C. P. U. No. 420

COMMITTEE ON PUBLIC UNDERTAKINGS (1980-81)

(SEVENTH LOK SABHA)

EIGHTEENTH REPORT

ON

KHETRI COPPER COMPLEX OF HINDUSTAN COPPER LIMITED

(MINISTRY OF STEEL & MINES) (DEPARTMENT OF MINES)

Presented to Lok Sabha on 24 APR 1981

and

Laid in Rajya Sabha on 24 APR 1981

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Page	Para	Line	For	Read
1	1.3	14	CP	CU
5		6	24	242
5	Item 10	2	Kilihan	Kolihan
7	1.23	3	post-factor	post-facto
7	1.24	3	started	startled
12		20	reval	level
13		1	an devaluate	and evaluate
16	foot note	2	estimated cost	estimated to cost
19	2.33	8	Delete Line 8 and substitute 'the public undertakings is stated to have been taken up at various levels'.	
19	2.33	10	Delete Line 10.	
19	2.33	13	After 'kind is' read 'undertaken, the inter-departmental and inter-enterprise linkages at the time'.	
23	3.17	last column against-st 1979-80	71,107	11,107
24	3.23	5	300	3000
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46	1.24	3	started	startled
49	-	16	Law if	Law of
51		6	peroduction	production
51	3.54	4	recified	rectified
51	Serial No.15		para 3.54	para 3.55
51	3.55	4	reuverts	reverts
51	3.55	7	abviate	obviate
52	3.57	10	expenditi-ously	expediti-ously
52	3.65	3	plats	plants
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*Elected w.e.f. 28-11-1980 in the vacancy caused by appointment of Shri P. A. Sangma as Deputy Minister.

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INTRODUCTION

I, the Chairman, Committee on Public Undertakings having been authorised by the Committee to present the report on their behalf, present this 18th Report on Khetri Copper Complex of Hindustan Copper Ltd.

2. The Committee's examination of the working of the copper complex was mainly based on the Report of the Comptroller & Auditor General of India—Part VI, Union Government (Commercial) 1978—Miscellaneous Topics of Interest—Section II.

3. The Committee took evidence of the representatives of Hindustan Copper Ltd. on 30th, 31st October, 1980 and of the Ministry of Steel and Mines (Department of Mines) on 2nd, 3rd and 8th December, 1980.

4. The Committee considered and adoted the Report at their sitting held on 7th April, 1981.

5. The Committee wish to express their thanks to the Ministry of Steel and Mines (Department of Mines) and Hindustan Copper Ltd. for placing before them the material and information they wanted in connection with the examination of the Company. They also wish to thank in particular the representatives of the Department of Mines and the Company who gave evidence and placed their considered views before the Committee.

6. The Committee also place on record their appreciation of the assistance rendered to them by the Comptroller and Auditor General of India.

NEW DELHI ;
April 14, 1981
Chaitra 24, 1903(S)

BANSI LAL,
Chairman,
Committee on Public Undertakings

CHAPTER I

PROJECT PLANNING

Khetri Copper Complex (Rajasthan) comprises (a) copper mines at Khetri and Kolihan; (b) concentrator plant; (c) smelter plant consisting of flash, converter and anode furnaces; (d) slag treatment plant; (e) electrolytic refinery; (f) cathode melting and wire bar casting plant; and (g) acid-cum-fertilizer plant. Planning and implementation of this project were initially handled by the National Mineral Development Corporation. The project was transferred to the control of Hindustan Copper Ltd. on 1 January, 1968.

1.2 In 1961 NMDC got a feasibility report for this project utilising the ore from Khetri Copper Mines prepared by an American firm of consultants—M/s. Western Knapp Engineering Ltd. for the production of 21,000 tonnes of copper metal per annum through reverberatory smelting process which was approved by Government in May, 1962 at a cost of Rs. 24.42 crores. In 1964, consequent on a decision to utilise the sulphur value of the copper ore, the change from Reverberatory smelter to Flash smelting was approved and a target of production of 1,94,000 tonnes of triple super-phospate was also fixed. Again in 1966, the scope of the project was enlarged for production of 31,000 tonnes of electrolytic grade copper per annum by inclusion of the neighbouring Kolihan Deposits within the scope of the project. According to the H.C.L., despite these changes there was no Detailed Project Report or even a fresh feasibility report prepared incorporating the total change in the scope of the project both in the terms of capacity as also the technology.

A. Estimates of Ore Reserves

1.3 The estimates of Khetri Ore reserves and production capacity of mines underwent several revisions. In November, 1961, based on the data provided by IBM, M/s. Western Knapp Engineering Company estimated the total reserves of copper ore at Khetri to be of the order of 106 million tonnes of 1 per cent copper grade. In April, 1963 based on additional exploratory work done, the same firm submitted another estimate of about 112 million tonnes of copper ore in the grade of 1 per cent. Around 1964-65 when mining development was taken up, doubts began arising about the estimates of ore reserves. In August, 1965 experts of IBM submitted an estimate of 93 million tonnes of 1 per cent grade ore over a strike length of 3.5 km. In addition the Kolihan mine was also known to contain 12.12 million tonnes of copper ore of 2.4 per cent grade and 11.62 million tonnes of 0.6 per cent (total 23.74 million tonnes of average grade 1.5 per cent cp.).

1.4 However, according to a note furnished by company the shape and disposition of ore bodies in Khetri mines as estimated by surface diamond drilling had not been confirmed by additional underground exploration which revealed that the ore bodies at Khetri were lensoid, irregular

and narrow. Consequently the ore reserves were now estimated at about 45 million tonnes at 0.9 per cent grade.

1.5 The Committee enquired during examination of H.C.L. (October 80) the reasons for the ore estimates going away. The Chairman-cum-Managing Director, HCL stated :—

> "In this case the type of the ore was entirely new in a new area and the normal conventional drilling which would have been valid in another type of deposits was carried out. In other words there was a hole drilled at intervals of 100 meters and it was taken that in between the two holes there was a continuous ore body.....and on that basis mathematically when the evaluation was done ore reserves were estimated around 106 million tonnes but when we went down and started opening out we found that that was entirely wrong; the mother earth had given us something much different from what we had visualised."

1.6 The Special Secretary of the Department of Mines stated in this connection :—

> "The investigations at that time were done according to the practice that being adopted at that stage. If we were going to do this at this stage, naturally IBM and GSI, they would adopt much more stringent standards and will adopt latest techniques and possibility we will not run up against problems that had happened."

1.7 Asked about the present estimates of ore reserves the Special Secretary stated that these were estimated to be only about 40.37 m.t. of 0.91 per cent average copper content.

1.8 The ore production capacity of Khetri and Kolihan mines was envisaged in July, 1969 at 9,600 tonnes per day (tpd) (8000 tpd from Khetri and 1600—2000 tpd from Kolihan), subject to *inter-se* adujustments. As per estimate then sanctioned the copper production was envisaged at 31,000 tonnes per annum. But, in the revised estimate proposals formulated in 1972, ore production capacity was revised to 7000 tonnes per day from Khetri and 3000 tonnes per day from Kolihan mines. The projected annual output of copper was, reduced from 31,000 tonnes to 25,700 tonnes. According to Audit it was stated (June 1973) by the management that the reduction in the projected annaul output was due to revision of mining scheme in July, 1971, in consultation with UNDP Mining Expert under which cut-off grade was lowered from 0.65 per cent to 0.5 per cent consequently lowering of mill grade ore from 1.2 per cent to 0.97 per cent.

1.9 Foreign firm, Seltrust engineering Ltd., London was appointed as Mining Consultants in May, 1974 to examine amongst others the optimum level of production which could be achieved at the mines. According to the findings of the Mining Consultants submitted in early, 1975 the maximum achievable capacity at Khetri and Kolihan mines was 4000 and

2500 tonnes of ore per day. In April, 1978, the consultants further indicated that with the opening of additional mine level the production of ore at Khetri and Kolihan mines might reach 5000 tonnes 3000 tonnes respectively per day by 1982-83 and in case exploration in Banwas block established reserves of the order of 2 million tonnes of recoverable ore per level, another 1000 tonnes per day could be achieved at Khetri.

1.10 A Committee of Directors was appointed by the Board in March 1978 to examine the report of the mining consultant on the optimum capacity of these mines. The report of the Committee was submitted in June 1978 which indicated a production capacity of 4000 tonnes and 2500 tonnes at Khetri and Kolihan mines respectively. The report of the Committee was forwarded to Government in July, 1978.

1.11. Asked about the action taken by Government on the report of the Committee of Directors, the Committee were informed by the Company that after considering the Report of the Committee of Directors as also the recommendations of the London firm of Consultants, the Government fixed the capacity of Khetri mine at 5000 tpd. and of Kolihan mines at 3000 tpd. Based on the reduced capacity of mines at 8000 tonnes of ore per day (24 lakhs tonnes per annum), the estimated maximum annual production of wire-bar at Khetri Copper Complex was about 20,000 tonnes. As regards production from Banwas block it was stated that as per the latest assessment, drilling and assesment of reserves would be completed by 1987-88. Stope preparation and production from the area might take another two years. Thus the Banwas block was likely to be in production by 1989-90 provided the reserves as assessed were proved.

1.12. In the course of evidence of H.C.L. it also came to light in this connection that in April, 1969, the Committee on Science and Technology considered an interim report of the working group on Non-ferrous metals, constituted by Cabinet Secretariat in December, 1967, which recommended that the target of ore production from Khetri mines be reduced to 4000 tonnes per day corresponding to 10,000 tonnes of metal per year and the capacity of Khetri smelter be reduced to 20,000 tonnes per annum. Asked about the action taken on the Report of the Working Group, it was explained in a note furnished by the Ministry that the Committee on Science and Technology decided to remit the report to a sub-Committee for consideration. The Sub-Committee considered the issues arising from the Report in June-July 1971 and it came to the conclusion *inter-alia* as follows :—

> "In view of the fact that orders have been placed for the capital equipment to the tune of Rs. 15 crores and the concentrator plant is also expected to come out by the end of 1972, it is felt that it is too late now to scale down the operations. The Sub-Committe felt that the best that can be done now is to take immediate steps to produce 31000 tonnes of copper per year at Khetri and that, on long term basis, economically in the interest of the country. In order to achieve this the Sub-Committee felt that it is necessary to take up exploitation of small deposits in and around Khetri on a crash basis, and

see that the above target is achieved at an early date. The Sub-Committee was glad to note that the Hindustan Copper Ltd., has already taken steps to exploit small deposits and detailed time schedule is expected to be worked out during the course of next one month. The Hindustan Copper Ltd. has also taken steps at Khetri mines and it is expected to achieve the optimum capacity of the mines of about 7,600 tonnes of ore per day by 1978."

1.13. The Committee enquired whether the recommendations of the working group were taken into consideration while sanctioning the capital Khetri Project in 1969. The Ministry stated in a reply furnished after evidence :—

"Approval of the revised cost estmiates of K.C.C. at Rs. 68.79 crores was communicated on 8-7-69 based on approval of the Cabinet Committee on Prices, Production and Exports held on 18-6-69. The Cabinet Committee's approval was based on a paper dated 7.4.69 prepared by the Department of Mines and Metals (forwarded to Cabinet Secretariat on 8-4-69) though this was modified to indicate the position regarding availability of water and power and the modified note was dated 30-5-69. It is seen that the Cabinet paper did not deal with the question of ore reserves/smelter capacity as such or the recommendations of the working group on non-ferrous metals. The Cabinet paper was, in fact, intended to firm up the cost estimates of the integrated project as required by the Industries Committee of the Cabinet earlier at its meeting on 10-10-66. In any case, the recommendation of the working group, it is seen, was contemporaneous with the Cabinet paper prepared for sanctioning the revised cost estimates in 1969."

B. *Cost Estimates*

1.14. An estimate of Rs. 78.52 crores was prepared by N.M.D.C. in March, 1966 which was later on revised to Rs. 87.55 crores taking into account the devaluation and other factors. Soon after taking over of the project from NMDC, MCL undertook a review of the cost estimates prepared by NMDC and submitted to the Government an estimate in May 1968 amounting to Rs. 75.77 crores for the Copper circuit, which was sanctioned in July, 1969. The estimate for Acid-cum-Fertilizer Plant was worked out at Rs. 17.80 crores against which the Government approved Rs. 16.21 crores in May 1971.

1.15. The cost estimates of the copper circuit were further revised to Rs. 98.63 crores in March, 1972 which were approved by Government in May, 1974 making up the approved cost of the project to Rs. 114.84 crores. The cost estimates were again revised by the company in March, 1976 to Rs. 135.36 crores and sent to Government for sanction. The revised cost estimate of the project were approved by Government only in July, 1979 for Rs. 138.36 crores comprising Rs. 113.82 crores for Copper circuit and Rs. 24.54 crores for Acid-cum-Fertilizer Plant. This amounted to an increase

of Rs. 38.05 crores for the Copper Circuit and Rs. 8.33 crores in the Acid-cum-Fertilizer Plant over the July 1969 and May 1971 sanctions. The increase in estimates was attributed to the following reasons :

	(Rs. in Lakhs)
1. Revision in the mine development and mine production schemes involving :	
(i) Additional mining equipment	24
(ii) Additional cost of mines development, shaft sinking etc.	1358
(iii) Price escalation and supervision charges	134
2. Inclusion of new and additional items for which either no provision or inadequate provision was made in the original estimates	543
3. Escalation in prices of equipment	152
4. Delay in completion of the Plant involving *inter alia*	
(i) Additional supervision charges (including Rs. 134 lakhs incurred upto Mar'67 omitted from the original estimates)	770
(ii) Interest during construction	237
5. Additional cost of laboratory general services engineering services, spare parts and inventories and contingencies	253
6. Excess expenditure due to variation in exchange rate	349
7. Additional expenditure in respect of interest & supervision due to delay in completion of Fertilizer Plant	36 3
8. Additional cost on water supply scheme of A&F	61
9. Increase in the cost of Turnkey lant due to delay in completion of Fertilizer Plant	410
Total increase	4872
10. **Deduct** : Decrease in cost of Concentrator Plant, Power Plant, Slag Treatment Plant, Township (Khetri & Kilihan Mines) on account of actual value of contracts reduction in erection and commissioning charges and deletion of some items	(—)233
Net increase	4639

1.16. By the time the estimates were sanctioned in July, 1979, the company had already incurred an expenditure of Rs. 131.38 crores upto 30-6-79 which entailed an excess expenditure of about Rs. 17 crores over the cost approved earlier.

1.17. As regards the reasons for the delay in sanctioning of the estimates, it was stated by the Ministry that the time taken was mainly due to obtaining detailed clarifications on certain points and also considering the question of derating of the mine capacities in consultation with concerned departments.

1.18. In the course of examination of the Ministry, the Committee pointed out that the excess expenditure having been already incurred and the Project commissioned, the Ministry was presented with a *fait accompli.* and there was no scope left for the various organisations of the Government to make any worthwhile contribution. The Special Secretary of the Department stated : "Partly that is right".

C. Return on Investment

1.19. The scaling down of estimated copper production coupled with increase in capital cost adversely affected the viability of the project. The capital investment per tonne of copper as per estimates of 1968 was Rs. 24,000 based on an investment cost of Rs. 75.77 crores for the copper circuit with a production capacity of 31,000 tonnes of metal. This had however, gone up to Rs. 57,000 per tonne, as the sanctioned capital estimates went up to Rs. 113.82 crores for copper circuit and the production capacity had gone down to about 20,000 tonnes of metal. The effect was increase in the cost of production per tonne of copper metal by Rs. 3184 due to additional charge for depreciation (Rs. 1767) and interest (Rs. 1417).

1.20. As regards return on capital invested the Committee were informed by the Ministry that while considering the revised cost estimates of KCC in October, 1966 it was noted that the Khetri Project would yield a profit of 12.5 per cent assuming price of copper at Rs. 7500 per tonne and TSF at Rs. 550 per tonne. In May 1969 the gross return on the copper circuit (excluding the acid plant) was kept at 1.24 per cent assuming copper price at Rs. 7500 per tonne. With the production of sulphuric acid the gross return was estimated at 8.82 per cent assuming notional sale price of sulphuric acid at Rs. 250 per tonne. The Project Appraisal Division of the Planning Commission appraised the Project in July, 1973 which revealed an IRR of 4.06 per cent at a total cost of Rs. 98.63 crores. Against the revised cost of Rs. 138.36 crores the analysis revealed that the financial IRR will be negligibly small. In the economic analysis it was found that the cash flow was totally negative. At a 12 per cent discount rate the net present value worked out to (—) Rs. 132 crores without FE premium and (—) Rs. 107 crores with 25 per cent premium on FE. In evidence the Special Secretary clarified that without taking the discount rate the IRR (economic) would have worked out to 4.5 per cent as against the rate of 4.06 per cent worked out on the basis of earlier estimates. According to him the rates were more or less the same despite increase in costs as for the latter calculations a higher price of copper was assured the prices having gone up beteween 1974 and 1979.

1.21. The Committee enquired whether in the light of the assessments of return it could be said that the Project Planning as a whole was satisfactory, the Special Secretary of the Department stated in evidence :

> "Obviously there is no sense for satisfaction for this. It is totally disappointing experience. In fact we wish this had not happened".

In reply to a question it was stated :

> "Right from the beginning the primary consideration was that because of its strategic importance we should have this project".

1.22. Planning and implementation of Khetri Copper Complex, which were initially handled by the NMDC were taken over by the HCL which was incorporated in 1967. Earlier in 1961, the NMDC employed an American firm of consultants to prepare a feasibility report for the copper complex utilising the ore from Khetri mines. The scope of the project was thereafter enlarged by including the development of Kolihan mines and production of triple superphosphate utilising the sulphur value of the ore and the estimated production of copper was increased from 21,000 tonnes per annum to 31,000 tonnes in 1966, but was later scaled down to 25,700 tonnes in March, 1972. Despite such significant changes neither was fresh feasibility study nor detailed project report prepared. This lapse cannot but be deplored.

1.23. According to an estimate prepared in March 1966 by the NMDC the cost of the enlarged project was Rs. 78.52 crores. This indicated that the project would yield a profit of 12.5 per cent. The estimate underwent revision thrice after the project was taken over by the HCL. The latest estimate sanctioned by the Government in July 1979 surprisingly after the project was completed, put the cost at Rs. 138.36 crores. There has been phenominal cost escalation of the order of 76 per cent albeit significant reduction of benefit. A post-factor appraisal of the project by the Planning Commission revealed ironically that the financial rate of return would be negligible even with the vast increase in copper prices by 1979. Although a cut off economic rate of return of 12 per cent is reported to be adopted by the Planning Commission for clearance of projects, the Internal Rate of Return (IRR) of the Khetri complex was finally found to be no more than 4.5 per cent on an economic analysis. At 12 per cent discount rate the net present value (NPV) of the project turned out to be negative, i.e., minus Rs. 132 crores. Such a project would not have been ordinarily taken up for implementation. It is indeed distressing that government was presented with a fait accompli and there was no scope left to the various organisations scrutinising the estimates to make any worthwhile contribution to effect economy. The Special Secretary's specious plea that the project could still be justified on the basis that copper is a strategic metal is at best an excuse for a totally uneconomic investment.

1.24. The basic bungling that materially altered the economics of the project was the gross overestimation of the ore deposits at Khetri. The Committee were started to hear that the deposits were reassessed and scaled down to 40 million tonnes of 0.91 per cent average grade of copper from the level of 106 million tonnes of 1 per cent grade. Curiously there were no detailed geological studies before the project formulation. It was assumed that in between two holes drilled at 100 meters interval there was a continuous ore body. This was, however, proved entirely wrong when mine development started. Surely, a more amateurish handling of the basic assessment of a project potential cannot be expected from any quarter.

1.25. Another distressing feature of this project planning episode is that the production capacity of the mines which was earlier estimated at 10,000 tonnes per day is now expected to go upto only 8,000 tonens per day. This has resulted in serious imbalance in the capacity of the mines and that of the process plants. The process plants have been designed to produce

31,000 tonnes of copper per annum. But owing to reduced production capacity of mines and lower grade of ore, the annual copper production capacity is now estimated to be only about 20,000 tonnes. It came to the notice of the Committee in this connection that a working group on non-ferrous metals constituted by the Cabinet Secretariat in December 1967 recommended in one of their reports that the capacity of Khetri smelter be reduced to 20,000 tonnes per annum. It is amazing that this was not brought to the notice of the Cabinet Sub-Committee while seeking their approval to the revised cost estimates of the project in July 1969 for the production of 31,000 tonnes of copper per annum. Reasons for this information gap need investigation.

1.26. The foregoing observations of the Committee would show clearly that the planning of Khetri Copper Complex typifies the way that projects should not be planned. The Committee have dealt with the equally unsatisfactory implementation and performance of the project in the succeeding sections of the Report.

CHAPTER II

PROJECT IMPLEMENTATION

A. *Delay in Construction and commissioning*

2.1. The following data as given by Audit indicate that there has been considerable delay in commissioning the mines and various process plants :—

Sections	Original schedule (May 1968)	Revised schedule (July'70)	Actual date of commissioning	Delay with reference to	
				Original schedule	Revised schedule
1	2	3	4	5	6
1. Mines & Mines Installations	1970	In phases during 1972-73 to 1976-77	April 1972 a	2 years	—
2. Concentrator plant	1970	December 1972	July 1973	3 years	6 months
3. Smelter Plant	October 1971	December 1973	November 1974	36 months	10 months
4. Refinery Plant	May 1972	December 1973	December 1974* (electrolytic Refinery)	30 months	11 months
5. Acid-cum-Fertilizer Plant	October 1971	February 1974	Sulphuric Acid Plant was commissioned in September '75 and production of single superphosphate started from October 1976.		

a Experimental production at mines started in 1970.

*Cathode Melting and Wire Bar Casting Plant-operating process stablished in November-December 1976.

2.2. As per the Audit Report in the Progress Report submitted to Government in March 1974, the following reasons were given for delay in implementation of the projects :—

(a) **Conceptual Shortcomings**

2.3. The scope of the project was conceived in stages on *ad hoc* considerations without any detailed project planning or project evaluation, nor were any realistic cost estimates or profitability study made. There were also no clear concepts of the magnitude of the operations and the time required for its implementation.

(b) **Execution Flaws**

(i) No expertise of sub-level stopping and long-hole drilling was available for the large scale under-ground mining of copper ore from the two mines at Khetri and Kolihan. The location of the main shafts at Khetri was decided without proper study and, in course of actual sinking, the shafts encountered major faulty zones and fractured ground conditions which severely impeded the pace of shafts sinking and mine development. Only in July 1971 with the help of the United Nations Development Programme Mining Expert, the entire mining scheme was reviewed and trackless mining and 2 mines entry systems opened for augmenting ore production.

(ii) Civil and structural construction of Concentractor Plan was delayed by 20 months from October 1970 to middle of June 1972 due mainly to the lack of practical experience of the National Projects Construction Corporation Ltd. (a Government Company). In fact, a part of the work awarded to it had to be withdrawn and awarded to another agency.

(iii) The organisational structure of the project was unsuitable for implementation of the Mining and Metallurgical Complex of the size planned at Khetri.

(c) **Other contributory factors**

(i) The foreign consultants were not having requisite knowledge and experience of designing various process plants to be erected at Khetri.

(ii) Abnormal delays of 4/6 years in supply of indigenous equipment like 400/1600 KW Winder Hoists etc. by the Mining and Allied Machinery Corporation Ltd. (a Government Company) and supply of sub-standard equipment by others.

(iii) Although the projects was conceived in 1961, detailed cost estimates were sanctioned by the Government in 1969. All major contracts had, therefore, to be referred until then to Government for approval, involving delays in placing various orders.

2.4 As a result of delay in commissioning, the Company had to extend the period of consultancy and service agreements thereby entailing an additional cost of Rs. 174.75 lakhs.

2.5 There has been delay of 2-3 years in commissioning of the plants with reference to original schedule. Asked about the reasons for the delay it was explained by the company in a written reply that the time schedule for the project was prepared in May 1968 without the help of a Detailed Project Report or a detailed PERT Chart for the various facets and activities of the project. At that stage only the preliminary design work had been initiated by the French Consultants and no major contract had been awarded. Thus the basis of 1968 time schedule was mostly the rough estimates by the Project authorities as to the time factor which would be needed in completion of various construction activities and commissioning of plants and installations, and not based on experience of some major project, or detailed investigation, with regard to the time frame etc. for individual activity.

2.6 The following main reasons were also found to have delayed the construction/commissioning of the plants :

1. Initial delay in the award of contracts for concentrator, smelter, refinery and acid-cum-fertilizer plant.
2. Delay in construction of cathode-melting and wire bar plants by the turn-key contractors M/s. GEC. Although the plant was to be handed over by the end of August 1973 mechanical completion was achieved only in the last quarter of 1974. The contractor failed to commission the plant and the contract was rescinded in May 1976 at his risk and cost.
3. Delay on the part of FACT to whom a turn key contract was awarded for acid-cum-fertilizer plant.
4. Delay in smelter due to shortage of steel, cement and acetylene gas and drastic cut in the power supply particularly during 1973-74.

2.7 With regard to reason for the delay in construction and commissioning of some of the plants due to delays in construction/supply of material by other public undertakings such as MAMC, NPCC and FACT the Committee enquired whether these delays on the part of public undertakings were brought to the notice of the Ministry and if so, the action taken by them in this regard. The representative of the Ministry stated in evidence that the matter was brought to their notice and they had taken it up at various levels in the Ministry. He, however, admitted that "the effect was not as expected".

B. *Organisational Structure*

2.8 The Committee referred to the statement in the progress report submitted by the Company in March, 1974 that organisational structure of the project was unsuitable for implementation of the mining and metallurgical complex of the size planned at Khetri and enquired about the steps taken by the Ministry in this regard. In a note furnished by the Ministry it was

stated that although the progress report was submitted by the project authorities in 1974 it referred to the situation prevailing in 1970. In the initial phase of planning and placement of orders between 1967 and 1969 there was a group of the Board of Directors which used to look at the staffing pattern and requirement and sanction various posts. In September, 1969, the Chairman, HCL addressed a letter to the Secretary, Department of Mines and Metals on the question of organisational set up for HCL and pointed out that at the meetings of the Board of Directors and the meeting of the Standing Committee of the Board of Directors it was agreed that a stage had come when there should be top officers at the various levels to have charge of various technical and specialised Departments/services. In this context various alternatives were considered by them as to the status of the top officers and ultimately it was decided that there should be a whole time functional director for finance and administration, mining and geology, process and metallurgy and acid-cum-fertilizer Departments. Government's approval for this proposal was sought by the Chairman. As regards organisational set up below the Board level it was indicated that this was also approved by the Standing Committee of Board of Directors and was being implemented in anticipation of the Government's approval of the proposal for the Board level organisational set up. The Secretary, Department of Mines and Metals indicated that the changes in the organisational set up below the Board level should not be implemented at that time till the higher set up were examined in the Ministry and also it would be desirable for the new Chief executive to consider the matter fully. The new Chairman took charge on 20th February, 1970. At the meeting of the Board of Directors held on 4th April, 1970 the new Chairman proposed a revised organisational set up below the Board level. The proposals regarding the revised organisational set up of HCL as a whole including Khetri Copper Project were by and large approved by the Board. Further, proposals for creation of two posts of functional directors were received in the Ministry from Chairman-cum-Managing Director in June 1972 and were approved by the Government Director (Personnel) was apponited on 17-7-1972 and Director (Finance) was appointed on 1-8-1973.

C. *Role of Foreign Consultants*

M/s. Western Knapp Engg. Ltd., USA

2.9 M/s. Western Knapp Engg. Ltd., U.S.A. were appointed in May 1961 as consulting engineers and advisers in respect of the Khetri project for the mining of ore and for the various processes leading to the production of electrolytic copper. This included evaluation of ore reserves and preparation of project report for mines and various process plants. Apart from general consultancy, a separate agreement was entered into with them on 1-9-65 to supply engineering and supervisory staff for the production/service shafts at Khetri, draw equipment specifications and supervise preparation of engineering design for shaft and related installations.

2.10 With the signing of a preliminary agreement with a French Group of Consultants M/s. Venot Pic & ENSA in June 1965 for the Khetri Copper Project, the agreement with WKE was reviewed and a fresh agreement signed on 1-3-1966 whereby they were to act as engineer expert and advisers to commission the integrated plant at Khetri and achieve the rated output, for

which the consultants were required to review an devaluate the desgins, specifications, processes, material balances, estimates of capital and operating costs and profitability, quotations etc. and advise on the suitability of designs, specifications etc. as well as the reasonableness of the cost. The total amount paid to the consultants under the three agreements amounted to Rs. 126.88 lakhs.

2.11 As mentioned earlier in this Report, the evaluation of ore reserves by the consultants did not prove correct. As against reserves of 112 million tonnes of 1 per cent grade estimated in 1963 for Khetri mines, the ore reserves were at present expected to be only about 40 million tonnes of 0.9 per cent grade. There were execution flaws in the location of main shafts for mine development and severat design defects were noticed in the process design and equipment supplied by French Consultants.

Venot-Pic & Ensa, France

2.12 For designing and supplying equipment for all process plant (excluding flash furnace area of Smelter and Acid-cum-Fertilizer Plant) M|s. Venot-Pic & ENSA, France were appointed in May 1967. They, however, did not have the requisite knowledge of designing various process plants. For Refinery, the French Consultants sub-contracted the job to M/s. BOR of Yugoslavia. For smelter also they had no expertise of their own and got the design prepared by another French Company M/s. JEUMONTSCHNEIDER. Some of the equipment supplied by French Group for smelter were found to be defective. In the Concentrator plant also numerous defects in design and lay out were found. This necessitated modifications/adjustment of a major nature in order to commission as well as to increase the output of the plant.

2.13 Asked how the French consultants who did not have the requisite experience came to be selected, the Committee were informed in written reply that a formal application for a loan of Rs. 9 crores was made to USAID/EXIM Bank in 1963. However, US financing was not forthcoming. M/s. Venot-Pic of France showed interest in the project and proposed that consortium consisting of Venot and Schneider Group of industries would supply a large part of the equipment needed for the Khetri Project from France under the French Aid India Club Credit.

2.14 The proposal submitted by the Consortium had the general approval of the Fernch Government. The French Consultants were thus selected mainly in the context of foreign exchage financing for import of equipment etc. for the project. It was also stated that before concluding the agreement in May, 1967 it was seriously considered whether Government should break with the French consultants as the fees quoted by them (total amount paid Rs. 511.72 lakhs) was felt to be on the high side. It was indicated that in case French Collaboration was terminated it was doubtful whether French Credit would be available for plant and equipment.

2.15 It came out during examination of the Department of Mines that the French consultants were themselves machinery manufacturers and exporters and they organised a consortium of five companies. No competitive

tenders were called from any other party even in France for this project. The total amount of machinery imported from France was, however, only for Rs. 450.20 lakhs. Asked about the views of the Ministry in this regard, the Secretary, Department of Mines stated in evidence "it was not a satisfactory way of doing this work. I would certainly agree that even at that time the procedures that were followed were not what should be normally followed."

2.16 In reply to another question, the Special Secretary stated : "while going into a new area of technology, the choice of Consultants should be such that he has got a large experience not only in any particular part of the project but in organising totality of the project and there ought to be a total responsibility cast on him so that he can coordinate."

D. *Defects in Plant & Machinery*

Concentrator Plant

2.17 According to Audit Report, the Concentrator Plant was accepted without any performance guarantee test. Asked about the reasons for it, the company stated in a note that the French Consultants had organised a Performance Guarantee test of the concentrator plant in November, 1973, but this test failed due to the following main reasons :

(1) Frequent break-down of equipment.

(2) Frequent power interruptions resulting in the dislocation of the operations.

(3) Ore supply not conforming to the contractual requirements.

(4) Difficulties in the availability of grinding media etc.

2.18 Subsequently during initial operations of the plant certain design deficiencies were noticed and were pointed out to the French Consultants by HCL. Certain modifications as suggested by French Consultants were introduced. In addition, the company's engineers on their own also introduced several modifications to bring the plant to regular working conditions. The Company forwarded their detailed claims amounting to Rs. 24.86 lakhs indicating cost of modifications introduced in accordance with the suggestions of the French Consultants as well as those introduced by H.C.L. on their own and other auxiliary claims like cost of items found redundant etc. The French Group took the stand that since the company had made many modifications and they were satisfied with the performance of their modifications French Consultants would like to have the final acceptance of the Concentrator Plant after settling the various financial claims made by the Company. Following this on 9th August, 1975 a comprehensive settlement was reached with French Consultants in terms of which they were freed from their obligations under the contract on payment of a lump sum amount of PFF 407000 (equivalent to Rs. 8.95 lakhs) in addition to supply of certain equipment for making modifications to the tailing thickner. According to H.C.L. the overall settlement was more favourable than invoking the penalty clause since the amount recoverable under the penalty clause for the failure to demonstrate the performance guarantee as per contract would have amounted to Rs. 79,258 only.

2.19 The Committee equired at what level was the decision taken to accept the equipment without examining the performance. They were informed by the Company in a note that the decision to accept a lump sum settlement and waiving of the performance guarantee test was taken jointly by the then Works Manager and Manager (Finance) of Khetri Copper Complex on the basis of negotiations conducted by them with the French consultants. This decision was ratified by the Chairman of the company subsequently. The matter came up before the Board of Directors of Hindustan Copper Limited only at their meeting held on 7th August, 1978, when the Board desired to know the circumstances under which the performance tests for concentrator plant was waived. The position was explained to the Board of Directors in a note submitted at the 86th meeting of the Board held on 4th December, 1978.

Smelter Plant

2.20 According to Audit two electrostatic precipitators (comprising imported and indigenous items under the Smelter Plant) were procured by the Company between October, 1972 and December 1973 at a total cost of Rs. 61.83 lakhs from Lodge Cottrel, UK and M/s. Simon Carves (India). The Company had also incurred an additional expenditure of Rs. 12.40 lakhs between November, 1973 to April 1974 on providing additional features/facilities, in the above equipment. M/s Outo Kumpu Oy., Finland and M/s Davy Power Gas Limited, Bombay were respectively responsible for process design and detailed engineering of the flash furnace incorporated in the above equipment.

2.21 In connection with the acquisition of the plant and the modifications made therein, the following observations of UNIDO expert are relevant :—

(i) "So we have from the outset a ridiculous situation in that Power Gas Limited accepts and recommends to its client (Hindustan Copper Limited) the low bidder, without the faintest idea of what it is really buying, while Outo Kumpu, which has expert knowledge of the subject, feebly accedes to this and thereafter makes no criticism of Lodge Cottrel's design though, if it had critically examined the drawings, it would from its own experience, have had a very good idea of the weaknesses in the design, as is evidenced by its support of recommendations made by the writer at Ghatsila in May 1972 and its own additional recommendations."

(ii) "According to Power Gas Ltd.'s letter of 19th April, 1973 these modifications have been successful though it is the writer's understanding that the modified precipitator only operated for about ten days before the Flash Furnace was shut down for overhaul. The Khetri precipitators are, therefore, quite logically being modified along the same lines as Ghatsila at considerable expenses."

(iii) "In the writer's opinion all three parties have certain moral liabilities towards their client HCL : OKO for not categorically stating that the SF design (Gadelins) was the only proven one

and that it took several years of effort on the part of OKO and SF jointly to make it reliable : OKO again for not criticising LC's design : PGL for recommending LC, the low bidders in spite of OKO's initial objections. LC for using HCL as a guineapig, in its first venture into this particular field of gas cleaning."

(iv) "Quite frankly, it is the writer's opinion that OKO, PGL and LC have made a real mess of this precipitator business."

2.22 Asked about the follow up action taken by the Company on the observations of UNIDO Expert the Committee were informed in a written reply that these observations relate to one item of the Smelter Plant *viz.* electrostatic precipitator. The order for this equipment was placed on M/s. Lodge Cottrel in March, 1971. The I.C.C. Ghatsila was also having a flash smelter like the one being set up at Khetri, though of a lower capacity purchased from the same supplier. Ghatsila smelter had faced considerable problems on account of electrostatic precipitators. However, after certain modifications this equipment had performed satisfactorily. Having regard to the experience of I.C.C. the manufacturers were asked to make certain modifications, which had yielded good results at Ghatsila. However, in view of the fact that the modifications, were suggested by H.C.L. themselves no contractual clause of a penal nature were attracted in this transaction.

2.23 Other defects noticed in the smelter plant affecting its efficiency, according to Audit were generation of reverts, loss of copper and excess consumption of heavy oil. As the problems could not be sorted out, the services of 2 Japanese smelter engineers from M/s. Furukawa Co. and one adviser from M/s. C. Itoh & Co. were availed of at a cost of Rs. 72,275 for 10 days in April, 1977 to make a pre-investigation report regarding the action to be taken for modification of the smelter. On the basis of the pre-investigation report, a contract was entered into on 2nd September, 1977 with one of firms *viz.* M/s. Furukawa Co. for obtaining their technical assistance for improvement and efficient operation of the Smelter Plant.

2.24 The consultancy fee paid to M/s. Furukawa amounts to Rs. 39.15 lakhs, besides an expenditure of Rs. 3.95 lakhs on air fare and other charges. The Japanese firm made certain recommendations for improvement of the plant. The actual expenditure in implementing these recommendations amounted to Rs. 149.21 lakhs.*

Supply of Sub-Standard equipment

2.25 The Committee enquired about the details in regard to sub-standard equipment supplied by certain parties, as mentioned by Audit. They were informed by HCL that the main items for which performance was not found upto the mark were as follows :

Name of the Equipment	Name of the Supplier
Diesel locomotives	NAMC
Underground drills	Voltas
Compressors	SLM Maneklal

*At the time of factual verification Audit pointed out that in addition three recommendations estimated cost Rs 69 lakhs are yet to be implemented.

2.26 As regards the action taken in this regard, it had been stated that in the case of underground drills and compressors, the defects noticed were rectified by the suppliers free of cost. As regards diesel locomotives the position was that out of 6 locomotives for which orders had been placed on MAMC at a cost of about Rs. 75,000 each, only 4 nos. were delivered by them. The contract did not provide for performance guarantee tests to be carried out before accepting the equipment. However, there was a provision for inspection of the equipment at the project-site before acceptance. During inspection no major defects were noticed. However when the equipment had actually worked for sometime certain defects were noticed and all the 4 locomotives were sent to MAMC for rectifications. Out of these only two locomotives were subsequently returned after repairs and modifications. The performance of these was found satisfactory. The balance 2 locomotives had not been delivered back. As regards the cost of repairs which amounted to Rs. 106,560 for each of the two locomotives, it was decided after discussion with MAMC that MAMC would bear 50 per cent charges and the balance 50 per cent will be paid by HCL.

E. *Recovery of Damages*

2.27 Asked about the damages and compensation claimed and recovered from the foreign suppliers/contractors and other contractors for defects in plants and delays in commissioning the company stated that the position was as follows :—

1. M/s. Venot-pic-ENSA for design defects in concentrator plant.
   Amount claimed Rs. 24.86 lakhs.
   Amount settled finally and received Rs. 8.95 lakhs.

2. M/s. Venot-Pic & ENSA for design defect in Fedoweights in smelter.
   Amount claimed Rs. 3.88 lakhs.
   Amount received Rs. 3.88 lakhs.

3. M/s. NPCC for delay in civil construction works etc.
   Amount claimed Rs. 31.92 lakhs.
   Amount awarded by Arbitrator Rs. 1.34 lakhs.

4. GEC for failure to commission the wirebar casting plant as per contract.
   Amount claimed Rs. 3.74 crores.
   Matter referred to arbitrator in January, 1977.
   Arbitration proceedings were in progress.

5. M/s. FEDO (FACT) regarding turnkey contract for aid-*cum*-Fertilizer Plant. As against FACT's claims amounting to Rs. 5.89 crores and HCL's claims amounting to Rs. 7.73 crores, an award was given by the arbitrators on 18th January, 1980 according to which H.C.L. were asked to pay a sum of Rs. 3.20 crores to FACT in full and final settlement of all claims and counter claims of both the parties.

2.28 The Khetri complex comprises mines at Khetri and Kolihan and concentrator, smelter, refinery and acid-cum-fertilizer plants at Khetri.

The project as a whole was expected to be operational by May 1972. The mines development and commissioning of the plants were, however, badly delayed by 2-3 years. The delay meant huge escalation of cost. There were conceptual shortcomings and execution flaws; besides the project authorities were let down by the consultants and contractors engaged for the project implementation. As pointed out earlier in this Report, adhocism ruled the project planning with its inevitable impact on the implementation. Modern techniques like PERT were not employed for project monitoring and control to obviate time silippage. What irks the Committee most is that the organisational structure of this mining and metallurgical complex initially at the crucial stage of its implementation was admittedly unsuitable. Despite the huge capital outlay a Director (Finance was appointed only in August 1973. Surely it was the responsibility of the Department of the Government that controlled the HCL to see that such deficiencies were not there.

2.29 A number of foreign consultants were engaged for various purposes and the experience with them has not been a happy one. No one seems to have been engaged to cordinate the entire project implementation and take the responsibility for the totality of results. This was necessary as the country lacked the necessary expertise at the time when the project was taken up. However, the Committee find that an American concern, Western Knapp Engineering Ltd. were appointed as engineering experts and advisers to commission the integrated plant at Khetri and achieve the rated output. The Committee would like to have an assessment by the Government of the role played by this concern and the extent of their responsibility in view of various deficiencies in the implementation and performance of the project.

2.30 The French consultants engaged on a fee of Rs. 511.72 lakhs for designing and supplying equipments worth Rs. 450 lakhs for the majority of the process plants did not have the requisite knowledge and experience of the designing. It is intriguing how they were selected. Easy availability of credit cannot be the main consideration. Strangely, no competitive tenders were called even restricting it to the French territory. Evidently there was no care exercised in selection of the consultants. They subcontracted the job to other foreign concerns. Various defects were noticed in the concentrator and smelter which needed modifications/ adjustments and delayed the commissioning.

2.31 The concentrator plant was accepted without performance guarantee tests. The decision to waive gtiarantee tests and to accept a lump sum payment of Rs. 8.95 lakhs as against claims amounting to Rs. 24.86 lakhs for the design defects appears to have been taken in March 1975 by the then Works Manager and Manager Finance without prior approval of the Chairman and the Board of Directors. The decision was stated to have been ratified by the Chairman subsequently and the matter came up before the Board of Directors only in August 1978. The reasons advanced for waiving the guarantee tests and not fully enforcing the claims are hardly convincing to the Committee. Considering the fact that the plant could still treat ore only upto 60 per cent of its capacity and further major modifications would be warranted to improve the performance, the Committee desire that the matter should be investigated and responsibility

fixed for the waiver and the settlement arrived at with the consultants. The Committee are suprised to learn that the penalty for the failure to demonstrate the guaranteed performance would be only Rs. 79,258 under the contract entered into with the consultants. The matter should be referred to the Ministry of Law. If their examination reveals any lacuna there should be no such lacuna in the contract in future.

2.32. There was delay in construction of cathode melting and wire bar plants by the turnkey contractors, GEC and the contractors having failed to commission the plant, the contract was rescinded at their risk and cost. The amount claimed against this concern is Rs. 3.74 crores and the matter is reported to be under arbitration.

2.33 The delay in implementation of the project was also partly due to delay in construction/supply of material by other public undertakings such as MAMC, NPCC and FACT. Civil and structural construction of concentrator plant delayed by 20 months due to lack of practical experience of the NPCC. There was delay in the execution of the turnkey contract by the FACT for the acid-cum-fertilizer plant whereas MAMC delayed certain supplies. Although the question of delay on the part of undertaken, the interdepartmental and inter-enterprise linkages at the time both by the company and the Ministry, the Special Secretary, Department undertaken, the interdepartmental and inter-enterprise linkages at the time of Mines, informed the Committee that "the effect was not as expected". Frankly, the Committe did not expect an expression of helplessness from Government. At least in future when a major project of this kind is of implementation should be identified and coordination committees at a fairly high level organised to see that various items of work are properly synchronised. Such a coordination ought to be the responsibility of the Government and it should be ensured that the projects are completed under time bound programme in order to avoid cost escalation and loss of production.

CHAPTER III

PROJECT PERFORMANCE

A. *Production Performance*

3.1 The processes involved in the production of copper metal are as under :

Concentrator

3.2 The ore produced in the mines is first milled at the Concentrator Plant. The milled ore is further processed in the plant for production of concentrate. The designed capacity of the Concentrator plant is to consume 10,000 tonnes of ore per day (approximately).

Smelter

3.3 The concentrate is charged to Smelter Plant. At the first stage Blister Copper (98 per cent pure) is produced, which contains dissolved gases and some impurities. The Blister Copper is charged to Anode Furnace where the dissolved gases and impurities are removed and "Anode Copper" (99 per cent to 99.3 per cent pure) is produced. The designed capacity of the Smelter Plant is to treat 2.31 lakh tonnes per annum at 700 tonnes of concentrate per day, for 330 working days a year.

Refinery

3.4 Refinery is composed of two plants. (a) Electrolytic Plant for electrorefining of anode copper and (b) Wire Bar Casting Plant for melting cathodes and castings into wire bars.

3.5 Anode Copper produced at Smelter is sent to the Electrolytic Plant for production of cathodes (99.95 per cent pure). Cathode sheets produced in Electrolytic Plant pass through the Preheating Furnace and Electrolytic Arc Furnace in the Wire Bar Casting Plant and from the molten metal thus derived from the arc furnace the wire bars are produced.

3.6 The rated capacity of the Wire Bar Casting Plants is to produce 15 tonnes per hour of electrolytic grade copper wire bars.

3.7 There was a pronounced imbalance between the capacity of the mines and that of the process plant. According to Audit the size of the process plant had not been decided upon after a proper evaluation of the production capacity of the mines leading to an irreversible situation in which a sizeable part of the capacity of the process plants had been rendered idle.

3.8 The Ministry had informed Audit (April 1977) that for meeting the imbalance between capacities of the mines and surface process plants, an adjacent Chandmari mines had been developed for the production of 1.5* lakh tonnes of ore per annum capacity. The expansion was likely to be completed by 1978-79.

Production of Mines

3.9 To achieve the target of production envisaged, the mine was required to produce 10,000 tonnes of ore per day i.e. 30 lakh tonnes per year on the basis of 300 working days a year. According to the project estimates (March, 1972), the phase achieveable capacity in respect of production of ore was 16.50, 25.50 and 30 lakh tonnes for 1974-75, 1975-76 and 1976-77 respectively. As mentioned earlier, the capacity of the mines has now been derated to 24 lakh tonnes per annum which was to be achieved by 1982-83. The actual production has been as shown below :

(Figures in lahh tonnes of ore)

Year	Budget Production		Actual Production	
	Khetri	Kolihan	Khetri	Kolihan
1972-73	2.50	1.13	0.95	0.62
1973-74 . . .	3.13	1.68	1.82	1.41
1974-75 . . .	4.00	2.00	3.50	2.63
1975-76 . . .	5.10	2.93	4.52	2.26
1976-77 . .	6.73	4.59	6.17	3.69
1977-78 . . .	7.80	4.40	5.65	3.86
1978-79 . . .	6.56	4.44	5.89	4.09
1979-80	7.62	3.90	5.34	3.54

3.10 The ore production from Khetri and Kolihan mines was much lower than the production capacity and was even lower than the budgetted production all these years. According to Audit, the management attributed (May, 1978), the shortfall in production *inter-alia* to the following reasons :—

(1) Some of the lenses were not as promising as estimated :

(2) delay in commissioning of production and service shafts ;

(3) problems and delays in getting spare parts of imported machinery ; and

(4) acute problems in long-hole drillings.

3.11 The Committee were informed that all these constraints had been overcome. Asked about the reasons for the production performance being still unsatisfactory, the management stated that in 1978-79 substantial production was lost on account of unsatisfactory industrial relations which culminated into a 52 days complete strike starting from 25th February,

*The committee were informed by the company that chandmari I & II mines will have a capacity of 3 lakh tonnes of ore per anumn.

1978 at Khetri Complex. Further, during the middle of 1978 there was acute shortage of high explosives in the country which in turn affected the mines performance. During 1979-80, the production was affected on account of chaotic power supply position.

3.12 Asked about the specific step taken to ensure availability of power at this complex, the Company stated in a note that as a short term measure the company was importing 2 Nos. 3.5 MW capacity diesel generating sets. These sets were expected to be received during 1981-82. One of the sets would be installed at Khetri and the other at the Kolihan mine.

3.13 The Committee were also informed by the Ministry in evidence that the production was affected due to inadequate mine development. The company was unable to do the required quantity of mine development with its own resources. They were therefore, trying to induct another public sector undertaking namely Mineral Exploration Corporation to augment resources for mine development. There was, however, opposition from the workers of H.C.L. through their unions to the induction of another agency. In spite of talks at the highest level they had not been able to sort it out.

3.14 To a question as to when on present indications, the de-rated capacity of ore (8000 tonnes per day) from Khetri and Kolihan mines was likely to be achieved, it was stated (in January, 1981) in a note by the Company that at present indication this capacity was expected to be achieved by 1984-85. This was, however, subject to the availability of adequate power supply at Khetri copper complex, for achieving the desired level of mine development activities.

Performance of Process Plants

3.15 The limited availability of ore coupled with design defects in concentrator plant and smelter and unsatisfactory power supply had affected the production of various process plants which were also working much below the rated capacity. The production performance of various process plants during the last five years was as shown below:

Concentrator Plant

3.16 As against rated capacity of 30 lakh tonnes per annum the actual production was as follows:

(in lakh tonnes)

Year	Ore Milled
1975-76	8.76
1976-77	11.25
1977-78	10.27
1978-79	11.58
1979-80	8.53

Smelter

3.17 As against designed capacity to treat 2.31 lakh tonnes of concentrates per annum, the actual production was as shown below :

Year	Dry Mill Concentrates treated (tonnes)	Production	
		Blister Copper	Anode
		Qty. (tonnes)	Qty. (Tonnes)
1975-76	91,521	9,231	8,680
1976-77	1,05,486	7,813	9,378
1977-78	85,913	8,499	12,231
1978-79	86,710	10,425	1,098
1979-80	92,056	11,677	71,107

Refinery

3.18 Design to produce 31,000 tonnes of copper per annum, the actual production was as follows :

Year	Anode treated (tonnes)	Production		Wire Bar produced	
		Cathode (Qty.) (tonnes)	Starting Scrap (Qty.)	Cathode treated (tonnes)	Wire Bar produced (tonnes)
1975-76	9,704	8,057	94	4,086	2,851
1976-77	14,346	11,220	136	16,180	11,142
1977-78	14,457	11,019	128	9,983	9,742
1978-79	13,967	10,400	196	7,303	6,798
1979-80	13,830	10,150	203	5,342	4,991

3.19 Owing to the low production of concentrates the project had to purchase concentrates from outsides both indigenous and imported. The total quantity of purchases was as follows :

Source of Purchase	Year	Quantity (tonnes)	Value (Rs. in lakhs)
Imports	1975-76	18826	379.68
	1976-77	13325	473.53
Indigenous	1977-78	1437	46.76
	1978-79	1000	32.85
Imports	1980-81 (upto Nov. 80)	15086	630.00

3.20 As a long term measure it has been proposed that the concentrate from Malanjkhand Project in M.P. would be transported for smelting at Khetri and with this arrangement not only the smelter's available capacity would be utilised but the smelter capacity would also need to be augmented to consume all the concentrates from Malanjkhand. The Malanjkhand project was scheduled to go into commercial production in July, 1982.

3.21 It was also noticed that to match the ultimate ore production capacities of 9000 tpd. on 300 days basis from Khetri, Kolihan and Chandmari mines, the Concentrator plant is required to have ore milling capacity of 8200 tonnes per day. It was reported to the Board in August 1978 that, according to the detailed review conducted by the plant management, the plant was expected to treat 6000 tonnes of ore per day and that, for improving performance beyond this level, major modifications would be involved. In order to determine the optimum level of the capacity, with some additional investment, if necessary, the company has requested an Indian firm (M/s. MacNally Bharat Engineering Limited) (MBE) to take up necessary study and make suitable recommendations. The Report of MBE was however, not accepted by the Management and in March 1979, the task was entrusted to Engineers India Ltd. for detailed technical review of the concentrator plant capacity and to determine the cost estimates to bring its capacity to match the ultimate mines capacity. The Report of EIL was yet to be received (October, 1980). In reply to a question the Committee were informed in evidence that the additional investment required to improve the capacity was expected to be in the region of Rs. 5 crores.

3.22 During examination of the Department of Mines the Committee enquired as to when the plant would be able to reach the production of 20,000 tonnes of copper per annum, the representative of the Department stated :

"It is difficult for me to answer this question precisely because I do not know whether we will be able to solve the problem of mine development because in this one more agency (MEC) has to be introduced. The labour problem has prevented us from introducing this agency. One assumption is that if this additional agency could be introduced, then in about two to three years, time it should be possible to bring up the mine capacity to the de-rated figure and then it will be possible to reach the figure of 20,000 tonnes".

3.23 The Committee desired to know the financial impications of the raising of ore much less than that envisaged and consequent under-utilisation at process plants. They were informed in a note by the Company that the ultimate production of wire bar at the revised capacities of 5000 tonnes per day of ore from Khetri mines and 300 tonnes per day from Kolihan mines would amount to approximately 20,000 tonnes. As against this the current operating level is around 3600 tonnes of ore per day from both Khetri and Kolihan mines. This will mean a production of 13,400 tonnes of wire bars. Ignoring the production from Chandmari and Dariba and processing of imported concentrates, the financial implication due to the shortfall in capacity resulting in a shortfall in the production of wire bars to the extent of 6600 tonnes, would be around Rs. 10 crores

per annum, based on current net realisable price or copper of Rs. 30,700 and variable cost of production of Rs. 15,000.

By-product Plant

Acid-cum-Fertilizer Plant

3.24 The production performance of the three plants for the period 1977-78 to 1979-80 is as below:

Unit : Tonnes

	Capacity	Budgeted Production	Actual Production
1. Sulphuric Acid			
1977-78	1,82,000	40,200	21,345
1978-79	1,82,000	29,700	18,918
1979-80	1,82,000	25,000	13,682
2. Phosphoric Acid			
1977-78	68,000	7,560	3,216
1978-79	68,000	6,680	5,017
1979-80	68,000	6,500	662
3. TSP Plant (Capacity 1,94,000 MT of TSP/annum)			
SSP			
1977-78		9,000	17,502
1978-79		28,300	37,239
1979-80		15,000	22,498
TSP			
1977-78		21,000	6,972
1978-79		18,550	15,012
1979-80		18,000	1,868

3.25 From the production data given above it is obvious that performance of the three plants remained at an unsatisfactory level during this period. It was explained (October, 1980) by the Company that the performance of Phosphoric acid and TSP plants would be primarily dependent upon the availability of sulphuric acid, which in turn depends upon the smelter capacity and efficiency.

3.26 Till late 1979 on account of varieties of problems the smelter could not operate at any reasonable capacity leading to generation of not only much less sulphur dioxide gases, but very often the percentage of SO_2 in the gases was low and had to be let off as the by product sulphuric acid plant cannot treat lean gases.

3.27 Unfortunately when the smelter operations showed improvements from December 1979 onwards, till date, and the sulphuric acid plant as also the phosphoric acid plant were in good operational condition efforts to step up production were completely nullified on account of power constraints as the first casualty of cuts in power supply in the scheme of priorities at Khetri is the Acid cum fertilizer plant because of operational necessities.

3.28 It was admitted in evidence by the Chairman, HCL that unless there was substantial improvement in the smelter plant, the acid-cum-fertilizer plants could not be satisfactorily utilised.

3.29 The phosphoric acid plant was commissioned in June, 1979 on dehydrate process as against hemihydrate process stipulated in the agreement with FACT who were engaged as turnkey contractors. The hemi-hydrate process would enable higher recovery of P_2O_5. It was explained by the Company (October, 1980) that for hemi-hyderate process the performance guarantee tests had to be carried out by FRDO with M/s. Prayon's backing as there was a back to back arrangement, that the representatives of M/s. Prayan were to come to India to carry out performance tests on the hemi-hydrate process. However, the power situation had made it extremely difficult to carry out guarantee performance tests. Considering the constraints in the final guarantee tests of the Prayon Process, it was considered prudent to operate the dehydrate part of the plant and produce TSP to the extent feasible till the power situation permitted the carrying out of the guarantees in the hemi-hydrate equipments.

3.30 The Committee were also informed that after carrying out the necessary guarantee tests with the Prayon Process, the company had planned to gradually develop a mix of imported and indigenous rock to optimise the production, productivity, recoveries and life of the plant.

3.31 The production of ore from Khetri and Kolihan mines was only about 9-10 lakh tonnes per annum during the last three years as against the capacity initially estimated as 30 lakhs tonnes and derated as 24 lakh tonnes. It has been estimated that the financial implication of the gross underutilisation of capacity was a loss of copper production to the extent of Rs. 10 crores per annum. The production of ore was lower than even the modest targets fixed by the company year after year. There has been also gross under-utilisation of capacity of process plants as well as the acid-cum-fertilizer plant. Owing to low production of concentrates, large quantities of concentrates valued at Rs. 14.83 crores had to be imported during the years 1975-76, 1976-77 and 1980-81 (upto November 1980). Still smelter and the refinery plants could be utilised only to the extent of about a third of their capacity. The Committee had earlier pointed out that the appraisal of final cost estimates of the project revealed that the project, besides being economically disappointing was financially unprofitable. It would be of interest to work out the economic rate of return on the basis of actual working results. The Committee would await the outcome of an exercise in this regard.

3.32. The Committee note that owing to persisting design defects in the concentrator plant, it operates below capacity and in order to improve it and to treat the ultimate ore production from Khetri, Kolihan and Chandmari mines inestment of about Rs. 5 crores would be required. The matter is stated to have been entrusted to Engineers India Ltd. for detailed technical review. Further, the Committee observe that the HCL is unable to tackle the mine develoment entirely on its own and needs the services of MEC. There seems to be opposition from the workers unions to the induction of the latter. The Committee feel that it should be possible to carry conviction with the workers keeping the matter in the perspective of large national interest. There is also a need to augment power supply to ensure uninterrupted production. The Committee desire that expeditious steps should be taken to ensure coordinated development of the mines and the capacity of the concentrator/smelter to avoid serious problems in future.

B. Problem of Reverts

3.33. According to Audit one of the main problems of the Smelter Plant was the generation of excess copper reverts. As on 31-3-78, total quantity of reverts generated and stockpiled was 37782 tonnes with metal content of 14437 tonnes (approx.) and the total book value was Rs. 2250.67 lakhs (valued at per with concentrates). In August, 1977 the following two alternatives were considered by the company for disposal of the reverts :

(i) installation or an Electric Furnace for the treatment of reverts; and

(ii) sending the reverts on toll basis to the treating smelters abroad and getting back the copper recovered as cathodes or wire bar after treatment.

3.34. After considering the relative advantages and disadvantages of the two modes of disposal, the Company decided (May 1978) to send the reverts on toll basis to the treating smelters abroad.

3.35. Accordingly, a contract was entered into in August, 1978 with a foreign firm (M/s. Mare Rich, Switzerland) for treatment of these reverts and return of wire bars.

3.36. According to estimates, the net realisation per tonne of metal content in the revert for toll smelting was Rs. 6,000 (approximately), thus resulting in a loss of Rs. 13 crores with reference to the book value of Rs. 21.49 crores.

3.37. The Committee pointed out that it was stated in the Annual Report for the year 1978-79 that weighing and sampling of reverts and slag stocks revealed a net discrepancy of 4399 tonnes of contained metal and that an enquiry committee had investigated the matter. As regards

this shortage, it was explained in a note furnished by the Ministry that for the period upto 31st March, 1979 neither the concentrates feed to the smelter nor the production of concentrates were weighed. The metal contained in the reverts was determined by the process of estimating inputs, outputs and assumed production losses and attributing the residury value to the reverts. In 1975-76 when there was appreciable increase in the stock of reverts the procedure of manual sampling, more or less similar to stock sampling for the ore was adopted for the reverts. The stocks were actually surveyed by marking section lines at 10 metres intervals and from each section line samples were collected at one metre intervals. A total of 24 samples were in all taken and analysed for copper contents. The individual samples varied within a wide range from about 8 per cent to about 57 per cent of copper. The average grade of the reverts was computed as 35.26 per cent copper for the portion of the reverts stocks covered. When the closing stock of concentrate as on 31st March, 1976 was surveyed a shortage of concentrates containing 4,185 Mt. copper was found. At about the same time the stock of reverts was also surveyed. This survey revealed that the total quantity in stock in the plant was of the order of 16,090 tonnes as against 4,753 tonnes as per books of accounts. The company surmised that the total feed to the smelter was more and that the copper in excess of anode production and assumed process losses had gone in the reverts. Thus, smelter consumption figures were taken as incorrect and concentrate production figures were considered as correct. On the basis of results of this survey, adjustments in the stock of reverts was made which had the effect of increasing the quantity by 11,336.9 tonnes (from 4753 to 16090) and the contained metal by 3678.9 tonnes.

3.38. Similar adjustments were made in the quantity and copper contents of reverts during 1976-77 and 1977-78.

3.39. To get an accurate estimate of copper content in the reverts before their disposal the services of an international firm viz. M/s. Alfred H. Knight of U. K. a firm of samplers and assayers, were obtained in June, 1978 for advising a suitable sampling scheme for reverts. According to the scheme prepared by this firm stock of reverts was crushed to minus 100 mm size and the crushed reverts sampled by a mechanical sampler in line with the conveyer belt. In the course of analysis of the revert samples, it was observed that the copper content in the reverts would be substantially lower than shown in the books of accounts. It was therefore, decided in October, 1978 to constitute a high power Committee (Wadhawan Committee) to go into various aspects of the situation and *inter-alia* to determine the actual copper which would be available in the reverts. The Committee submitted its main report in June 1979 and the Supplementary report in July, 1979. The Committe established a shortfall of 4399 Mt. of metal contained in the stock of reverts as on 31-3-79 *vis-a-vis* the figures given in the books of accounts. The main finding of the Committee was :

It is concluded from all available evidence that the total quantity of metal as feed to the smelter had been over-estimated on the

assumption that the concentrate production is correct. It follows that the actual concenrate production was less than that reported by an amount equivalent to the shortage observed. The Committee suggested that an indepth study be undertaken on the operations of the concentrator and mining to ascertain the reasons for the over estimation of production of concentrates. It was also suggested that for the proper metal accounting the weighment of concentrate at Khetri Copper Complex was essential and the problems encountered would persist in future if this was not undertaken. Asked about the action taken on the Report of Wadhawan Committee, it was stated by the Ministry in a note that the report of the Committee was considered by the Board of Directors of Hindustan Copper Ltd. at their meeting held on 31st July, 1979. The Board agreed with the finding of the Committee that the shortage of the metal content in the reverts compared to the quantity in the books was attributable to the over-estimation of production of concentrates where process parameters were not stabilised and proper weighment facilities for concentrates were not available. The Board also considered whether responsibility could be fixed on individual (s) for this discrepancy. Considering the long period during which the discrepancy had accumulated and the designing features of the plant, the Board felt that the discerpancy occurred on account of the system in vogue and it could not be possible to fix responsibility to any individual (s). The Board approved the proposal for the adjustment of 4,399 tonnes of metal in the reverts in the books of accounts of the Company for the year 1978-79. The value of adjustment was stated by the company to be Rs. 2.81 crores.

3.40. Asked about the reasons for unsatisfactory weighing mechanism which was stated to be the cause for over-estimation of concentrate production, the Committee were informed by the Ministry that the concentrator plant as originally designed did not have any weighing arrangements for the concentrates produced. A decision was taken in the year 1975 to instal a belt weigher, on the concentrate discharge conveyer (from the filtration unit) and order for the weigher was placed with Messrs. Dynacraft Machine Company Ltd., Bombay in December, 1975.

3.41. The belt weigher was installed but did not function satisfactorily due to system difficulties, and the nature of the concentrates (which is wet with moisture varying from 8 per cent to 15 per cent). Modifications were carried out to improve the working of weighing arrangement and till date it had not been possible to obtain dependable service from the weigher. M/s. Dynacraft were still on the assignment.

3.42. The Committee enquired as to when the fact that the estimates of copper content in the reverts were not correct first came to the notice of the Ministry and what was the action taken by them. It was stated in a note that it came to the notice of the Ministry in September, 1978 when in reply to the Ministry's letter pointing out the adoption of different unit rates of valuation at different times for the reverts, H. C. L. informed that "new developments were occurring in as much as crushing and sampling done so far had shown metal content in reverts to be about 23 per cent only as against 35 to 37 per cent estimates earlier.

3.43. The report of the Wadhawan Committee along with the Board minutes was received in the department of Mines in August, 1979. The Deptt. informed Chairman-cum-Managing Director, Hindustan Copper Ltd. in early September, 1979 that the matter was considered in the Ministry and it was felt that keeping in view that the discrepancy was of a very high order and it appeared to have arisen due to certain lapses/shortcomings in the practices at Khetri, the matter should be gone into in depth by a Committee of Directors of HCL Board assisted by an outside expert so as to fix the responsibility for the lapses, if any, on individual (s). Accordingly, a Committee of 3 Directors was appointed which finalised its report in June, 1980 and which was considered and approved by the Board of Directors at their meeting held on 29th July, 1980. The main conclusions of the Committee were as follows :—

(i) All evidence leads to the conclusion that the discrepancy leading to shortage of 4,399 tonnes of metal in the reverts occurred because of original over-estimation of the concentrates production.

(ii) Due to design defects and operational problems of the concentrator, the plant operations could not stabilise. In the circumstances, particularly in the absence of proper weighment facilities, an error of judgement of the very complex metal accounting system could have easily crept in and accumulated over a period of time. Thus, no responsibility can be fixed on any individual (s) for the discrepancy in the metal. This discrepancy was as a result of the system in vogue.

(iii) The Committee noted that operations of the smelter and concentrator have shown appreciable improvement and effective steps have also been taken for the proper weighment of concentrates. They also noted that the metal accounting system both at the concentrator and smelter has been streamlined and is constantly under review by a team of technical officers.

(iv) The Committee recommended that the metal accounting data should be considered every quarter by the top management in the project for taking any corrective action which may be necessary. This would enable the project to reconcile the actual metal content in the intermediate products and the Books of Accounts. The findings of the Committee had been accepted by the Department of Mines.

3.44. During the course of examination of the Department of Mines, the Committee enquired whether the enquiry Committee went into the question of the possibility of leakage or pilferage of metal. The Special Secretary stated 'that was not the term of reference'.

3.45. The Committee pointed out that there had been imports of concentrates also for the treatment at Khetri Smelter and enquired whether, there was any possibility at all that in the purchases that were made from outside the country, the metal was less than what was stated. I was explained in a note furnished by the Ministry that for Khetri copper complex the quantity of concentrates imported during 1975-76 and 1976-77 was 32151 tonnes at Rs. 853.21 lakhs from Peru and Phillipines. Weighment, sampling and assay was carried out for determining the copper content, etc. as per procedure provided in the agreement.

Shipment of reverts

3.46. The Committe wanted to know the basis on which the foreign firm M/s. Marc Rich, Switzerland were selected for treatment of the reverts and return of wire bars. In a note furnished by the Ministry it was stated that quotations were invited in June, 1978 and in response 9 quotations were received. These were evaluated and the Company decided to conclude a contract with M/s. Marc Rich Switzerland whose terms were most favourable to the Company. The Committee enquired in evidence whether the Swiss firm had done smelting themselves. The Special Secretary of the Department of Mines stated 'they were not doing it themselves'. They were giving it to some other concerns for smelting. Asked whether it was not possible to deal directly with the Smelters rather than through Swiss intermediatry, he stated "Furukawa and Co. quoted for outright purchase, not for the return of metal. From the list (of quotations received) I find that practically everybody else was metal trader and not a smelter operators.

3.47. Asked how was it ensured that the copper content in the reverts sent abroad for smelting was correct, the Committee were informed that before despatching the crushed reverts to Kandla Port for shipment a total of 112 lots were formed. Out of these the assay for the 80 lots was carried out for copper by HCL and for gold and silver by M/s. Alfred. H. Knight, who also carried out the check analysis for copper for the remaining 32 lots, the assay for copper alone was carried out by HCL. As per the terms of the contract, M/s. Alfred. H. Knight, were engaged as representatives of HCL to witness the operations for determining the weight and sampling of reverts delivered at the receiving smelters. The samples were divided in three parts, one part was sent to HCL, the second to M/s. Marc Rich and the third retained for reference to umpire. The contract had named M/s. Daniel C. Griffiths, Ltd. U.K. and Alfred H. Knight International Ltd. U.K. as the two umpires of whom one was to be nominated. The sample were anaylsed at Khetri and assays were exchanged with those of Marc Rich and wherever assay results were found to be beyond spilting limit the umpire assays were made.

3.48. From the copper and gold assay results of H.C.L. Marc Rich, Umpire and the final settlement arrived at, it was noticed that Marc Rich assays were in all cases lower than the of H.C.L. and except in a few cases, the percentage of copper and gold content in the reverts which was finally settled was even lower than Umpire assay.

3.49 A total quantity of 41,907 tonnes of reverts was despatched to Kandla Port during 1978-80. Out of this a quantity of 40731 tonnes was transported to the foreign firm in four shipments. The final picture emerging from the four shipments in regard to recovery of metal was as follows :

Parcel No.	Name of the reverts carrying vessel	Final weight of reverts (Dry MT)	Final-settlement copper assay %	Returnable copper (after unit deduction) (M.T.)	Copper already received (M.T.)	Settlement Gold
1.	Korean Diamond	8,392	27.027	2,184	2,152	3.378 gms/MT
2.	Solomon Carrier	11,871	24.624	2,804	2,802	2.974 ,,
3.	Han Cheang .	10,411	24.540	2,451	2,501	3.163 ,,
	Total: . . .	30,674	25.25	7,439	7,455	3,1487 gms/MT (overall average)
4.	Kota Jaya . .	10,057	*	*	1,997	* The final settlement with regard to copper assay is still due

3.50 The Committee enquired as to how did the actual recoveries compared with the assessment made. They were informed that H.C.L. had no information in regard to the actual method of smelting the reverts and the actual recoveries effected. The agreement concluded by H.C.L. with the Swiss firm *inter-alia* provided for supply of copper wire bars based on the assay results after allowing for a deduction of 'one unit' as is customarily allowed to the buyer towards process loss. The agreement did not provide for supply of copper wire bars based on actual recoveries.

Valuation of Reverts

3.51. From an analysis of the reasons for losses furnished by the Ministry, it was, noticed that an amount of Rs. 13.68 crores was shown as loss in the accounts for 1977-78 on account of re-valuation of reverts. Similary a profit of Rs. 5.64 crores was shown in account for 1978-79 due on account of accretion in value of revert stock due to valuation. As regards the reasons for revaluation of reverts it was stated in a note that till 1976-77, reverts were treated as a work-in-progress for accounting purposes and the value attributed to it in the accounts was the same as the cost of production/realisable value of concentrates appropriately adjusted for metal contained in the reverts *vis-a-vis* concentrates. The value assigned per tonne of metal content of reverts were Rs. 13,366, Rs. 14,470 and Rs. 16,6000 on 31st March, 1975, 1976 and 1977 respectively. Subsequently as it had been decided that the reverts should be sent abroad for smelting, the Board approved a proposal that the reverts stock should be valued on the basis of the return which the company was likely to get on the disposal of the same. The reverts were revalued at Rs. 6,110 per

tonne on the basis of the quotations available, the customs duty structure and the international/indigenous selling prices at the time accounts were finalised and a loss of about Rs. 13 crores on account of revaluation adjusted in the accounts for 1977-78. The valuation of reverts in stock as on 31-3-1979 and 31-3-1980 was based on the terms of toll smelting contract which had been entered into in August, 1978, the selling price of copper wire bars, the customs duty structure and the duty concessions which had been accorded for the returned wire bars.

3.52. The Committee enquired whether in view of heavy losses shown in the books of accounts on account of reverts the Ministry did not consider the question of reverts serious enough for examination by an independent body. The Special Secretary Department of Mines stated in evidence "I think from the discussion here and seeing what the earlier two committees looked into, we will certainly like to consider further examination of these matters. We would take a view on that and would let the Committee know."

3.52. Based on the information furnished by the Department and their evidence the Committee called for further information *inter alia* on the following points.

(i) According to the Report of Directors the discrepancy leading to shortage of 4399 tonnes of copper metal in the reverts occurred because of original over-estimation of concentrates production. On what basis the Committee came to this conclusion, when earlier the concentrates production figures were considered correct ? What is the average percentage of metal content in the concentrates ? Has it ever been verified ? How does it compare with the percentage assumed earlier ?

(ii) The Wadhawan Committee came to the conclusion that the tailings losses were higher than what was assessed earlier. What were the tailing losses assessed earlier and how did the Committee come to the conclusion that the actual tailing losses were higher than those assessed earlier ? What was the additional loss of copper assessed on account of higher tailing losses ?

(iii) (a) Wadhawan Committee concluded that sampling assaying and reporting system as standardised by Khetri have been adequate but the sampling procedure had not been strictly followed. What were the reasons for it ? Why no responsibility has been fixed for this lapse ?

(b) Can the Ministry say categorically that there was no unaccountable loss of copper at any stage of processing ? Can it be also

said that there was no short receipt of copper after toll smelting of the reverts ?

(iv) Were any tenders invited for toll smelting of reverts from known smelters ? If not, why ?

Instead of furnishing any specific reply to the above points the Department has stated that this matter is proposed to be referred to an expert Committee to be constituted for examination and giving their findings.

3.54 A serious problem that arose in the processing of ore for copper production has been the incredibly excessive generation of reverts at the stage of smelting on account of the Smelter Plant deficiencies, which were later rectified. As a result 41,907 tonnes of reverts had to be sent out of the country for toll smelting. In this connection, certain facts that cause grave concern have emerged on examination by the Committee.

3.55 A net unaccounted shortage of copper content to the extent of 4399 tonnes as at the end of March 1979 was noticed by the company although it was assumed that the accumulated reverts included this quantity. Neither the production of concentrates nor the feed to the smelter has been weighed. No proper metal accounting system has been followed to obviate unaccountable loss of copper at any stage of processing. Whenever shortage of concentrates was found it was assumed that it had gone into the reverts and adjustments were made in the books if accounts. Curiously enough, no attempt was made to have the stock of reverts weighed and analyse the copper content thereof to see whether the reverts actually contained the assumed quantity of copper. Subsequently when the reverts were crushed, sampled and analysed in 1978 before their shipment for toll smelting abroad and shortage of copper content to the extent of 4399 tonnes was found, it was concluded by a committee appointed to investigate the matter (Wadhawan Committee) that the actual concentrate production was less than that reported by an amount equivalent to the shortage observed. This conclusion does not appear quite convincing. Neither the Wadhawan Committee nor the Committee of Board of Directors which subsequently went into the matter, examined the possibility of leakage or pilferage of the metal at any stage of production. There was import as well as indigenous procurement of concentrates which were also charged to the smelter at Khetri and there was no way of knowing the actual recovery of copper from these concentrates and whether it was lower than that assumed on the basis of which the concentrates were paid for.

3.56 The Swiss firm, which was selected for toll smelting the reverts did not themselves undertake the smelting. It is doubtful whether any tenders were at all invited by the HCL from any other known smelters. It was also noticed that in the final settlement arrived at with the firm the percentage of copper and gold content in the reverts as agreed to was in all cases lower than the result of analysis of samples by HCL. Neither did the agreement provide for the return of copper based on actual recovery, nor did the company receive any information in regard to copper actually recovered. There was thus no means of assessing the correctness of copper and gold contents in the reverts, as agreed to.

3.57 The Committee regret that inspite of the fact that a huge loss was involved and there were many pertinent questions which remained unanswered, the Ministry did not consider it necessary to have the matter examined thoroughly by an independent body but chose at one stage to refer the matter back to the Board for an indepth study by a Committee of the Board. It was only at the instance of the Committee that the Ministry agreed to institute further enquiry. The Committee desire that the whole matter be examined expeditiously by an independent body associating the C.B.I. and responsibility fixed.

C. Norms of Recovery

3.58 No norms of recovery at various stages in the process plants *i.e.* from production of concentrate to production of wire bars had been fixed by the plant suppliers and designers. These were fixed by the Company only in November, 1977 after taking into consideration the general recovery efficiencies obtained elsewhere, the characteristics of the Khetri/Kolihan ores, the pattern of results of the tests carried out on these ores in the past, the performance of the plants at Khetri.

3.59 Norms of recovery fixed for various process plants were as indicated below :

Ore to Concentrate	92.50%
Concentrate to Anode	94.50%
Anode to Cathode	99.00%
Cathode to Wirebar	98.50%

3.60 The actual recoveries during 1976-77 to 1979-80 have been as follows :—

	1976-77	1977-78	1978-79	1979-80
Ore to Concentrate	90.32	88.35	88.60	90.62
Concentrates to Anode	84.25	91.78	91.51	92.60
Anode to Cathode	99.69	99.52	99.57	99.56
Cathode to Wirebars	98.04	98.52	98.72	98.82

3.61 As regards the reasons for lower recoveries than the norms fixed, it was stated that the operations of the plants at Khetri had largely not stabilised fully as was evident from capacity utilisation of the various plants.

In addition, for a long time the large accumulation of reverts had taken place which prevented accurate compilation of metal recoveries from stage to stage. In fact, the position was so grave in this regard that as utmost priority the task of toll smelting of reverts had to be taken in hand to clear up the accumulations and start with a position where reasonably accurate assessments of the recoveries could be possible.

3.62 The financial implications on account of lower recoveries than the norms fixed were stated to be broadly as follows :—

	(Rs. in lakhs)
1976-77	90
1977-78	58
1978-79	64
1979-80	21

3.63 It was noticed in this connection that according to the Report of the Wadhawan Committee, assumed process losses in the smelter appeared to be very liberal when a comparison is made to the other operating Flash Smelters elsewhere (*e.g.* 1.6 per cent in Harjavlta Smelter), and with the existing technology, the recovery at the smelter of 95 per cent to 97 per cent of the total feed could be progressively achieved. The Wadhawan Committee suggested that a Standing Group consisting of senior technical and operating personnel of KCC, HCL should be constituted to quantify the present stage wise losses to fix up realistic stage wise norms and to review periodically process losses and suggest revising of norms. Any adjustment if required in any quantities of inputs of finished products be done every quarter after appropriate survey and with the concurrence of the Standing Study Group.

3.64 Asked about the action taken in this regard, it was stated by the Company that a Committee constituted in November, 1980 was reviewing *inter alia* the norms of recovery fixed in 1977.

3.65 The Committee have been informed that no norms of recovery of metal at various stages of processing have been fixed by the suppliers of plants. The Committee would like to know whether it is the normal practice. Although the company itself had fixed in November 1977 some norms of recovery, the actual recoveries during 1976-77 to 1979-80 had been significantly lower than the norms and the loss suffered on this account of lower recovery is stated to be of the order of Rs. 233 lakhs. The position becomes all the more serious when it is considered that according to the report of the Wadhawan Committee (June 1978) the assumed process losses in the Khetri smelter appeared to be very liberal on a comparison with operations of flash smelters elsewhere. Although the Wadhawan Committee suggested that a Standing Study Group consisting of senior technical and operating personnel of K.C.C.

should be constituted to quantify the present stagewise losses, to fix up realistic norms and to review periodically the process losses and suggest revision of norms, it was only in November 1980 that a Committee had been constituted for the purpose. The Committee desire that stagewise realistic norms for process losses should be fixed soon and losses reviewed periodically with reference to the norms so fixed to ensure that there are no avoidable process losses.

D. *Cost of Production*

3.66 The following statement shows the product-wise selling price, cost of production and profit/loss in respect of production of copper and fertilizers during the last three years :

Product	Period	Selling price Rs/MT	Cost of production Rs/MT	Profit/Loss Rs.
Copper	1977-78	19920	32413	(12493)
	1978-79	22160	32188	(10028)
	1979-80	30430	34993	(4563)
Sulphuric Acid . .	1977-78	490	797	(307)
	1978-79	No sale	800	(Nil)
	1979-80	460	1355	(895)
TSP (Granulated) . . .	1977-78	1920	3426	(1506)
	1978-79	1955	2854	(899)
	1979-80	1950	N.A.	—
SSP (Granulated) . .	1977-78	665	1343	(673)
	1978-79	690	1162	(472)
	1979-80	775	1136	(361)

3.67 The cost of production has been much higher than the selling price. The cost of production would have been still more but for the fact that there has been increase in the average grade of the ore used which has gone up from 0.954 per cent in 1977-78 to 1.584 per cent in 1979-80. The cost of production has also been much higher than the average landed cost which was in the region of Rs. 15000 to Rs. 19000 per tonne.

3.68 On account of the high cost of indigenous production and decrease in the international price of copper in the international market Government had to take recource to certain fiscal measures to vary the rates of customs/ excise duties on copper. The Government had in January, 1978 reduce the excise Duty on Copper from Rs. 5600 to Rs. 3000 per tonne and increased the customs duty from 45 per cent to 70 percent *ad valorem* as measure

of assistance to H.C.L. Asked as to how long this protection would be needed, the Secretary, Department of Mines stated that "in the Indian System with reference to international pricing system, there is certain level of protection which we find the indigenous industry requires and we have given it an extra protection. In the later part of 1982, we will have to make a complete review and on that basis we will try and see how much extra protection we can give so that the management of the company is put on its mettle to show performance and will become operationally better."

3.69 The Ministry has also informed that the selling price of TSP for all producers are fixed by the Government on the advice of the Fertilizer Industry Coordination Committee. Under the Scheme of pricing, retention prices are fixed for each producer and the difference between the two prices (retention and sale prices) is paid as a subsidy. The price of SSP of all producers is also fixed by the FAI with a fixed subsidy thereon.

3.70 The company had also been paid subsidy on the sale of fertilizer amounting to Rs. 57.59 lakhs for 1977-78, Rs. 89.68 lakhs in 1978-79 and Rs. 91.20 lakhs for 1979-80.

3.71 In this connection the Commitee also noticed that the Bureau of Industrial costs and prices were requested by the Department of Mines to take up a study on the fair selling price payable to copper metal produced by H.C.L. in 1978. Asked whether the Bureau went into the cost efficiency of the project while fixing the selling price, the Special Secretary stated in evidence that as usual the Bureau take the actual capital costs and the input costs. Then they assumed certain capacity utilisation and rate of return for capital employed. On that basis, the price was fixed. But the cost efficiency conveyed something beyond that like efficiency of labour capital employed, etc. and the Bureau did not do that.

3.72 The Committee pointed out that in the U.K. any major increase in the prices of important items were referred to the National Board for Prices and Incomes to see whether such increase could be reduced or avoided by increased efficiency, etc. The Board's enquiries covered the industry's machinery for keeping down costs including the appropriate forecasting and decision making techniques. Asked whether it was not necessary to have any such system for examining cost efficiency in India, the Special Secretary stated :

> "Yes, in any system, cost efficiency is important. Cost efficiency has to be related to the realistic environment and not necessarily to give them all the alibi for their own inefficiency. But there are certain external factors which the management itself cannot control. Granted those external factors, the efficiency system will have to be drawn up. This has to be looked at across the board for several industries. If there is a way of doing it, certainly I agree it would be useful."

3.73 It was also noticed that the company did not have until 1980-81, the system of working out cost of production based on budgets and to compare it with the actuals to have a meaningful cost control.

Financial Results

3.74 The Project started preparing profit and loss account since 1972-73. The working result of the Project from 1972-73 to 1979-80 showed a cumulative loss of Rs. 74.43 crores as indicated below :

Year	Loss including interest and depreciation
	(Rs. in lakhs)
1972-73	89.53
1973-74	121.49
1974-75	794.36
1975-76	813.31
1976-77	788.29
1977-78	3726.92
1978-79	815.00
1979-80	37.00
	7185.90

3.75 An analysis of KCC's losses in comparison with the loss anticipated at the maximum possible capacity utilisation based on mines capacity and prices assumed in the RCCE profitability calculations is given below :

(Figures in Crores of Rupees)

	1979-80	1978-79	1977-78
1. Actual profit/loss	(—)0.37	(—)8.15	(—)37.26
2. Anticipated profitability at the maximum possible capacity utilisation based on mine capacity and prices assumed in the RCCE.	(—)14.02	(—)12.18	(—)5.32
3. Difference (1—2)	13.65	4.03	(—)31.94
4. Analysis of the difference:			
4.1 Lower capacity utilisation-copper circuit.	(—)4.32	(—)3.12	(—)4.30
4.2 Lower capacity utilisation-Fertilisers circuit.	(—)4.84	(—)4.02	(—)6.11
4.3 Higher selling price	9.72	3.08	0.85
4.4 Higher metal content in ore	3.26	1.60	—
4.5 Reverts transactions including valuation of its by products	7.75	7.63	(—)14.91
4.6 Others	2.08	(—)1.14	(—)7.47

3.76 Asked as to when the unit was expected to turn the corner and earn profit it was stated in written reply by the company that on the basis of the current level of prices and costs and duty structure the unit will make a profit of Rs. 6.25 crores at a capacity utilisation of 90% of the smelter. A better capacity utilisation of the smelter and other plants would be possible when the Malanjkhand Copper Project goes on stream and concentrates from that project is made available for processing in K.C.C.

3.77 The cost of production of copper at Khetri has gone up from Rs. 32,413 in 1977-78 to Rs. 34,993 per tonne in 1979-80 and is much higher than the international price of copper. The cost of production would have been higher but for the fact that there has been continuous increase in the average grade of ore lately and the government had reduced the excise duty on copper as a measure of assistance to HCL. The Cost of production is also higher than the selling price inspite of the fact that the selling price was raised from Rs. 19,920 per tonne in 1977-78 to Rs. 30,430 in 1979-80. The Committee understand that in U.K., major price increases in nationalised industries are referred to the National Board for prices and incomes. This allows the National Board to see whether such increases can be reduced or avoided by increased efficiency or changes of practices. The Boards enquiries cover the industry's machinery for keeping down costs including the appropriate forecasting and decision-making techniques. Admittedly, in any system, cost efficiency is important and it would be useful to have such an examination in our country too. The Committee trust that government would consider taking steps to have an independent examination of cost efficiency of the pubic undertaking before agreeing to any major increase in the price of their products.

3.78 After examining the project it does not come as a surprise to the Committee that the Khetri project had suffered a cumulative loss of Rs. 71.86 crores from 1972-73 to 1979-80. But for substantial increase in the selling price of copper and the protection afforded by lower excise duty the losses would have been still higher. Obviously the predominant reason for the losses has been the lower capacity utilisation of both copper circuit and the fertilizer plant. The estimated loss on this account is Rs. 10.41 crores, Rs. 7.14 crores and Rs. 9.16 crores in 1977-78, 1978-79 and 1979-80 respectively. This estimate does not take into account the price increase but is presumably based on 1976 price. On the basis of current level of prices and costs, it is expected that the unit could make a profit of Rs. 6.25 crores at a capacity utilisation of 90 per sent of the smelter. The Committee stress that all out efforts should be made to achieve the rated capacity so that the unit instead being a drain on the national exchequer gives a fair return on heavy capital investment.

E. *Demand and Supply of Copper*

3.79 The copper industry stood fully nationalised with the take-over of Indian Copper Complex by the Hindustan Copper Ltd. in 1972. The projected demand of copper at the end of the Fifth Plan was of the order of 1.04 lakh tonnes. The target for indigenous production for the terminal year of the Fifth Plan, namely, 1978-79, was 37,000 tonnes against a capacity of 57,000 tonnes. However, the achievement was only to the extent of

21,888 tonnes of production against capacity of 47,500 tonnes created. Thus, there was a huge gap between the demand and the indigenous supply.

3.80 Shortfall in supply had to be met by imports to the extent possible. The import of copper during 1974-75 to 1979-80 had been as follows :—

Year	Quantity (tonnes)	Value (Rs. lakhs)
1974-75	41766	7302
1975-76	14810	2184
1976-77	31699	4616
1977-78	36685	5121
1978-79	75473	10378

3.81 According to Audit, of the total import of copper during 1973-74 to 1977-78, import of 60,265 tonnes valued at Rs. 79.66 crores (approx.) was necessitated due to the inability of the Khetri project to produce copper according to the plans initially contemplated. As regards the reasons for imports in 1978-79 having gone up from 36685 tonnes in 1977-78 to 75473 in 1978-79, the SPI Secretary, Department of Mines clarified in evidence that the imports during 1978-79 were abnormally high. On account of change in the copper control order under which use of copper was allowed for housing wires resulting in increased demand and speculation in the international market that copper prices were going to rise very high. The fact, however, remains that there is a substantial gap between the demand and the indigenous supply.

3.82 Asked how do the Government propose to meet the situation, the Special Secretary stated that even after various geological examinations including Malanikhand area, Singhbhum belt etc., reserves of copper were not so encouraging as to enable them to plan on the basis of 100% domestic production. However realising the strategic value of copper, they were expecting that by 1984-85 roughly about 50% of the copper requirement should be met from domestic production. Beyond 1985, unless they struck more deposits and organise further production, the indigenous production might even come down to 40% or so by the end of the decade.

3.83 The copper industry stood fully nationalised with the take-over of the Indian Copper Complex (Bihar by the HCL in 1972. The projected demand of copper by the end of March 1979 was of the order of 1.04 lakh tonnes. The plan target for indigenous production for the year 1978-79 was 37,000 tonnes against creation of capacity of 57,000 tonnes. However, regretable the achievement was only 21,888 tonnes of production against capacity of 47,500 tonnes created. Thus, there is a huge gap between the demand and the indigenous availability and the country continues to rely on imports for meeting a major part of the demand. In this context the failure of the Khetri Copper complex becomes glaring. Though the Committee see no possibility of total avoidance of imports in the foreseecable future they desire that steps should be taken to see that at least 50

per cent of the requirement is met by indigenous production by the end of the Sixth Plan in view of the strategic importance of the metal. The protection afforded to the indigenous industry by way of lower excise duty on production and higher customs duty on imports should also be progressively relaxed inducing the industry to improve its cost efficiency.

F. *Flight of Engineers*

3.84 One of the serious problems faced by Hindustan Copper Ltd. is the large scale exodus of their engineers to other copper producing countries like Zambia after getting good experience. From Khetri Copper Complex alone 75 executives left the company in 1979-80 which was 18.4 per cent turn over rate during the year. Out of 75 executives 50 persons (66 per cent) went abroad.

3.85 As regards the steps taken to stop this drain of talent, the Committee have been informed by the company that with the early indications of a large number of executives planning to leave Hindustan Copper Ltd. for taking up jobs abroad, the matter was taken up with the Government in August, 1979, and through the Ministry of Steel & Mines and the External Affairs Ministry, Zambian authorities were persuaded to stop the unplanned recruitment of trained executives of Hindustan Copper Ltd. At the same time, to assist the Zambian authorities to the extent possible, it was offered to them that they may refer their requirements to the company so that to the extent possible engineers could be released for short term periods. The company had also offered training facilities for fresh engineers which they might recruit.

3.86 Measures have also been taken within the company. A scheme had been introduced in the company whereby officers who go abroad on the basis of registration with the Department of Personnel & Administrative Reforms are now eligible to retain lein on their posts in the company. The Recruitment and Promotional Rules had been reviewed and a cadre-scheme introduced. This had helped in classification of cadres on a planned and systematic basis in different disciplines within the organisation providing for planned and systematic career growth opportunities for the officers. As a general policy, recruitment of engineers from the open market is confined at the lowest executive level and the posts in the higher levels are filled by promotion. The terms and service conditions of executives have been recently revised to bring the same broadly at par with other large public sector organisations. Improvements have been made in the perquisites admissible to officers including liberalisation of leave travel concession benefits, grant of advance for purchase of conveyance etc. A scheme for grant of house building advance has also been introduced in the company.

3.87 With the steps taken through the goods offices of the Zambian authorities and the steps taken within the company, it is expected that the rate of separation of trained engineers from Hindustan Copper Limited, both for taking up jobs abroad and within the country would be contained within the normal rate.

3.88 In the initial steps the HCL suffered from lack of expertise. The engineering personnel after gaining experience by trial and error at the cost of the public exchequer are now steadily leaving the company for their good. In one year, 1979-80, 75 executives are reported to have left and 50 of them went aboard, notably to Zambia to take up assignments in her copper industry. The Committee view this phenomenon of brain-drain with considerable concern and dismay. The Committee have, however, been assured that the exodus in future will be contained within limits consequent on certain steps taken. There should be a uniform policy in this regard to be followed by all the pubilc enterprises. The Committee suggest that the problem in all its aspects should be gone into by the BPE and suitable guidelines issued. The guidelines should cover interalia the wage policy for highly skilled personnel, their service conditions and motivation, terms of deputation training within and outside the country etc. The talent developed within the country at considerable cost to the economy should largely become available for the country's economic development.

G. C&AG Reports

3.89 The Ministry had stated in a note that whereas C&AG's comprehensive reports on individual undertakings are discussed by the Board, Reports which contain observation(s) on a number of undertakings as the Commercial Reports of 1978 and 1979 and observations of general interest as in the 1975, 1976 and 1977 reports (these mainly relate to Hindustan Copper Limited) have not yet been placed before the Board of Directors of the undertakings under the control of the Department of Mines. The companies have been addressed to consider the advisability of placing the relevant observations of the C&AG before their respective oards for giving direction to the management. The Special Secretary of the Department of Mines conceded that the procedure that had been followed hitherto required a lot of tightening up and improvement. He also agreed that the Ministry should set up some machinery in the Ministry where annual Reports of the Companies and the observations of the C&AG on these reports were properly examined and necessary directives given in the light of that to the company concerned.

3.90 In addition to incorporating the results of comprehensive appraisal of selected enterprises by the Audit Board, the Reports of the Comptroller & Auditor General of India brings out several topics of interest including systems deficiencies relating to Central public enterprises. These Reports are presented to Parliament year after year. The Committee are distressed to learn from the Department of Mines that all the Reports are not placed before the Boards of the concerned enterprises for giving directions to the management for improvement in their working. This should be done in future without fail.

3.91 Incidentally, the Committee's attention has been drawn by the C & AG to a number of other points relating to HCL raised in his Reports, which have not been commented upon by the Committee. such points have, however, been taken up with the Ministry/undertaking. The Committee desire that the issues involved should be sorted out in consultation with the C & AG and the follow-up action monitored by the Board/ Administrative Department

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		reduction of benefit. A post-facto appraisal of the project by the Planning Commission revealed ironically that the financial rate of return would be negligible even with the vast increase in copper prices by 1979. Although a cut off economic rate of return of 12 per cent is reported to be adopted by the Planning Commission for clearance of projects, the Internal Rate of Return (IRR) of the Khetri complex was finally found to be no more than 4.5 per cent on an economic analysis. At 12 per cent discount rate the net present value (NPV) of the project turned out to be negative, i.e., minus Rs. 132 crores. Such a project would not have been ordinarily taken up for implementation. It is indeed distressing that government was presented with a *fait accompli* and there was no scope left to the various organisations scrutinising the estimates to make any worthwhile contribution to effect economy. The Special Secretary's specious plea that the project could still be justified on the basis that copper is a strategic metal is at best an excuse for a totally uneconomic investment.
3	1.24	The basic bungling that materially altred the economics of the project was the gross ovrestimation of the ore deposits at Khetri. The Committee were started to hear that the deposits were reassessed and scaled down to 40 million tonnes of 0.91 per cent average grade of copper from the level of 106 million tonnes of 1 per cent grade. Curiously there were no detailed geological studies before the project formulation. It was assumed that in between two holes drilled at 100 metres interval there was a continuus ore body. This was, however, proved entirely wrong when mine development started. Surely, a more amateurish handling of the basic assessment of a project potential cannot be expected from any quarter.
4	1.25	Another distressing feature of this project planning episode is that the production capacity of the mines which was earlier estimated at 10,000 tonnes per day is now expected to go upto only 8,000 tonnes per day. This has resulted in serious imbalance in the capacity of the mines and that of the process plants. The process plants have been designed to produce 31,000 tonnes of copper per

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		annum. But owing to reduced production capacity of mines and lower grade of ore, the annual copper production capacity is now estimated to be only about 20,000 tonnes. It came to the notice of the Committee in this connection that a working group on non-ferrous metals constituted by the Cabinet Secretariat in December 1967 recommended in one of their reports that the capacity of Khetri smelter be reduced to 20,000 tonnes per annum. It is amazing that this was not brought to the notice of the Cabinet Sub-Committee while seeking their approval to the revised cost estimates of the project in July 1969 for the production of 31,000 tonnes of copper per annum. Reasons for this information gap need investigation.
5	1.26	The foregoing observations of the Committee would show clearly that the planning of Khetri Copper Complex typifies the way that projects should not be planned. The Committee have dealt with the equally unsatisfactory implementation and performance of the project in the suceeding sections of the Report.
6	2.28	The Khetri complex comprises mins at Khetri and Kolihan and concentrator, smelter, refinery and acid-cum-fertilizer plants at Khetri. The project as a whole was expected to be operational by May 1972. The mines development and commissioning of the plants were, however, badly-delayed by 2-3 years. The delay meant huge escalation of cost. There were conceptual shortcomings and execution flaws; besides the project authorities were let down by the consultants and contractors engaged for the project implementation. As pointed out earlier in this Report, adhocism ruled the project planning with its inevitable impact on the implementation. Modern techniques like PERT were not employed for project monitoring and control to obviate time slippage. What irks the Committee most is that the organisational structure of this mining and metallurgical complex initially at the crucial stage of its implementation was admittedly unsuitable. Despite the huge capital outlay a Director (Finance) was

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		appointed only in August 1973. Surely, it was the responsibility of the Department of the Government that controlled the HCL to see the such deficiencies were not there.
7	2.29	A number of foreign consultants were engaged for various purposes and the experience with them has not been a happy one. No one seems to have been engaged to coordinate the entire project implementation and take the responsibility for the totality of results. This was necessary as the country lacked the necessary expertise at the time when the project was taken up. However, the Committee find that an American concern, Western Knapp Engineering Ltd., were appointed as engineering experts and advisers to commission the integrated plant at Khetri and achieve the rated output. The Committee would like to have an assessment by the Government of the role played by this concern and the extent of their responsibility in view of various deficiencies in the implementation and performance of the project.
8	2.30	The French consultants engaged on a fee of Rs. 511.72 lakhs for designing and supplying equipments worth Rs. 450 lakhs for the majority of the process plants did not have the requisite knowledge and experience of the designing. It is intriguing how they were selected. Easy availability of credit cannot be the main consideration. Strangely, no competitive tenders were called even restricting it to the French territory. Evidently there was no care exercised in selection of the consultants. They subcontracted the job to other foreign concerns. Various defects were noticed in the concentrator and smelter which needed modifications/adjustments and delayed the commissioning.
9	2.31	The concentrator plant was accepted without performance guarantee tests. The decision to waive guarantee tests and to accept a lump sum payment of Rs. 8.95 lakhs as against claims amounting to Rs. 24.86 lakhs for the design defects appears to have been taken in March 1975 by the then Works Manager and Manager Finance without prior

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		approval of Chairman and the Board of Directors. The decision was stated to have been ratified by the Chairman subsequently and the matter came up before the Board of Directors only in August 1978. The reasons advanced for waiving the guarantee tests and not fully enforcing claims are hardly convincing to the Committee. Considering the fact that the plant could still treat ore only upto 60 per cent of its capacity and further major modifications would be warranted to improve the performance, the Committee desire that the matter should be investigated and responsibility fixed for the waiver and the settlement arrived at with the consultants. The Committee are surprised to learn that the penalty for the failure to demonstrate the guaranteed performance would be only Rs. 79,258 under the contract entered into with the consultants. The matter should be referred to the Ministry of Law if their examination reveals any lacuna there should be no such lacuna in the contracts in future.
10	2.32	There was delay in construction of cathode melting and wire bar plants by the turnkey contractors, GEC and the contractors having failed to commission the plant, the contract was rescinded at their risk and cost. The amount claimed against this concern is Rs. 3.74 crores and the matter is reported to be under arbitration.
11	2.33	The delay in implementation of the project was also partly due to delay in construction/supply of material by other public undertakings such as MAMC, NPCC and FACT. Civil and structural construction of concentrator plant delayed by 20 months due to lack of practical experience of the NPCC. There was delay in the execution of the turnkey contract by the FACT for the acid-cum-fertilizer plant whereas MAMC delayed certain supplies. Although the question of delay on the part of the public undertakings is stated to have been taken up at various levels both by the company and the Ministry, the Special Secretary, Department of Mines, informed the Committee that "the effect was not as expected". Frankly, the Committee did not expect an expression of helplessness from Government. At least in

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		future when a major project of this kind is undertaken, the interdepartmental and inter-enterprise linkages at the time of implementation should be identified and coordination committees at a fairly high level organised to see that various items of work are properly synchronised. Such a coordination ought to be the responsibility of the Government and it should be ensured that the projects are completed under time bound programme in order to avoid cost esclation and loss of production.
12	3.31	The production of ore from Khetri and Kolihan mines was only about 9-10 lakh tonnes per annum during the last three years as against the capacity initially estimated as 30 lakh tonnes and derated at 24 lakh tonnes. It has been estimated that the financial implication of the gross under-utilisation of capacity was a loss of copper production to the extent of Rs. 10 crores per annum. The production of ore was lower than even the modest targets fixed by the company year after year. There has been also gross under-utilisation of capacity of process plants as well as the acid-cum-fertilizer plant. Owing to low production of concentrates, large quantities of concentrates valued at Rs. 14.83 crores had to be imported during the years 1975-76, 1976-77 and 1980-81 (upto November 1980). Still smelter and the refinery plants could be utilised only to the extent of about a third of their capacity. The Committee had earlier pointed out that the appraisal of final cost estimates of the project revealed that the project, besides being economically disappointing was financially unprofitable. It would be of interest to work out the economic rate of return on the basis of actual working results. The Committee would await the outcome of an exercise in this regard.
13	3.32	The Committee note that owing to persisting design defects in the concentrator plant, it operates below capacity and in order to improve it and to treat the ultimate ore production from Khetri, Kolihan and Chandmari mines investment of about Rs. 5 crores would be required. The matter is stated to have been entrusted to Engineers India Ltd. for detailed technical review. Further, the Committee observe that the HCL is unable to tackle the mine development entirely on its own and needs the services of MEC.

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		There seems to be opposition from the workers unions to the induction of the latter. The Committee feel that it should be possible to carry conviction with the workers keeping the matter in the perspective of large national interest. There is also a need to augment power supply to ensure uninterrupted peroduction. The Committee desire that expeditious steps should be taken to ensure coordinated development of the mines and the capacity of the concentrator/smelter to avoid serious problems in future.
14	3.54	A serious problem that arose in the processing of ore for copper production has been the increadibly excessive generation of reverts at the stage of smelting on account of the Smelter Plant deficiencies, which were later recified. As a result 41,907 tonnes of reverts had to be sent out of the country for toll smelting. In this connection, certain facts that cause grave concern have emerged on examination by the Committee.
15	3.56	A net unaccounted shortage of copper content to the extent of 4399 tonnes as at the end of March 1979 was noticed by the company although it was assumed that the accumulated revrerts included this quantity. Neither the production of concentrates nor the feed to the smelter has been weighed. No proper metal accounting system has been followed to abviate unaccountable loss of copper at any stage of processing. Whenever shortage of concentrates was found it was assumed that it had gone into the reverts and adjustments were made in the books of accounts. Curiously enough, no attempt was made to have the stock of reverts weighed and analyse the copper content thereof to see whether the reverts actually contained the assumed quantity of copper. Subsequently when the reverts were crushed, sampled and analysed in 1978 before their shipment for toll smelting abroad and shortage of copper content to the extent of 4399 tonnes was found, it was concluded by a committee appointed to investigate the matter (Wadhawan Committee) that the actual concentrate production was less than that reported by an amount equivalent

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		to the shortage observed. This conclusion does not appear quite convincing Neither the Wadhawan Committee nor the Committee of Board of Directors which subsequently went into the matter, examined the possibility of leakage or pilferage of the metal at any stage of production. There was import as well as indigenous procurement of concentrates which were also charged to the smelter at Khetri and there was no way of knowing the actual recovery of copper from these concentrates and whether it was lower than that assumed on the basis of which the concentrates were paid for.
16	3.56	The Swiss firm, which was selected for toll smelting the reverts did not themselves undertake the smelting. It is doubtful whether any tenders were at all invited by the HCL from any other known smelters. It was also noticed that in the final settlement arrived at with the firm the percentage of copper and gold content in the reverts as agreed to was in all cases lower than the result of analysis of samples by HCL. Neither did the agreement provide for the return of copper based on actual recovery, nor did the company receive any information in regard to copper actually recovered. There was thus no means of assessing the correctness of copper and gold contents in the reverts, as agreed to.
17	3.57	The Committee regret that inspite of the fact that a huge loss was involved and there were many pertinent questions which remained unanswered, the Ministry did not consider it necessary to have the matter examined thoroughly by an independent body but chose at one stage to refer the matter back to the Board for an indepth study by a Committee of the Board. It was only at the instance of the Committee that the Ministry agreed to institute further enquiry. The Committee desire that the whole matter be examined expenditiously by an independent body associating the CBI and responsibility fixed.
18	3.65	The Committee have been informed that no norms of recovery of metal at various stages of processing have been fixed by the suppliers of plats. The Committee would like to know whether it is the normal practice. Although the

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		company itself had fixed in November 1977 some nomrs of recovery, the actual recoveries during 1976-77 to 1979-80 had been significantly lower than the norms and the loss suffered on this account of lower recovery is stated to be of the order of Rs. 233 lakhs. The position becomes all the more serious when it is considered that according to the report of the Wadhawan Committee (June1978) the assumed process losses in the Khetri smelter appeared to be very liberal on a comparison with operations of flash smelter elsewhere. Although the Wadhawan Committee suggested that a Standing Study Group consisting of senior technical and operating personnel of K.C.C. should be constituted to quantify the present stagewise losses, to fix up realistic norms and to review periodically the process losses and suggest revision of norms, it was only in November 1980 that a Committee had been constituted for the purpose. The Committee desire that stagewise realistic norms for process losses should be fixed soon and losses reviewed priodically with reference to the norms so fixed to ensure that thre are no avoidable process losses.
19	3.77	The cost of production of copper at Khetri has gone up from Rs. 32,413 in 1977-78 to Rs. 34,993 per tonne in 1979-80 and is much higher than the international price of copper. The cost of production would have been higher but for the fact that there has been continuous increase in the average grade of ore lately and the government had reduced the excise duty on copper as a measure of assistance to HCL. The cost of production is also higher than the selling price inspite of the fact that the selling price was raised from Rs. 19,920 per tonne in 1977-78 to Rs. 30,430 in 1979-80. The Committee understand that in U.K., major price increases in nationalised industries are referred to the National Board for prices and incomes. This allows the National Board to see whether such increases can be reduced or avoided by increased efficiency or changes of practices. The Boards enquiries cover the industry's machinery for keeping down costs including the appropriate forecasting and decision-making techniques. Admittedly, in any system, cost of efficiency is important and it would

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		be useful to have such an examination in our country too. The Committee trust that government would consider taking steps to have an independent examination of cost efficiency of the public undertakings before agreeing to any major increase in the price of their products.
20	3.78	After examining the project it does not come as a surprise to the Committee that the Khetri project had suffered a cumulative loss of Rs. 71.86 crores from 1972-73 to 1979-80. But for substantial increase in the selling price of copper and the protection afforded by lower excise duty the losses would have been still higher. Obviously the predominant for the losses has been the lower capacity utilisation of both copper circuit and the fertilizer plant. The estimated loss on this account is Rs. 10.41 crores, Rs. 7.14 crores and Rs. 9.16 crores in 1977-78, 1978-79 and 1979-80 respectively. This estimate does not take into account the price increase but is presuambly based on 1976 price. On the basis of current level of prices and costs, it is expected that the unit could make a profit of Rs. 6.25 crores at a capacity utilisation of 90% of the smelter. The Committee stress that all out efforts should be made to achieve the rated capacity so that the unit instead of being a drain on the national exchequer gives a fair return on heavy capital investment.
21	3.83	The copper industry stood fully nationalised with the take-over of the Indian Copper Complex (Bihar) by the HCL in 1972. The projected demand of copper by the end of March 1979 was of the order of 1.04 lakh tonnes. The plan target for indigenous production for the year 1978-79 was 37,000 tonnes against creation of capacity of 57,000 tonnes. However, regretably the achievement was only 21,888 tonnes of production against capacity of 47,500 tonnes created. Thus, there is a huge gap between the demand and the indigenous availability and the country continues to rely on imports for meeting a major part of the demand. In this context the failure of the Khetri Copper complex becomes glaring. Though the Committee seen no possibility of total avoidance of imports in the

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		foreseeable future they desire that steps should be taken to see that atleast 50 per cent of the requirement is met by indigenous production by the end of the Sixth Plan in view of the strategic importance of the metal. The protection afforded to the indigenous industry by way of lower excise duty on production and higher customs duty on imports should also be progressively relaxed inducing the industry to improve its cost efficiency.
22	3.88	In the initial stage the HCL suffered from lack of expertise. The engineering personnel after gaining experience by trial and error at the cost of the public exchequer are now steadily leaving the company for their good. In one year, 1979-80, 75 executives are reported to have left and 50 of them went abroad, notably to Jambia to take up assignments in her copper industry. The Committee view this phenomenon of brain-drain with considerable concern and dismay. The Committee have, however, been assured that the exodus in future will be contained within limits consequent on certain steps taken. There should be a uniform policy in this regard to be followed by all the public enterprises. The Committee suggest that the problem in all its aspects should be gone into by the BPE and suitable guidelines issued. The guidelines should cover *inter alia* the wage policy for highly skilled personnel, their service conditions and motivation, terms of deputation training within and outside the country etc. The talent developed with the country at considerable cost to the economy should largely become available for the country's economic development.
23	3.90	In addition to incorporating the results of comprehensive appraisal of selected enterprises by the Audit Board, the Reports of the Comptroller & Auditor General of India brings out several topics of interest including systems deficiencies relating to Central public enterprises. These Reports are presented to Parliament year after year. The Committee are distressed to learn from the Department of Mines that all the Reports are not placed before the Boards of the concerned enterprises for giving directions to the management for improvement in their working. This should be down in future without fail.

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24	3.91	Incidentally, the Committee's attention has been drawn by the C&AG to a number of other points relating to HCL raised in his Reports, which have not been commented upon by the Committee. Such points have, however, been taken up with the Ministry/undertaking. The Committee desire that the issues involved should be sorted out in consultation with the C&AG and the follow-up action monitored by the Board/Administrative Department.
25	3.94	An indepth study of the Khetri Copper Complex has brought to light, among other things, that the Administrative Department of the Government was more or less a passive witness to the bad performance almost throughout. The Committee find that although according to the guidelines issued by BPE in 1969, the controlling Ministries/ Departments were to hold review meetings at least twice a year and according to the guidelines issued subsequently in 1975, such meetings should be four in a year, the review meetings were not held systematically and as frequently as was required. The Special Secretary, Department of Mines, agreed with the Committee that the project implementation and performance could have been much better had action-oriented review meetings been held regularly. The Committee trust that in future the Department would not be found wanting in the discharge of its responsibilities in regard to proper functioning of the public enterprises under its control.

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