPUT VALUES	Tons Mined	548647.00	539100.00
ORE	OUTPUT VALUES	Tons Ore	573310.00	544500.00
GRADE		Grade %	0.10	0.08
	OUTPUT VALUES	Tons Potential Product	57904.31	41382.00
PLANT		Yield %	0.55	0.69
	OUTPUT VALUES	Tons Product	31600.00	28500.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	20410.00	27900.00
	OUTPUT VALUE	Sales tons at production costs(R000	5377.65	7354.83
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	20410.00	27900.00
	OUTPUT VALUES	Production costs & Cost of Sales	10372.65	13874.83
		Cost of Sales (R000)	4995.00	6520.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	20410.00	27900.00
	OUTPUT VALUES	Revenue(R000)	15905.00	19658.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		2587.00	5825.00
	CHANGE IN WORKING PROFIT (R000)			3038.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	8328.00	0.02	548847.00	7513.00	0.01	539100.00
Inputs	Labour - Officials	1053.00	66.00	16.11	1087.00	64.00	16.98
	Labour - Cat 1-7	590.00	278.00	2.12	627.00	251.00	2.50
	Stores	4480.00	36.96	121.20	2643.00	21.38	123.60
	Car 2	0.00	0.00	121.20	678.00	5.49	123.60
	Electricity	118.00	0.97	121.20	346.00	2.80	123.60
	Water	288.00	2.38	121.20	246.00	1.99	123.60
	Other	1285.00	10.35	121.20	1074.00	8.69	123.60
	Head Office	532.00	4.39	121.20	812.00	6.57	123.60

deltaQold(U)=(Qun-Quo)/Quo -0.08

deltaPnew(U)=(Pun-Puo)/Puo -0.02

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 60.63
Pnr=Po(1+deltaPnew(U)) 16.82
Ynew=(Qnp-Qn)Pn -57.20
Rlong=Qnp(Pnr-Pn) -70.60

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 255.39
Pnr=Po(1+deltaPnew(U)) 2.06
Ynew=(Qnp-Qn)Pn 10.97
Rlong=Qnp(Pnr-Pn) -105.58

Stores
Qnp=Qo(1+deltaQold(U)) 33.96
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn 1554.13
Rlong=Qnp(Pnr-Pn) -154.59

Car 2
Qnp=Qo(1+deltaQold(U)) 0.00
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn -678.00
Rlong=Qnp(Pnr-Pn) 0.00

Electricity
Qnp=Qo(1+deltaQold(U)) 0.89
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn -235.45
Rlong=Qnp(Pnr-Pn) -4.07

Water
Qnp=Qo(1+deltaQold(U)) 2.16
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn 23.82
Rlong=Qnp(Pnr-Pn) -9.94

Other
Qnp=Qo(1+deltaQold(U)) 9.51
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn 101.76
Rlong=Qnp(Pnr-Pn) -43.31

Head Office
Qnp=Qo(1+deltaQold(U)) 4.03
Pnr=Po(1+deltaPnew(U)) 119.05
Ynew=(Qnp-Qn)Pn -313.59
Rlong=Qnp(Pnr-Pn) -18.36

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	8326.00	573310.00	0.01	7513.00	544500.00	0.01
Inputs	Tons Mined	8326.00	548847.00	0.02	7513.00	539100.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.05

deltaPnew(U)=(Pun-Puo)/Puo -0.05

ORE
Qnp=Qo(1+deltaQold(U)) 521268.32
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn -248.53
Rlong=Qnp(Pnr-Pn) 248.53

GRADE

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	8326.00	57904.31	0.14	7513.00	41382.00	0.18
Inputs	Tons Ore	8326.00	573310.00	0.01	7513.00	544500.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.29

deltaPnew(U)=(Pun-Puo)/Puo 0.26

GRADE
Qnp=Qo(1+deltaQold(U)) 409722.77
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -1859.65
Rlong=Qnp(Pnr-Pn) 1859.65

PLANT

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	8326.00	31600.00	0.26	7513.00	28500.00	0.26
Inputs	Tons Potential Product	8326.00	57904.31	0.14	7513.00	41382.00	0.18

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo 0.00

PLANT
Qnp=Qo(1+deltaQold(U)) 52223.82
Pnr=Po(1+deltaPnew(U)) 0.14
Ynew=(Qnp-Qn)Pn 1968.36
Rlong=Qnp(Pnr-Pn) -1968.36

PRODUCT STOCKPILE

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	5377.65	20410.00	0.26	7354.83	27900.00	0.26
Inputs	Tons Product	8326.00	31600.00	0.26	7513.00	28500.00	0.26

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo 0.00

Cost of sales
Qnp=Qo(1+deltaQold(U)) 43198.47
Pnr=Po(1+deltaPnew(U)) 0.26
Ynew=(Qnp-Qn)Pn 3874.20
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	10372.65	20410.00	0.51	13874.83	27900.00	0.50
Inputs	Sales Tons	5377.65	20410.00	0.26	7354.83	27900.00	0.26

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo -0.02

Sales Ton.,
Qnp=Qo(1+deltaQold(U)) 27900.00
Pnr=Po(1+deltaPnew(U)) 0.26
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -161.49

REVENUE

		Quarter 2/92			Quarter 3/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	15908.00	20410.00	0.78	19858.00	27900.00	0.70
Inputs	Tons for Sales	10372.65	20410.00	0.51	13874.83	27900.00	0.50

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo -0.10

Sales Tons
Qnp=Qo(1+deltaQold(U)) 27900.00
Pnr=Po(1+deltaPnew(U)) 0.46
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -1057.04

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 2/92 and 3/92

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Pro...	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-127.80		-57.20	-70.60
Labour - Cat 1-7							-94.01		10.97	-105.58
Stores							1399.55		1554.13	-154.59
Car 2							-678.00		-678.00	0.00
Electricity							-239.52		-235.45	-4.07
Water							13.08		23.02	-9.94
Other							58.45		101.76	-43.31
Head Office							-331.95		-313.59	-18.36
MINING	8326.00	7513.00	8326.00	7513.00	0.00	0.00	0.00	0.00	406.43	-406.43
ORE	8326.00	7513.00	8326.00	7513.00	0.00	0.00	-0.00	0.00	-249.53	249.53
GRADE	8326.00	7513.00	8326.00	7513.00	0.00	0.00	-0.00	0.00	-1659.65	1659.65
PLANT	8326.00	7513.00	8326.00	7513.00	0.00	0.00	-0.00	0.00	1568.36	-1568.36
STOCKPILE	5377.65	7354.83	8326.00	7513.00	-2948.36	-158.17	2790.19	-1004.01	3074.20	0.00
COST OF SALES	5377.65	7354.83	5377.65	7354.83	0.00	0.00	0.00	161.49	0.00	-161.49

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 3/92 July-Sep	Quarter 4/92 Oct-Nov
MINING	INPUT VALUES	Skilled Labour (R)	1087.00	1043.00
		Cat 1-7 Labour (R)	627.00	762.00
		Stores (R)	2843.00	2816.00
		Car 2 (R)	676.00	669.00
		Electricity (R)	346.00	332.00
		Water (R)	246.00	236.00
		Other (R)	1074.00	1036.00
		Head Office (R)	812.00	699.00
		TOTAL (R)	7515.00	7593.00
	QUANTITIES	Skilled Labour	64.00	61.00
		Cat 1-7 Labour	251.00	219.00
	PRICE INDEX	Elec,water,gas for S A	123.60	124.80
		Materials for civil,mech,elec,eng		
		PPI all group commodities for S A	123.60	124.80
	OUTPUT VALUES	Tons Mined	539100.00	524700.00
ORE	OUTPUT VALUES	Tons Ore	544500.00	495600.00
GRADE		Grade %	0.08	0.08
	OUTPUT VALUES	Tons Potential Product	41382.00	38161.20
PLANT		Yield %	0.69	0.71
	OUTPUT VALUES	Tons Product	28500.00	27000.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	20410.00	27800.00
	OUTPUT VALUE	Sales tons at production costs,R000	5380.36	7846.10
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	20410.00	27800.00
	OUTPUT VALUES	Production costs & Cost of Sales	10375.36	14366.10
		Cost of Sales (R000)	4995.00	6520.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	20410.00	27800.00
	OUTPUT VALUES	Revenue(R000)	15908.00	19858.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		3400.00	5546.00
	CHANGE IN WORKING PROFIT (R000)			2145.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	7513.00	0.01	539100.00	7593.00	0.01	524700.00
Inputs	Labour - Officials	1087.00	84.00	16.98	1043.00	81.00	17.10
	Labour - Cat 1-7	627.00	251.00	2.50	762.00	219.00	3.48
	Stores	2643.00	21.38	123.60	2816.00	22.56	124.80
	Car 2	678.00	5.49	123.60	668.00	5.36	124.80
	Electricity	346.00	2.80	123.60	332.00	2.66	124.80
	Water	246.00	1.99	123.60	236.00	1.89	124.80
	Other	1074.00	8.69	123.60	1038.00	8.30	124.80
	Head Office	812.00	6.57	123.60	699.00	5.60	124.80

deltaQoid(U)=(Qun-Quo)/Quo 0.04

deltaPnew(U)=(Pun-Puo)/Puo -0.03

Labour - Officials
Qnp=Qo(1+deltaQoid(U)) 66.46
Pnr=Po(1+deltaPnew(U)) 16.53
Ynew=(Qnp-Qn)Pn 93.30
Rlong=Qnp(Pnr-Pn) -37.72

Labour - Cat 1-7
Qnp=Qo(1+deltaQoid(U)) 260.63
Pnr=Po(1+deltaPnew(U)) 2.43
Ynew=(Qnp-Qn)Pn 144.87
Rlong=Qnp(Pnr-Pn) -273.19

Stores
Qnp=Qo(1+deltaQoid(U)) 22.20
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn -44.90
Rlong=Qnp(Pnr-Pn) -89.85

Car 2
Qnp=Qo(1+deltaQoid(U)) 5.70
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn 41.86
Rlong=Qnp(Pnr-Pn) -25.64

Electricity
Qnp=Qo(1+deltaQoid(U)) 2.91
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn 30.77
Rlong=Qnp(Pnr-Pn) -13.08

Water
Qnp=Qo(1+deltaQoid(U)) 2.07
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn 21.92
Rlong=Qnp(Pnr-Pn) -9.30

Other
Qnp=Qo(1+deltaQoid(U)) 9.02
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn 90.05
Rlong=Qnp(Pnr-Pn) -40.62

Head Office
Qnp=Qo(1+deltaQoid(U)) 6.82
Pnr=Po(1+deltaPnew(U)) 120.30
Ynew=(Qnp-Qn)Pn 152.35
Rlong=Qnp(Pnr-Pn) -30.71

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	7513.04	544500.00	0.01	7593.00	495600.00	0.02
Inputs	Tons Mined	7513.00	539100.00	0.01	7593.00	524700.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.08

deltaPnew(U)=(Pun-Puo)/Puo 0.11

ORE
Qnp=Qo(1+deltaQold(U)) 490584.96
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -492.24
Rlong=Qnp(Pnr-Pn) 492.24

GRADE

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	7513.00	41382.00	0.18	7593.00	39161.20	0.20
Inputs	Tons Ore	7513.00	544500.00	0.01	7593.00	495600.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.08

deltaPnew(U)=(Pun-Puo)/Puo 0.10

GRADE
Qnp=Qo(1+deltaQold(U)) 502121.05
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 99.8
Rlong=Qnp(Pnr-Pn) -99.81

PLANT

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	7513.00	28500.00	0.26	7593.00	27000.00	0.28
Inputs	Tons Potential Product	7513.00	41382.00	0.18	7593.00	39161.20	0.20

deltaQold(U)=(Qun-Quo)/Quo -0.06

deltaPnew(U)=(Pun-Puo)/Puo 0.07

PLANT
Qnp=Qo(1+deltaQold(U)) 39204.00
Pnr=Po(1+deltaPnew(U)) 0.19
Ynew=(Qnp-Qn)Pn 207.49
Rlong=Qnp(Pnr-Pn) -207.49

PRODUCT STOCKPILE

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	5380.36	20410.00	0.26	7848.10	27900.00	0.28
Inputs	Tons Product	7513.00	28500.00	0.26	7593.00	27000.00	0.28

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo 0.07

Cost of Sales
Qnp=Qo(1+deltaQold(U)) 38958.94
Pnr=Po(1+deltaPnew(U)) 0.28
Ynew=(Qnp-Qn)Pn 3363.09
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	10375.36	20410.00	0.51	14366.10	27900.00	0.51
Inputs	Sales Tons	5380.36	20410.00	0.26	7846.10	27900.00	0.28

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo 0.01

Sales Tons
Qnp=Qo(1+deltaQold(U)) 27900.00
Pnr=Po(1+deltaPnew(U)) 0.27
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -388.26

REVENUE

		Quarter 3/92			Quarter 4/92		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	15908.00	20410.00	0.78	19658.00	27900.00	0.70
Inputs	Tons for Sales	10375.36	20410.00	0.51	14366.10	27900.00	0.51

deltaQold(U)=(Qun-Quo)/Quo 0.37

deltaPnew(U)=(Pun-Puo)/Puo -0.10

Sales Tons
Qnp=Qo(1+deltaQold(U)) 27900.00
Pnr=Po(1+deltaPnew(U)) 0.49
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -1544.95

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 3/92 and 4/92

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							55.67		93.30	-37.72
Labour - Cat 1-7							-126.52		146.67	-273.19
Stores							-144.06		-44.50	-99.55
Car 2							16.22		41.06	-25.04
Electricity							17.69		30.77	-13.08
Water							12.82		21.52	-8.30
Other							49.44		90.06	-40.62
Head Office							121.65		152.35	-30.71
MINING	7513.00	7593.00	7513.00	7593.00	0.00	0.00	0.00	0.00	630.22	-630.22
ORE	7513.00	7593.00	7513.00	7593.00	0.00	0.00	-0.00	0.00	-492.24	492.24
GRADE	7513.00	7593.00	7513.00	7593.00	0.00	0.00	0.00	0.00	99.91	-99.91
PLANT	7513.00	7593.00	7513.00	7593.00	0.00	0.00	-0.00	0.00	207.46	-207.46
STOCKPILE	5380.36	7846.10	7513.00	7593.00	-2132.64	253.10	2385.74	-672.36	3363.00	0.00
COST OF SALES	5380.36	7846.10	5380.36	7846.10	0.00	0.00	0.00	388.20	0.00	-388.20
REVENUE	15908.00	19658.00	10375.36	14366.10	5532.64	5291.90	-240.74	1304.31	0.00	-1544.95
TOTAL					3400.00	5545.00	2145.00	632.15	3512.85	-1500.00

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 4/92 Oct-Dec	Quarter 1/93 Jan-Mar
MINING	INPUT VALUES	Skilled Labour (R)	1043.00	1045.00
		Cat 1-7 Labour (R)	762.00	624.00
		Stores (R)	2816.00	3340.00
		Car 2 (R)	669.00	630.00
		Electricity (R)	332.00	344.00
		Water (R)	236.00	229.00
		Other (R)	1036.00	1128.00
		Head Office (R)	699.00	785.00
		TOTAL (R)	7593.00	8105.00
	QUANTITIES	Skilled Labour	61.00	61.00
		Cat 1-7 Labour	219.00	224.00
	PRICE INDEX	Elec,water,gas for S A	124.80	127.70
		Materials for civil,mech,elec,eng		
		PPI all group commodities for S A	124.80	127.70
	OUTPUT VALUES	Tons Mined	524700.00	509000.00
ORE	OUTPUT VALUES	Tons Ore	495600.00	491000.00
GRADE		Grade %	0.08	0.10
	OUTPUT VALUES	Tons Potential Product	38161.20	50082.00
PLANT		Yield %	0.71	0.47
	OUTPUT VALUES	Tons Product	27000.00	23700.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	27900.00	29886.00
	OUTPUT VALUE	Sales tons at production costs(R000	7846.10	10220.51
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	27900.00	29886.00
	OUTPUT VALUES	Production costs & Cost of Sales	12841.10	16740.51
		Cost of Sales (R000)	4995.00	8520.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	27900.00	29886.00
	OUTPUT VALUES	Revenue(R000)	15909.00	18858.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		3320.00	6033.00
	CHANGE IN WORKING PROFIT (R000)			1713.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	7593.00	0.01	524700.00	9105.00	0.02	509000.00
Inputs	Labour - Officials	1043.00	81.00	17.10	1045.00	81.00	17.13
	Labour - Cat 1-7	762.00	219.00	3.48	624.00	224.00	2.79
	Stores	2816.00	22.56	124.80	3340.00	26.19	127.70
	Car 2	669.00	5.36	124.80	630.00	4.93	127.70
	Electricity	332.00	2.66	124.80	344.00	2.69	127.70
	Water	236.00	1.89	124.80	229.00	1.79	127.70
	Other	1036.00	8.30	124.80	1128.00	8.83	127.70
	Head Office	699.00	5.60	124.80	765.00	5.99	127.70

deltaQold(U)=(Qun-Quo)/Quo 0.10

deltaPnew(U)=(Pun-Puo)/Puo -0.03

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 67.12
Pnr=Po(1+deltaPnew(U)) 16.59
Ynew=(Qnp-Qn)Pn 104.87
Rlong=Qnp(Pnr-Pn) -36.54

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 240.98
Pnr=Po(1+deltaPnew(U)) 3.38
Ynew=(Qnp-Qn)Pn 47.30
Rlong=Qnp(Pnr-Pn) 142.09

Stores
Qnp=Qo(1+deltaQold(U)) 24.83
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn -169.40
Rlong=Qnp(Pnr-Pn) -164.72

Car 2
Qnp=Qo(1+deltaQold(U)) 5.90
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn 123.24
Rlong=Qnp(Pnr-Pn) -39.13

Electricity
Qnp=Qo(1+deltaQold(U)) 2.93
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn 29.81
Rlong=Qnp(Pnr-Pn) -19.42

Water
Qnp=Qo(1+deltaQold(U)) 2.08
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn 36.72
Rlong=Qnp(Pnr-Pn) -13.80

Other
Qnp=Qo(1+deltaQold(U)) 9.13
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn 38.46
Rlong=Qnp(Pnr-Pn) -60.60

Head Office
Qnp=Qo(1+deltaQold(U)) 6.16
Pnr=Po(1+deltaPnew(U)) 121.07
Ynew=(Qnp-Qn)Pn 22.02
Rlong=Qnp(Pnr-Pn) -40.89

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	7593.00	495600.00	0.02	8105.00	491000.00	0.02
Inputs	Tons Mined	7593.00	524700.00	0.01	8105.00	509000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.01

deltaPnew(U)=(Pun-Puo)/Puo 0.00

ORE
Qnp=Qo(1+deltaQold(U)) 519829.80
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 172.45
Rlong=Qnp(Pnr-Pn) -172.45

GRADE

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	7593.00	38161.20	0.20	8105.00	50082.00	0.16
Inputs	Tons Ore	7593.00	495600.00	0.02	8105.00	491000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo 0.31

deltaPnew(U)=(Pun-Puo)/Puo -0.19

GRADE
Qnp=Qo(1+deltaQold(U)) 650415.58
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 2631.49
Rlong=Qnp(Pnr-Pn) -2631.49

PLANT

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	7593.00	27000.00	0.28	8105.00	23700.00	0.34
Inputs	Tons Potential Product	7593.00	38161.20	0.20	8105.00	50082.00	0.16

deltaQold(U)=(Qun-Quo)/Quo -0.12

deltaPnew(U)=(Pun-Puo)/Puo 0.22

PLANT
Qnp=Qo(1+deltaQold(U)) 33497.05
Pnr=Po(1+deltaPnew(U)) 0.24
Ynew=(Qnp-Qn)Pn -2684.02
Rlong=Qnp(Pnr-Pn) 2684.02

PRODUCT STOCKPILE

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	7846.10	27900.00	0.28	10220.51	29886.00	0.34
Inputs	Tons Product	7593.00	27000.00	0.28	8105.00	23700.00	0.34

deltaQold(U)=(Qun-Quo)/Quo 0.07

deltaPnew(U)=(Pun-Puo)/Puo 0.22

Cost of sales
Qnp=Qo(1+deltaQold(U)) 28921.94
Pnr=Po(1+deltaPnew(U)) 0.34
Ynew=(Qnp-Qn)Pn 1785.81
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	12841.10	27900.00	0.46	16740.51	29886.00	0.56
Inputs	Sales Tons	7846.10	27900.00	0.28	10220.51	29886.00	0.34

deltaQold(U)=(Qun-Quo)/Quo 0.07

deltaPnew(U)=(Pun-Puo)/Puo 0.22

Sales Tons
Qnp=Qo(1+deltaQold(U)) 29886.00
Pnr=Po(1+deltaPnew(U)) 0.34
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 8.19

REVENUE

		Quarter 4/92			Quarter 1/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	15908.00	27900.00	0.57	19658.00	29886.00	0.66
Inputs	Tons for Sales	12841.10	27900.00	0.46	16740.51	29886.00	0.56

deltaQold(U)=(Qun-Quo)/Quo 0.07

deltaPnew(U)=(Pun-Puo)/Puo 0.15

Sales Tons
Qnp=Qo(1+deltaQold(U)) 29886.00
Pnr=Po(1+deltaPnew(U)) 0.53
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -872.37

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 4/92 and 1/93

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							68.33		104.87	-36.54
Labour - Cat 1-7							189.38		47.30	142.09
Stores							-334.12		-169.40	-164.72
Car 2							84.11		123.24	-39.13
Electricity							10.38		29.81	-19.42
Water							22.91		36.72	-13.80
Other							-22.14		18.46	-60.60
Head Office							-19.87		22.02	-40.89
MINING	7593.00	8105.00	7593.00	8105.00	0.00	0.00	-0.00	0.00	233.02	-233.02
ORE	7593.00	8105.00	7593.00	8105.00	0.00	0.00	0.00	0.00	172.46	-172.46
GRADE	7593.00	8105.00	7593.00	8105.00	0.00	0.00	-0.00	0.00	2631.49	-2631.49
PLANT	7593.00	8105.00	7593.00	8105.00	0.00	0.00	0.00	0.00	-2604.02	2604.02
STOCKPILE	7846.10	10220.51	7593.00	8105.00	253.10	2115.51	1862.41	76.00	1786.01	0.00
COST OF SALES	7846.10	10220.51	7846.10	10220.51	0.00	0.00	0.00	-8.19	0.00	8.19
REVENUE	15908.00	19658.00	12841.10	16740.51	3066.90	2917.49	-149.41	722.96	0.00	-872.37
NO [illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 1/93 Jan-Mar	Quarter 2/93 Apr-June
MINING	INPUT VALUES	Skilled Labour (R)	1045.00	1118.00
		Cat 1-7 Labour (R)	624.00	668.00
		Stores (R)	3340.00	3612.00
		Car 2 (R)	630.00	373.00
		Electricity (R)	344.00	368.00
		Water (R)	229.00	233.00
		Other (R)	1128.00	1509.00
		Head Office (R)	765.00	767.00
		TOTAL (R)	8105.00	8650.00
	QUANTITIES	Skilled Labour	61.00	60.00
		Cat 1-7 Labour	224.00	228.00
	PRICE INDEX	Elec,water,gas for S A	127.70	125.20
		Materials for civil,mech,elec,eng		
		PPI all group commogities for S A	127.70	125.20
	OUTPUT VALUES	Tons Mined	505000.00	567000.00
ORE	OUTPUT VALUES	Tons Ore	491000.00	585000.00
GRADE		Grade %	0.10	0.10
	OUTPUT VALUES	Tons Potential Product	50082.00	56160.00
PLANT		Yield %	0.47	0.49
	OUTPUT VALUES	Tons Product	23700.00	27700.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	29886.00	32301.00
	OUTPUT VALUE	Sales tons at production costs(R000)	10220.51	10096.44
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	29886.00	32301.00
	OUTPUT VALUES	Production costs & Cost of Sales	15215.51	16818.44
		Cost of Sales (R000)	4995.00	6520.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	29886.00	32301.00
	OUTPUT VALUES	Revenue(R000)	15908.00	19858.00
ADJ CHANGE WORKING PROFIT	WORKING PROFIT (R000)		2808.00	3178.00
	CHANGE IN WORKING PROFIT (R000)			1670.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	8105.00	0.02	[illegible]000.00	8660.00	0.01	587000.00
Inputs	Labour - Officials	1045.00	61.00	17.13	1118.00	60.00	18.63
	Labour - Cat 1-7	624.00	224.00	2.79	659.00	225.00	2.93
	Stores	3340.00	26.16	127.70	3612.00	28.85	125.20
	Car 2	620.00	4.93	127.70	373.00	2.98	125.20
	Electricity	344.00	2.69	127.70	369.00	2.95	125.20
	Water	229.00	1.79	127.70	233.00	1.86	125.20
	Other	1128.00	8.83	127.70	1509.00	12.05	125.20
	Head Office	765.00	5.99	127.70	787.00	6.29	125.20

deltaQold(U)=(Qun-Quo)/Quo -0.07

deltaPnew(U)=(Pun-Puo)/Puo 0.15

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 56.52
Pnr=Po(1+deltaPnew(U)) 19.76
Ynew=(Qnp-Qn)Pn -84.91
Rlong=Qnp(Pnr-Pn) 63.47

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 207.54
Pnr=Po(1+deltaPnew(U)) 3.21
Ynew=(Qnp-Qn)Pn -51.15
Rlong=Qnp(Pnr-Pn) 58.88

Stores
Qnp=Qo(1+deltaQold(U)) 24.23
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn -578.08
Rlong=Qnp(Pnr-Pn) 534.79

Car 2
Qnp=Qo(1+deltaQold(U)) 4.57
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn 199.27
Rlong=Qnp(Pnr-Pn) 100.87

Electricity
Qnp=Qo(1+deltaQold(U)) 2.50
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn -58.52
Rlong=Qnp(Pnr-Pn) 55.08

Water
Qnp=Qo(1+deltaQold(U)) 1.66
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn -24.99
Rlong=Qnp(Pnr-Pn) 36.87

Other
Qnp=Qo(1+deltaQold(U)) 8.18
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn -484.37
Rlong=Qnp(Pnr-Pn) 180.81

Head Office
Qnp=Qo(1+deltaQold(U)) 5.55
Pnr=Po(1+deltaPnew(U)) 147.27
Ynew=(Qnp-Qn)Pn -92.10
Rlong=Qnp(Pnr-Pn) 122.49

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	8105.00	491000.00	0.02	8660.00	585000.00	0.01
Inputs	Tons Mined	8105.00	509000.00	0.02	8660.00	587000.00	0.01

deltaQold(U)=(Qun-Quo)/Quo 0.19

deltaPnew(U)=(Pun-Puo)/Puo -0.10

ORE
Qnp=Qo(1+deltaQold(U)) 606446.03
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 286.89
Rlong=Qnp(Pnr-Pn) -286.89

GRADE

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	8105.00	50082.00	0.16	8660.00	56160.00	0.15
Inputs	Tons Ore	8105.00	491000.00	0.02	8660.00	585000.00	0.01

deltaQold(U)=(Qun-Quo)/Quo 0.12

deltaPnew(U)=(Pun-Puo)/Puo -0.05

GRADE
Qnp=Qo(1+deltaQold(U)) 550588.24
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -509.41
Rlong=Qnp(Pnr-Pn) 509.41

PLANT

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	8105.00	23700.00	0.34	8660.00	27700.00	0.31
Inputs	Tons Potential Product	8105.00	50082.00	0.16	8660.00	56160.00	0.15

deltaQold(U)=(Qun-Quo)/Quo 0.17

deltaPnew(U)=(Pun-Puo)/Puo -0.09

PLANT
Qnp=Qo(1+deltaQold(U)) 58534.66
Pnr=Po(1+deltaPnew(U)) 0.15
Ynew=(Qnp-Qn)Pn 366.18
Rlong=Qnp(Pnr-Pn) -366.18

PRODUCT STOCKPILE

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	10220.51	29686.00	0.34	10098.44	32301.00	0.31
Inputs	Tons Product	8105.00	23700.00	0.34	8660.00	27700.00	0.31

deltaQold(U)=(Qun-Quo)/Quo 0.00

deltaPnew(U)=(Pun-Puo)/Puo -0.09

Cost of sales
Qnp=Qo(1+deltaQold(U)) 25615.13
Pnr=Po(1+deltaPnew(U)) 0.31
Ynew=(Qnp-Qn./Pn -851.80
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	15215.51	29886.00	0.51	16618.44	32301.00	0.51
Inputs	Sales Tons	10220.51	29886.00	0.34	10098.44	32301.00	0.31

deltaQold(U)=(Qun-Quo)/Quo 0.08

deltaPnew(U)=(Pun-Puo)/Puo 0.01

Sales Tons
Qnp=Qo(1+deltaQold(U)) 32301.00
Pnr=Po(1+deltaPnew(U)) 0.35
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 1064.44

REVENUE

		Quarter 1/93			Quarter 2/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	16908.00	29886.00	0.53	19858.00	32301.00	0.61
Inputs	Tons for Sales	15215.51	29886.00	0.51	16618.44	32301.00	0.51

deltaQold(U)=(Qun-Quo)/Quo 0.08

deltaPnew(U)=(Pun-Puo)/Puo 0.14

Sales Tons
Qnp=Qo(1+deltaQold(U)) 32301.00
Pnr=Po(1+deltaPnew(U)) 0.58
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 2183.83

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 1/93 and 2/93

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-1.44		-64.91	63.47
Labour - Cat 1-7							7.73		-51.16	58.89
Stores							-43.35		-578.08	534.73
Car 2							306.		199.27	106.87
Electricity							-1.		-56.92	55.08
Water							1.84		-24.99	26.87
Other							-303.76		-484.37	180.61
Head Office							30.38		-92.10	122.48
MINING	8105.00	8660.00	8105.00	8660.00	0.00	0.00	-0.00	0.00	-1152.96	1152.96
ORE	8105.00	8660.00	8105.00	8660.00	0.00	0.00	-0.00	0.00	286.99	-286.99
GRADE	8105.00	8660.00	8105.00	8660.00	0.00	0.00	0.00	0.00	-500.41	500.41
PLANT	8105.00	8660.00	8105.00	8660.00	0.00	0.00	-0.00	0.00	360.18	-360.18
STOCKPILE	10220.51	10098.44	8105.00	8660.00	2115.51	1438.44	-677.07	-28.27	-481.99	0.00
COST OF SALES	10220.51	10098.44	10220.51	10098.44	0.00	0.00	0.00	-1064.44	0.00	1064.44
REVENUE	16908.00	19858.00	15215.51	16618.44	692.49	3030.56	2347.07	163.24	0.00	2183.83
[illegible]										0

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 2/93 Apr-June	Quarter 3/93 July-Sep
MINING	INPUT VALUES	Skilled Labour (R)	1118.00	955.00
		Cat 1-7 Labour (R)	659.00	676.00
		Stores (R)	3612.00	2994.00
		Car 2 (R)	373.00	1074.00
		Electricity (R)	369.00	408.00
		Water (R)	233.00	360.00
		Other (R)	1509.00	1364.00
		Head Office (R)	787.00	779.00
		TOTAL (R)	8660.00	8563.00
	QUANTITIES	Skilled Labour	60.00	54.00
		Cat 1-7 Labour	225.00	239.00
	PRICE INDEX	Elec,water,gas for S A	125.20	125.80
		Materials for civil,mech,elec,eng		
		PPI all group commodities f - S A	125.20	125.80
	OUTPUT VALUES	Tons Mined	587000.00	547000.00
ORE	OUTPUT VALUES	Tons Ore	585000.00	532000.00
GRADE		Grade %	0.10	0.09
	OUTPUT VALUES	Tons Potential Product	58160.00	49476.00
PLANT		Yield %	0.49	0.48
	OUTPUT VALUES	Tons Product	27700.00	23700.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	32301.00	16601.00
	OUTPUT VALUE	Sales tons at production costs(R000	10098.44	5998.07
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	32301.00	16601.00
	OUTPUT VALUES	Production costs & Cost of Sales	16618.44	8847.07
		Cost of Sales (R000)	6520.00	2849.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	32301.00	16601.00
	OUTPUT VALUES	Revenue(R000)	19658.00	9822.00
CHANGE WORKING PROFIT	WORKING PROFIT (R000)		4478.00	-1990.00
	CHANGE IN WORKING PROFIT (R000)			-6468.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	8660.00	0.01	587000.00	8563.00	0.02	547000.00
Inputs	Labour - Officials	1118.00	60.00	18.63	988.00	54.00	18.30
	Labour - Cat 1-7	659.00	225.00	2.93	676.00	239.00	2.83
	Stores	3612.00	28.85	125.20	2894.00	23.00	125.80
	Car 2	373.00	2.98	125.20	1074.00	8.54	125.80
	Electricity	369.00	2.95	125.20	408.00	3.24	125.80
	Water	233.00	1.86	125.20	380.00	3.02	125.80
	Other	1509.00	12.05	125.20	1364.00	10.84	125.80
	Head Office	787.00	6.29	125.20	779.00	6.19	125.80

deltaQoId(U)=(Qun-Quo)/Quo 0.06

deltaPnew(U)=(Pun-Puo)/Puo -0.07

Labour - Officials
Qnp=Qo(1+deltaQoId(U)) 63.67
Pnr=Po(1+deltaPnew(U)) 17.36
Ynew=(Qnp-Qn)Pn 178.86
Rlong=Qnp(Pnr-Pn) -59.38

Labour - Cat 1-7
Qnp=Qo(1+deltaQoId(U))
Pnr=Po(1+deltaPnew(U)) 2.73
Ynew=(Qnp-Qn)Pn -0.71
Rlong=Qnp(Pnr-Pn) -23.67

Stores
Qnp=Qo(1+deltaQoId(U)) 30.61
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn 957.08
Rlong=Qnp(Pnr-Pn) -279.54

Car 2
Qnp=Qo(1+deltaQoId(U)) 3.16
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn -676.31
Rlong=Qnp(Pnr-Pn) -28.87

Electricity
Qnp=Qo(1+deltaQoId(U)) 3.13
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn -14.58
Rlong=Qnp(Pnr-Pn) -28.56

Water
Qnp=Qo(1+deltaQoId(U)) 1.97
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn -131.58
Rlong=Qnp(Pnr-Pn) -18.03

Other
Qnp=Qo(1+deltaQoId(U)) 12.79
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn 244.88
Rlong=Qnp(Pnr-Pn) -116.78

Head Office
Qnp=Qo(1+deltaQoId(U)) 6.67
Pnr=Po(1+deltaPnew(U)) 116.67
Ynew=(Qnp-Qn)Pn 60.09
Rlong=Qnp(Pnr-Pn) -60.91

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	8660.00	585000.00	0.01	8563.00	532000.00	0.02
Inputs	Tons Mined	8660.00	587000.00	0.01	8563.00	547000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.09

deltaPnew(U)=(Pun-Puo)/Puo 0.09

ORE
Qnp=Qo(1+deltaQold(U)) 533818.80
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -206.34
Rlong=Qnp(Pnr-Pn) 206.34

GRADE

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	8660.00	56160.00	0.15	8563.00	49476.00	0.17
Inputs	Tons Ore	8660.00	585000.00	0.01	8563.00	532000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.12

deltaPnew(U)=(Pun-Puo)/Puo 0.12

GRADE
Qnp=Qo(1+deltaQold(U)) 515375.00
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -267.59
Rlong=Qnp(Pnr-Pn) 267.59

PLANT

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	8660.00	27700.00	0.31	8563.00	23700.00	0.36
Inputs	Tons Potential Product	8660.00	56160.00	0.15	8563.00	49476.00	0.17

deltaQ..ld(U)=(Qun-Quo)/Quo -0.14

deltaPnew(U)=(Pun-Puo)/Puo 0.16

PLANT
Qnp=Qo(1+deltaQold(U)) 48050.25
Pnr=Po(1+deltaPnew(U)) 0.18
Ynew=(Qnp-Qn)Pn -246.76
Rlong=Qnp(Pnr-Pn) 246.76

PRODUCT STOCKPILE

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	10099.44	32301.00	0.31	5998.07	16601.00	0.36
Inputs	Tons Product	8660.00	27700.00	0.31	8563.00	23700.00	0.36

deltaQold(U)=(Qun-Quo)/Quo -0.48

deltaPnew(U)=(Pun-Puo)/Puo 0.16

Cost of sales
Qnp=Qo(1+deltaQold(U)) 14236.33
Pnr=Po(1+deltaPnew(U)) 0.36
Ynew=(Qnp-Qn)Pn -3419.30
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	16618.44	32301.00	0.51	8847.07	16601.00	0.53
Inputs	Sales Tons	10098.44	32301.00	0.31	5998.07	16601.00	0.36

deltaQold(U)=(Qun-Quo)/Quo -0.49

deltaPnew(U)=(Pun-Puo)/Puo 0.04

Sales Tons
Qnp=Qo(1+deltaQold(U)) 16601.00
Pnr=Po(1+deltaPnew(U)) 0.32
Ynew=(Qnp-Qn)Pn 0.00
Rlang=Qnp(Pnr-Pn) -822.02

REVENUE

		Quarter 2/93			Quarter 3/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	19658.00	32301.00	0.61	9822.00	16601.00	0.59
Inputs	Tons for Sales	16618.44	32301.00	0.51	8847.07	16601.00	0.53

deltaQold(U)=(Qun-Quo)/Quo -0.49

deltaPnew(U)=(Pun-Puo)/Puo -0.03

Sales Tons
Qnp=Qo(1+deltaQold(U)) 16601.00
Pnr=Po(1+deltaPnew(U)) 0.50
Ynew=(Qnp-Qn)Pn 0.00
Rlang=Qnp(Pnr-Pn) -543.77

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 2/93 and 3/93

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							117.49		176.86	-59.36
Labour - Cat 1-7							-24.38		-0.71	-23.67
Stores							677.54		957.08	-279.54
Car 2							-705.18		-676.31	-28.87
Electricity							-43.13		-14.58	-28.56
Water							-149.61		-131.60	-18.03
Other							128.18		244.48	-116.70
Head Office							-0.02		60.09	-60.91
MINING	8660.00	8663.00	8660.00	8663.00	0.00	0.00	0.00	0.00	615.74	-615.74
ORE	8660.00	8663.00	8660.00	8663.00	0.00	0.00	-0.00	0.00	-206.34	206.34
GRADE	8660.00	8663.00	8660.00	8663.00	0.00	0.00	-0.00	0.00	-297.69	297.69
PLANT	8660.00	8663.00	8660.00	8663.00	0.00	0.00	0.00	0.00	-240.76	240.76
STOCKPILE	10098.44	5998.07	8660.00	8663.00	1438.44	-2664.93	-4003.36	-524.00	-3418.30	0.00
COST OF SALES	10098.44	5998.07	10098.44	5998.07	0.00	0.00	0.00	822.02	0.00	-822.02
REVENUE	19658.00	9822.00	16618.44	8847.07	3038.56	974.93	-2064.64	-1520.06	0.00	-543.77

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 3/93 July-Sep	Quarter 4/93 Oct-Dec
MINING	INPUT VALUES	Skilled Labour (R000)	988.00	1047.00
		Cat 1-7 Labour (R000)	676.00	782.00
		Stores (R000)	2894.00	3255.00
		Car 2 (R000)	1074.00	961.00
		Electricity (R000)	408.00	415.00
		Water (R000)	380.00	126.00
		Other (R000)	1364.00	735.00
		Head Office (R000)	779.00	877.00
		TOTAL (R000)	8563.00	8277.00
	INPUT QUANTITIES	Skilled Labour	54.00	49.00
		Cat 1-7 Labour	239.00	241.00
	INPUT PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	125.80	127.80
			125.80	128.80
	OUTPUT QUANTITIES	Tons Mined	547000.00	566000.00
ORE	OUTPUT QUANTITIES	Tons Ore	532000.00	574000.00
GRADE		Grade %	0.09	0.10
	OUTPUT QUANTITIES	Tons Potential Product	49478.00	59699.00
PLANT		Yield %	0.48	0.41
	OUTPUT QUANTITIES	Tons Product	23700.00	24700.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	16601.00	30426.00
	OUTPUT VALUE	Sales tons at production costs(R000)	5998.07	10195.79
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	16601.00	30426.00
	OUTPUT VALUES	Production costs & Cost of Sales	8847.07	15873.79
		Cost of Sales (R000)	2849.00	5678.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	16601.00	30426.00
	OUTPUT VALUES	Revenue(R000)	9822.00	19477.00
CHANGE WORKING PROFIT	WORKING PROFIT (R000)		-1590.00	4522.00
	CHANGE IN WORKING PROFIT (R000)			6112.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	8563.00	0.02	547000.00	8277.00	0.01	568000.00
Inputs	Labour - Officials	988.00	54.00	18.30	1047.00	49.00	21.37
	Labour - Cat 1-7	676.00	239.00	2.83	782.00	241.00	3.24
	Stores	2894.00	23.00	125.80	3255.00	25.47	127.80
	Car 2	1074.00	8.54	125.80	981.00	7.68	127.80
	Electricity	408.00	3.24	125.80	415.00	3.25	127.80
	Water	380.00	3.02	125.80	185.00	1.45	127.80
	Other	1364.00	10.84	125.80	735.00	5.80	126.80
	Head Office	779.00	6.19	125.80	877.00	6.92	126.80

deltaQold(U)=(Qun-Quo)/Quo -0.07

deltaPnew(U)=(Pun-Puo)/Puo 0.04

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 50.27
Pnr=Po(1+deltaPnew(U)) 19.00
Ynew=(Qnp-Qn)Pn 27.06
Rlong=Qnp(Pnr-Pn) -119.05

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 222.48
Pnr=Po(1+deltaPnew(U)) 2.94
Ynew=(Qnp-Qn)Pn -60.11
Rlong=Qnp(Pnr-Pn) -69.47

Stores
Qnp=Qo(1+deltaQold(U)) 21.41
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn -518.25
Rlong=Qnp(Pnr-Pn) 60.59

Car 2
Qnp=Qo(1+deltaQold(U)) 7.95
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn 34.64
Rlong=Qnp(Pnr-Pn) 22.49

Electricity
Qnp=Qo(1+deltaQold(U)) 3.02
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn -29.17
Rlong=Qnp(Pnr-Pn) 8.64

Water
Qnp=Qo(1+deltaQold(U)) 2.81
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn 174.35
Rlong=Qnp(Pnr-Pn) 7.86

Other
Qnp=Qo(1+deltaQold(U)) 10.09
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn 544.79
Rlong=Qnp(Pnr-Pn) 38.85

Head Office
Qnp=Qo(1+deltaQold(U)) 5.76
Pnr=Po(1+deltaPnew(U)) 130.63
Ynew=(Qnp-Qn)Pn -146.09
Rlong=Qnp(Pnr-Pn) 22.07

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	8563.00	532000.00	0.02	8277.00	574000.00	0.01
Inputs	Tons Mined	8563.00	547000.00	0.02	8277.00	568000.00	0.01

deltaQold(U)=(Qun-Quo)/Quo 0.08

deltaPnew(U)=(Pun-Puo)/Puo -0.10

ORE

Qnp=Qo(1+deltaQold(U))	590184.21
Pnr=Po(1+deltaPnew(U))	0.01
Ynew=(Qnp-Qn)Pn	323.27
Rlong=Qnp(Pnr-Pn)	-323.27

GRADE

		Quarter 3/93			Quarter 4/93		
		Vo		Po	Vn	Qn	Pn
Product	Tons Potential Product	8563.00	49476.00	0.17	8277.00	59696.00	0.14
Inputs	Tons Ore	8563.00	532000.00	0.02	8277.00	574000.00	0.01

deltaQ old(U)=(Qun-Quo)/Quo 0.21

deltaPnew(U)=(Pun-Puo)/Puo -0.20

GRADE

Qnp=Qo(1+deltaQold(U))	641892.47
Pnr=Po(1+deltaPnew(U))	0.01
Ynew=(Qnp-Qn)Pn	979.00
Rlong=Qnp(Pnr-Pn)	-979.00

PLANT

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	8563.00	23700.00	0.36	8277.00	24700.00	0.34
Inputs	Tons Potential Product	8563.00	49476.00	0.17	8277.00	59696.00	0.14

deltaQold(U)=(Qun-Quo)/Quo 0.04

deltaPnew(U)=(Pun-Puo)/Puo -0.07

PLANT

Qnp=Qo(1+deltaQold(U))	51563.59
Pnr=Po(1+deltaPnew(U))	0.16
Ynew=(Qnp-Qn)Pn	-1127.58
Rlong=Qnp(Pnr-Pn)	1127.58

PRODUCT STOCKPILE

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	5998.07	16601.00	0.36	10195.79	30426.00	0.34
Inputs	Tons Product	8563.00	23700.00	0.36	8277.00	24700.00	0.34

deltaQold(U)=(Qun-Quo)/Quo 0.83

deltaPnew(U)=(Pun-Puo)/Puo -0.07

Cost of sales

Qnp=Qo(1+deltaQold(U))	43436.91
Pnr=Po(1+deltaPnew(U))	0.34
Ynew=(Qnp-Qn)Pn	6278.79
Rlong=Qnp(Pnr-Pn)	0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	8847.07	16601.00	0.53	15873.79	30426.00	0.52
Inputs	Sales Tons	5998.07	16601.00	0.36	10195.79	30426.00	0.34

deltaQold(U)=(Qun-Quo)/Quo 0.83

deltaPnew(U)=(Pun-Puo)/Puo -0.02

Sales Tons
Qnp=Qo(1+deltaQold(U)) 30426.00
Pnr=Po(1+deltaPnew(U)) 0.35
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 566.21

REVENUE

		Quarter 3/93			Quarter 4/93		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	9822.00	16601.00	0.59	18477.00	30426.00	0.61
Inputs	Tons for Sales	8847.07	16601.00	0.53	15873.79	30426.00	0.52

deltaQold(U)=(Qun-Quo)/Quo 0.83

deltaPnew(U)=(Pun-Puo)/Puo 0.03

Sales Tons
Qnp=Qo(1+deltaQold(U)) 30426.00
Pnr=Po(1+deltaPnew(U)) 0.55
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 769.19

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 3/93 and 4/93

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-92.00		27.06	-119.06
Labour - Cat 1-7							-128.58		-60.11	-68.47
Stores							-457.66		-518.25	60.59
Car 2							57.13		34.64	22.49
Electricity							-20.63		-29.17	8.54
Water							182.31		174.36	7.96
Other							583.44		544.78	38.66
Head Office							-124.02		-146.09	22.07
MINING	9563.00	9277.00	9563.00	9277.00	0.00	0.00	-0.00	0.00	27.23	-27.23
ORE	9563.00	9277.00	9563.00	9277.00	0.00	0.00	-0.00	0.00	323.27	-323.27
GRADE	9563.00	9277.00	9563.00	9277.00	0.00	0.00	-0.00	0.00	979.00	-979.00
PLANT	9563.00	9277.00	9563.00	9277.00	0.00	0.00	0.00	0.00	-1127.50	1127.50
STOCKPILE	5998.07	10195.79	9563.00	9277.00	-2564.93	1918.79	4483.72	-1765.05	6248.78	0.00
COST OF SALES	5998.07	10195.79	9563.00	10195.79	0.00	0.00	0.00	-566.21	0.00	566.21
REVENUE	9822.00	18477.00	9847.07	15873.79	974.93	2603.21	1628.28	566.09	0.00	769.19
TOTALS					-1589.99	4522.00	[illegible]	[illegible]	[illegible]	[illegible]

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 4/93 Oct-Dec	Quarter 1/94 Jan-Mar
MINING	INPUT VALUES	Skilled Labour (R000)	1047.00	1107.00
		Cat 1-7 Labour (R000)	782.00	862.00
		Stores (R000)	3255.00	3132.00
		Car 2 (R000)	981.00	789.00
		Electricity (R000)	415.00	403.00
		Water (R000)	195.00	243.00
		Other (R000)	735.00	509.00
		Head Office (R000)	877.00	842.00
		TOTAL (R000)	8277.00	7887.00
	INPUT QUANTITIES	Skilled Labour	49.00	52.00
		Cat 1-7 Labour	241.00	239.00
	INPUT PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	126.80	126.20
			126.80	126.20
	OUTPUT QUANTITIES	Tons Mined	568000.00	555000.00
ORE	OUTPUT QUANTITIES	Tons Ore	574000.00	565000.00
GRADE		Grade %	0.10	0.11
	OUTPUT QUANTITIES	Tons Potential Product	59696.00	62715.00
PLANT		Yield %	0.41	0.48
	OUTPUT QUANTITIES	Tons Product	24700.00	26900.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	30426.00	24572.00
	OUTPUT VALUE	Sales tons at production costs(R000	10195.79	7204.44
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	30426.00	24572.00
	OUTPUT VALUES	Production costs & Cost of Sales	15873.79	11828.44
		Cost of Sales (R000)	5678.00	4624.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	30426.00	24572.00
	OUTPUT VALUES	Revenue(R000)	18477.00	15541.00
CHANGE WORKING PROFIT	WORKING PROFIT (R000)		4522.00	3030.00
	CHANGE IN WORKING PROFIT (R000)			-1492.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	8277.00	0.01	588000.00	7887.00	0.01	555000.00
Inputs	Labour - Officials	1047.00	49.00	21.37	1107.00	52.00	21.29
	Labour - Cat 1-7	782.00	241.00	3.24	862.00	239.00	3.61
	Stores	3255.00	25.67	126.80	3132.00	24.43	128.20
	Car 2	981.00	7.74	126.80	789.00	6.15	128.20
	Electricity	415.00	3.27	126.80	403.00	3.14	128.20
	Water	185.00	1.46	126.80	243.00	1.90	128.20
	Other	735.00	5.80	126.80	509.00	3.97	128.20
	Head Office	877.00	6.92	126.80	842.00	6.57	128.20

deltaQold(U)=(Qun-Quo)/Quo -0.02

deltaPnew(U)=(Pun-Puo)/Puo -0.02

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 47.78
Pnr=Po(1+deltaPnew(U)) 20.88
Ynew=(Qnp-Qn)Pn -89.73
Rlong=Qnp(Pnr-Pn) -19.60

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 235.02
Pnr=Po(1+deltaPnew(U)) 3.17
Ynew=(Qnp-Qn)Pn -14.34
Rlong=Qnp(Pnr-Pn) -102.50

Stores
Qnp=Qo(1+deltaQold(U)) 25.03
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn 77.33
Rlong=Qnp(Pnr-Pn) -107.70

Car 2
Qnp=Qo(1+deltaQold(U)) 7.54
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn 176.24
Rlong=Qnp(Pnr-Pn) -32.46

Electricity
Qnp=Qo(1+deltaQold(U)) 3.19
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn 6.18
Rlong=Qnp(Pnr-Pn) -13.73

Water
Qnp=Qo(1+deltaQold(U)) 1.42
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn -50.60
Rlong=Qnp(Pnr-Pn) -6.12

Other
Qnp=Qo(1+deltaQold(U)) 5.65
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn 215.69
Rlong=Qnp(Pnr-Pn) -24.32

Head Office
Qnp=Qo(1+deltaQold(U)' 6.74
Pnr=Po(1+deltaPnew(U)) 123.90
Ynew=(Qnp-Qn)Pn 22.69
Rlong=Qnp(Pnr-Pn) -29.02

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	8277.00	574000.00	0.01	7887.00	555000.00	0.01
Inputs	Tons Mined	8277.00	568000.00	0.01	7887.00	555000.00	0.01

deltaQold(U)=(Qun-Quo)/Quo -0.03

deltaPnew(U)=(Pun-Puo)/Puo -0.01

ORE
Qnp=Qo(1+deltaQold(U)) 549198.81
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn -82.44
Rlong=Qnp(Pnr-Pn) 82.44

GRADE

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	8277.00	59696.00	0.14	7887.00	62715.00	0.13
Inputs	Tons Ore	8277.00	574000.00	0.01	7887.00	555000.00	0.01

deltaQold(U)=(Qun-Quo)/Quo 0.05

deltaPnew(U)=(Pun-Puo)/Puo -0.09

GRADE
Qnp=Qo(1+deltaQold(U)) 603028.85
Pnr=Po(1+deltaPnew(U)) 0.01
Ynew=(Qnp-Qn)Pn 882.53
Rlong=Qnp(Pnr-Pn) -882.53

PLANT

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	8277.00	24700.00	0.34	7887.00	26900.00	0.29
Inputs	Tons Potential Product	8277.00	59696.00	0.14	7887.00	62715.00	0.13

deltaQold(U)=(Qun-Quo)/Quo 0.09

deltaPnew(U)=(Pun-Puo)/Puo -0.13

PLANT
Qnp=Qo(1+deltaQold(U)) 65013.05
Pnr=Po(1+deltaPnew(U)) 0.12
Ynew=(Qnp-Qn)Pn 289.00
Rlong=Qnp(Pnr-Pn) -289.00

PRODUCT STOCKPILE

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	10195.79	30428.00	0.34	7204.44	24572.00	0.29
Inputs	Tons Product	8277.00	24700.00	0.34	7887.00	26900.00	0.29

deltaQold(U)=(Qun-Quo)/Quo -0.19

deltaPnew(U)=(Pun-Puo)/Puo -0.13

Cost of sales
Qnp=Qo(1+deltaQold(U)) 19847.69
Pnr=Po(1+deltaPnew(U)) 0.29
Ynew=(Qnp-Qn)Pn -2039.40
Rlong=Qnp(Pnr-Pn) 0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	15873.79	30428.00	0.52	11828.44	24572.00	0.48
Inputs	Sales Tons	10195.79	30428.00	0.34	7204.44	24572.00	0.29

deltaQold(U)=(Qun-Quo)/Quo -0.19

deltaPnew(U)=(Pun-Puo)/Puo -0.05

Sales Tons
Qnp=Qo(1+deltaQold(U)) 24572.00
Pnr=Po(1+deltaPnew(U)) 0.31
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 393.01

REVENUE

		Quarter 4/93			Quarter 1/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Sold	18477.00	30428.00	0.61	15541.00	24572.00	0.63
Inputs	Tons for Sales	15873.79	30428.00	0.52	11828.44	24572.00	0.48

deltaQold(U)=(Qun-Quo)/Quo -0.19

deltaPnew(U)=(Pun-Puo)/Puo 0.04

Sales Tons
Qnp=Qo(1+deltaQold(U)) 24572.00
Pnr=Po(1+deltaPnew(U)) 0.54
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 1523.00

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 4/93 and 1/94

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recovery Variance
Labour - Officials							-109.33		-89.73	-19.60
Labour - Cat 1-7							-116.88		-14.34	-102.50
Stores							-30.37		77.33	-107.70
Car 2							145.78		178.24	-32.46
Electricity							-7.55		6.18	-13.73
Water							-86.72		-80.60	-6.12
Other							191.37		215.68	-24.32
Head Office							-6.32		22.69	-29.02
MINING	8277.00	7887.00	8277.00	7887.00	0.00	0.00	-0.00	0.00	334.45	-334.45
ORE	8277.00	7887.00	8277.00	7887.00	0.00	0.00	-0.00	0.00	-82.44	82.44
GRADE	8277.00	7887.00	8277.00	7887.00	0.00	0.00	0.00	0.00	882.83	-882.83
PLANT	8277.00	7887.00	8277.00	7887.00	0.00	0.00	-0.00	0.00	289.00	-289.00
STOCKPILE	10195.79	7204.44	8277.00	7887.00	1918.79	682.56	-2601.35	-682.56	-2030.40	0.00
COST OF SALES	10195.79	7204.44	10195.79	7204.44	0.00	0.00	0.00	-393.01	0.00	393.01
REVENUE	18477.00	15541.00	15873.79	11828.44	2603.21	3712.56	1109.35	-313.68	0.00	1523.00
TOTALS										

RHINO ANDALUSITE PRODUCTIVITY MODEL

INPUT DATA

			Quarter 1/94 Jan-Mar	Quarter 2/94 Apr-June
MINING	INPUT VALUES	Skilled Labour (R000)	1107.00	1138.00
		Cat 1-7 Labour (R000)	882.00	912.00
		Stores (R000)	3132.00	3713.00
		Car 2 (R000)	789.00	520.00
		Electricity (R000)	403.00	416.00
		Water (R000)	243.00	316.00
		Other (R000)	509.00	686.00
		Head Office (R000)	642.00	1546.00
		TOTAL (R000)	7887.00	9247.00
	INPUT QUANTITIES	Skilled Labour	52.00	53.00
		Cat 1-7 Labour	239.00	247.00
	INPUT PRICE INDEX	PPI - Mining & Quarrying plus electricity and gas	128.20	129.50
			128.20	129.50
	OUTPUT QUANTITIES	Tons Mined	555000.00	560000.00
ORE	OUTPUT QUANTITIES	Tons Ore	555000.00	560000.00
GRADE		Grade %	0.11	0.11
	OUTPUT QUANTITIES	Tons Potential Product	62715.00	61040.00
PLANT		Yield %	0.48	0.46
	OUTPUT QUANTITIES	Tons Product	26900.00	28200.00
PRODUCT STOCKPILE	OUTPUT QUANTITIES	Sales tons	24572.00	22200.00
	OUTPUT VALUE	Sales tons at production costs(R000)	7228	7279.55
COST OF SALES	OUTPUT QUANTITIES	Tons for sale	24572.00	22200.00
	OUTPUT VALUES	Production costs & Cost of Sales	11828.44	10691.55
		Cost of Sales (R000)	4824.00	3412.00
REVENUE	OUTPUT QUANTITIES	Tons Sold	24572.00	22200.00
	OUTPUT VALUES	Revenue(R000)	15541.00	12925.00
CHANGE WORKING PROFIT	WORKING PROFIT (R000)		3030.00	266.00
	CHANGE IN WORKING PROFIT (R000)			-2764.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS

MINING

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Mined	7887.00	0.01	555000.00	9247.00	0.02	560000.00
Inputs	Labour - Officials	1107.00	52.00	21.29	1136.00	53.00	21.47
	Labour - Cat 1-7	862.00	239.00	3.61	912.00	247.00	3.69
	Stores	3132.00	24.43	128.20	3713.00	28.67	129.50
	Car 2	789.00	6.15	128.20	520.00	4.02	129.50
	Electricity	403.00	3.14	128.20	416.00	3.21	129.50
	Water	243.00	1.90	128.20	316.00	2.44	129.50
	Other	509.00	3.97	128.20	686.00	5.30	129.50
	Head Office	842.00	6.57	128.20	1546.00	11.94	129.50

deltaQold(U)=(Qun-Quo)/Quo 0.16

deltaPnew(U)=(Pun-Puo)/Puo 0.01

Labour - Officials
Qnp=Qo(1+deltaQold(U)) 60.42
Pnr=Po(1+deltaPnew(U)) 21.48
Ynew=(Qnp-Qn)Pn 159.37
Rlong=Qnp(Pnr-Pn) 0.52

Labour - Cat 1-7
Qnp=Qo(1+deltaQold(U)) 277.71
Pnr=Po(1+deltaPnew(U)) 3.64
Ynew=(Qnp-Qn)Pn 113.39
Rlong=Qnp(Pnr-Pn) -14.75

Stores
Qnp=Qo(1+deltaQold(U)) 28.39
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn -36.81
Rlong=Qnp(Pnr-Pn) -4.12

Car 2
Qnp=Qo(1+deltaQold(U)) 7.15
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn 406.09
Rlong=Qnp(Pnr-Pn) -1.04

Electricity
Qnp=Qo(1+deltaQold(U)) 3.65
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn 57.02
Rlong=Qnp(Pnr-Pn) -0.53

Water
Qnp=Qo(1+deltaQold(U)) 2.20
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn -30.78
Rlong=Qnp(Pnr-Pn) -0.32

Other
Qnp=Qo(1+deltaQold(U)) 4.61
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn -68.58
Rlong=Qnp(Pnr-Pn) -0.67

Head Office
Qnp=Qo(1+deltaQold(U)) 7.63
Pnr=Po(1+deltaPnew(U)) 129.35
Ynew=(Qnp-Qn)Pn -557.70
Rlong=Qnp(Pnr-Pn) -1.11

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

ORE

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Ore	7887.00	555000.00	0.01	9247.00	560000.00	0.02
Inputs	Tons Mined	7887.00	555000.00	0.01	9247.00	560000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo 0.01

deltaPnew(U)=(Pun-Puo)/Puo 0.16

ORE
Qnp=Qo(1+deltaQold(U)) 560000.00
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) 0.00

GRADE

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Potential Product	7887.00	62715.00	0.13	9247.00	61040.00	0.15
Inputs	Tons Ore	7887.00	555000.00	0.01	9247.00	560000.00	0.02

deltaQold(U)=(Qun-Quo)/Quo -0.83

deltaPnew(U)=(Pun-Puo)/Puo 0.20

GRADE
Qnp=Qo(1+deltaQold(U)) 540176.99
Pnr=Po(1+deltaPnew(U)) 0.02
Ynew=(Qnp-Qn)Pn -327.33
Rlong=Qnp(Pnr-Pn) 327.33

PLANT

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons Product	7887.00	26900.00	0.29	9247.00	28200.00	0.33
Inputs	Tons Potential Product	7887.00	62715.00	0.13	9247.00	61040.00	0.15

deltaQold(U)=(Qun-Quo)/Quo 0.05

deltaPnew(U)=(Pun-Puo)/Puo 0.12

PLANT
Qnp=Qo(1+deltaQold(U)) 65745.84
Pnr=Po(1+deltaPnew(U)) 0.14
Ynew=(Qnp-Qn)Pn 712.89
Rlong=Qnp(Pnr-Pn) -712.89

PRODUCT STOCKPILE

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Sales Tons	7204.44	24572.00	0.29	7279.65	22200.00	0.33
Inputs	Tons Product	7887.00	26900.00	0.29	9247.00	28200.00	0.33

deltaQold(U)=(Qun-Quo)/Quo -0.16

deltaPnew(U)=(Pun-Puo)/Puo 0.12

Cost of sales
Qnp=Qo(1+deltaQold(U)) 24303.27
Pnr=Po(1+deltaPnew(U)) 0.33
Ynew=(Qnp-Qn)Pn -1277.77
Rlong=Qnp(Pnr-Pn) -0.00

CALCULATION OF PRODUCTIVITY/ PRICE RECOVERY CONTRIBUTIONS - CONTINUED

COST OF SALES

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn	Qn	Pn
Product	Tons for Sales	11828.44	24572.00	0.48	10691.55	22200.00	0.48
Inputs	Sales Tons	7204.44	24572.00	0.29	7279.55	22200.00	0.33

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo 0.00

Sales Tons
Qnp=Qo(1+deltaQold(U)) 22200.00
Pnr=Po(1+deltaPnew(U)) 0.29
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -767.57

REVENUE

		Quarter 1/94			Quarter 2/94		
		Vo	Qo	Po	Vn		Pn
Product	Tons Sold	15541.00	24572.00	0.63	12925.00	22200.00	0.58
Inputs	Tons for Sales	11828.44	24572.00	0.48	10691.55	22200.00	0.48

deltaQold(U)=(Qun-Quo)/Quo -0.10

deltaPnew(U)=(Pun-Puo)/Puo -0.08

Sales Tons
Qnp=Qo(1+deltaQold(U)) 22200.00
Pnr=Po(1+deltaPnew(U)) 0.44
Ynew=(Qnp-Qn)Pn 0.00
Rlong=Qnp(Pnr-Pn) -854.18

SOURCES OF ADJUSTED CHANGE IN UNIT WORKING PROFIT - Quarters 1/94 and 2/94

	Old Revenue	New Revenue	Old Cost	New Cost	Old Profit	New Profit	Delta Profit	Old Margin Variance	Product-ivity Variance	Price Recover Variance
Labour - Officials							159.89		159.37	0.5
Labour - Cat 1-7							98.64		113.39	-14.7
Stores							-40.93		-36.21	-4.71
Car 2							406.05		408.09	-1.04
Electricity							56.49		57.02	-0.53
Water							-31.10		-30.78	-0.32
Other							-89.23		-89.66	0.07
Head Office							-556.01		-557.70	1.11
MINING	7887.00	9247.00	7887.00	9247.00	0.00	0.00	0.00	0.00	22.02	-22.02
ORE	7887.00	9247.00	7887.00	9247.00	0.00	0.00	0.00	0.00	0.00	0.00
GRADE	7887.00	9247.00	7887.00	9247.00	0.00	0.00	-0.00	0.00	-327.33	327.33
PLANT	7887.00	9247.00	7887.00	9247.00	0.00	0.00	-0.00	0.00	712.09	-712.09
STOCKPILE	7204.44	7279.55	7887.00	9247.00	-682.56	-1967.45	-1284.89	-7.12	-1277.77	-0.00
COST OF SALES	7204.44	7279.55	7204.44	7279.55	0.00	0.00	0.00	767.97	0.00	-767.97
REVENUE	15541.00	12925.00	11828.44	10691.55	3712.56	2233.45	-1479.12	-624.93	0.00	-854.18
TOTAL										