SHORT – REPORT
ON
RE-ORGANISATION OF KARKAR MINE

(PUL-E- KHUMRI AREA)(NORTH COAL DEPARTMENT)

BY

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&

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INDIAN TECHNICAL ECONOMIC

CO. OPERATION PROGRAMME

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S H O R T R E P O R T

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by

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(Indian Technical and Economic
Cooperation Programme)

Kabul

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SHORT REPORT

ON

RE-ORGANIZATION OF KARKAR MINE

Prepared by:-

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in consultation and association of

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2. Engineer Abdul Bari, Vice-President (Technical), North Coal Department.
3. Engineer Audil, Director, Karkar Mine.

under the guidance of

H.E. Dr. J.S. Teja, Ambassador, Embassy of India, Kabul.

A C K N O W L E D G E M E N T S

This short report on re-organization of Karkar Mine has been prepared on the specific request of President, North Coal Department. Thanks to the enthusiasm shown by Dr. M.M.M. Nedai, President, North Coal Department, because of which we have taken up this project with great interest and completed it in record time.

We also thank Vice-President (Technical), Engr. Abdul Bari, Director of Karkar Mines, Engr. Audil Ibrahim and General Director, Liaison Office, North Coal Department, Kabul, Engr. M.H. Osman, who have helped us in all possible ways in bringing out this report.

We will be failing in our duty if we do not acknowledge our heartfelt thanks to our respected Ambassador, Dr. J.S. Teja and Second Secretary, Mr. K.M. Meena, who are always kind and helpful and encouraged us in the preparation of this report.

November, 1980.

P. Dharma Rao
K.L. Gupta

P R E A M B L E

Any report on the re-organization of a coal mine, necessarily involves a lot of data collection and hard work and also is a time consuming process. A detailed report cannot be made by two mining experts alone. Assistance of mechanical, electrical and civil engineers, cost and finance experts and a mining geologist is a minimum necessity.

The authors had to work many long hours consistently for days together for completion of this report. They had to face lot of difficulties in the absence of much needed assistance of a mine surveyor and a mine geologist.

It may be mentioned here that in none of the past geological reports, clear cut mention about proved coal reserves of Karkar Mines was ever made. As per the Director of Karkar Mines, in one of the Russian geological reports prepared in 1978, Karkar coal reserves are said to be 10 million tonnes. But the authors have prepared this short report on a modest figure of hypothetical coal reserves of 2.8 million tonnes only.

The draft report was discussed with President, North Coal Department and Director, Karkar Mines. The different suggestions made by them during the discussion have been incorporated in the report.

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

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SUMMARIZED DATA

1. Reserve (in million tonnes)

   a. Total - 2.8

   b. Mineable - 2.24 (80% extractability)

   Further reserves are likely to be available, if workings on the dip side extend for more than 1,000 metres.

2. Target output (in million tonnes per annum) - 0.180

3. Life in years - 12-1/2

4. Quality of coal - Sub-Bituminus

   Calorific value - 5000-5500 k.cal/kg

5. Capital outlay in '000 of US $ - Total - 3,663.98

6. Capital outlay per tonne of annual output - 20.355 US $

7. Estimated cost of production per tonne:

   a. at 100% of target - 16.548 US $

   b. at 85% of target - 19.29 US $

8. Average selling price per tonne - 19.29 US $

9.	Profit per tonne:		
	a. at 100% of target	-	2.742 US $
	b. at 85% of target	-	NIL
10.	Total annual profit	-	493,560 US $
11.	Number of persons required	-	2,000
12.	Output per man shift (OMS)	-	0.30 tonne
13.	Capital requirement for plant and equipments:		
	a. Total	-	1,953,960 US $
	b. Per tonne of annual output	-	10.855 US $
14.	Anticipated date of achieving 85% of target	-	1362

ABSTRACT FOR

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

1. GENERAL

1.1 Introduction

This subject has been taken as a project study by the ITEC Experts, namely, Messers P. Dharma Rao and K.L. Gupta working for North Coal Department on the specific request of the President, North Coal Department.

The preparation of this report has been taken up in the right earnest in the month of July, 1980. The experts have taken this opportunity to study the past reports available with the Ministry of Mines and Industries. Various reports mainly geological, were prepared by experts from different countries. Some of the reports were not available in English language and hence could not be taken advantage of by the ITEC Experts.

Right from the beginning, ITEC Experts felt that the present mining method was not at all scientific. The method being followed was very old and a continuation of initial method of prospecting drivages. ITEC Experts felt that Re-organization must be done to establish a scientific method of mining. For this, an initial investment of capital is very much needed and a must.

The re-organized mine will obviate the need of maintaining long roadways and in return will save a lot of manpower.

No detailed prospecting has ever been undertaken in this area. The authors also would not suggest any such proposal at this juncture due to three reasons, namely:

i. The urgency of the re-organization;

ii. The prohibitive cost involved in prospecting in such difficult terrains as is available at Karkar mine; and

iii. The existing complicated tectonics.

But for all practical purposes, a safe assumption of about 2.8 million tonnes of coal reserves can be made.

The reserves assumed here may not be a last word and as the dip development progresses, additional resources may come into sight.

Because of the available infra-structure in the mine, the coal could be produced at a lesser cost than by opening a new mine. The proposal for the re-organization of the mine has been made mainly to modify the present old system of working and to start new scientific system of mining coal, at Karkar mine.

1.2 Location and Communication

This colliery is situated in Baghlan province 36°01'57" north and 68°46'36" east. Karkar is 11 kms from Pul-e-Khumri

town which is on the national highway and at a distance of 240 kms from Kabul. Road from Pul-e-Khumri to Karkar mine is not metalled. It can simply be called a dust track. It is needless to mention that there is no railway line anywhere in Afghanistan, leave alone from this colliery area. Hence, the entire coal is transported by trucks.

2. NECESSITY OF RE-ORGANIZATION AND MARKETABILITY

As mentioned earlier, production from the present Karkar mine is being obtained on antiquated method and is wasteful in manpower and material resources. Moreover, the present level of production has to be increased to meet the rising demands for coal of various industries. Because of these two reasons, there is an urgent need for re-organizing the mine. It has always been a case of demand exceeding the production of coal and there has been no problem of selling the coal any time in the past.

3. GEOLOGY

3.1 The coal of this area belongs to upper Jurrasic formations. Coal beds are most irregular. There appears no continuity either in strike or dip direction. The crumbled laminated varieties of coal are characterised by fussion. The coal is generally dull and semi-dull. The thickness of coal seam varies from 0.6 to 10 metres. (Reference Geological Survey, Ministry of Mines and Industries, Mineral Resources

of Afghanistan published in 1977). The dip varies from 8° to 19° towards east and North-east.

3.2 Quality and Reserves

No reports are available on the analysis of coal characteristics of this area. However, this coal is said to be long flame and slightly metamorphosed with a heat value of about 5000-5500 calories. The ash percentage varies very much and it may be as low as 15% and as high as 25%.

Speculative reserves of coal in this area are 2.8 million tonnes. This report is made on this basis.

4. TARGET AND LIFE

The present target of coal production is only 120,000 tonnes per annum and it is proposed to increase this production by about 50%, i.e., an annual production of 180,000 tonnes by 1362. Speculative geological reserve is 2.8 million tonnes. Assuming that the future mining activity will be able to extract 80% of the coal reserves, including the coal lost in barriers, the mineable resources will be 2.29 million tonnes which will give a life of about 12-1/2 years. However, the reserves and consequently the life of the mine would considerably increase if the coal seams extend on the dip side to a distance of more than 1,000 metres.

5. SHORT DESCRIPTION OF THE PRESENT MINE

The present mine is being worked for the past 40 years. The entries have been made in the out crop in the form of adits and later one incline No.03 was also driven to meet the coal seam at No.3 level. Most of the roadways are in the coal seam and are zigzag and crooked. This feature is specially noted in the levels. The dip progress has gone up to a depth of about 200 metres. Extraction of the developed area has been completed up to a depth of 150 metres, i.e., about 25 metres above the rise of 3L. The coal from the dip is hoisted by direct haulage and in the main level, diesel locomotive hauls the train of mine wagons. On the surface, these wagons are hand-tipped on to surface natural storage (hill slopes) bunkers from where trucks are loaded by opening the chute.

The mine is very dry and no water problem is encountered in the dip development. This feature makes the mine very dusty and water spraying becomes very essential to allay the dust.

A surface main mechanical ventilator exhausts about 750 cum of air per minute from the mine workings. This is supported by a number of auxiliary fans at various points inside the mine.

In spite of these attempts, it may be said that ventilation in depillaring areas and in the dip development faces can be branded as very sluggish.

The mine is highly gassy and there is a history of mine explosion too, in the year 1966.

The entire strata above the coal seam is highly fractured. The roadways are very difficult to maintain. It has been seen that in spite of steel arch supports, roof in most of the galleries has shown signs of sinking and at a great cost, these roadways are being restored at frequent intervals.

About a minimum of 100 persons are employed on an average to restore the important roadways. The wages cost alone on this will work out to about 90,000 US $ per year.

6. PROPOSED RE-ORGANIZATION

This re-organization report is drawn up on the assumption that there will be enough coal on the dip side, to enable the mine to work for abother 12-15 years. Although there are no proved reserves, but it may safely be assumed that about 2.8 million tonnes of coal reserves will be available for extraction.

As the upper entries are considered very costly in maintenance etc. specially for the dip side extraction of coal reserves, it is proposed to drive a new incline at 06 to meet the coal seam at an approximate reduced level of 200 metres. A permanent loco roadway in stone, also will be driven to serve

for the life of the mine. From this loco level, three level cross measure drifts 300 m apart will be driven towards the dip side of the seam to touch the coal seam. A level in coal seam will then be driven, to which will connect, all the cross measure drifts. Another level 30 m below will also be driven. From these levels, rise dip headings will be driven in coal to connect with No.3 level. Once this is done, a new ventilation circuit will be established and all the entires above No. 3 can be closed down permanently after recovering all the existing equipment and machinery.

7. MODE OF ENTRY

The existing No.03 will be utilised to serve as future exhaust airway. New incline No.06 will be main coal transportation and intake roadway. About 6 metres below the point where No.06 meets the coal seam in the strike direction, a permanent loco level also will be driven in stone.

8. METHOD OF EXPLOITATION

From the main loco level, pair of rise dip headings will be driven in the true dip direction. These headings will be interconnected at 45 m intervals for the purpose of ventilation. From these rise/dip headings pairs of level will be driven to form panels. The size of panels is kept 135 m along dip and 150 m along strike so that extraction can be done before any

chance of heating occurs. While extracting the panels, a barrier pillar of 15 m thick will be left against main dip/rise headings. The panel itself will be extracted by retreating, slicing method. For details of method of extraction, please see Plate No.5.

9. TRANSPORT

Coal from the development face will be hand shoveled either into wheel barrows or steel pans or directly into coal wagons. Coal from the extraction areas will be directly loaded either on chain conveyors or steel pans. The coal wagons will be hauled up or lowered down into main loco level to be hauled out by a diesel locomotive to be finally brought to surface through No.06 incline by a double drum hoist.

The existing fan at No.1 incline is considered quite inadequate. Once the new ventilation circuit is established, a higher capacity fan is proposed to be installed at No.03 incline. This fan will have a capacity of 5000 cum per minute at a maximum water gauge of 3.5 cm. Once this fan is commissioned, ventilation in the mine is bound to improve.

10. PUMPING AND DRAINAGE

The mine is dry and the future workings are also expected to be practically dry. Hence there is no pumping problem at the mine. However, to meet any occasional pockets

of water, two small face pumps have been provided in the report.

11. COAL HANDLING

Coal from the mine is brought out in coal wagons of 0.7 tonne capacity. The wagon handling on the surface is completely mannual. A gravity tippler, tipples the loaded wagons on to hill slopes, where the coal is stored in a sort of gravity bunker. No screening or picking is done before the coal is loaded into trucks for sale. This is mainly due to the fact that most of the run of mine coal comes in the form of fine dust.

12. MANPOWER AND PRODUCTIVITY

Total manpower required for producing 180,000 tonnes per annum under the new layout will be 2,000. Productivity at 100% of target will be 0.3 tonne and 85% of target will be 0.25 tonnes.

13. RESIDENTIAL ACCOMMODATION

Residential accommodation is needed for a total of 2,000 persons. Housing accommodation for 1,200 persons has been provided in this report. The overall satisfaction comes to about 60%.

14. CAPITAL INVESTMENT

Total capital is 3,663,980 US $. This works out to 20.355 US $ per tonne of target output.

15. COST OF PRODUCTION AND PRODUCTIVITY

On the basis of 9% interest on the capital:

a.	Cost of production at 100% of the target	- 16.548 US $/tonne
b.	Cost of production at 85% of the target	- 19.29 US $/tonne
c.	Current selling price	- 19.29 US $/tonne
d.	Profit at 100% of production	- 2.742 US $/tonne
e.	Profit at 85% of production	- NIL
	Total annual profit at 100% of target production	- 493,560 US $

The productivity on the basis of 100% of the target production works out to 0.3 tonne per man shift.

16. CONCLUSION

The proposed re-organization will increase the production from this mine by 50%. This will require only 3,663,980 US $ capital and a small gestation period. As a result of the re-organization, increased coal will be available from this mine to partially meet the increasing demand of various industries and at a cheaper price. It is, therefore, necessary to take immediate steps to implement this re-organization scheme.

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

(Pul - e - Khumri area)

(NORTH COAL DEPARTMENT)

I. Introduction

Karkar mine was being worked for the last 40 years. This mine produces on the average about 110,000 tonnes per annum. The present conditions warrant that the production be increased to at least 180,000 tonnes per annum to meet the demand of various industries like cement, textile, etc. At the moment about 90,000 tonnes of coal per annum is being consumed by cement and textile industries. The country has an ambitious programme of expansion of these two industries. At the end of the plan period, the consumption of coal is likely to increase about three times. Although it is not possible to meet the entire demand of coal from Karkar mine alone, but it is a right step in a proper direction to re-organize Karkar mine to increase the production from the present level of 110,000 tonnes to 180,000 tonnes.

II. Location

The location of this colliery is well-known and for the purpose of record, it is shown in Plate No. 1. This colliery lies about 11 kms away in the North-eastern direction on the latitude 36° 0' 50" and longitude 68°46'36" in the province of Baghlan. There is no limitation of lease hold area as the entire coal bearing area can be worked out. There is no private lands too in the neighbouring area. Hence, no cost is involved for the purpose of land acquisition.

III. Topography and Drainage

The topography of the area can be said to be hilly and full scale contouring has not been done till now. The highest to the lowest point, the level difference may range up to 100 metres. The drainage over the coal bearing areas is through the valleys. There are no regularly flowing rivers or streams over the area. Because of the steep slopes, there is practically no percolation of any rain water into the mine and most of it runs off through valleys in flash floods.

Because of this, high surface run-off of water, there is no pumping problem in the underground workings. It is very rarely we get some little seepage of water and that too may be in the final extraction areas. Hence, no permanent pumping installation is needed inside the mine.

On one side it may be an advantage not to have any pumping problem, but on the other side, it is great disadvantage to the aspect of dust allaying.

IV. Geology

The geology of Karkar-Dudkash area is shown in Plate No. 2.

This coal field occurs in upper Jurassic formations. These formations extend over an area of about 40 sq. kms.

The middle jurassic deposits are represented by inter-stratification of sand stones and consolidated coaly clays often with vegetative remains and lenses of hard coal. (Reference Report by Mikhailov, 1967). The thickest coal seam section observed is up to 9 m. Beds of medium and coarse pebly conglomerates and sand stones are also observed. The total thickness of middle jurassic deposits in the region is about 200 metres. The details of the section are given below starting from bottom:

1.	Sand stones of pinkish brown colour and of fine grained	- 42 m
2.	Clays - greenish-grey, lumpy, inter-bedded with sand stone and small vegetative remains	- 42.5 m
3.	Sand stone light yellow with brown, coarse grained	- 34.3 m
4.	Aleurolites and consolidated clays	- 32.5 m
5.	Fine grained sand stone, saturated with vegetative detritus	- 13.8 m
6.	Red brown clay lying above conglomerates	- 45.9 m

4.1 Structure

The strata in this area is very much disturbed and broken. There is no continuity of beds either in the strike or in the dip direction. From the past working of the mine, the dip of coal seam can be said to be varying from 8° to 18° in the direction of the east. It must be mentioned that direction of dip varies from place to place, from north-east to south-west. The area is marked by numerous tectonic disturbances.

4.2 Coal Seam and its quality

The geological and quality data for the seam is not fully available, although the seam is being worked for the last many years. However, the quality will not materially affect the consideration of this report in the opinion of the authors. This coal has been in use by many industries for the last forty years. As we go towards dip, the quality of coal may be expected to improve further. The thickness of the coal seam varies from 1.5 m to 9 metres and at most of the places, the seam is intermingled with bands of coaly clays and shales. The coal seam is soft and can be dug out with pick axes, (pick mining).

The approximate analysis of Karkar coal is given below:-

Moisture	-	2.4%
Ash	-	15-25%
V.M.	-	23-36%
Fixed Carbon	-	54-78%

Traces of sulphur and phosphorous also exist. The sulphur content is about 2.4%. The coal is of sub-bituminous type and is non-coking.

V. Reserves

The area is roughly divided into two parts. Northern part is named as Karkar mine and Southern area is known as Dudkash area. On purely hypothetical basis and assuming a specific gravity of 1.3 and workable thickness of 2 metres, the calculation of reserves in an area extending up to 1,000 metres from the dip end of the present workings, works out to about 4.5 million tonnes. Assuming loss of 30% due to geological disturbances, in the seam, we have a workable reserves of 3.15 million tonnes.

Irrespective of the above calculations, the authors feel that sufficient coal will be available for at least another 12-15 years and hence worth considering for re-organization of the present system of mining.

VI. Marketability and Justification for Re-organization

At present, the main consumers are cement and textiles followed by domestic consumers for space heating purposes. However, the coal requirement of industries is likely to go up very much in the near future. Seeing the present trend it can safely be said that there is no problem for selling the coal.

To meet the increasing demands of coal in the future and even at the moment, the re-organization of this colliery is a necessity. With a little more investment and capital, the production can be increased to 150% of the present level of output.

VII. Gassiness, dustiness and spontaneous combustion of coal

The seam is highly gassy on the northern side, i.e., Kerkar area and gassy on the southern side, i.e., Dudkash. Both the areas are very dusty. The coal is prone to spontaneous combustion.

In a number of instances in the past, gas was found in the working faces. The maximum record of gas percentage observed on Interferrometer was up to 4%. However, in the past, no calculations have been made as to the volume of gas being exuded from the working and, therefore, actual release of methane or mine gasses for every tonne of coal produced is not known. This is very important and useful information and attempt must be made to determine this figure. This will help in determining the quantity of air to be circulated in the mine to dilute the gas percentage to a level so that they are rendered harmless. The importance of this aspect needs no further stressing, if one recalls the past explosiion at this mine in the year 1345 (1966).

As the mine is in category of highly gassy all the equipment used in the mine must be of flame proof type and instrisically safe. Attempt must be made to maintain this equipment in safe condition throughout.

The underground workings are very dry. Even in the

dip workings water is never met and there is no pumping problem. This nature of the mine workings makes the entire coal mine very dusty. Fine dust is seen all over the workings and to prevent this dust from becoming an explosive mixture when raised into the air, enough quantities of line stone dust must be used. At the faces and main loco roadways, attempt should be made for providing water spraying arrangements. Fine air borne dust is also harmful for human lungs. It is a well-recognized fact that pneumokoniasis is the result of inhaling fine coal dust.

Adequate provision must be made for coal dust cleaning, water spraying etc. Proper type of dust barriers must be installed at strategic points.

There has been an instance of fire in the very recent past in Dudkash area. Hence these workings must be considered to be liable to spontaneous combustion. Therefore, proper barriers must be left and isolation stoppings must be constructed wherever needed.

VIII. Short Description of the Present Mine

The existing mine workings can be divided into two main blocks, namely, Karkar on the northern side and Dudkash on the southern side. The present mine workings are shown in Plate No.3.

From the plan it can be seen that the area of Karkar workings is much larger than Dudkash. Dudkash comparatively is of recent origin. Production from these two areas is in the ratio of 2:1. That is about 80,000 tonnes of production comes from Karkar and 40,000 tonnes from Dudkash.

On the rise side of Karkar workings, over a small area, lower seam has been developed. This seam on the dip side appears to have merged with the upper seam. As the coal seam is very soft, in the northern areas, coal is won manually by pick mining.

No explosives are required to win the coal. Hence the use of explosives is limited only to stone drivages or wherever stone bands are met. Hence this aspect has been kept in view in allocating resources for providing explosives in the future re-organization.

The coal won by pick mining is manually loaded directly into mine wagons or sometimes by means of wheel barrows, chain conveyors and steel pans, or by a combination of two or more of the above-mentioned equipment. Then the wagons are hauled up

by direct hoists up to the main loco level, from where diesel locomotives haul out the wagons to the surface or to the bottom of main haulage incline. In the main haulage incline a double drum hoist pulls out the loaded wagons, while lowering empty wagons. On the surface all the wagon handling is mannual and the loaded wagons are tipped by the gravity tippler on to sloping bunkers. (Natural slope of the ground has been used for the purpose of storage bunkers). The capacity of these storage bunkers is quite large and there has never been a problem for storing coal.

This stock from the natural sloping bunkers is loaded directly into trucks for despatch to different destinations. Mannual labour is also used in conjunction with steel pans for loading this coal into trucks.

The existing method of mining has not been very systematic. Levels approximately in the strike direction are driven in coal seam and as the dip of the seam is varying these levels have never been straight for any considerable distance. This obviously presents numerous difficulties such as in track laying, transportation of coal, increasing air resistance, etc. The interval both between levels and dips is not kept constant. As the strata is broken and not self-supporting, the roof and sides in all the roadways is being kept supported by artificial supports such as steel arches and three piece wooden sets.

In spite of heavy density of support, roadways do not stand well and frequent repairs are undertaken involving lot of expenses in manpower and material.

No regular panels are formed and size of individual blocks for final extraction is also not fixed. Such irregular block extraction is harmful for strata control as well as coal conservation. Timber in extraction areas is lost for good as the roof pressure is immediate.

A suggestion is, however, made in the re-organization scheme to try at least partial withdrawal of timber by the help of long chains and Sylvester Prop withdrawer. Provision has been made for Sylvester chain Prop withdrawer.

IX. Proposed Re-organization

As the old method of working has been considered not very systematic, uneconomical both in the manpower and material, an attempt has been made in the re-organization shceme to bring the mine workings on a more scientific and systematic manner.

The present entry No.03 will be maintained to serve as a return airway as well as for hauling out coal in case of necessity. But the main transportation and intake incline will be No.06. This incline will be driven at a gradient of 1 in 4 and by the time it reaches the coal seam, at a reduced level of about 1290 metres will be about 800 metres in length. This will be taken further down about 6 metres below the coal seam where proper wagon handling circuit will be provided. No.6 level will be driven in stone, below the coal seam in the strike direction and in a straight line. This will serve as a main loco roadway for almost the life of the mine. From this level, pairs of dips placed at 300 m apart will be driven in the coal seam with interconnections at 45 m intervals. For extraction purposes, blocks of size 150 m along strike and 135 m along dip will be formed. These blocks will be extracted by modified method of slicing using chain conveyors in the rise dip direction.

There are two more entries above No.03 incline. They are No.1L and No.02. At present, some work is being carried out

through these entries; No.1L entry will specially be useful for the extraction of lower seam. Every attempt should be made to finish the lower seam workings as quickly as possible and in any case the workings of lower seam should be completely extracted by the time the No.06 incline workings connect with No.03 incline.

Once this is achieved, entries above No.03 will be redundant. The entire track material, steel arches supporting the roadways, power cables and all other machinery and equipment can be withdrawn and utilised down below. While retreating from these entries and main roadways connecting them, left over coal pillars will also be extracted. It is needless to mention that in this process of closing down entries above No.03, a lot of equipment specially arches and rails will be available for future use.

In the main coal seam, the coal from both development and panel extraction areas is transported in mine wagons, after being loaded by either chain conveyor or steel pans or wheel barrows or a combination of the above.

X. Mode of Entry

The existing entry at 03 will be maintained in future too. Another incline No.06 will be made right from the surface to be driven at a gradient of 1 in 4. When this touches the coal seam, this will be further taken down 6 m below the seam level at the same gradient and a main loco level No.6 will be driven in stone for the entire strike length of the property. From this stone drift, level cross measure drifts in the direction of main dip will be driven to touch the coal seam, from where a pair of headings both in the rise and dip are driven in the coal seam, with inter-connections at 45 m interval. Once a pair of headings on the rise reaches up to No.3L a new ventilation circuit can be established by installing main exhaust fan at 03. These straight roadways should considerably reduce the mine resistance and improve the mine ventilation. The size of the main incline at 06 in the stone should be not less than 4.0 m wide x 2 m high. However, the loco roadway at No.6 level in stone can be of smaller dimension, say 2.25 x 1.8 metres. Both these roadways should be kept well supported by steel arches. The main headings in coal shall be kept supported by steel arches, but the inter-connections can be supported by three piece wooden sets.

Plate No.4 will show the proposed roadways which will be main entries for the mine for transportation as well as

ventilation. The positions of these roadways are only tentative and may be changed depending on the surface features and practical conditions existing in the mine at the time of opening the various roadways and inclines.

Adequate capital has been provided for driving these inclines, loco roadways and cross measure drifts, which will all be in stone. The cost estimates and total length of drivages are given in Appendix I.

XI. Development of Panels

From the main loco level pair of dip headings at 300 m intervals will be driven in the true dip direction, interconnections between the headings will be at 45 m intervals for ventilation purposes. A pair of levels will be driven connecting various pairs of dips, so as to form panels of 135 m along the dip rise and 150 metres along strike. Once these blocks are formed, they can be extracted with minimum of delay and irrespective of progress of development in neighbouring areas.

XII. Extraction of Panels

A detailed sketch plan of extraction panel has been shown in Plate No.5.

Main feature of the extraction will be provision of barrier of 15 m thick against pair of dip headings. The panel will be extracted by retreating method of extraction. Rises will be driven at 10 metres intervals with inter-connections at 45 metres for ventilation purposes. At no time there will exist more than two complete rise headings. Once the first pair of rise headings has been completed, slicing can be started from the rise most point as shown in the sketch. Panel extraction has been shown in Plate No. 5.

Depending on the gradient of the seam, either chain conveyors or steel pans will be used for rise/dip transportation of coal in the panels.

XIII. Phasing of Coal Production

The drivages of drifts etc. is important for achievement of target and should be started immediately. The proposed target production figures for the future years is given below:-

1359	1360	1361	1362
120,000 T	140,000 T	160,000 T	180,000 T

It is evident from the above figures that there is a gradual increase in coal production from the present level of 110,000 T to 180,000 T in 1362. The rates of progress for different operations has been projected as follows:-

i)	Drivage of incline in stone	-	50 m/month
ii)	Development of loco roadway in stone	-	65 m/month
iii)	Development of dip/rise headings (in coal)	-	75 m/month
iv)	Development of level headings in coal	-	100 m/month

XIV. Pumping and Drainage

Practically there is no water problem in the mine. From the working in the past forty years, it was clear that no pumping is necessary in the mine. This might be due to two reasons:-

1. As the surface topography is hilly and steeply sloping, most of the rain water and snow has easy run off and no percolation takes place.

2. The second reason might be that the strata above coal seam is highly fractured and do not have a capacity to hold any water.

Any underground water can be expected only beneath carboniferrous strara.

However, pockets of water in very meagre quantities may be met during final extraction stages, as happened while extracting in area No.4 level. This can be easily dealt with by installing a small pump or by diverting the water into a dip heading specially driven for this purpose.

XV. Ventilation

At present the mine does not have a systematic ventilation circuit. Most of faces have very sluggish ventilation in spite of a number of audiliary fans being run in the mine.

In the proposed re-organization, maximum production will come, after a couple of years, and the proposed ventilation planning should be on the basis of this highest production to be achieved in future.

As the mine is not highly mechanized, the air quantity requirement should be calculated on the basis of maximum manpower employed in any shift. This should further be enhanced, to allow for grassiness of the mine. The maximum manpower in any shift may not exceed 700 persons. For each person 6 m^3 of air per minute has to be provided to ratify the minimum standards of statutory requirements of some of the countries, i.e., the re-organized mine should have a main ventilating fan which can produce 700 x 6 = 4200 cum of air per minute or say 5,000 cum of air per minute. The present main fan on the surface produces only 750 m^3 of air/minute which is quite inadequate and must be replaced by a bigger fan. Suitable provision has been made for a bigger fan.

Because of the nature of deposit, the internal airways in the coal seam are likely to be narrow and crooked and the

total mine resistance for this much of air circulation is likely to be high. Although no actual measurements of pressure drop have been made, on a rough calculation on theoretical basis, the pressure drop in the present ventilation circuit works out to 2.5 cum. On this basis, it can safely be assumed that the future resistance of the mine will also be quite high and the fan should be able to meet these high resistance requirements.

XVI. Coal Transport

Underground: The coal transport outbye of the face would be done by chain conveyors or steel pans or wheel barrows and mine wagons. The coal from the rise side can come down through steel pans, if suitable gradient is available. Chain conveyors should be used at other places. The loaded mine wagons can be lowered down to or hauled up to main tunnel where a diesel locomotive will haul out to the bottom of the incline. A double drum hoist will raise the wagons to the surface. Provision has been made for chain conveyors, hoist and locomotives.

Surface: On the surface, the coal wagons will generally be handled by manual labour. The tracks shall be suitably laid out with mild gradients to help the movement of loaded and empty mine wagons. The loaded coal wagons will be tipped manually by a gravity tippler. Coal will be kept stocked on the natural slopes from where trucks can be directly loaded with the help of steel pans. Two separate tracks will be provided for loaded and empty wagons. These two tracks will be in opposite gradients to reduce drudgery on the part of workers.

XVII. Safety Measures

All the equipment in the underground should be of FLP type. This has been decided because the mine has been found to be very gassy. Provision has been made for a number of methanometers to enable determining of gas percentage in the general body of the air at regular intervals.

To avoid spontaneous heating of coal, it has been decided to keep the panel size to the minimum. The size chosen for panels is 150 x 135 m. This size of panel has been decided on the basis of past depillaring experience of the mine. These panels will be sealed off by isolation stoppings after completion of extraction. These isolation stoppings should be provided with sampling pipes for monitoring the conditions of atmosphere inside the sealed off area.

As the mine is highly gassy and dusty and roadways are very dry, it is essential to provide sufficient manpower for coal dust cleaning, stone dusting and water spraying. Adequate arrangements for water spraying have been provided. Stone dust barriers should be installed at all necessary locations.

Main tunnels and the main loco roadways will be kept supported by steel arches. The rest, secondary roadways, will be kept supported by sets of timber supports.

XVIII. Civil Construction

A suitable magazine must be constructed for the storage of explosives. The site for the construction of such storage magazine should be within a reasonable distance, keeping the safety in view. It should be approximately about 1000 metres away from the entrance of the mine.

The design of the magazine should be on the basis of sketch plan enclosed at the end of this report (Plate No.8).

A sketch plan of fully self-service type lamp room to accommodate 1,000 lamps is also shown at the end of the report (Plate No.7).

The next priority on the civil construction comes to workers canteen, workers education centre, mine site office, and residential accommodation for the workers. As the total employment of the mine is likely to be 2,000 persons, accommodation for workers should be at least to the tune of 60% satisfaction, i.e., workers room must be constructed for about 1,200 persons.

Two types of accommodation has been provided in this report to meet the needs of supervisors and workers. Enough capital has also been provided.

Director and other senior officers of the mine travel daily from Pul-e-Khumri to the mine and back, and, therefore, no accommodation near the mine has been provided for them.

XIX. Water Supply

The total manpower at the mine when it reaches the peak production will be about 2,000 persons. At present, the mine does not have a good water supply scheme. It is most inadequate and supplies only unfiltered water. Any future water supply arrangement should include filtered water supply scheme for human consumption and industrial water supply for spraying purposes.

The possibilities of sinking a suitable well near the mine site should be explored, so that the existing bothersome water pumping from Pul-e-Khumri can be avoided. To locate underground water resources nearest to the mine, services of hydrogeologist should be sought. The mine has been suffering for the lack of adequate quantities of water for the past forty years. It is high time that the distress should not be prolonged any further and adequate water supply arrangement be made available to the workers.

Water Demand

An estimate of total water demand can be made on the following norms:-

i) 200 litres per day per man and industrial demand at the rate of 15% of total potable water demand.

ii) Assuming 1500 workers will reside at the mine on an average, the total potable water supply demand should be 230 x 1500 = 345,000 litres.

iii) Allow losses for processing and leakage 10% = 34,500 litres.

iv) The total water demand of mine will be 345,000 + 34,500 = 379,500 litres, say 4 lakh litres (400,000 litres).

The authors suggest that the details for the civil construction and the water supply scheme should be worked out by a separate committee of experts; preferably assistance from Ministry of Public Works should be sought for this job.

This committee should work out all the details including the total capital required, surface location of various buildings and water treatment plant. This committee should be responsible for securing the necessary financial sanctions and subsequent implementation of the residential accommodation and water treatment plants. Therefore, a lump sum provision of 50,000 U.S. Dollars has been made in this report for this purpose.

XX. Power Supply

As the mine is not very mechanised and there is hardly any pumping in the mine, the energy requirement may not be very high. However, rough estimate on the basis of following thumb rule can be made.

Every tonne of coal production will need about 6 Kw hours. Therefore, total energy requirement for 180,000 T/annum will be 10,80,000 Kw hours.

Therefore, daily requirement of energy is about $\frac{10,80,000}{300}$ = 3,600 KW hours.

This much power can be drawn from the general power circuit of Pul-e-Khumri. A suitable step down transformer has been provided at the mine site.

XXI. Coal Handling and Despatch

Future coal raising will be from 06 incline. Approach roads have to be constructed to this location for facilitating the trucks to approach this point easily. A lump sum capital has been provided for this purpose. For coal storage purposes at 06 incline, advantage will be taken of the natural slopes available near the mine site. However, to avoid employment of workers for truck loading purposes, the natural slopes should be suitably modified by cutting or filling the earth on the slopes wherever required and construction of small parapet walls will be made to serve as a bunker. A proper chute and a door will be provided to facilitate easy loading of the trucks with no loss of time. No sizing and screening has been provided because the coal is mostly dusty and most of the consumers take run of mine coal and have no specific demand.

Present arrangement of weighing the empty trucks and loaded trucks for the purpose of sale of coal is considered quite adequate.

XXII. Manpower, training of personnel and research

Mining is complicated and hazardous job, which is an accepted fact all over the world. It is needless to say that adequate training facilities must be made available at the mine site. The education centre provided at the mine can suitably be utilised for vocational training purposes. One or two engineers should specifically be made incharge of this training centre. All the fresh workers must undergo a minimum period of one month training on the surface at such vocational training centre, before being employed underground. The existing workers should also be given refresher training in the jobs. The engineers specifically appointed for this training centre, should also visit underground workings to impart on-the-job training to the workers.

A separate industrial engineering cell should be started to undertake work study problems. This cell should be manned by two or three engineers who can undertake time and motion study, method study of various mining operations. Such study is very useful for determining the norms of work and norms of coal production. These norms can conveniently be utilised for devising suitable incentive schemes.

The benefits of such cells are many and it will go a long way in increasing the efficiency of the entire management of the coal industry.

XXIII. Capital Investment, Productivity and Economics

Total requirement of capital works out to 3,663,980 U.S. Dollars. This is equivalent to 20.355 US $ per tonne of annual output.

Investment on plant and machinery works out to 1,953,960 US $ which works out to 10.855 US $ per tonne of annual output. The cost of different items of plant and machinery have been taken on the basis of latest quotations received.

Detailed requirement of plant and machinery is given in Appendix F. Requirement of electrical equipment is shown in Appendix G.

Sufficient capital for drivage of No.06 incline and main loco level in stone has been provided.

Enough capital has been provided for residential and service buildings and water supply.

Total annual targetted production is 180,000 tonnes with a manpower requirement of 2,000 personnel. The estimated output per manshift works out to 0.3 tonne.

The cost of production at 100% and 85% of the target works out to 16.548 and 19.290 US $. The details of cost estimates are shown in Appendix N. The present selling price

is 19.29 US $. On this basis, there will be no profit at a production level of 153,000 tonnes or 85% of the targetted production, which will be known as break even point. But when the mine achieves 100% of targetted production, the profit per tonne of output is 2,742 US $, and annual profit is 493,560 US $.

XXIV. Conclusion

Method of work, transport arrangement, and equipment etc. have been designed taking into account the present known structure of coal seams and the level of technology available at the mine. Should there be any improvement in technology level, or change in structure of the seams, the layouts may have to be modified for obtaining best results.

This report only outlines broadly the indices of economics of the re-organization scheme and the method of work proposed. This should not be considered as a detailed feasibility report, which is possible only when full geological data and other particulars are available.

[illegible] REPORT ON RE-ORGANIZATION OF KAILAR MINE

ESTIMATED REQUIRED CAPITAL INVESTMENT

Appendix A

Target Production - .18 MT
Amount in US $ '000
Project Life - 12-1/2 years

S.No.	Particulars	Total Capital Requirement	Phasing of Capital			Life in years	Depre-ciation	Remarks
			1360	1361	1362			
1.	Building:							
	a) Service	5.02	25	10	15.02	12.5	4.002	
	b) Residential	830	330	250	250	12.5	66.40	
2.	Plant and equipment	1953.96	609.78	742.92	601.26	1-28	197.263	
3.	Furniture and fittings	5	-	2.5	2.5	12.5	0.40	
4.	Vehicles	410	150	160	100	9-13	41.794	
5.	Development:							
	a) Capital outlay in mines	344	144	120	80	12.5	27.52	
	b) Roads and culverts	21	8	8	5	12.5	1.68	
	c) Water supply	50	-	25	25	12.5	4.0	
		3663.98	1266.78	1318.42	1078.78		343.059	

Appendix B

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT OF EXISTING SERVICE BUILDINGS

S.No.	Particulars	No.	Remarks
1.	Office of the Chief of the Mine	1	Considered unsuitable. A new one is proposed near No.06 incline.
2.	Stores shed and office	1	New one is proposed near No.06
3.	Workshop	1	--do--
4.	Main sub-station	1	--do--
5.	Main magazine	1	Main magazine is proposed.
6.	Pit head bath	1	Old one is not adequate. New one is proposed.
7.	Canteen	1	For improvement of canteen, lump-sum provision has been made.
8.	First aid centre	1	A lump-sum provision has been made for equipping the first aid room.
9.	Cap Lamp room	1	
10.	Garage	NIL	New one is proposed to accommodate two vehicles.

Appendix C

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT OF ADDITIONAL SERVICE BUILDINGS REQUIRED

Life of the mine: 12.5 years
Target: 180,000 T/annum

S. No.	Particulars	No.	Plinth area in m^2	Height in M	Total m^3	Rate per m^3 in US $	Total amount in '000 US $	Remarks
1.	Office of the Chief of the Mine	1	70	2.8	196	30	5.9	
2.	Site sub-station	1	15	3	45	30	1.4	
3.	Main magazine	1	9	2.8	25.2	20	.5	
4.	Canteen improvement	L.S.					2	
5.	Lavotary and urinal (5-seater)	L.S.					2	
6.	Site workshop	1	100	3	300	30	9	
7.	Garage	2	20	2.8	56.0	20	1.12	
8.	Pithead bath 10 cubicals	1	40	2.8	112	30	3.4	
9.	Stores shed and office	1	200	3	600	30	18	
10.	Workers training centre	1	50	2.8	140	30	4.2	
11.	Survey office	1	30	2.8	84	30	2.5	
							50.02	

Appendix D

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT SHOWING THE EXPENDITURE ON RESIDENTIAL BUILDINGS

S.No.	Category	Type of Quarter	Strength	No. Reqd.	Unit Cost in '000 US $	Total Cost in '000 US $	REMARKS
1.	Workers quarters	C	1,100	220	1.5	330.0	
2.	Supervisors quarters	B	100	100	5.0	500.0	
					Total:	830.0	

Note: B-type is one bed room quarters
Plinth area - 60 square metres

C-type is camp accommodation
Plinth area - 25 square metres

Appendix E

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT SHOWING THE ESTIMATED CAPITAL EXPENDITURE FOR FURNITURE AND FITTINGS

S.No.	Description	Total cost in '000 US $	Remarks
1.	General furniture and fittings	2.5	
2.	Office equipment	1.5	
3.	Miscellaneous equipment	1.0	
	Total:	5.0	

Note: Provision include the cost of First-Aid Centre equipment, canteen equipment and fittings, furniture for workers training centre, etc.

Appendix F

DRAFT REPORT ON REORGANIZATION OF KARKAR SALT

STATEMENT SHOWING REQUIREMENT OF PLANT AND MACHINERY

S.No.	Particulars	Unit Cost in US $	Qty. Reqd.	Total cost in '000 US $	Phasing of Capital 1360 Qty.	1360 Amount in '000 US $	1361 Qty.	1361 Amount in '000 US $	1362 Qty.	1362 Amount in '000 US $	Life in years	Depreciation in '000 US $
1	2	3	4	5	6	7	8	9	10	11	12	13
	FACE MACHINERY											
1.	Compressed air jack hammer drill for drilling in stone to work under 80 PSI complete with air leg, flexible compressed air hose etc.	510	12	6.12	6	3.06	6	3.06	-	-	28	.218
2.	Electrical compressor for the above complete with swtich electric rotor etc.	3500	6	21.00	4	14	2	7	-	-	28	0.75
3.	Blasting cable with exploders, etc.	150	12	18	4	6	4	6	4	6	3	6.0
4.	Steel arches complete, big size	130	2000	260	1000	130	1000	130	-	-	28	9.285
5.	Steel arches complete, medium size	130	2000	260	-	-	1000	130	1000	130	28	9.285

1	2	3	4	5	6	7	8	9	10	11	12	13
6.	Friction props 30 T capacity range 1.5 to 2.5 m	160	300	48	-	-	150	24	150	15	9	5.33
7.	Bars to suit the above props 1.2 m long	100	300	30	-	-	150	15	150	15	9	3.333
8.	Wheel barrows	50	20	1	-	-	10	.5	10	.5	1	1.000
9.	Face Pump 4 lit/sec, 30 m head with G.E.B., F.L.P. etc. to operate on 380 V	600	2 sets	1.2	1 set	0.6	1 set	0.6	-	-	9	.133
10.	Misc. items such as drill bits, chain prop withdrawer etc.	L.S.		50	-	-	-	-	-	-	10	.277
	FACE TRANSPORT											
1.	Light duty scraper chain conveyors complete with starter FLP motor to operate on 380V, 60m long	30000	4 units	120	-	-	-	-	4 units	1.2	9	13.333
2.	Steel pans 3 mm thick, 2 m long semi-circular	50	300	15	-	-	100	5	200	10	28	.535
3.	Mine wagons 0.7 T capacity with roller bearings	620	100	124	-	-	100	62	100	62	3	41.333

1	2	3	4	5	6	7	8	9	10	11	12	13
	GATE TRANSPORT											
1.	Single drum hoist 20 KW complete with starter etc. to operate on 380V,50 c/s 3-phase FLP	2800	15	42	5	14	5	14	5	14	28	1.30
2.	Rails 18 kg/metre with fish plates bolts etc.	600	100 T	60	20T	12	40T	24	40T	24	28	2.142
3.	Sleepers and other connecting materials for the above rails	L.S.	6600	6.6	-	1.4	-	2.6	-	2.6	18	.366
4.	Steel wire rope 18 mm dia.	3.0	4000m	12	-	-	2000m	6	2000m	6	3	4.0
	TRUNK TRANSPORT											
1.	Diesel locomotives	44000	4 nos	176	-	-	2 nos	88	2	88	18	9.777
2.	Rails 18 kg/metre with fish plates	600	50T	30	-	-	25T	15	25T	15	28	1.071
3.	Sleepers and other connecting materials for the above rails	L.S.		3.3	-	-	-	1.65	-	1.65	18	.183
4.	Double drum hoist, 60KW complete with starter etc. to operate on 380V, 3-phase, 50 c/s non-FLP	20000	2 nos	40	1 no.	20	1 no.	20	-	-	28	1.428
5.	Steel wire rope 22mm dia.	3.5	2000m	7	2000	7	-	-	-	-	3	2.333

1	2	3	4	5	6	7	8	9	10	11	12	13
	VENTILATION											
1.	Main ventilation fan 5000 m^3/min at 35 mm water gauge approx. complete with non-FLP motor, starter etc. to work on 380 V	17500	1 no.	17.5	1	17.5	-	-	-	-	28	0.625
2.	Auxiliary fans 8-10 KW	1800	20 nos	36	-	-	10 nos	18	10 nos	18	18	2.000
	MISCELLANEOUS ITEMS											
1.	Cap lamps with charger and charging rack etc. complete	100	2000 nos	200	500	50	1000	100	500	50	3	66.666
2.	End on gravity tipplers	2500	2 nos	5	1	2.5	1	2.5	-	-	28	.178
3.	Safety and Testing equipment	L.S.	5	5	-	1	-	2	-	2	18	.277
4.	Fire Fighting equipment	L.S.	2	2	-	1	-	1	-	-	18	.111
	WORKSHOP EQUIPMENTS											
1.	Medium Lathe machine bed length 3m, centre height 30 cm (approx.)	20000	1	20	1	20	-	-	-	-	28	.714
2.	Vertical Drill machine to operate on 380 V	1200	1	1.2	1	1.2	-	-	-	-	28	.042
3.	Portable hand drill	500	2 nos	1.0	1	.5	1	.5	-	-	28	.035

1	2	3	4	5	6	7	8	9	10	11	12	13
5.	Transformer welding set	3000	1 unit	3	1	3	-	-	-	-	28	.107
6.	Cable vulcaniser	1000	1 set	1	1 set	1 set	-	-	-	-	28	.035
7.	Oxyacetelene gas cutting set	750	1	.75	1	.75	-	-	-	-	28	.026
EARTH MOVING MACHINES												
1.	Bull dozer medium size diesel operated	50000	1	50	1	50	-	-	-	-	28	1.785
2.	Road grader medium size diesel operated	29000	1	29	1	29	-	-	-	-	28	1.035
3.	Road roller, medium size diesel operated	27000	1	27	1	27	-	-	-	-	28	.964
4.	Shovel loader 1.5 m^3 capacity diesel operated	50000	1	50	1	50	-	-	-	-	28	1.785
5.	Dump trucks 10 T capacity	30000	2	60	2	60	-	-	-	-	28	2.142
	GRAND TOTAL:			1794.92		524.76		680.41		589.75		191.152

SHORT REPORT ON RE-ORGANIZATION OF KARAR MINE — Appendix G

STATEMENT SHOWING THE REQUIREMENT OF ELECTRICAL EQUIPMENTS

S.No.	Particulars	Unit Cost in US $	Qty. Reqd.	Total cost in '000 US $	Phasing of capital						Life in years	Depre-ciation in '000 US $
					Qty.	Amount in' 000 US $	Qty.	Amount in '000 US $	Qty.	Amount in' 000 US $		
1	2	3	4	5	6	7	8	9	10	11	12	13
a.	SURFACE											
1.	Transformer indoor type, 300 KVA 13800/380V, two cable entry boxes on secondary side	17000	1 no.	17	1	17	-	-	-	-	28	.607
2.	Diesel generator 150 KVA, 380 V, 50 cycles, 3-phase	50000	2 nos	100	1	50	1	50	-	-	28	3.571
3.	Power cables	L.S.	-	5	-	2	-	2	-	1	28	.178
4.	Miscellaneous items	L.S.	-	5	-	2	-	2	-	1	28	.178
b.	UNDERGROUND											
1.	Power cables	L.S.	-	5	-	2	-	2	-	1	28	.178
2.	Switches and joint boxes	L.S.	-	5	-	2	-	2	-	1	28	.178

1	2	3	4	5	6	7	8	9	10	11	12	13
3.	Lighting transformer FLP, 3 KVA 380/110 V	1000	5	5	-	-	2	2	3	3	18	.277
4.	Lighting cables and other fittings	L.S.		5		2		2		1	18	.277
5.	Signalling bell, with transformer intrinsically safe	51	40	2.04	20	1.02	10	0.51	10	.51	18	.113
6.	Mining type telephones 10 lines normal exchange	L.S.		5		5	-	-	-	-	18	.277
7.	Miscellaneous items	L.S.		5	-	2	-	2	-	1	18	.277
	Total:			157.04		85.02		62.51		11.51		6.111

Appendix H

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT SHOWING REQUIREMENT OF VEHICLES, THEIR COST AND DEPRECIATION

S.No.	Description	No.	Total value in '000 US $	Phasing			Life in years	Depreciation in US $	REMARKS
				1360	1361	1362			
1.	Trucks	15	300	100	100	100	9	33,333	
2.	Jeeps	4	80	40	-	40	13	6,154	
3.	Ambulance van	1	30	-	30	-	13	2,307	
	Total:		410					41,794	

Appendix I

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT SHOWING CAPITAL OUTLAY IN MINE

S.No.	Particulars	Length in M	Rate/m in US$	Amount in '000 US $
1.	4.00 m wide x 2 m high incline in stone	800	180	144.00
2.	2.25 m wide, 1.8 m high loco level in stone	1,000	100	100.00
3.	Cross-measure drifts 2.25 m wide, 1.8 m high, 50 m long, each - 3 Nos.	150	100	15.00
4.	Permanent support	L.S.	-	60.00
5.	Miscellaneous jobs	L.S.	-	25.00
				344.00

Appendix J

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT SHOWING CAPITAL INVESTMENT ON MINE ROADS AND CULVERTS

S.No.	Description	Cost in '000 US$	Life in years	Depre-ciation in '000 US $	Remarks
1.	Approach road to the colony, 3.5 metres wide, 15 cm thick, with boulder soling, 10 cm thick metalling, 2 km long.	10	12.5	.80	
2.	Culverts .3 m span, RCC slab culverts 3 Nos.	6	12.5	.48	
3.	Drains and tree guards	5	12.5	.40	
		21		1.68	

Appendix K

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT ON ESTIMATED CAPITAL EXPENDITURE ON WATER SUPPLY

S.No.	Description	Approximate cost in '000 US $	Remarks
1.	Water supply scheme	50.00	
	Total:	50.00	

Note: Please read report pages in this connection.

Appendix L

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT ON MANPOWER REQUIREMENT, THEIR WAGES, SALARIES AND BENEFITS

S.No.	Description	Strength	Wages in US $	Benefits in US $	Total in US $
1.	Chief of Mine	1	80	60	140
2.	Mine Engineers	6	67	50	702
3.	Nigoran	1	67	23	100
4.	Sir Bashis	7	55	20	525
5.	Bashis	17	45	16	1,098
6.	Surveyor	1	75	30	105
7.	Doctor	1	75	30	105
8.	Clerks	10	56	14	700
9.	Electrical Mechanical fitters	15	60	23	1,245
10.	Loco driver	3	60	23	249
11.	Lamp room incharge	1	38	23	61
12.	Fan attendant	3	38	23	183
13.	Blacksmith	1	51	23	74
14.	Carpenters	3	38	33	183
15.	Mason	2	51	23	148
16.	Generator operator	3	51	23	222

Appendix L Contd...

S.No.	Description	Strength	Wages in US $	Benefits in US $	Total in US $
17.	Compounder	1	55	10	65
18.	Cook	3	38	23	183
19.	Pickminers (Kaninda)	112	67	23	11,200
20.	Assistant to Pickminer (Movin Kaninda)	112	60	23	9,296
21.	Miners-cum-workers	1,616	51	23	119,584
22.	Surface workers	80	38	23	4,880
	Total:	2,000			151,048

Note: 1 US $ = 45 Afghanis

Production per month = 15,000 Tonnes

Wages cost per tonne of output = 10.07 US $

Appendix M

SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

STATEMENT OF UNIT COST

Target: 180,000 T/annum

S.No.	Cost Item	Cost per tonne in US $	Fixed Cost in US $	Variable cost in US $
1.	OMS	0.30 Tonnes		
2.	EMS	1.007 US $		
3.	Wages cost per tonne	10.07		10.07
4.	Stores cost per tonne	1.22	.732	0.488
5.	Power cost per tonne	0.45	.270	0.180
6.	Administrative charges per tonne	1.07	-	1.07
7.	Depreciation per tonne	1.906	-	1.906
8.	Interest on net capital at 9%	1.832	-	1.832
	Total:	16.548	1.002	15.546

Note: 1. 60% of the store cost is normally a constant item irrespective of production.

2. 60% of the power cost is normally a constant item irrespective of production.

Appendix N

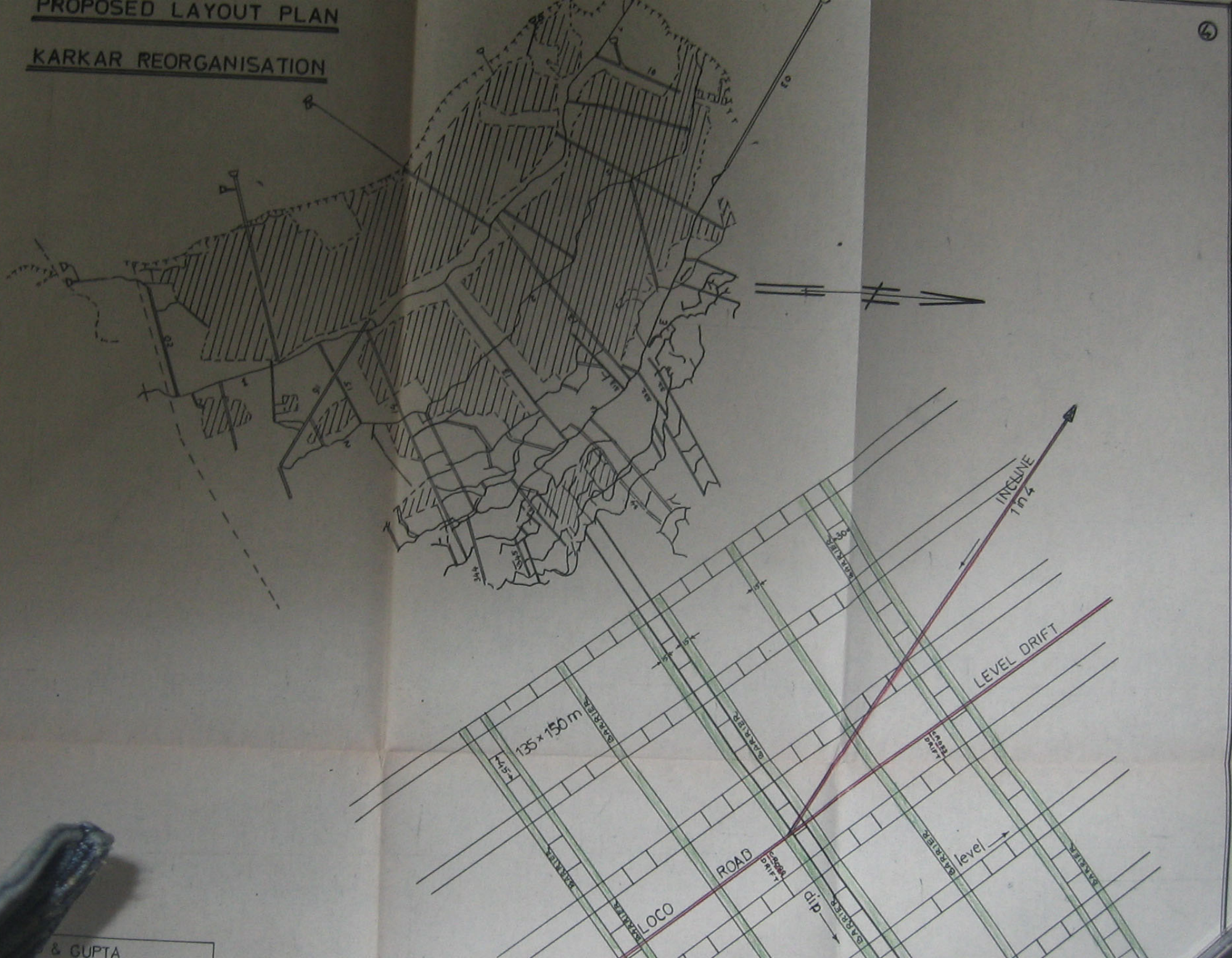
SHORT REPORT ON RE-ORGANIZATION OF KARKAR MINE

ESTIMATED COST AND PROFITABILITY AT VARIOUS LEVELS OF PRODUCTION

1.	Level of Production	85%	100%
2.	Production in tonnes	153,000	180,000
3.	Fixed cost per tonne in US $	1.002	1.002
4.	Variable cost per tonne in US $	18.289	15.546
5.	Total cost in US $	19.29	16.548
6.	Capital investment per tonne of annual output in US $	23.95	20.355
7.	Profit per tonne in US $	NIL	2.742
8.	Annual profit in US $	NIL	493,560

PROPOSED LAYOUT PLAN

KARKAR REORGANISATION

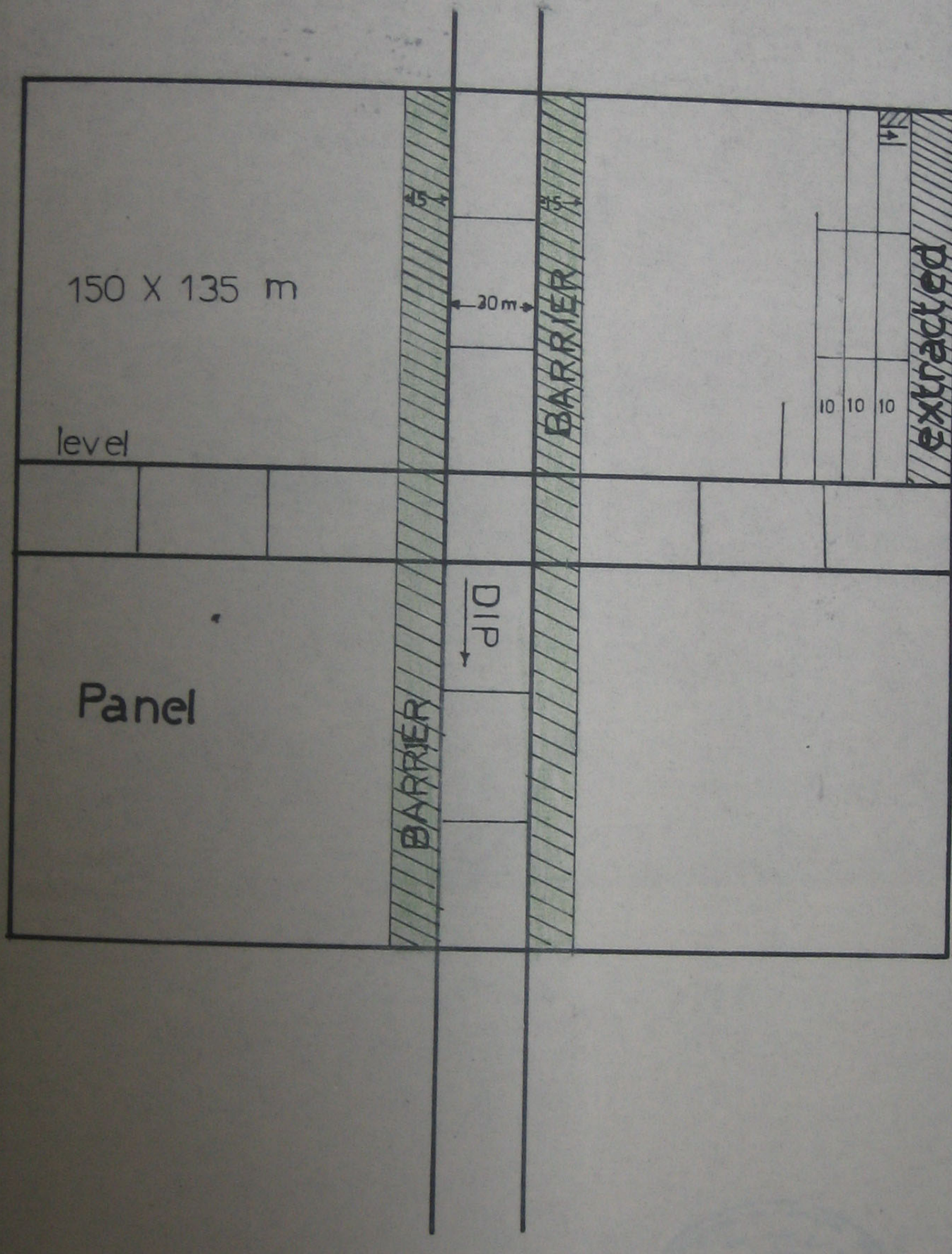


& GUPTA

METHOD OF EXTRACTION

⑤

(Not to Scale)

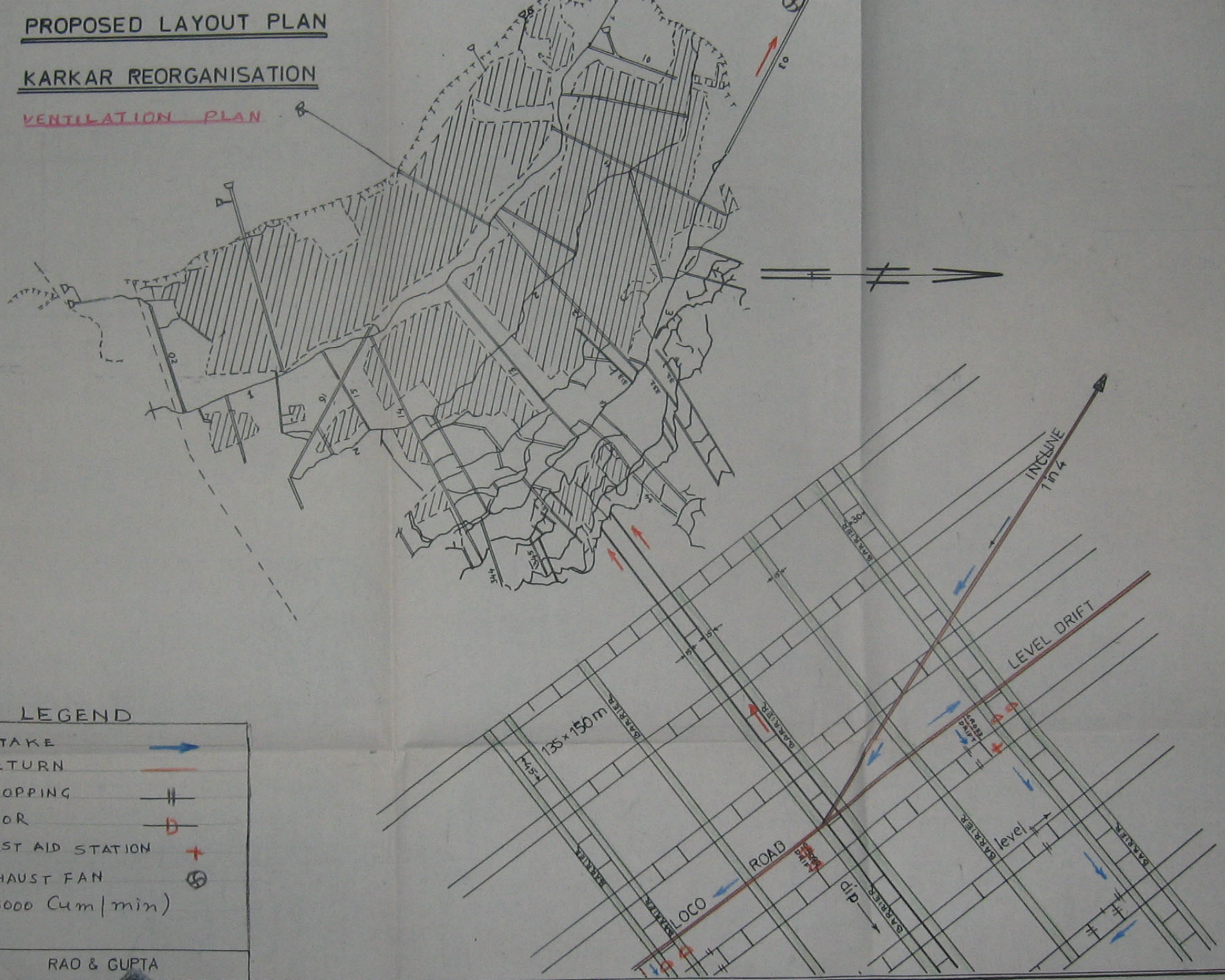


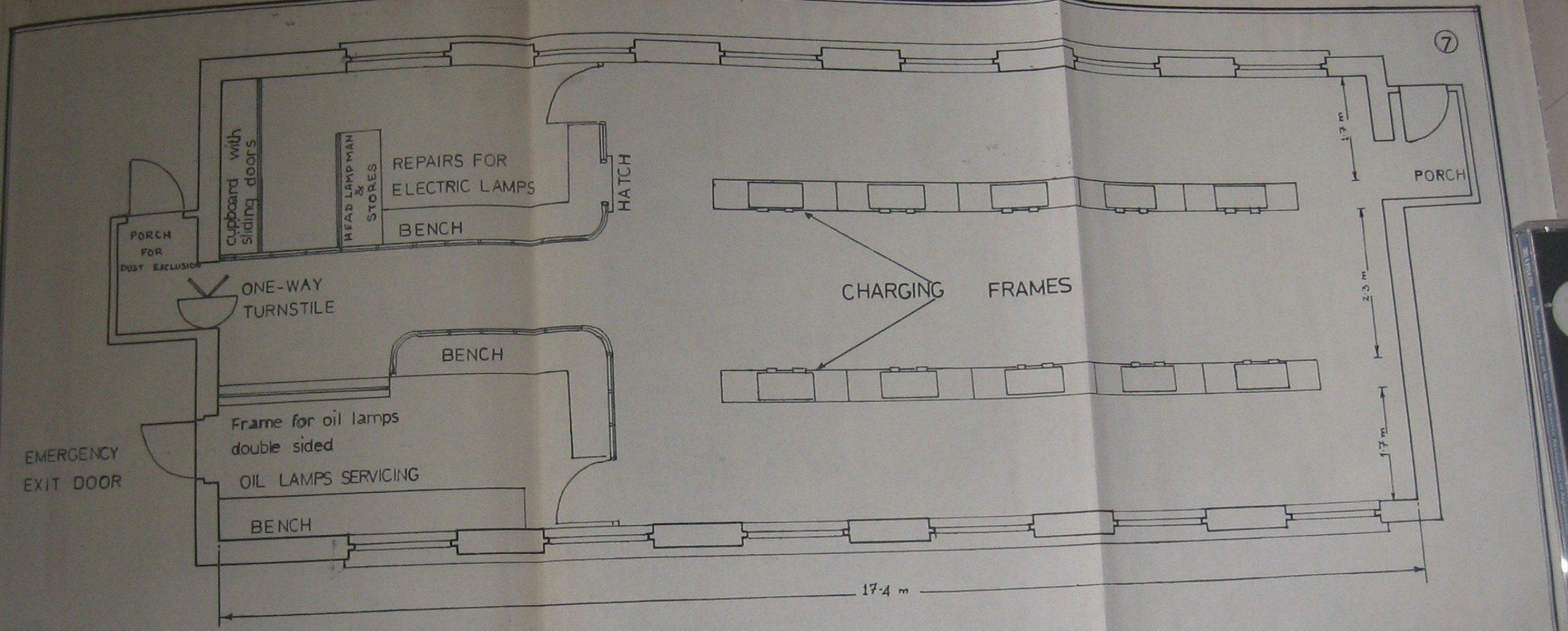
RAO & GUPTA .

PROPOSED LAYOUT PLAN

KARKAR REORGANISATION

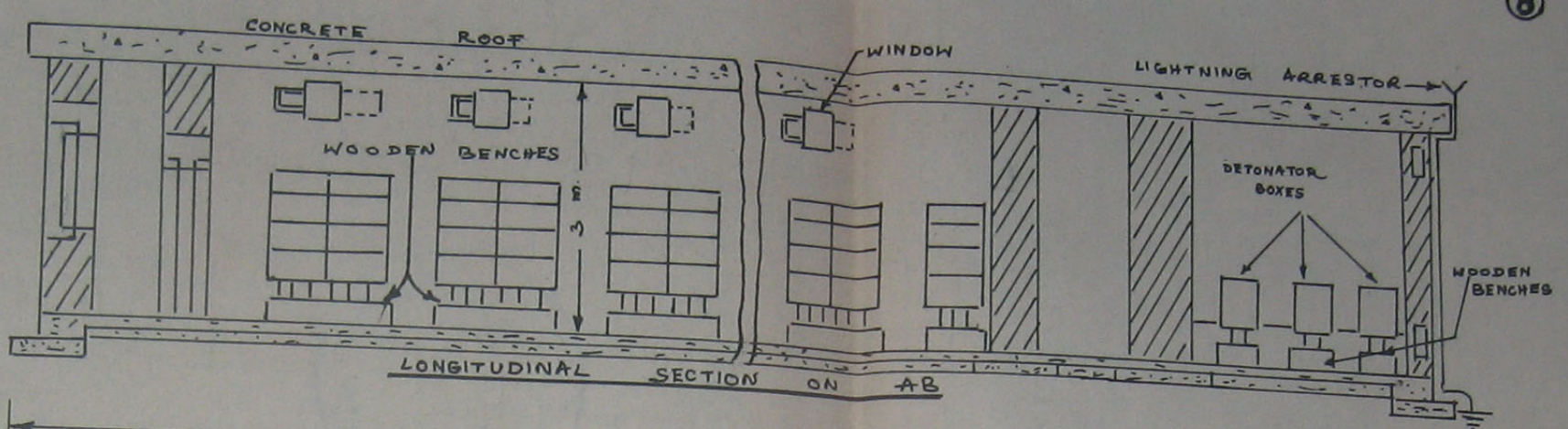
VENTILATION PLAN

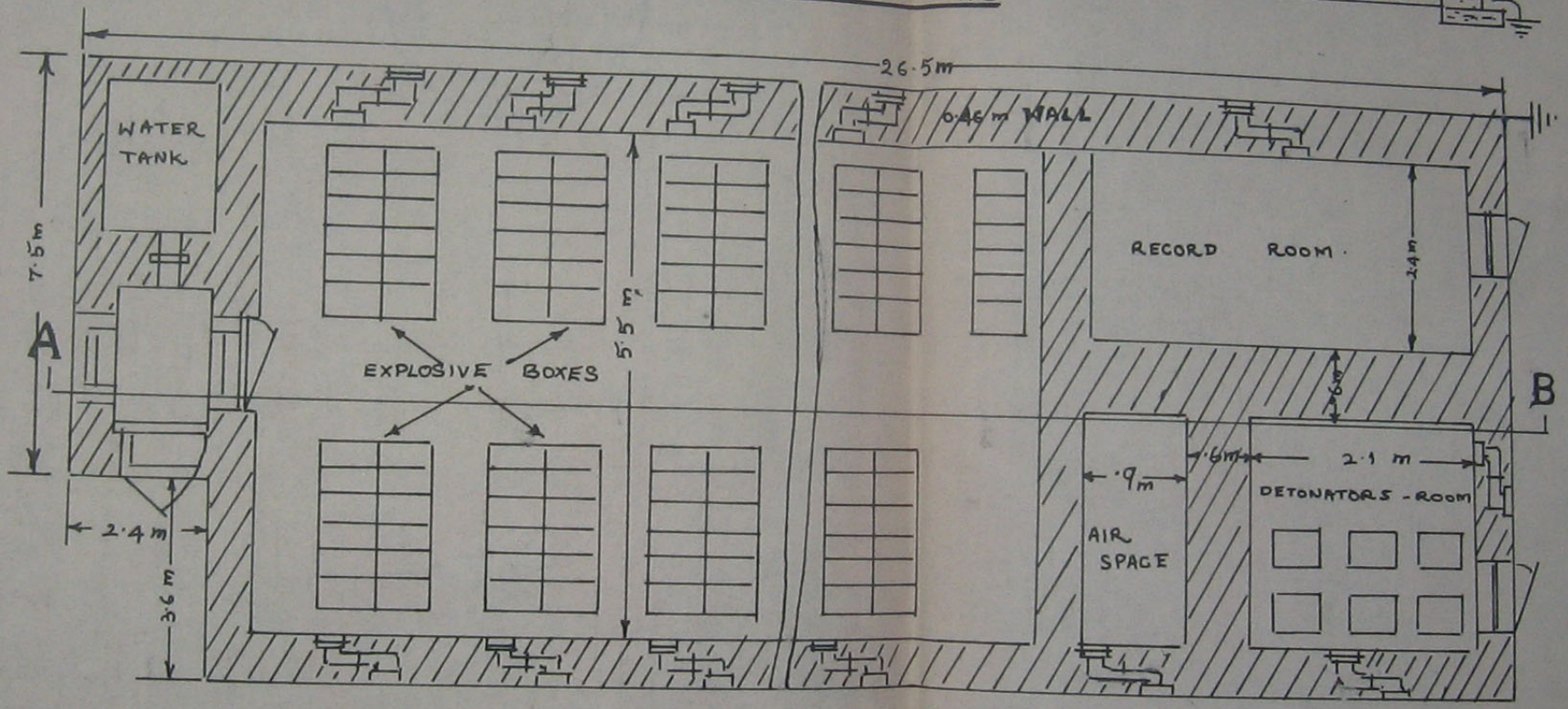




PLAN VIEW OF FULLY SELF SERVICE LAMP ROOM FOR 1000 CAPLAMPS

P. DHARMA RAO
K. L. GUPTA





MAGAZINE FOR STORING EXPLOSIVES

(NOT TO SCALE)