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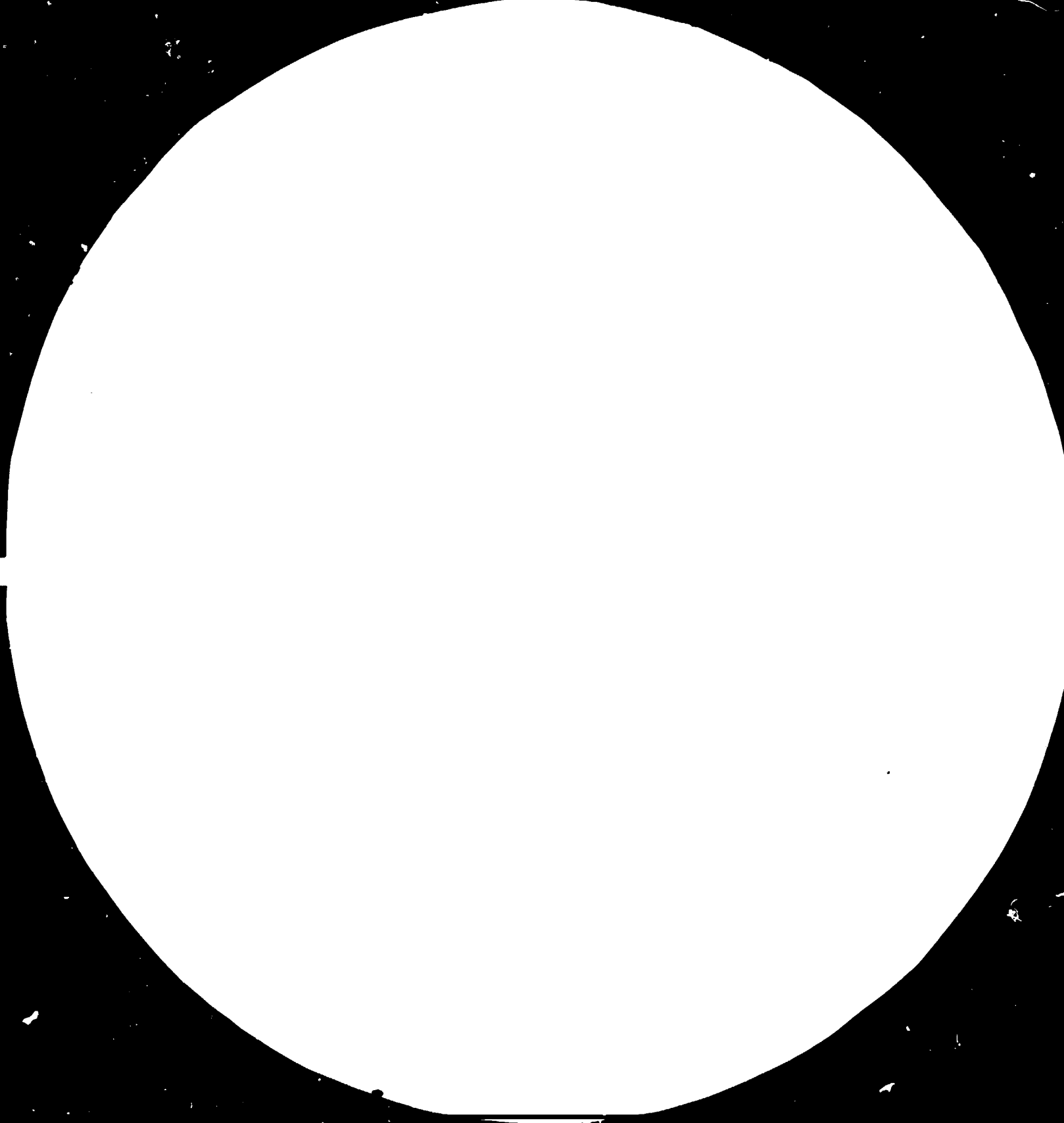
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS  
STANDARD REFERENCE MATERIAL 1010a  
(ANSI and ISO TEST CHART No. 2)

14671

April 1985

India.

Mill Size Desilication Plant for Black Liquor  
at The Central Pulp Mills, Ltd, Fort Songad, Gujarat State, India

US/IND/79/206/11-05/32.1.E.

Mission Report

by

Jan Leffler

UNIDO Expert

3939

This report has been produced without formal editing.



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## PURPOSE OF THE MISSION

After his latest mission for the Project during the period 26 August-20 October 1984 the Expert had been informed by UNIDO about the purchase and orders given to the main equipment suppliers Waagner-Biro Aktiengesellschaft (carbonation) and Delkor Mineral Technik GmbH (filtration) during December 1984.

The first part of this new mission was intended for meetings and discussions with the UNIDO responsables Dr Judt, Substantive Officer, and Mr Yamashita, Purchase Officer, and also with representatives for Waagner-Biro and Delkor, in order to get the actual situation clear.

The second part of the mission should be executed in Fort Songad together with the counterparts and representatives for CENPULP.

During a third part of the mission the Expert should participate in meetings arranged in New Delhi with GOI, CPPRI, CENPULP, UNDP and UNIDO.

Finally the Expert's findings and conclusions during the different parts of the mission should be followed up by necessary recommendations and actions and a mission report edited to UNIDO.



## ACTIVITIES DURING THE MISSION

First Part of Mission

- 25 February:** Briefing at UNIDO by the substantive officer Dr Judt, the purchase officer Mr Yamashita and different administrative officers.  
Copies of the purchase orders for equipment from Waagner-Biro and Delkor were handed over to the Expert and studied.  
As the technical documentation from the suppliers still was incomplete and no time schedule given for such deliveries of drawings and specifications necessary for final site layout, foundations, Indian complementary equipment etc, it was decided to arrange meetings with both suppliers for clarifications.
- 26 February:** The Expert visited Waagner-Biro in Graz and had a meeting with Mr H Berger, W-B Sales Dept, who until the order was placed by UNIDO had been responsible for the project, and Mr H Buchrieser, who then had been nominated as the project coordinator for final design, manufacture, purchases from sub-suppliers etc. By questioning information was given about the W-B internal project organization and how the UNIDO order was going to be handled.  
Information was given about the design situation and all considerations involved therein, some of them at that time still not finally settled, e.g. the choice of pump sub-supplier, the geometry of reactor tanks and piping, which may be excused because the delivery is the first of its kind and the W-B research and development expert for this project Mr A Glasner (unfortunately not available the day of visit) is very ambitious to find out the best design for a successful operation of the carbonation in the future. Messrs Berger and Buchrieser could not promise the final and complete delivery of technical documents before late April, even if some information could be released earlier.  
The Expert insisted to get at least a complete list of expected deliveries and dates to be given to Dr Judt 2 weeks later before his departure to India, but this was obviously not fulfilled, only a revised flow-sheet and some layout sketches was sent in time. In a covering letter to these was mentioned that the basic design for the purchaser's own installations should be provided in beginning of April.
- 27 February:** Meeting and discussions with Dr Judt and the co-expert Mr Bleier.  
During the evening the Expert had a meeting with the representatives Messrs F Hubinger and W-D Poppe from Delkor and was given 2 sets of 3 drawings with general and detailed installation layouts. Also Delkor was asked to specify their document deliveries until week 11 to Dr Judt, but apparently didn't manage.

Second Part of Mission

- 1 March: Briefing in Bombay at UNDP suboffice by Mr M L Pania under very appreciated assistance from Mr P R Gargate, Asst Mgr (Materials), Central Pulp Mills, Bombay office. Telephone conference with Mr N S Sadawarte, Jt Managing Director, Central Pulp Mills, Poona headoffice, with request from Dr Judt; if possible arrange a meeting in New Delhi during the beginning of week 12 with Mr V K Chanana, Joint Secretary, Department of Industrial Development, and other parts involved in the project, in order to clarify the actual status of the project and its future, particularly the economics, during Dr Judt's visit in New Delhi.
- 4 - 5 March: Introduction meetings and discussions with Mr P G Nemade, General Manager, and Mr C Gopinath Rao, Technical Manager, in Fort Songad branch of Central Pulp Mills. All available information, drawings etc, received in Austria from UNIDO and the suppliers the week before, was forwarded to Mr C G Rao in his position as counterpart to the UNIDO experts.
- 6 March: The activities performed in the mill since the UNIDO experts left 28 September 1984 were reported. The mill had been shut down for general overhaul during a number of weeks and was now in proper operation with fresh bamboo. Several laboratory trials with the 2 stages laboratory glass column bubble reactor had been made with good results. The instruments to control the volumes and ratio between CO<sub>2</sub>/air had finally arrived and were installed and operated successfully. The trials had so far been made with 30 % CO<sub>2</sub>, but further trials with 14 % were planned as with flue gas from recovery boiler in the initial stage of the future mill size desilication plant.
- 7 March: A demonstration of a laboratory desilication experiment was arranged to inform and consult the Expert. Some changes in the original 2 stage flow sheet had been made since September 1984. An intermediate buffer tank between the two stages had been installed with the good intention to get a safer control of the stepwise pH-reductions. Restrictions in the pump characteristics had made it necessary to exchange the pump positions, which sometimes could affect the quality and filterability of the precipitation (centrifugal pump in column 2 recirculation). It was agreed to rebuild the units to original design and compare the two flow sheets based on now available black liquor from fresh bamboo, which was not available during the test runs in September 1984.





- 8 - 10 March: Mr Sadawarte arrived in Fort Songad and was given a general briefing about the project situation, based on information from Europe and the recent days discussions in Fort Songad. Mr Sadawarte informed that arrangements were made for the project meeting in New Delhi with Mr Chanana and others. No site preparation activities should be started on the decided desilication plant area until the financing on the Indian side had been agreed upon mutually with GOI and UNDP/UNIDO. The UNIDO Expert and his counterpart informed that they had found that the area intended for the mill size desilication plant, considering the area indications now received from Waagner-Biro and Delkor, seemed to be too small for all installations together. The main reason was the unexpected big diameters of the 3 bubble reactor tanks that W-B show in the layout sketch, resulting in need of the area 30x8 meters. In the tentative layout which was made in September 1984 only max 15x8 meters area was estimated. The new situation had been studied during the recent days and it had been found that rearrangements of the original layout could admit 20x8 meters area for the W-B installation, which had been communicated to Dr Judt by telex for W-B's consideration. It was also found that the Delkor layout had to be "mirror-turned" to fit in the general lay-out. This information had also been transferred to the supplier via UNIDO. Before his departure from Fort Songad Mr Sadawarte arranged a general meeting with all the staff officers. He emphasized that all efforts should be made to find a suitable layout, even if necessary using mill area outside the until now considered. The UNIDO Expert's job description was finally verbally announced for general information and cooperation.
- 11 - 12 March: As a follow up of the meetings with Mr Sadawarte and the Expert's mission work so far everybody going to be involved in the future project implementation was summoned to a general meeting. The notes for the file from this meeting were made and signed by the Expert and his counterpart Mr C G Rac and are attached to this report as APPENDIX 1. A copy of these minutes was given during the debriefing in New Delhi both to Dr Judt and Dr M Kamal Hussein, UNIDO Senior Industrial Development Field Adviser. Of particular interest from the meeting is the decision to elude the underground water tank, which might give space for a L-shaped layout area of sufficient size for the W-B plant. This information was given W-B by telex.
- 11 - 14 March Trials were made with the rebuilt laboratory carbonation pilot plant. The results were excellent and results from one of trials are attached to this report as APPENDIX 2. Copies of the laboratory report was given in New Delhi to Messrs Judt and Hussein.

Third Part of Mission

18 - 21 March: An International Seminar on Energy Conservation in Paper Industry was arranged in New Delhi by Indian Pulp and Paper Technical Association together with UNIDO and GOI.

The seminar was attended by a number of prominent participants and guest lecturers from pulp and paper industries, GOI, CPPRI and UNIDO/UNDP, so the project meeting could be conveniently arranged and took place in the office of Mr V K Chanana at 4 pm on Tuesday, 19 March 1985.

-/- Notes for the file were taken by Mr M K Hussein and are attached to this report as APPENDIX 3.

-/- A separate meeting was also held between GOI, CPPRI and CENPULP representatives regarding the division of investment costs on Indian side. It was later known that a 50/50 percents participation of the total USD 290.000 in rupies was considered by GOI from CENPULP, which now has been agreed, see APPENDIX 4.

The Expert informed UNIDO and CENPULP, though, that his preliminary cost estimates for the installations from India reached USD 390.000 in rupies.

If the final cost estimates, based on actual offers, will be the same, the scope of the Indian supply has to be minimized, e.g. by choice of less expensive steel qualities and thicknesses, which could be justified as the desilication plant first of all shall be a demonstration unit.

-/- The Expert's cost estimates are attached as APPENDIX 5.

Finalizing Part of Mission

Knowing that the total layout has to be solved first of all by the Expert, CENPULP and the suppliers a revised layout sketch was made and sent to Dr Judd in 4 copies and a covering letter on 10 April.

-/- The part of the letter dealing with the layout is copied and attached as APPENDIX 6 and the layout proposal as APPENDIX 7.



SWEDFOREST CONSULTING AB

APPENDICES

**THE CENTRAL PULP MILLS LTD  
FORT SONGADH, DIST : SURAT**

12th March, 1985

UNIDO Project No. US/IND/79/206

Desilication of Bamboo black Liquor

MINUTES OF THE MEETING

Held on : 12th March, 1985  
Venue : Conference room of  
Central Pulp Mill Factory.

Participants:

Mr. C Gopinath Rao		
Mr. A P Nagarkar		CENPULP
Mr. M C Kashikar		
Mr. P P Puntambekar		
Mr. J Leffler		UNIDO Expert

Following discussions took place on matters related to the Full Size Demonstration Plant for Desilication of bamboo black liquor :

- Layout of the proposed plant at the location of the old NESU Liquor Preparation plant was discussed. It was decided that :
  - the underground water tank will be shifted to some other convenient places as it is coming in the way of a compact layout.
  - the three submerge reactors will be located in an 'L' shape layout. In this case, the Delkor filter also will be at a convenient location adjacent to the bubble reactor.
- Dr. Judt will bring with him when he arrives at New Delhi next week the time schedule for drawings and specifications for the bubble reactors and Delkor filter.

: 2 :

3. Waagner Biro and Delkor will give complete details of piping, layout, within their battery limits, specifications of the equipments within their scope as well as other auxiliary equipments to make the unit complete.
4. For example, Waagner Biro should specify the fan specifications for recovery flue gas indicating the material of construction, capacity and the pressure drop across the gas injection nozzles of the submerse reactor etc.
5. Complete instrumentation for the submerse reactor as well as Delkor filter will be supplied along with the equipments.
6. Inter connecting piping, tank fabrication details, structural details, electrical engineering and instrumentation engineering, civil design etc will be carried out by the Cenpulp engineering team.
7. It is not clear as to the scope of supply for instrumentation control panels, control desks etc. The matter to be clarified further from Waagner Biro & Delkor.
8. It has been mentioned that 1 No. tank for the bubble reactor (the 3rd stage) in SS 316 construction will be supplied by Waagner Biro but since the tank is of 6 M  $\phi$  & 4.5 M height, it can not be supplied as single piece because of transportation problems. Hence, it can be supplied in two or three pieces which can be assembled and fabricated at site. The limitation for transportation on Indian roads is 2 Mtrs in width and 10 tons is in weight. There is no restriction on length.
9. For all the motors, control equipments, instrumentation etc to be supplied for the project, the specifications should satisfy either of the following:
  - a) 415 (400-440) volts, 3 phase, 50 cycles/second
  - b) 230 volts, single phase, 50 cycles.
  - c) 24 volts, single phase, 50 cycles.

: 3 :

10. The time schedule for the project will be tentatively as follows:
- a) Time schedule for release of design drawings by Waagner Biro & Delkor will be delivered in March 1985 (expected to be brought to India by Dr. Judt).
  - b) It is likely that the drawings for design work will be released in late April 1985.
  - c) Design work by Cenpulp engineering team will be completed by June 1985.
  - d) Quotations and comparison of quotations and decision on indigenous supply will be completed during May-July 1985.
  - e) Placement of order for indigenous equipments and auxiliaries will be made in June-July depending upon availability of funds from Govt. of India,
  - f) Civil designs to be completed during May and civil work to be started in late May 1985.
  - g) Delivery of Delkor filter will be in Aug-Sept 1985 and bubble reactors in Oct-Nov 1985 at Fort Songadh.
  - h) Site fabrication work to start in Aug-Sept 1985.
  - i) Erection of Delkor filter to be carried out during Sept-Oct 1985.
  - j) Erection of Waagner Biro's system to be carried out during Nov-Dec 1985.
  - k) Delivery of indigenous equipments will be in Jan/Feb 1986 (Delivery period ranges from 5 to 8 months)
  - l) Erection to be completed in March-April 1986.
  - m) Commissioning of the demonstration unit will be in April-May 1986.

*J. Laffier*  
**J. LAFFIER**  
 UNIDO EXPERT

*C. Gopinath Rao*  
**C GOPINATH RAO**  
 CENPULP

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Chemulp Technical Dept.  
Date: 14.03.1985

DESILICATION OF WBL  
(Trial carried out on 12.03.1985)

Submerge bubble reactor - Two stage carbonation

1. Experimental conditions & observations:

Initial BL pH at 30°C	:	12.3
Initial BL Twaddel at 65°C	:	11.5°
Compressed air pressure	:	15 psi
CO <sub>2</sub> content in gas (CO <sub>2</sub> + air)	:	28%
Temperature of BL carbonation	:	70°C
pH of BL in I column at 30°C (mixed BL from memmert tank)	:	11.3-10.8
pH of BL in II column at 30°C (final over flow from II column)	:	10.5-10.1
Filtration of carbonated BL at 10.34	ph :	500 ml/27 secs
Filtration of carbonated BL at 10.10	ph :	500 ml/29 secs
Filtration of mixed carbonated BL at pH 10.32 (immediate filtration)	:	500 ml/34 secs
Colour of silica sludge	:	grey white
Output BL flow	:	<u>700 ml-1000 ml</u> 1 min
CO <sub>2</sub> + air mixed flow	:	2-5 lits/l min
CO <sub>2</sub> + air pressure in I column	:	0.2-0.4 Kgs/cm <sup>2</sup>
CO <sub>2</sub> + air pressure in II column	:	0.2-0.4 Kgs/cm <sup>2</sup>

2. Sedimentation and filtration expts.

500 ml mixed carbonated BL (pH 10.32) kept for hot sedimentation for 1 hr.

Filtration after 1 hr retention:-

Filtration at 52°C	:	500 ml/32 secs
Filtration at 63°C	:	500 ml/47 secs
Sludge volume in 500 ml of BL (carbonated BL)	:	40 cc
Sludge filtration time (40 ml sludge + 60 ml BL)	:	100 ml sludge/9 secs
Initial BL silica	:	6.2 gpl
Carbonated BL silica (mixed BL pH 10.32)	:	1.26 gpl
Silica removal	:	79.6 %

100/100 - 100%

19 March 1985

NOTE FOR THE FILE

US/IND/79/206 - Desilication Pilot Plant for  
Bamboo Black Liquor

A meeting was held in the office of Mr. V.K. Chanana, Joint Secretary, Department of Industrial Development, at 4 p.m. on Tuesday, 19 March 1985.

It was attended by:

1. Mr. V. K. Chanana
2. Dr. Rajesh Pant, Director, Central Pulp and Paper Research Institute, 104/11, Vasant Vihar, Dehra Dun
3. Mr. N. S. Gadawarte, Joint Managing Director, The Central Pulp Mills Ltd., Fort Songad, Dist. Surat, 394660 Gujarat State
4. Mr. N.K. Sharma, Research Officer, Department of Industrial Development, Udyog Bhavan, New Delhi
5. Mr. M. Judd, UNIDO Backstopping Officer
6. Mr. Janne Leffler, Expert under the project and
7. Mr. Kamal Hussein, UNIDO Senior Industrial Development Field Adviser.

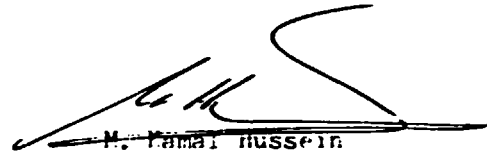
After discussing development on project activities and implementation, the following points expressing common understanding of the meeting were agreed upon:

1. All project equipment ordered under the project will be assigned to the Central Pulp and Paper Research Institute and be sent to the Central Pulp Mills Ltd., Songad. UNIDO should inform equipment suppliers to address consignments to the Resident Representative, UNDP, 55 Lodhi Estate, New Delhi, for project US/IND/79/206: Desilication Pilot Plant for Bamboo Black Liquor, at the Central Pulp Mills Ltd., Fort Songad, Dist. Surat, 394660 Gujarat State. The Receiving and Inspection Reports are to be signed by both - Central Pulp and Paper Research Institute and the Central Pulp Mills Ltd.
2. Assurance was given that Government counterpart funds needed for the commissioning of the unit, for infrastructure and for running expenses will be made available <sup>equipment</sup> once received. The approval of the additional funds required (corresponding rupees to \$ 220,500) is in process and communication regarding the approval will be intimated in a month's time.



- 2 -

3. A Project Advisory Committee would be formed from the parties concerned to minimise communication gaps.
4. The draft project document prepared by UNIDO and handed over to the Department of Industrial Development, during the meeting, which reflects the latest situation regarding this project, would be signed by the Ministry of Industry, CIDA and UNIDO.



M. Kamal Hussein  
UNIDO Senior Industrial Development  
Field Adviser

- cc: Mr. V. K. Chakana  
cc: Mr. M.S. Gadawarte  
cc: Dr. Rajesh Pant  
cc: Mr. Janne Leffler - with the request to pass on a copy of this  
Note to CIDA also.  
cc: Mr. W. Judt, UNIDO, Vienna  
cc: Mr. N.K. Sharma, Research Officer, Dept. of Industrial Dev.



J. Leffler

19/3/1985

Mill size demonstration desilicication plant at  
 Central Pulp Mills, Fort Songad, India.

Cost estimates for installation

	RS.	USD
<u>UNIDO</u>		600,000
<u>GOI</u>		
2 bubble reactors, piping	1,400,000	
2 propeller pumps	250,000	
4 motors	115,000	
Flue gas blower, ducting	200,000	
Hot retention	160,000	
Clarification	500,000	
Filtrate receiver, moist. trap, piping	100,000	
Realkalization	200,000	
Tanks, pumps, piping	440,000	
Motors etc.	400,000	
	<u>3,765,000</u>	(290,000)
<u>CPM</u>		
Manpower etc.	600,000	
Site development, civil structures	600,000	
Transports	100,000	
	<u>1,300,000</u>	(100,000)
	<u><u>4,065,000</u></u>	<u><u>600,000</u></u>
Total		(+390,000)



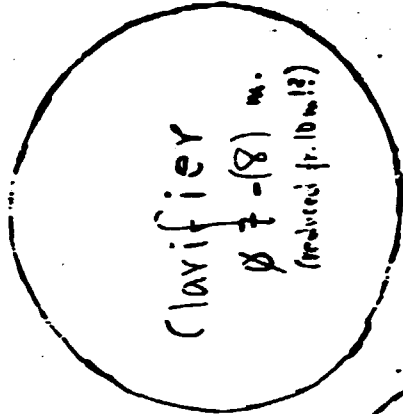
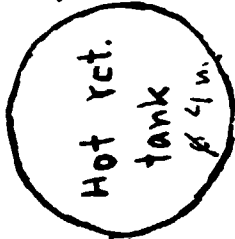
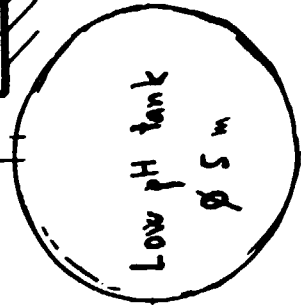
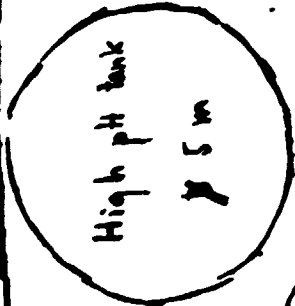
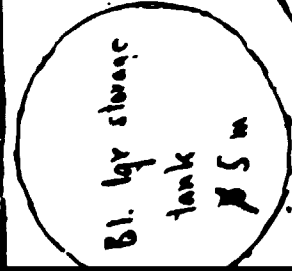
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REVISED (AY: T, decilication plant proposal)  
BY: 1. Kaffha

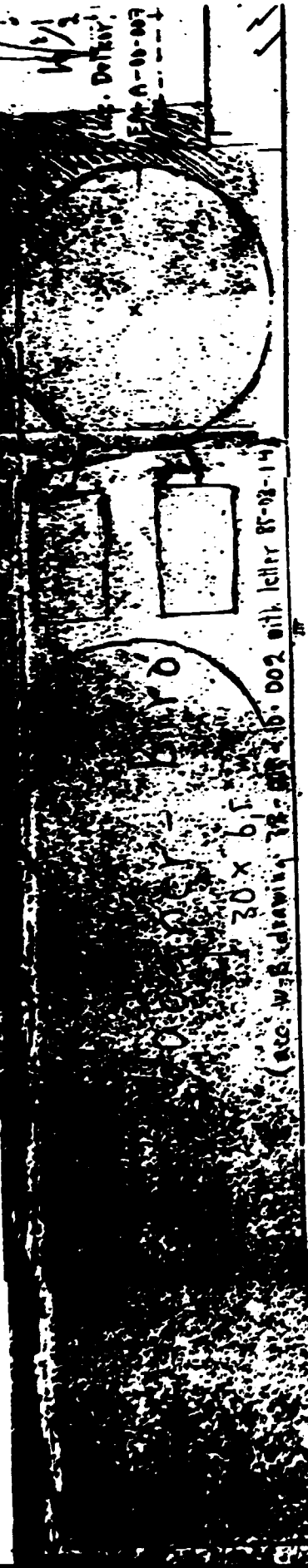
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ELECTRICAL ROOM



Instrumentation/control area. Facilities for operators. 3 x 10 m.



(acc. w/ drawing 12-002-002 with letter 85-02-14)

WATER  
UNICO PROJECT 16/IND/30/206  
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