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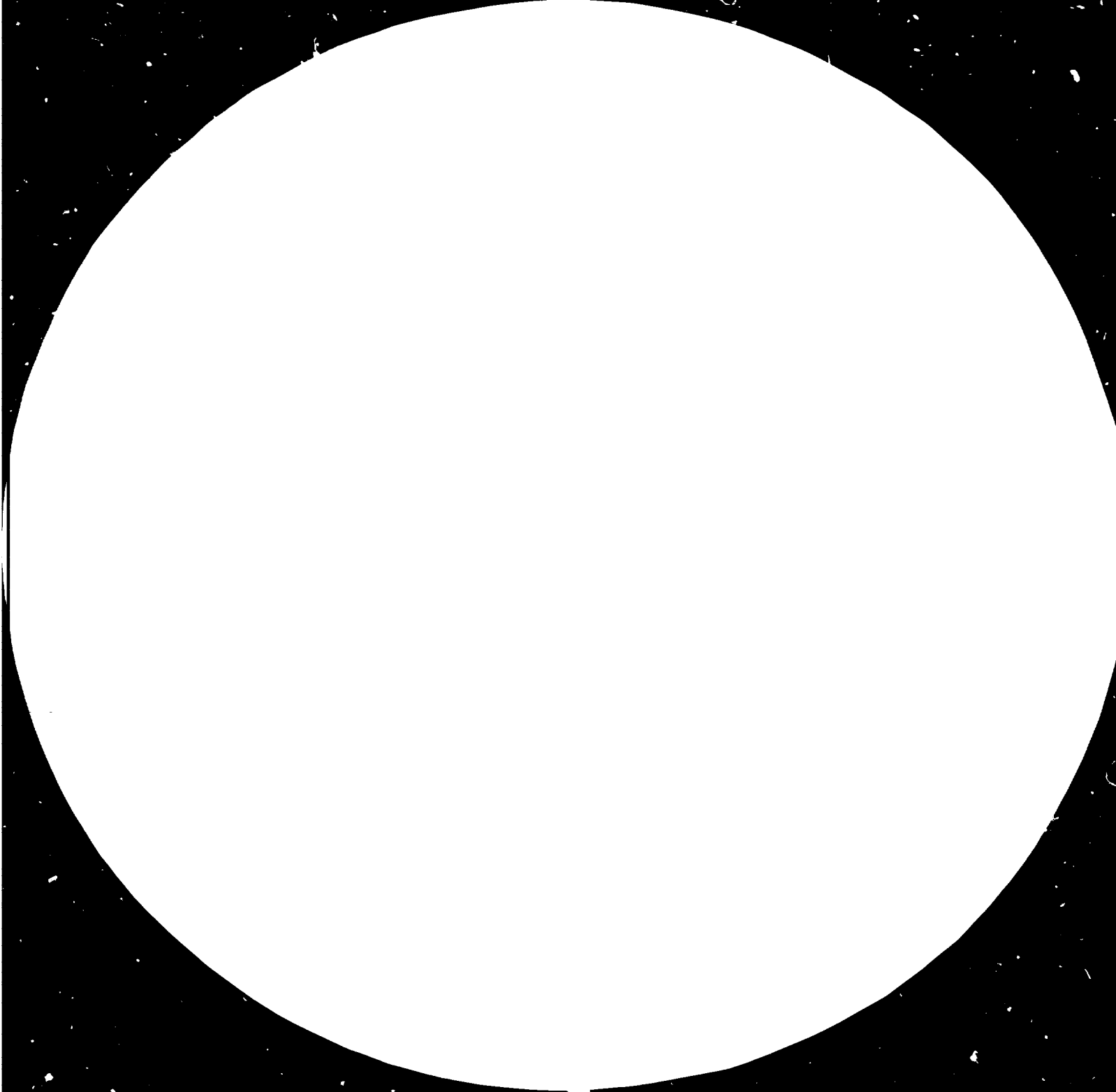


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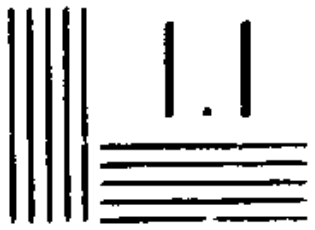
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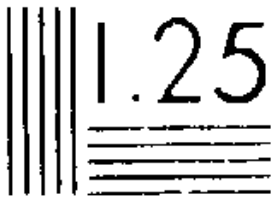
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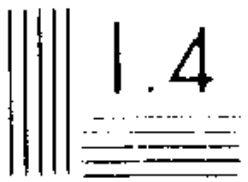
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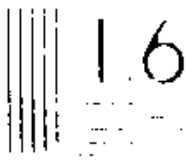
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RESTRICTED 11494 20 Novembre 1981

English

Bolivia and India.

FEASIBILITY OF UTILIZING THE EQUIPMENT FROM ASBESTOS PLANT COCHABAMBA FOR PROCESSING IN THE PLANT PULIVENDLA, INDIA·DP/IND/74/038/11 /01/32.1.B.

REPORT AND PRELIMINARY PROJECT

Prepared for the Governments of Bolivia and India by the United Nations Industrial Development Organization, executing agency for the United Nations Development Programme

Based on the work of A.N. Madjanović, adviser on asbestos processing

United Nations Industrial Development Organization
Vienna

Introduction

The facts concerning the experimental asbestos plant at Cochabamba in Bolivia are as follows:

a) The plant was destined for processing examinations of the asbestos ore from the amphybolcrokidelit asbestos deposit which is in the area Alto Capare, situated approh. 130 Kms in the direction of North-East from Cochabamba.

b) The plant was completed and the process examinations were finished at the end of 1973.

c) The trial to use the exprerimental plant as an industrial one gave a negative economical result and the production was stopped the next year.

The project of utilization of the asbestos equipment from Cochabamba has been proposed by U.N.I.D.O., Vienna - Chemical Industrial Section - Conected with the project of Puliuendla asbestos plant in India from 1978.

This report according to the Job Description comprises the analyses of the technology, equipment and the results of the Cochabamba asbestos plant and the possibility of application of its equipment in the previous projected asbestos plant of Puliuendla.

1. F I N D I N G S

1.1. Location, Ground, Buildings

The asbestos plant is situated 9 Kms from Cochabamba, near the eastern suburb Sakaba, on a modern asphalted road, surounded with all auxiliary objects.

The ground of the boctery limits is a surface of 100 x 150 MTS equalling 15000 Sq.m. and belongs to the neighbauring Ceramic tiles factory - Corporation Boliviana de Fomento (C.B.F.) - which is going to accomplish a new project of Sanitary ceramic factory in the same battery limits.

The building of asbestos plant was constructed in steel - concrete and has two floors in technological part:

- the ground floor, grade 0,25, as transport and conections lever and
- the first floor grade 3,25 MTS, as a main processing lever.

The annex to the plant building consists only of ground floor used as sub-power station and starages.

The auxiliory objects are as follows: laboratory, administration, workers' dress room, main storage of technical materials, sheded open storage and truck-scale house.

The building surface is distributed:
a) Technological part of the plant:

			sg.m.
1) The drying section	12 x 8,5	102,0	
two floors	x 2		204,0

			sq.m.
2)	The rock circuit 12 x 10,5	123,4	
	two floors x 2		256,8
3)	The fiber circuit 15,5 x 8,5	131,8	
	two floors x 2		263,5
	SUB TOTAL OF TECH.PART.	362,2	724,3

b) Annex of the plant-only groundfloor

4)	Sub power station 4,8 x 6,0	28,8
5)	Spare part storage 12,0 x 4,8	57,6
6)	Asbestos fiber storage 15,5x7,0	108,5
	SUB TOTAL OF ANNEX PART.	194,9
	Total surface under plant	557,1
7)	Laboratory 20,0 x 5,5	110,0
8)	Personnel offices 21,0x9,0	189,0
9)	Workers' dress room 16x5,5	88,0
	Summary of the objects with sanitary instalation	387,0
10)	Storage of tech.mat. 20x6	120,0
11)	Sheded open storage 18x6	108,0
12)	Truck scale house 4x3,5	14,0
	SUB TOTAL	242,0

The approximated primary value of all buildings:

			bs
1) to (3)	724,3 m^2 x 3,500 bs		2.535,050.-
4) to (9)	581,9 " x 2,800 "		1.629.320.-
10) to (12)	242,0 " x 1,900 "		459,800.-
	SUB TOTAL	bs	4.624,170.-

The exchange ratic of Bolivian pesos to US dollar was 20:1 in 1972/73.

The primary value of all buildings

231,208 US$

These buildings will be integrated in the Sanitary ceramic factory project with some addaptations.

1.2. Asbestos Plant Technology Description

The Cochabamba asbestos plant is a simple type of one line pilot plant applying the dry Canadion processing system.

The capacity in one phase is up to 5 TPH if input ore contains less than 20% of asbestos. The capacity is decresed to 3 TPH with enlargement of asbestos contents. Over 35% of asbestos in feed ore increases mechanical blocking very much because of volume expanding of asbestos in the fiberization process.

The oversize middlings products are processed in the same line in second and third run which make doun the capacity of the plant between 1,6 to 1,2 TPH.

The commercial and planning estimation of yearly asbestos fiber production was as per 1972-73:

1.500 TPA in one shift wark and
5.000 TPA in three shifts wark

These figures were rother an expression of an ambitions wish than a technological reality.

The yearly effective working hours should be estimated at 3,600 HPA. The quantity of the processed ore 3,600 x 1,4 TPH = 5.040 TPA.

The yearly input ore is 5,000 TPA with an approximate optimum of asbestos content of 20% and an extraction ratio for long and medium fiber of 80%.

The yearly production of asbestos fiber

5,000 x 80% x 20% = 800 TPA

This account is also a theoretical one becauze of the real production state at the mines of Alto Chapare. A mining paper at 1972 gives the datas of monthly production in all mines of 40 TPM but only for the period of 9 months in a year, excluding 3 months of the raining season becuse of any grenage system in the mines. The capacity of the all mines was less a thouxend tonns per year or only 10% to 20% of the plant.

The mines of Alto Chapare were not devoloped to the leveel of the small capacity of the asbestos plant.

The process of asbestos fiber production was composed of three groups of processing phases:

(A) Preparation of ore
(B) Rock circuit
(C) Fiber circuit

The preparation of ore of mine which is mostly done at the mine side resulting in semi-concentraded ore with a content 10% to 40% of asbestos, at the plant side but outside the plant it consists of

1) - hand picking of long fiber and control of steryl rock;

2) - screening ± 1/2 inch which gives fine ore for drying middle grain ore for crushing

3) - impactor crusher after the crushed ore comes back to screening.

The technical data of the machines are given in details in appendix 1 under numbres 3) - sereener 1) impact cousher 4) - dryer.

Rock circuit includes two phases

4) - milling and fiberizing in an impactor mill (app. 1 - N° 2)

5) screening with fiber asspiration (appx 1 - N° 5), 6), 7), 8)

Fiber circuit includes five phases:

6) - refining - screening with fiber aspiration
app. 1 - N° 9), 7), 8)

7) - dedusting - app. 1 - N° 11)

8) - classification - app. 1. N° 12)

9) - mixing - app. 1. - N° 13)

10) - packing - app. 1. N° 14)

The middling are oversize grain products of the phases 5) and 6).

The reject is the undersize grain products of the phases 5), 6) and 7) .

The control of the quantity of processed ore was the weighting in a truck all of reject which by transported truck to reject materal area outside the battery limits.

1.3. Production results

The processing trial of Cochabamba asbestos plant was performed from May to December 1973.

The total quantity of input ore was 247,2 Tons and the production of asbestos fiber was 63, 23 Tons, which was given a medium content of extracted fiber of 25,6%.

The effective capacity achieved in the trial rum was 1,18 TPH of the feed ore and 302 Kgs. of asbestos fiber per effective hour.

The feed ore was devided in 20 samples which mere heterogeneous asbestos content as a minimum of 12,5% and a maximum of 40% and one sample weight being between 9 and 16 Tons each.

The samples of fed ore were collected predominantly from ten private, small capacity mines named as follows:

TRES AMIGOS, LIMBO, SIELIT, SAN FRANCISCO, BOLIVAR, GLORIA, CORPUS CHRISTI, MINILLO SALSIPEEDE AND ELENA.

The quality of asbestos fiber was tested in the laboratory of the plant applying dry and wet methods as followes:

- Quebec Standard Test (Q.S.T
- Ro-tap - serening test (R.T.)
- Bauer Mc.Nett, wet test (BMc.N.)
- Surface Area test (Blain) (S.A.T.)
- Filtration (F.T.)
- Humidity content of fiber (h.f.)

A preliminary standard was prepared for the trial rum based on B.Mc.N. test REGLAMENTO PROVISIONAL DE COMERCIALIZACION DEL MINERAL DE ASBESTO, COCHABAMBA, FEBRERO de 1971 which anticipated three sortes of asbestos fiber:

	Seves mesh				
	+4	+ 14	+35	+100	-100
	Percentage:				
A - long fiber	56	15	5	4	20
B - medium "	46	18	10	5	21
C - chort "	14	25	17	6	38

The sorts of South Africa Cape Blue asbestos with same data

	P-ercentage				
A - long fiber	80	4	2	3	11
S - medium "	48	19	7	3	23
II - short "	12	23	17	5	43

The sort "A" Cochabamba filer is shorter as the "A" cape Blue fiber, the "B" sort is very mer to "S" Cape, and the short "C" is also better, as the "II" - Cape one is.

The lab-test of the end product pointed out more devicetions as compared to the preliminary standard.

	B.Mc.N - test sieve mesh				
Fiber Sorte	4	14	35	100	-100
	Percentage				
Medimu fibre "B"	42,8	6,3	5,1	7,0	38,8
	38,8	3,1	4,5	8,0	42,2
Short fibre "C"	29,7	12,5	10,0	9,8	37,7
	23,0	8,2	7,4	10,4	50,7

The analyzes of Surface Area

- medium fiber 11,100 to 11,700 cm^2/grs.
- Short " 13,100 cm2/grs.

The filtration test at 20°C

- medium fiber 319
- short fiber 275 to 280

The humidity of fibre was less than 0,5%.
The dry screening test Qst and RT.
pointed out that the medium fiber was in a lower sub-group 3 and the short fiber was either in a high sub-groupe 5 or in a lower sub-group 4. when compared with Canadior Standard.

No test was done over F.S.U. Fiber Strenght unit-which examination is of big importance in asbestos-cement industry.

The end products of trial testing was estimated and the account of the fiber value is as follows:

Sort of fiber	Participation percentage	Price US$	Value US$	b$
A - long	5,5	420	23,10	462,0
B - medium	38,7	240	92,88	1,857,6
c - short	55,8	190	106,02	2,120,4
	100,0		222,00	4,440,0

The average value of the production fiber was 222 US$ or 4,440 b$

(Price comments: at 1973 the prices of cape Blue asbestos fiber were appox:

- long 481 US$ for Bolivian 15% less because of some shorter ones
- medium 257 US$ for Bolivian 5% less becuse of more dust content
- short 215 US$ for Bolivian 12% less becuase of more dust content)

1.4. Economy of production

The costs of the prepared ore production at the mine side was estimated, in 1972/74, to be on a lovel of 900 to 1400 $b per ton. The feed ore for trual run was purchased mostly from private concesioners of the mine fields and the appoximate price, FOB mine, was 1000 $b or 50 US$ per one ton. In trial run the feeding ratio was 4 Tons of input ore per 1 T. of fiber.

The transport to the plant was estimated to be 60 to 80 $b per Ton
4 x 80 = 320 $b or 16 US$ per Ton of fiber.

The cost of the plant production was estimated at a minimum of 20 US$ per ton of fiber and 40 jute bags x 0,6 = 24 US$, total 44 US$ per ton of fiber. These figures showing production costs did not include the depreciation rate, nor the capital investment rate.

	The costs per 1 T of fiber	
	US$	b$
The mine explatation	200.-	4,000.-
Transport the plant	16.-	320.-
The processing costs	44.-	880.-
TOTAL	260.-	5.200.-
The fiber alue estimaticn under 1.3	222.-	4.440.-

It is a fact the production was uneconanical one und the main cause was the high casts of the mining (77% of all costs). Only two examples with make the matter clearer or more understandable.

1) In 1973/74 the excavation, the first hand sorting, the haulage out to surface from underground stope for a quantity of 50 Kgs the cost was 40 $b, i.e. one ton cost 800 $b or 40 US$. All operations were performed manually.

2) The plant processing report of octobre 1974 gives the following data:

a) The processing of 59,71 Tons of feed ore from private mines: TRES AMIGOS, CAROLINA, SAN FRANCISCO, LIMBO and FLORIA gave the products:

long fiber	300 Kgs.	content	0,6%
medium "	11.250 Kgs.	"	19,0%
short "	7.535 Kgs.	"	12,4%

The estimation value based on Conadian standards and prices amounts to 113,30 US$.

b) The processing of one sample of 4,69 Tons from mine ELENA (the owner Corporation Boliviana de Fomente - the aid receiver of UNDP - asbestos ore process project), gave the end products:

long fiber	210 Kgs	content	4,5%
medium "	1.625 Kgs	"	34,6%
short "	835 Kgs	"	17,9%

The estimation value 220,07 US$

The differences pointed out in above figures should have a background of various economical interests: The long fiber in the sample

a) was put out for selling to another purchaser.

2. Conclusions

The experimental asbestos plent at Cochabamba construcked by S.N.C. (SURVEYER, NENNIGER A CHENEVETER) a Canadion Eng. and Consult firm, a capasity of 1.4 TPH limited to 35% asbestos in feed ore, not suitable for processing of high grade ore - contains asbestos up to 40%, from the trial testing run, very detailed technological data were presented for projecting an industrial plan.

The trial of using the experimental plant as a industrial one gave an uneconomical production because of the extreme high costs in mining.

The first task for the future work is a systematical development of an intensive modern mining process where all costs have to be limited to less than 50% of the asbestos fiber value.

3. Recommendations

3.1. The technical paper of asbestos project Cochabamba ought to be resettled as:

a) geology and mining

b) technology of procesting.

This task shovd be worked out by Mr.Andreas Lenel, officer of UNDP La Paz it takes two months for this work,

3.2. Servicio geologico de Bolivia (Geobol) should receive the document under 3.1. and take cure of the future development of asbestos deposit in area Alto Chapare, which shoud be a long term task.

3.3. Appx. 1 gives the proposed list of the equipment projected to transfer to India connected with technologycal solution in appx. 3.

The total value is 243,804 US$

The estination of expenses are:

	U$$
a) Dismantling of plant equipment apprex. 45,000 Kgs á 0,45	20,250.-
b) Cleaning, protecting lubrication, and oversea packing	10,500.-

c) Transport cost from Cochabambe to Madras	45,000.-
d) Insurance	3,500.-
e) Head office support service	5,000.-
f) Unforseen expenses	4,000.-
TOTAL:	88,250.-

The UNDP ofice in La Paz shoud organise this work which takes approx. 6 to 8 weeks.

3.4. The preliminary project (appx. 3) or a rough draft has to be completed with following work in India:

a) The industrial size test run of impactor crusher and mill appx. 1 - N° 1 and 2) combined with an Indian production Jaw crusher and a cone (Symons) crusher.
These experimental study will give the technological basical data for the final project of the Pulivendla asbestos plant.
This work takes approx. two months.

b) The final tehnological projecting after (a) has to be worked out (side by side) at the same time with the mechanical errection project. Thise work takes three months.

c) After (b) phase the rest of projecting work takes place (civil, electrical etc.) which takes two months.

An Indian projecting firm specialised for ore processing has to be engaged for the phases (b) and (c).

THE SPENT - TIME REVIEW OF THE EXPERT WORK

November 1981

1st. - Trip to Vienna arrival 6 p.m.

2nd. - and 3rd - the briefing

4th - TRIP vienna - frankfurt - La Paz duration 26 hours, arrival in La Paz 5th Nov. 6 A.M.L.T.

5th - TRIP La Paz - cochabamba arrival at Cochabambe 9. A.M.L.T. with MR. A. LENEL, Undp La Paz, MR. J.Sing and Mr. Chowdhury the delegates of India

5-15 - CCochabamba - 10 days

5th - First day work in the asbestos Plant - 10 A.M. to 6.P.M.

6th - Second day work at the Laboratory - the end day with Indian Eng. who went back on 7th.

7 - 8th Weekend days - work on the Preliminary Pulivendlas Project.

9-11 work at the technical Documentation of the Cachabamba asbestos Project

12-14 - Work on report

15th - Trip to La Paz

16th - Debriefing in Undp La Paz

17th - Back Trip to Vienna

18 and 19 - Debriefing

20th Back trip to Yugoslavia

THE LISTE OF COCHABAMA ASBESTOS PLANT EQUIPMENT
PROJECTED FOR TRANSFER TO INDIA

1) ONE HAZEMAG IMPACT CRUSHER model APK 20, Serial N° 8967 cap. up to 20 TPH, weight 9500 lbs or 4310 Kgs, gabarites 67 x 64 x 66 Inches or 1702 x 1626 x 1676 mm, HP 30 to 50 Drive: 30 HP, 380 V, 3 ph, 50 C, 950 RPM with reducer ratio 1,85 and V-belt Sheane, output specd 400 RPM Primary value 14,232 US$.

2) ONE SPECIAL HAZEMAG IMPACTOR MILL SYSTEM ANDREAS, type SAP 1/S, max. imput grain 200 mm, weight 5400 Kgs. gabarites as per (1) Drive: 22 KW, 220/380 V, 50 C, 1450 RPM Special reeves variale speed reducer, vertical type N° 102 assembly N° 441-661 K gabarites: $44\frac{9}{16}$ x $18^{5}/8$ x $30^{1}/16$ Inches, or 1122 x 473 x 764 mm.
Primary value 35,700 DM 16,227 US$

3) ONE VIBRATING SCREENER, manufactored by Link - Belt, Canada, m type UP-138, Single deck, 1.75 sq. m, 2,540 mm long, 790 mm max. angle 30^{0}
Drive: 3 HP, 380 V, 3 ph, 50 c, 1500 RPM with V-belt, weight app. 1.200 Kgs Primary value 7,050 US$.

4) ONE ROTARY DRYER, manufactured by Link-Belt, type 400-20, cap. as per data L.B. 6050 pounds per hour, as per data SNC 12.000 TPH, input gases 1,200°F, output 250°F
Drive: 5 HP, 380 V, 3 ph, 50 c, 1450 RPM worm gear reducer, imput 1450 output 72,5 LB WB 500, Ratio 20/1, with V-belt sheave Hauck Burner equipment NPT $1^{1}/2$ inch Dust control output gases with a fan Sheldons Eng. Lmt TK 4210 and a cyclons 6 ft diameter $17^{1}/2$ inches
The Ducon C Inc.
Weight of the set 6 Tons.
Primary value 25,877 US$

5) ONE ROCK SCREENER - GYRATIN SCREEN 5' x 10', manufactured by FOURNIER STEEL WORKS Ltd, model 3000 F, double deck, 2 x 4.7 sq.m, 3050 mm long, 1520 mm wide, the sereening surface rotate 186 RPM with 101.6 mm diameter of circular motion.
Drive: 5 HP, 380 V, 3 ph, 50 c, with V-belt weight approx. 2,500 Kgs.
Primary value 7,515 US$.

6) ONE ROTARY ASPIRATOR 24" manufactured by FOURNIER STEEL WORKS LTD. dia 610 mm, speed motor 1440 RPM aspirator 48 RPM.
Drive: 1 HP, 380 V, 3 ph, 50 c. with V-belt sheave one speed reducer TD 125
Gabarites: 1800 x 700 x 900 mm, weight 520 Kgs.
Primary value 2240 US$

7) TWO 30" CYCLONE COLLECTOR SYSTEM dia of cyclon 1'4", cylinder of collector 1'6", comus part 1' $9^{7}/_{10}$", air outlet on the top of the cylinder 1'5" dia. 1'4" with rotary valves, long 6 fts $5^{1}/_{6}$"
Weight 500 Kgs each
Primary value 4100 US$

8) TWO ROTARY AIRLOCK VALVE 18" x 18"
Drive: 2 HP, 380 V, 3 ph, 50 c, 1500 RPM Dodge double reduction N° 425 ratio 24.61/1 reduced to rotary valve on 20.8 RPM, weight 400 Kgs each
Primary value 3570 US$

9) ONE FIBRE SCREENER - ROTEX SCREENER, manufactured by ORVILLE SIMPSON Co. model N° 81, seria N°: 090472, Single deck, 4,7 sq.m, long 3050 mm, wide 1520 mm speed of surface rotation 227 RPM the motion 76.2 mm diameter.
Drive: 3 PH, 380 V, 3 ph, 50 c. with V-belt sheaves and drive head
Weight 1800 Kgs
Primary value 6,651 - US$

10) TWO VIBRATING FEEDERS - PARAMOUNT manifactured by FORANO Ltd.

with cable instalation. Surface 0,95 sg.m. 2,134 mm long, 445 mm wide. Inclined 7^{o} 30' angle to the horizontal lever.
Drive:1 PH, 380 V, 3 ph, 50 c. 900 RPM weight 600 Kgs each
Primary value 5100 US$

11) ONE 36" DUSTER PADDLE TROMMEL diameter 9144 mm, long 2540 mm, 7,27 sq.m. Serial N^{o} 139-72 manifactured by FOURNIER STEEL WORKS Ltd. with 22 beater arms
Paddles motor one 15 HP, 1000 RPM 380 V, 3 ph, 50 cyc. Reduced with V-belt ratio 5,31 through a 1" pitch rolled chain drive to give a trommel speed of 20,4 RPM and to the paddle 177 RPM Screw conveyor drive through a 1" pitch rolled chain drive to give a conveyor speed of 44 RPM.
Gabarites: long 12,9" (3886 mm) height 6'2" (1880 mm), wide 54" (1372 mm) weight 1800 Kgs .
Primary value 8,510 US$

12) ONE 26" STANDARD GRADER manufactured by FOURNIER STEEL WORKS Ltd. with 14 double arms.
Drive: one 15 HP, 380 V, 3 ph, 50 cyc. 1500 RPM with V-belt shearce ratio 2
Gabarites: 9'7" (2974 mm) long, 3' $10^{1}/2$" (1182 mm) wide, 4'$10^{1}/16$" (2555 mm) hight.
Weight 1300 Kgs
Primary value 6510 US$

13) ONE BLENDER-MIXER -LIVE BOTTON BIN
4 conveyor screws 410 mm diameter (2 with righthand and 2 with lefthand flights)
1 output conveyor screw 360 mm dia.
Drive: Two 3 HP, 380 V, 3 ph, 50 cyc, 1000 RPM
Two speed reducers - Crofts radiator - type R- reducing

ratio 70/1 with V-belt sheanes and sprochers.
speed bin bottom conveyor screns 5 RPM bin bottom discharge conueyor screw 60 RPM.
Gabarites: 4000 x 2000 x 600 mm
Weight 3500 Kgs.
Primary value 16.900 US$

14) ONE VERTICAL SCREW PACKER manufactured by FOURNIER STEEL WORKS Ltd.
One 356 mm helicoidal conveyer screve rotating 180 RPM in a 381 mm diameter tube.
Drive: one 10 PH, 380 V, 3 ph, 50 cyc. 1500 RPM
one HOLROYD, single reducer, type HV, ratio 10/1
Gabarites: 9'2" (2796 mm), 3'6" (1067 mm), 35" (889 mm)
Weight: 1800 Kgs
Primary value: 9.820 US$

15) TWO SCREW CONVEYORS, diameter 305 mm one 4270 mm long, the other 6,200 mm long capacity to 12 Tonnes.
Drive: Two 5 HP, 380 V, 3 ph, 50 cyc. 1500 RPM with V-belt sheave,
Two speed reducers in output 50 RPM.
Gabarites: 500 x 500 x 6200 mm
Weight: approx. 12oo and 4300 850 Kgs.
Primary value: 3,400 US$

16) ONE BUCKET ELEVATOR N^{o} 6 IN PLANT as a part of the blender-mixer
Long 11 met, 900 x 300 mm
Capacity 4 MTPH to handle dry crocidolite fibre at 5 lbs. per cu.ft.
Backot 14 x 8 x 11 3/4 inches.
Drive: One 3 HP, 380 V, 3 ph, 50 cyc, 1500 RPM
The head shaft assembly 19, 1 RPM and Boot shaft assembly.
Weight: 1200 Kgs.
Primary value: 4,120 US$

17) ONE ULTRA-JET DUST COLLECTOR
N° 115,model 108 produced by WHEELABRADOR, Canada 1972
Drive: Screw conveyor 1,5 HP, 380 V, 3 ph, 50 c, 1400 RPM with V-belt sheave and DODGE screw conveyor drive CD 218 B-2, output to serew 30 RPM
One fan drive 75 HP, 380 V, 3 ph, 50 c, 1400 RPM
The fan 1786 RPM
On the spot there is any compressor assembly.
Gabarites: Dust collector 6500 x 2500 x5000 mm, Fan 2000 x 1800 x 1800 mm.
Weight 4500 Kgs.
Primary value: 20.818 US$

The equipment of the asbestos plant
Total weight (1) to (17) 40,880 Kgs.
Total Primary value " 162,640 US$

I. ANNEX OF THE SPARE PARTS

18) One set of screening net plates
Approx. weight 350 Kgs., Gabarites: 3100 x 1600 x 50 mm (x3)
Primary value: 3,000 US$

19) One set of different spare parts of the plant machines
Approx: weight 1500 Kgs.
Primary value: 15,000 US$

II. ANNEX OF THE ELECTRIC EQUIPMENT

20) Three substations - panel of distribution (as per annected detail list from June 11 th 1973). The machines switch - on - off boxes. The electric materiel and accesaries.
Approx: weight 500 Kgs
Primary value: 40,000 US$

III. ANNEX OF THE LABORATORY EQUIPMENT

21) The detaled list of lob-equipment is attached. The appox: weight 3,500 Kgs. The primary value 25,164 US$

The asbestos plant equipment with taree annexes

TOTAL WEIGHT 46,730 Kgs.

TOTAL PRIMARY VALUE 243,804 US$

Appx. 1.

III ANNEX

THE LIST OF LAB-EQUIPMENT FON TRANSFER TO INDIA

1) Suter-webb Sorter
   2" model, complete with accessories value 655 US$

2) Standard Filtration Tester value 638 US$

3) Tensometer type Hounsfield
   complete with motor drive unit value 1,301 US$

4) Temperature Humidity Cubinet value 2,214 US$

5) Laboratory Impact Crusher, type Hasenag, value 1,549 US$

6) Surface Screener, type Rotex value 2,329 US$

7) Cyclone Collector value 1,621 US$

8) Dust Tube Collector (SNC) value 4,300 US$

9) Testing Siene Shaker, type Teles Rotap value 1,110 US$

10) Asbests Testing Machine, model Quebec standard
    N^{O} 2 value 7,450 US$

11) Hydraulic lab. press, type Apex model A 434, 50 T, value 2,488 US$

    (Measurement of reinforcing strength of Asbestos in asbestos cement)

12) Monitaire - gas - sampler value 150 US$

13) Air velocity meter (SNC) model 400-10, value 227 US$

14) 6 Cylinder hex base 2000 ml, pyrex glass, graduated value 132 US$

    Approx: weight 3,500 Kgs.
    Primary value 26.164 US$

VOLUME ACCOUNT OF THE LIST 1 ASBESTOS PLANT EQUIPMENT

Gabarites of the Packing in mm

		Volume m^3
1)	1750 x 1680 x 1700	5,0
2)	ibid	5,0
3)	2600 x 1300 x 600	2,0
4)	(Dryer) 7500 x 1600 x 2000 24,0 (Cyclon) 3500 x 1000 x 1000 3,5 (Fan) 1500 x 1200 x 1000 2,0	29,5
5)	4000 x 2200 x 1000	8,2
6)	2200 x 1000 x 1500	3,3
7)	4000 x 1600 x 1600 (x2) 600 x 600 x 600 (x2)	10,3 0,5
8)	750 x 750 x 750 (x2)	0,6
9)	5000 x 2000 x 1200	12,0
10)	2500 x 750 x 1200 (x2)	4,5
11)	4000 x 2000 x 1500	12,0
12)	3000 x 1300 x 2600	10,0
13)	4300 x 3000 x 700 9,0 3200 x 2500 x 600 5,0	14,0
14)	3000 x 1200 x 1000	3,6
15)	6500 x 500 x 500 1,6 4500 x 500 x 500 1,2	2,8
16)	11000 x 950 x 350	3,7
17)	(Collector) 4500 x 800 x 600 2,2 5000 x 2500x2500 31,0 (Fan) 2000 x 2100x2100 9,0	42,2
18)	Set of screening net plates spare parts 3100 x 1600 x 150	0,8
19)	The spare partes of the plant	4,0
20)	The electric equipment	3,5
21)	The lab-equipment	8,0
	TOTAL VOLUME	186,0

The total estimated volume of all oversea packed equipment which is proposed for transfer to India Equals Approx: 190 Cubic Meters.

THE LIST OF THE COCHABAMBA ASBESTS PLANT EQUIPMENT WHICH WILL BE USED FOR PREPARATION OF RESAURCES FOR THE NEW FACTORY OF SANITARY CERAMICES

1) Three Belt Conneyors 460 mm
outside of the plant:
BC 1 long 28,7 Uts.
Drive 5 HP, 380 V, 3ph 50 cyc. with V-belt reducer TD 415 speed 21 RPM
BC 1-a long Uts.
reducer Dodge TD 625 speed 22 RPM
Drive 1,5 HP, 380 V, 3 ph, 50 cyc. with V-belt speed of the el.moter 1500 RPM
inside of the plant
BC 2 long 29,5 Mts.
Drive as per B-1a
Weight 6,120 Kg.
Primary value 19,405 US$

2) Six Backat Elevators
N° 1 to 7, except N° 6, manufactured by Forano Ltd. vertical continuaus backet elevator 12" x 39" castings
BE-1 - Long 8,5 Mts, 3 HP et 1500 RPM
BE-2 - Long 9,6 with rec.car etc.
BE-3 - " 12,5 "
BE-4 - " 8,0 "
BE-5 - " 10,2 "
BE-7 - " 8,3 "
Weight 7,800 Kgs.
Primary value 24.700 US$

3) Trucr Scall modal 20 T. manufactured by Fairbanks, Morso Co. for maximum weight of 18,8 M.T.
This scale is now in use by the Ceramich Tiles Factory,
Weight 7.800 Kgs.
Primary value 7,950 US$

4) Portable Scale type Toledo, model 4181 manufactured by Reliance Electic Co. with a sensitivity of 0,25 Kgs. total capacity 455 Kgs. Weight 120 Kgs.
Primary value 1,700 US$

Total Weight 14,840 Kgs.
Total Primary value 53.755 US$

ANNEX 1 tO APPX. 2.

TOTAL PRIMARY VALUE 9,403 US$

All equipment per List 2.
Primary value 63.158 US$

Appx 2.
Annex 1.

THE LIST OF LAB-EQUIPMENT WILL BE USED IN BOLIVA

1) Fibre wet Classifier, model Bauer Mc.Nett type 203 C.
   Weight 130 Kg.
   Primary value 3,129 US$
   with filter Paper 112,50 US$

2) Air Permeability Tester, type Blaine weight 25 Kgs.
   Primary value 1,148 US$

3) Sieve air Jet Alpine WG.
   model A 200 LS, complete
   Weight 15 Kgs
   Primary value 817 US$

4) Lab. - Mill Alpine WG.
   Type Perplex
   Weight 8 Kg.
   Primary value 537 US$

5) Furnace 220 V.
   Primary value 1510 US$

6) Microscope
   Primary value 574 US$

7) Balance 1 - 200 g.
   Primary value 93 US$

8) Precision Balance Mettler
   Model P-1200
   Primary value 539 US$

9) Balance Micrometer
Primary value 188 US$

10) Balance Analytical
Complete with weight
Primary value 755 US$

TOTAL 9403 US$

The items from 5 to 10 were not on spot in the lab at Cochabamba at the time the expert asked for.

Perhaps they were used by the laboratory of the Ceramics factory.

The expert proposes that items from 1 to 4 be transferred to Technological Faculty of the University "St.Simon" in Cochabamba.