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20614

IMPLEMENTATION OF ENVIRONMENTALLY CLEANER TECHNOLOGIES

UNIDO Project: US/IND/90/244/2

FINAL REPORT (Phase 1)

CENTRAL LEATHER RESEARCH INSTITUTE
(Council of Scientific and Industrial Research)
ADYAR, MADRAS-600020

MAY, 1994

PREAMBLE

UNIDO has awarded the sub-contract 2 of Project US/IND/90/244/2 to Central Leather Research Institute (CLRI). Madras to Implement Environmentally Cleaner Technologies in selected tanneries in Pallavaram area near Madras City. Following technologies have been selected in consultation with UNIDO for implementation:

i) Ammonia free and cleaner wet tanning operations
ii) Chrome recovery and reuse
iii) Mechanical desalting
iv) Sulphide reduced liming

CLRI has formed a special task force for the implementation of the above project.

The Flash Report 1 submitted to UNIDO in December 1992 covered the basic profiles of the above projects. technical specifications of the equipment and the schedules of the implementation programme. Flash Report 2 submitted to UNIDO in September 1993 highlighted the progress of work achieved during December 1992 to September 1993 with reference to the above project. It also provides information on the agreements executed by CLRI with various user tanneries as identified in Flash Report 1, the status of equipment procurement, progress of civil and other works at the site and location aspects of the proposed facilities.

Certain unforeseen delays had taken place in this programme particularly in the execution of formal agreements with the user tanneries and in selection of the subcontracting agencies for undertaking the erection work at site. However, intense efforts were made subsequently to speed up the process of implementation. It is gratifying to note that all the subcontracting agencies have installed the facilities at various sites by the end of January 1994 for trial runs.

This report gives a summary of the work carried out from the beginning to the end of Phase 1, i.e. identification of tanneries, design, selection of tenders and awarding of contract to sub-contract.

(K.V. Raghavan)
Director
Central Leather Research Institute
Adyar, Madras 600 020, INDIA

C O N T E N T S

3. SULFIDE REDUCED LIMING PROCESS

4. MECHANICAL DESALTING

PROPOSED PROJECTS AT A GLANCE

Project Title	Objectives	Estimated Project Cost (Rs. million)			Completion Time, Months with 1st October 1992 as starting date			
		UNIDO	CLRI	USER AGENCY	Equip Ordering	Instal-lation	Commis-sioning	Demonstra-tion
Ammonia free and Cleaner Wet Tanning Operations	a) Inprocess Pollution Control b) BOD/COD Reduction c) Better Water/Chem Management d) Improved working Environment	1.85	0.5	6.75	4 (Feb '93)	12 (30 Oct 93)	15 (30 Nov 93)	18 (31 Dec 93)
Chrome Recovery and Reuse	a) Minimization of Chromium wastage b) Minimization of effluent treatment costs c) Easier Disposal of Chrome Sludge	1.36	0.2	0.90	4 (Feb '93)	9 (31 Jul 93)	12 (Sept 93)	12 (31 Oct 93)
Sulphide Reduced Liming	a) Substantial Reduction in Sulphides in Waste Liquors b) BOD/COD Reduction c) Energy Reduction d) Cleaner Working Environment	0.2	0.04	0.06	4 (30 Jan 93)	6 (30 Mar 93)	8 (30 May 93)	10 (31 Jul 93)
Mechanical Desalting	a) Reduction of Salt content in Soak Liquors b) Minimization of ground water contamination c) Recycle of Process liquors containing salts	0.15	0.04	0.03	3 (31 Dec 93)	5 (28 Feb 93)	7 (30 Apr 93)	9 (30 Jun 93)

TIME SCHEDULE FOR IMPLEMENTATION OF CLEANER TECHNOLOGIES

STARTING DATE : 1ST OCTOBER 1992

ACTIVITIES	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
										(MONTHS)						
I. MECHANICAL DESALTING																
1. Field Study	XXXX															
2. Specifications to UNIDO	XXXX															
3. Equipment ordering		XXXX														
4. Installation			XXXX													
5. Commissioning				XXXX	XXXX											
6. Demonstration and Training						XXXX	XXXX									
II. SULFIDE BASED LINING																
1. Field Study	XXXX															
2. Specifications to UNIDO	XXXX															
3. Equipment Ordering		XXXX	XXXX													
4. Installation				XXXX	XXXX											
5. Commissioning						XXXX	XXXX									
6. Demonstration and Training								XXXX	XXXX							
III - CHROME RECOVERY AND REUSE																
1. Field Study	XXXX															
2. Field Improvement		XXXX	XXXX													
3. Inplant Layout Preparation		XXXX	XXXX													
4. Execution of Civil Works				XXXX	XXXX											
5. Specifications to UNIDO	XXXX															
6. Design Package Preparation		XXXX														
7. Ordering of Equipment				XXXX	XX											
8. Implementation through Contract Agency					XX	XXXX	XXXX	XXXX	XXXX							
9. Standardization/Training										XXXX	XXXX	XXXX				
IV - AMMONIA FREE AND CLEANER WET TANNING OPERATIONS																
1. Contract with User Tannery	XXXX	XXXX														
2. Finalization of cost estimates to be sent to UNIDO	XXXX	XX														
3. Equipment specifications finalisation to be sent to UNIDO		XXXX														
4. Ordering of Equipments			XXXX	XXXX	XXXX											
5. Receipt/Fabrication of equip.						XXXX	XXXX	XXXX								
6. Design Package Preparation			XXXX													
7. Selection of Implementing Agency					XXXX	XXXX										
8. Civil Works									XXXX	XXXX	XXXX	XXXX				
9. Installation of Equipments													XXXX	XXXX		
10. Testing, Commissioning														XXXX	XXXX	
11. Demonstration and Training													XXXX	XXXX	XXXX	

AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

IMPLEMENTATION OF CLEANER TECHNOLOGIES

1.0. AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

1.1. BRIEF DESCRIPTION OF THE PROJECT

For the sustained growth and development of Indian leather industry, implementation of cleaner production technologies is essential. Realising this need, CLRI through financial support from UNIDO is implementing environmentally friendly technologies to minimize ammonia and other toxic chemical load in the tannery waste waters. These technologies aim at in-process control of pollutants through improved processing techniques and deployment of environmentally cleaner chemicals.

A commercial scale demonstration facility of the above process is being set up at M/s Tejoomals Ltd., tannery at Pernambut, North Arcot Ambedkar District, Tamil Nadu. Implementation of this project will enable CLRI/UNIDO to demonstrate the techno-economic potential of the environmentally friendly option to various other tanneries in the area and to achieve multiplier effect therefrom. The project also aims at financial participation by the host or user tannery to achieve closer involvement in the technology absorption.

The CLRI project team in consultation with the Chief Technical Adviser of UNIDO selected M/s Tejoomals,

Tannery at Pernambut as the host tannery for the absorption and demonstration of the above technology. A bilateral agreement was entered into between CLRI and the host tannery for the implementation of this project activity.

1.2. BASIC OBJECTIVES OF THE PROPOSED PROJECT

i) to reduce ammonia, chromium and other toxic chemical/biological load in the tannery waste waters through improved in-process measures and implementation of cleaner technologies.

ii) to achieve better water management through water input control and float recycles.

iii) to minimize the rejects of finished leather and batch to batch variation of its quality through improved in-process control measures.

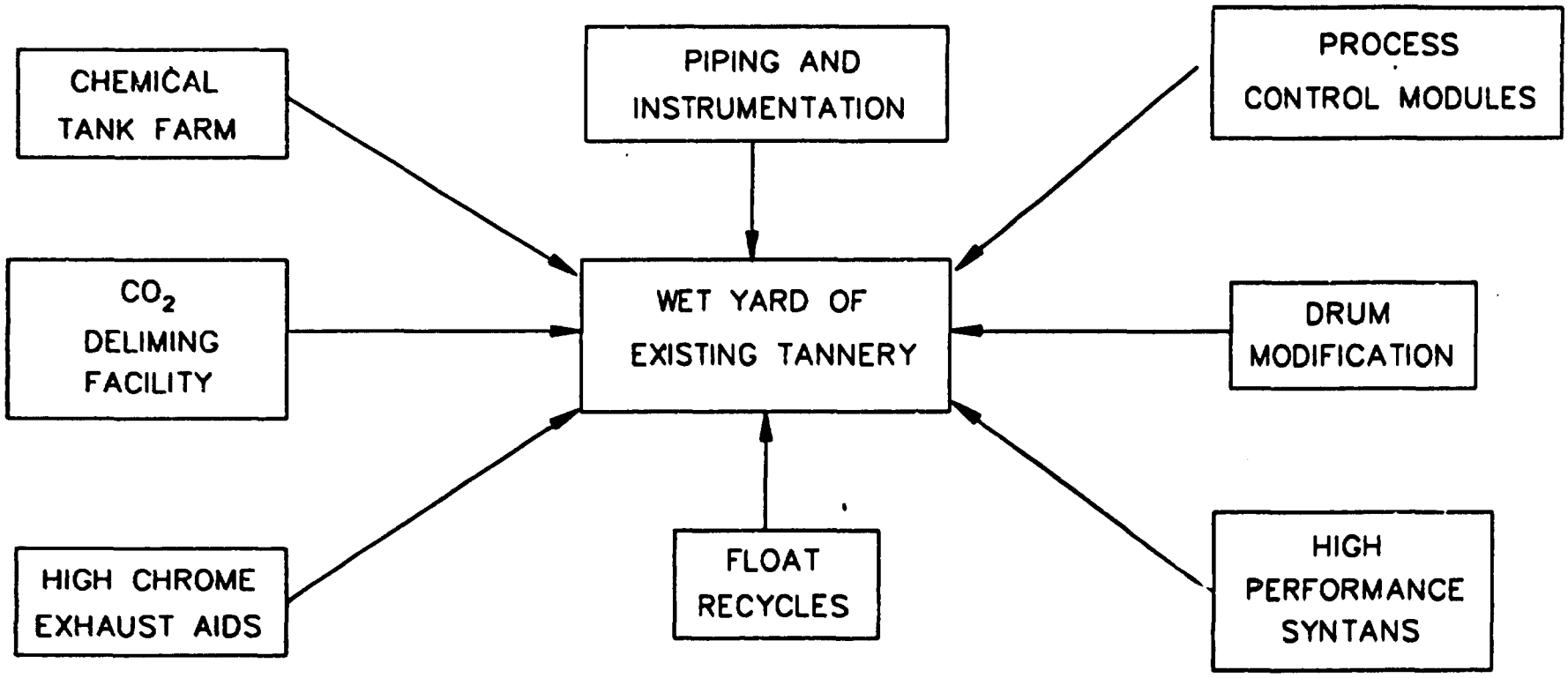
iv) to create better working environment and improved house keeping in tannery wet section.

v) to provide adequate protective measures to the tannery personnel to minimize occupational health hazards of chemical handling and processing techniques and

vi) to provide on-job training to the host tannery personnel in the operation and maintenance of the add-on facilities.

1.3. NATURE OF THE TECHNOLOGIES TO BE EMPLOYED

1.3.1. To achieve the objectives stated above, following technologies and engineering options will be implemented (See Fig. 1):



F 3.1. ADD-ON FACILITIES AND TECHNOLOGIES TO BE IMPLEMENTED IN THE EXISTING WET YARD OF A PALLAVARAM TANNERY

i) Incorporation of CO_2 deliming facility along with necessary control instrumentation.

ii) Installation of input and output monitoring facility for chemical and water additions with appropriate data logging systems. They are developed by CLRI and the Madras Centre of the Central Electronic Engineering Research Institute (CEERI), Pilani, India.

iii) Application of high chrome exhaust aids and high performance syntans for better chrome management.

iv) Reorganisation of the existing wet section in the host tannery by equipping with working platform, drains and improved chemical handling systems

v) Preparation of operation and safety manuals for tannery wet yard

1.3.2. Brief Process Description

Fig. 2 shows the process engineering flow scheme for the proposed demonstration facilities consisting of instrument controlled water, chemical, pH and CO_2 handling systems, modified drum configuration, chemical tank farm and data logging system. Deliming, pickling, chroming and rechroming, neutralization, fatliquoring and dyeing operations have been selected for implementing the environmentally cleaner options.

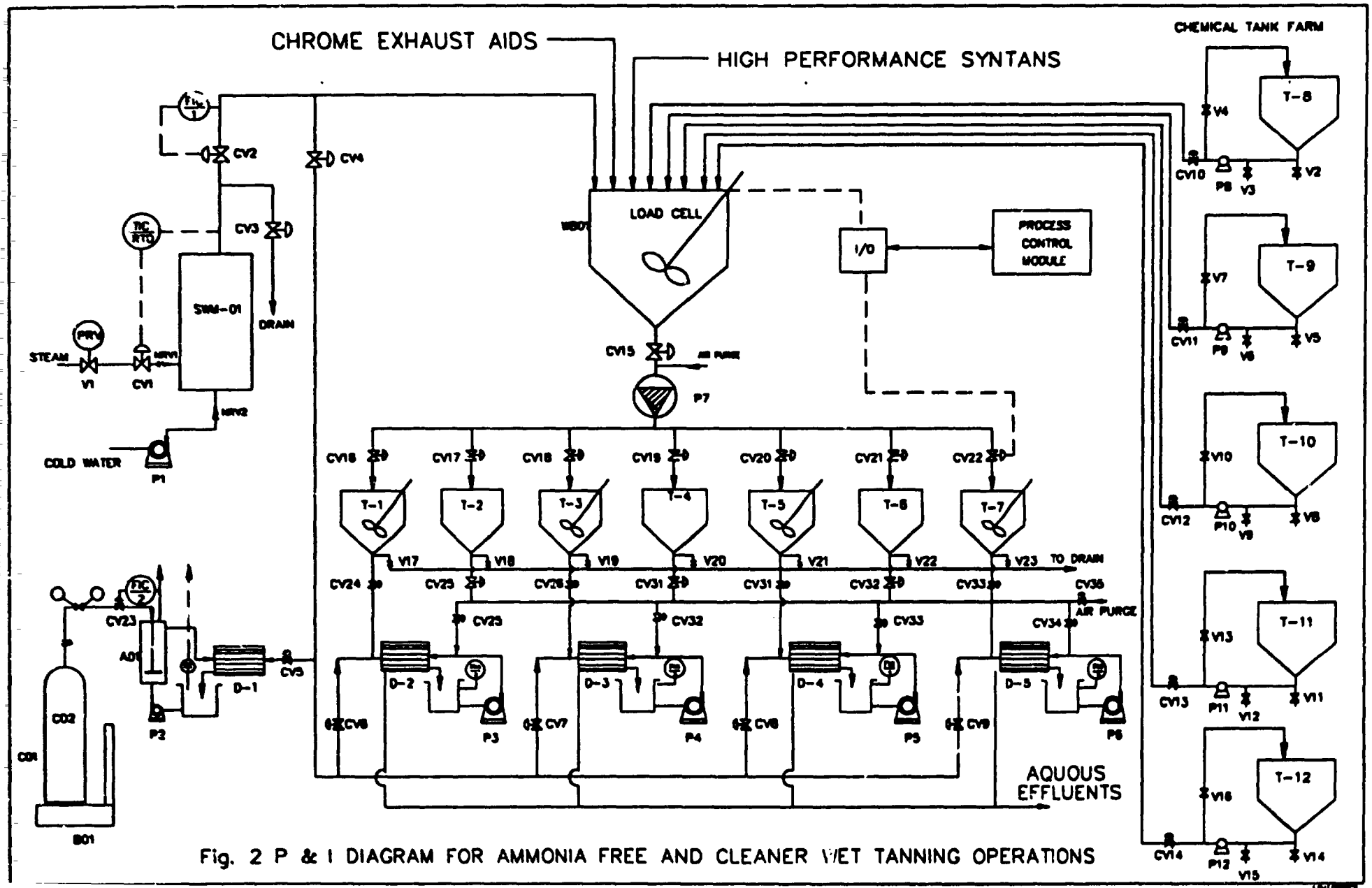


Fig. 2 P & I DIAGRAM FOR AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

The charging of chemicals and water will be monitored as per the revised process recipe and all the operations will be properly sequenced for data logging purposes.

As a departure from conventional practice, CO_2 gas will be continuously introduced into the absorption section of the drum and the deliming operation will be closely monitored with on the spot quality checks. Similarly, continuous and regulated addition of acid with pH control will be resorted to in pickling operations. High performance syntans and chrome exhaust aids will be introduced during tanning and retanning operations keeping a close watch on effluent characteristics.

1.3.3. Effluent Stream Characteristics

The delime bate stream is the predominant source of ammonia in tanyard waste water (5000 mg NH_3 - N/litre) and contributes to nearly 33% of the Total Kjeldahl Nitrogen (TKN). CO_2 deliming technology, developed by CLRI, will enable the tannery to drastically reduce total ammonia nitrogen in the effluent stream. Incorporation of high chrome exhaust aids, high performance syntans and other inplant control measures developed by CLRI will contribute to the significant reduction of chemical/biological load (BOD/COD) in the effluent waste waters as shown in Table 1.

TABLE 1 : CHARACTERISTICS OF COMPOSITE WASTE WATER FROM RAW TO FINISH PROCESS (CHROME TANNING)

Parameters	Conventional Process (Actual)	Ammonia free Process (Anticipated)
pH	7.4-8.2	7.2-8.0
Alkalinity (as CaCo3)	900-1600	700-1400
B.O.D. 5 days at 20 C	1000-1800	900-1650
C.O.D.	2400-4250	2200-4000
Total solids	18050-27200	16000-25000
Dissolved solids	16030-23400	14000-21000
Suspended solids	2020-3800	2000-4000
Chloride (as cl)	5600-9500	5600-9500
Sulphate (as SO4)	1820-4000	1200-2500
Sulphide (as S)	75-180	60-130
Kjeldahl Nitropen (as N)	580-1280	400-1000
Phosphate (as P)	2.8-5.0	2.8-5.0
Chromium (as Cr)	230-400	100-180

Note: All values except pH are expressed in mgs/l

1.3.4. Training of Tannery Personnel

On-job training of host tannery personnel (number has been mutually agreed upon) will be one of the main activities of the proposed program. The existing skills of their personnel is being updated and ehnanced by imparting training (duration : 15 days) in the following areas:

i. CO_2 gas handling and flow monitoring
ii. Controlled addition of water and chemicals with appropriate instrumentation
iii. Online monitoring of process parameters
iv. Operation of pH control system attached to the drum

v. Safe handling of chemicals and rotating equipments

vi. Data logging and information retrieval

vii. Time sequencing of process operations

First phase training has already imparted to their personnel at the pilot scale demonstration plant at the CLRI, Madras.

1.4. PROJECT COST PROJECTIONS

Basis : Capacity of the plant : 2000 goat skins/day
No. of working days : 300/yr
Process : Raw skins to finished leather

The cost projections for implementing the above cited cleaner technologies were made at the beginning of the project implementation. Annexure I compares the techno-economics of implementing conventional and environmentally cleaner technologies as new ventures. Financial and Technical norms as applicable to the Indian leather industry have been considered in the techno economic analysis. Annexure II shows the cost benefit analysis for implementing cleaner technology as an add-on facility to an existing tannery. Annexure III shows the capital cost of an add-on facility for implementing cleaner technology.

The cost analysis shows that the additional capital cost required for the implementation of environmentally cleaner technology can be recovered with

attractive returns. This is due to the significant material and energy savings which will accrue on implementing the cleaner technology, less chemical load in effluents and less rejections in lower ends of leather.

1.4.1. Accepted Mode of Financing

Implementation of ammonia free and environmentally cleaner tanning operations in an existing tannery, the additional capital investment required works out to be Rs 2.6 million (USD 0.1 million). The following mode of financing has been accepted:

MODE OF FINANCING

1. UNIDO funds for capital equipment : USD 52,000
2. Design Engg, know-how package and other charges to be absorbed by CLRI as counter part expenditure : Rs. 0.50 million
3. Clients contribution Rs. 1.00 million

1.5. WORK PLAN

Initially, it was proposed to implement the project over a period of 15 months excluding demonstration time. A detailed work plan was prepared for the purpose along with the milestones to be achieved during this period. The plan had to be revised twice to accommodate unforeseen delays. The latest schedule is highlighted in Annexure IV and V.

1.6. Execution of Agreement with M/s Tejoomals Limited

The Central Leather Research Institute (CLRI) had entered into an agreement with M/s Tejoomals Limited on 31st May 1993 for implementing the above project at their tannery site at Pernambut, Tamilnadu State, India. The scope of the agreement covers:

i) Installation, commissioning and demonstration of the process technology by CLRI, Madras

ii) The Tejoomals shall supply at its own cost the requisite quantity of chemicals/raw materials within ten days from the date of such a request by the CLRI.

iii) The Tejoomals shall provide free access to the CLRI and UNIDO personnel to visit the site as and when required.

iv) The Tejoomals shall allow demonstration of the operational aspects of the control and other systems and the efficacy of the technology to the interested representatives of the leather industry as recommended by CLRI/UNIDO. This facility shall be made available for demonstration for a period of 3 years and can be extended on mutual agreement with UNIDO/CLRI. The exact time and duration of each demonstration shall be finalized by CLRI in

consultation with Tejoomals.

v) Tejoomals shall also participate in techno-economic assessment of the technology.

1.7. Financial Arrangement

To facilitate the above, M/s Tejoomals had earmarked a sum of Rs.1 million as their counterpart implementation cost. The following facilities were created at their site:

i) Civil works covering working platforms, control room and drain system

ii) Drum modifications

iii) CO_2 deliming accessories

iv) Pipings and fittings

v) Accessories to liquid addition systems

vi) Electrical/electronic accessories

The following financial arrangement was agreed by M/s Tejoomals Ltd:

Rs.0.5 million	already paid to CLRI on signing the agreement
Rs.0.5 million	pledged for making payment for procurement of equipments/ facilities and services as specified by CLRI from time to time during the implementation of the proposed activity

A copy of the agreement is given in Annexure VI

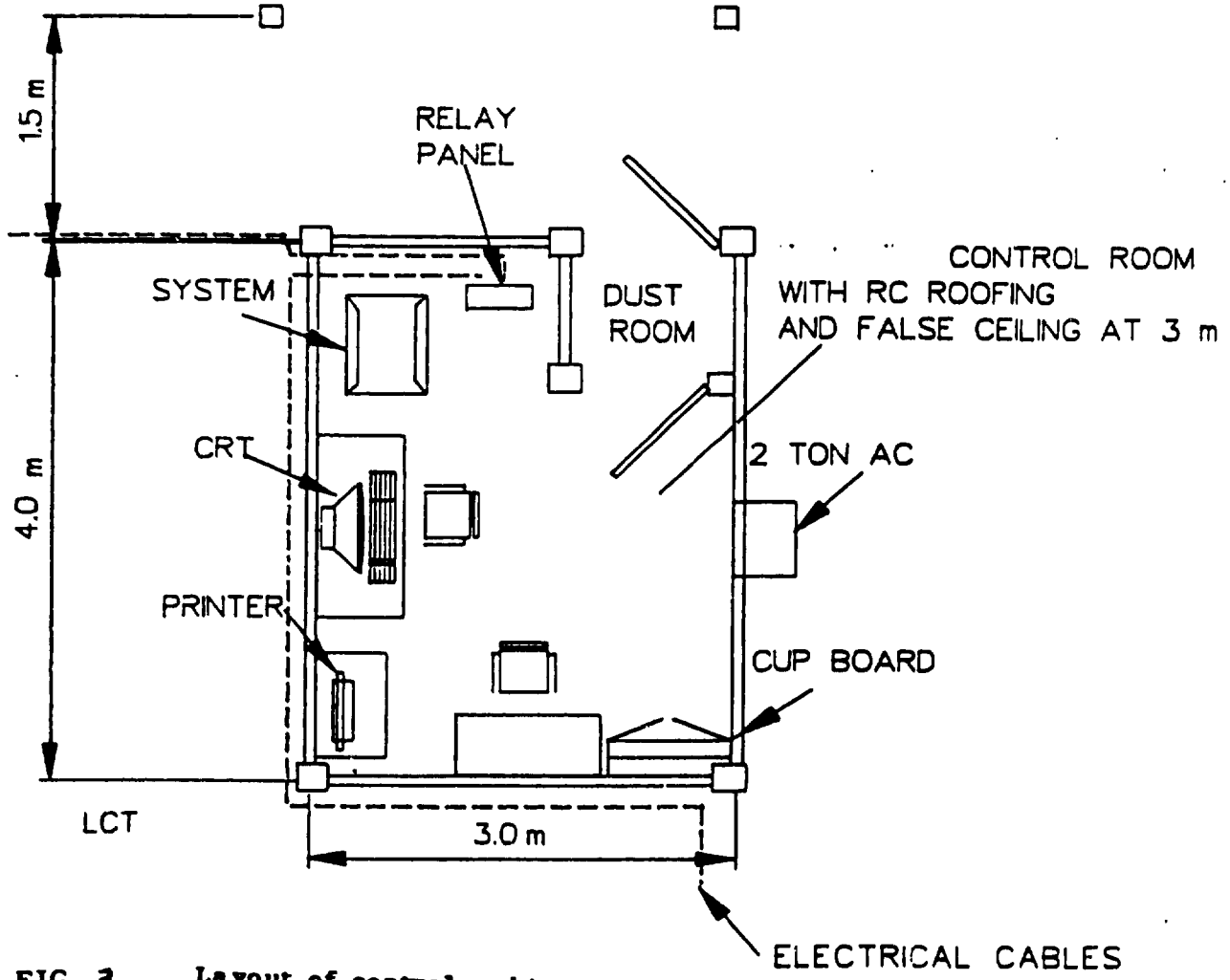


FIG. 3 **Layout of control cabin**

1.7.1. Status of Equipment Purchase Process

Table 2 provides the list of equipments procured with UNIDO funding. The CLRI has received the formal clearance from UNIDO vide their Fascimile Transmission No.7835 dated 3.9.1993 for the placement of orders for the above equipments. CLRI has already procured all these equipments. Copies of the Purchase Orders are given in Annexure 1.2 of Flash Report 2.

1.7.2. Processing of tenders for implementation of chemical Tank Farm and piping

This work was executed utilizing the counterpart fund received from M/s Tejoomals Ltd, Pernambut. A limited tender (Annexure 1.3 of Flash Report 2) was floated during August 1993 and competitive bids were received during 2nd week of September 1993. The bids were evaluated and the most competent sub-contractor was selected to undertake the installation work of the chemical tank farm and the related process piping. The installation work is expected to be completed by the end of March 1994.

1.7.3. Sampler Assembly tc Existing Drums

The existing drums at the user tannery were partially modified and equipped with float liquor sampler for pH and other process parameter monitoring and control. FRP has been selected as the material of construction in view of its light weight, good corrosion

TABLE 2

Equipment Procured from UNIDO Funds
(Ammonia Free and Cleaner Wet Tanning Operations)

S. No.	Ref. No.	Name of the Equipment	Quantity.	Tenders Issued	No. of Tenders Received	Present Status of Procurement: Selection has been made	Present Status of Procurement: Interviewed	File No.	Remarks	Cost of Equip. Rs. in (Lakhs)	Delivery Schedule (Weeks)
01	2.5.2	Co2 Gas Cylinders with Regulators	2	3	3	Yes	No	30(8)/UNIDO/95-PUR.	UNIDO Approved Order Placed	0.19	3
02	4.1	Air Compressor with Storage tank	1	3	2	Yes	No	30(4)/UNIDO/95-PUR.	UNIDO Approved Order Placed	0.17	4
03	6.2.2	Steam control water heater system	1	2	2	Yes	No	30(6)/UNIDO/95-PUR.	UNIDO Approved Order Placed	0.40	8
04	6.2.2	Steam control valve with pressure reducer	1	5	3	Yes	No	30(5)/UNIDO/95-PUR.	UNIDO Approved Order Placed	0.485	16
05	8.0	Control module system	1	1	1	Yes	No	30(3)/UNIDO/95-PUR.	UNIDO Approved Order Placed	8.75	20
06	6.2.2.1	Temperature transmitter	1	11	2	Yes	No	30(10)/UNIDO/95-PUR	UNIDO Approved Order Placed	0.097	16
07	2.6.1 | 6.2,6.3 | 3.2.1	Centrifugal Pumps	3	9	5	Yes	No	30(1)/UNIDO/95-PUR.	Awaiting UNIDO's clearance	1.07	8
08	2.6.2	PH Transmitters	4	4	2	Yes	Yes	30(7)/UNIDO/95-PUR.	Awaiting UNIDO's clearance	1.04	8
09	6.2.3	Flow Indicator Controller for Water	1	1	1	Yes	No	30(2)/UNIDO/95-PUR.	Awaiting UNIDO's clearance	0.70	16
10	7.1 & 7.2	2/2 way ball Valve 1" -- do -- 1.5" 2/2 plunger Valve, 2"	21 2 7	11	1	Yes	Yes	30(9)/UNIDO/95-PUR.	Awaiting UNIDO's clearance	3.70	10
		Total								16.402	

CLRI undertakes to limit the financial support by UNIDO to USD 52000 and any cost overrun will be absorbed from CLRI/counterpart contribution of the client.

resistance and flexibility in fabrication. Fig. 4(a) to 4(e) provide mechanical details of the sampler assembly. A prototype has already been fabricated and is being tested at the site for its field performance. An alternative design was also developed for testing.

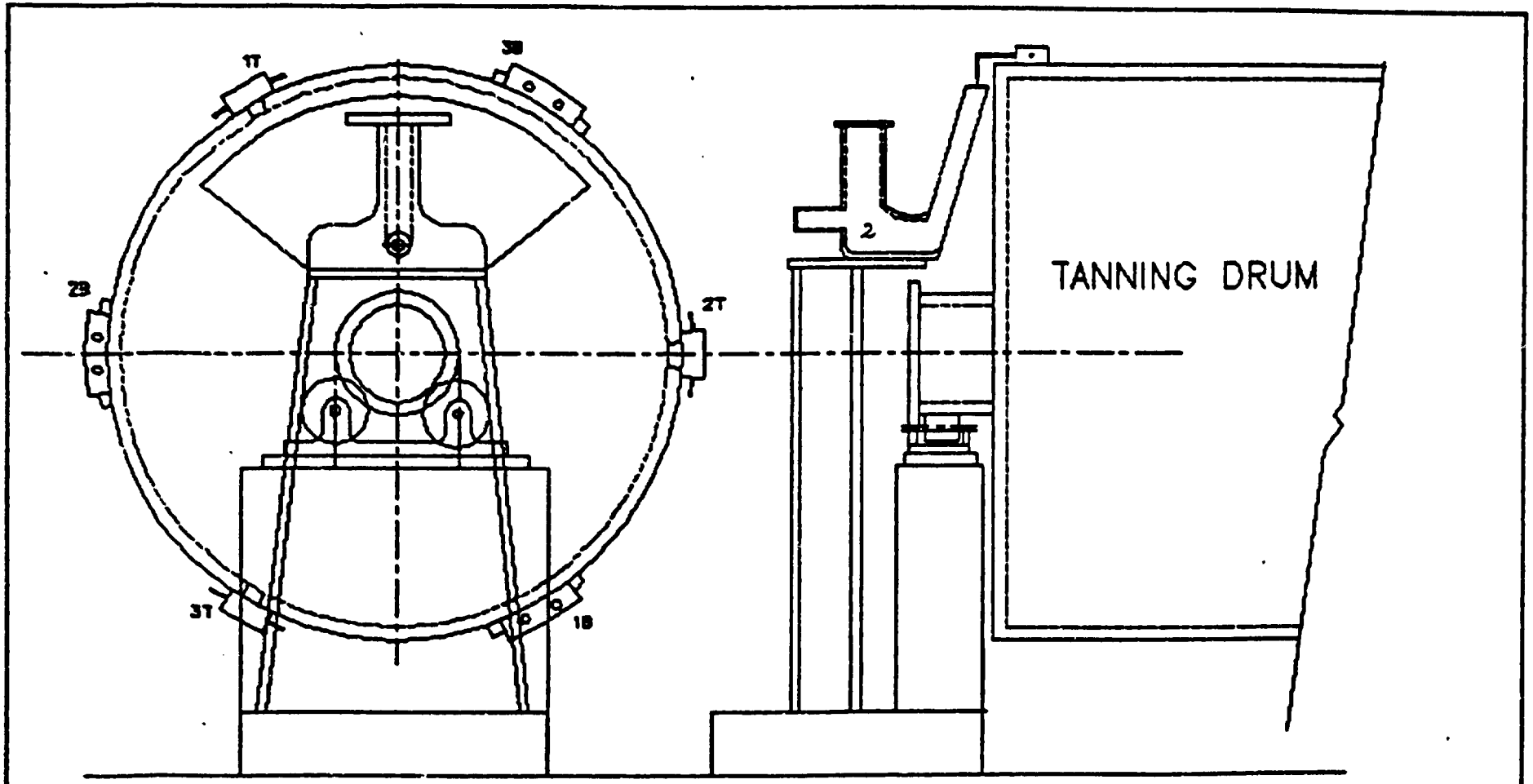
1.8. Visit of Experts

1.8.1. Visit of UNIDO Project Officer

Mr J Buljan, the Project Officer, UNIDO, visited the CLRI, Madras on 15th and 16th July 1993. He held detailed technical discussions with the CLRI project teams pertaining to their implementation. He visited the tannery of M/s Tejoomals Limited, Pernambut to assess the site conditions and the technical capabilities of the tannery personnel for implementation of the Ammonia free and cleaner wet processing technology. He stressed the need for speeding up the implementation programme to achieve the pre-agreed time targets. The CLRI team assured him that all efforts would be made to complete the project on time.

1.8.2. Visit of Prof KH Munz from the Testing and Investigating Institute for Leather, Vienna, Austria

As part of the cleaner technology implementation programme of UNIDO, Prof KH Munz visited the CLRI from 20 to 30 July 1993. He held extensive scientific disussions with the CLRI project team on CO-2 deliming and pickle free chrome tanning. He visited the



Tube connection 1T – 1B
Tube connection 2T – 2B
Tube connection 3T – 3B

FIG. 4 (a)

SAMPLER ASSEMBLY TO DRUM

CLRI
MADRAS

Sheet	
Drawn	V.R.L
Scale	

AMMONIA FREE CLEANER & WET TANNING OPERATION

VRL/UNI1239

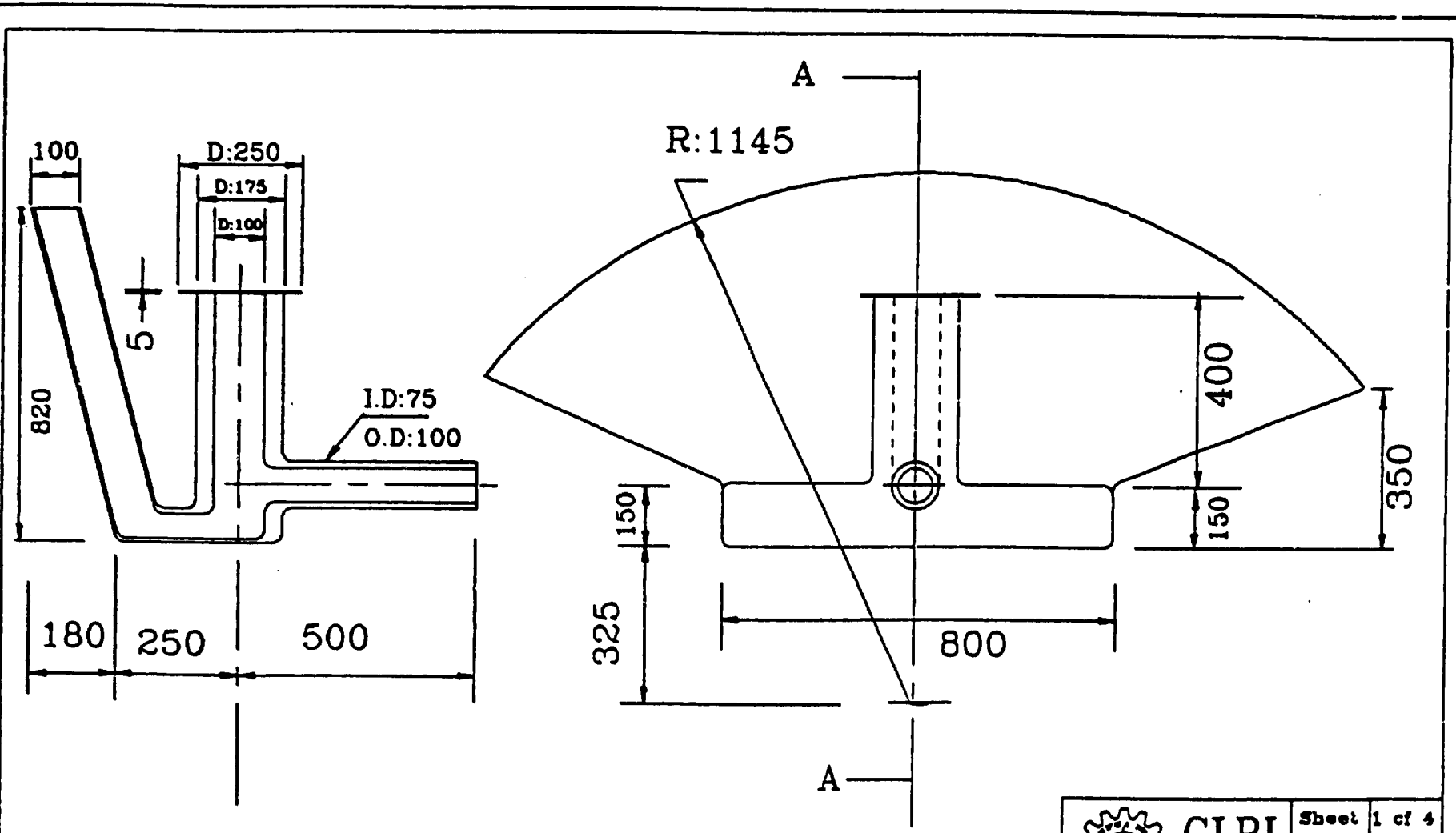


FIG. 4 (b) FLOAT COLLECTOR

Material: FRP
No: 4

CLRI MADRAS	Sheet	1 of 4
	Drawn	LSM
	Scale	1:5

AMMONIA FREE CLEANER AND WET TANNING OPERATIONS

LSM/UNI1240

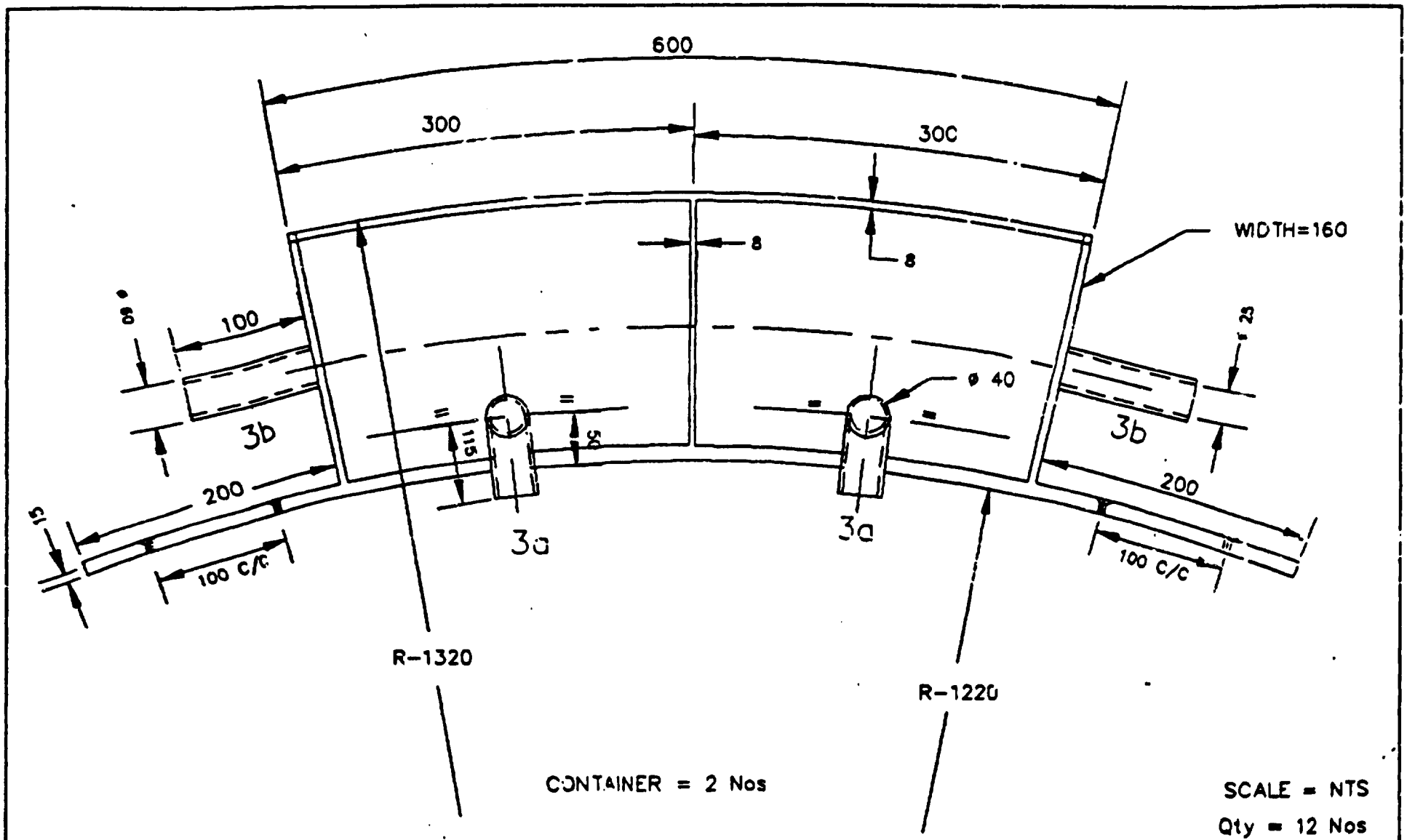


FIG. 4 (c) SAMPLE COLLECTION BOX (FRP)

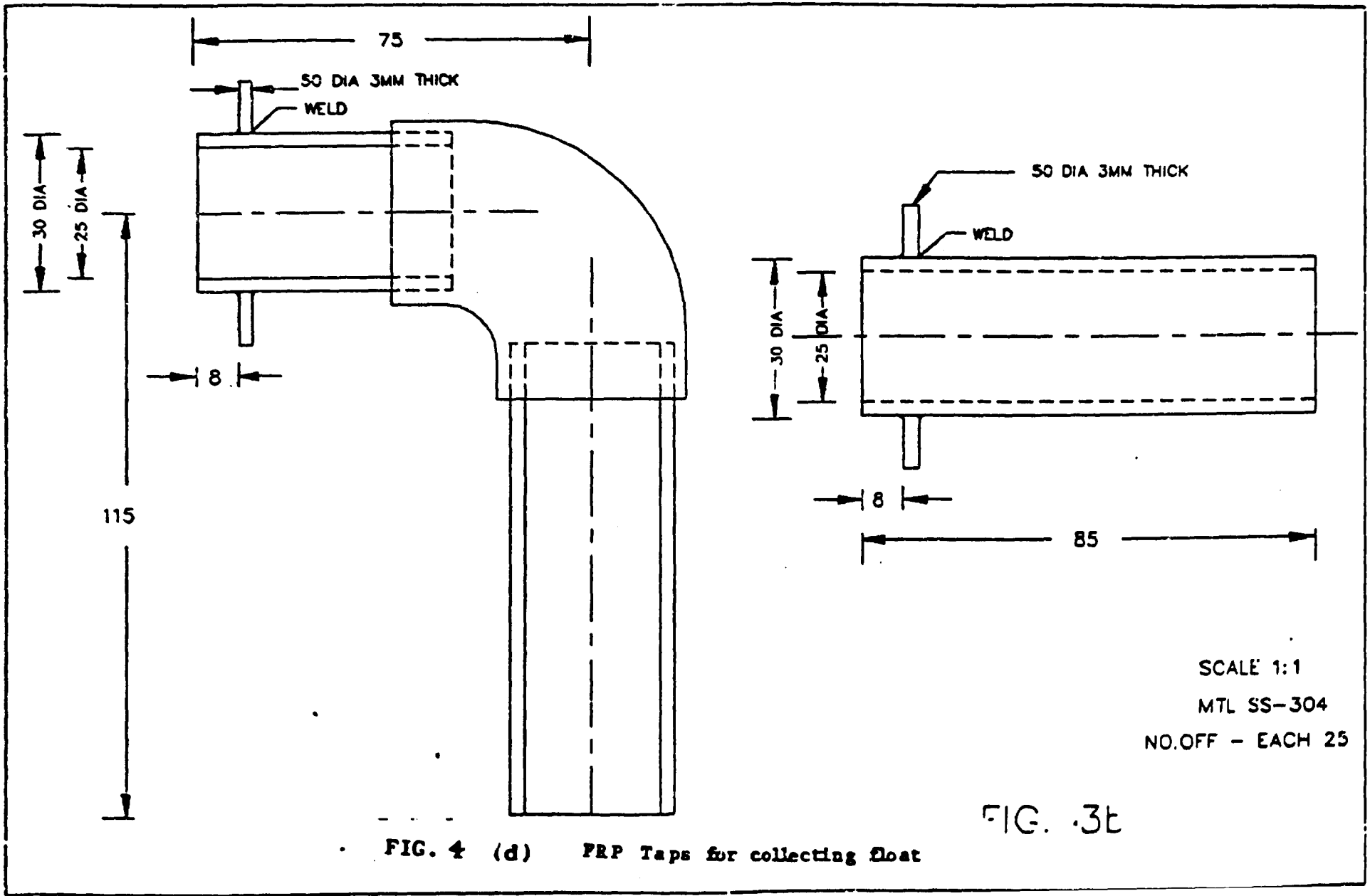
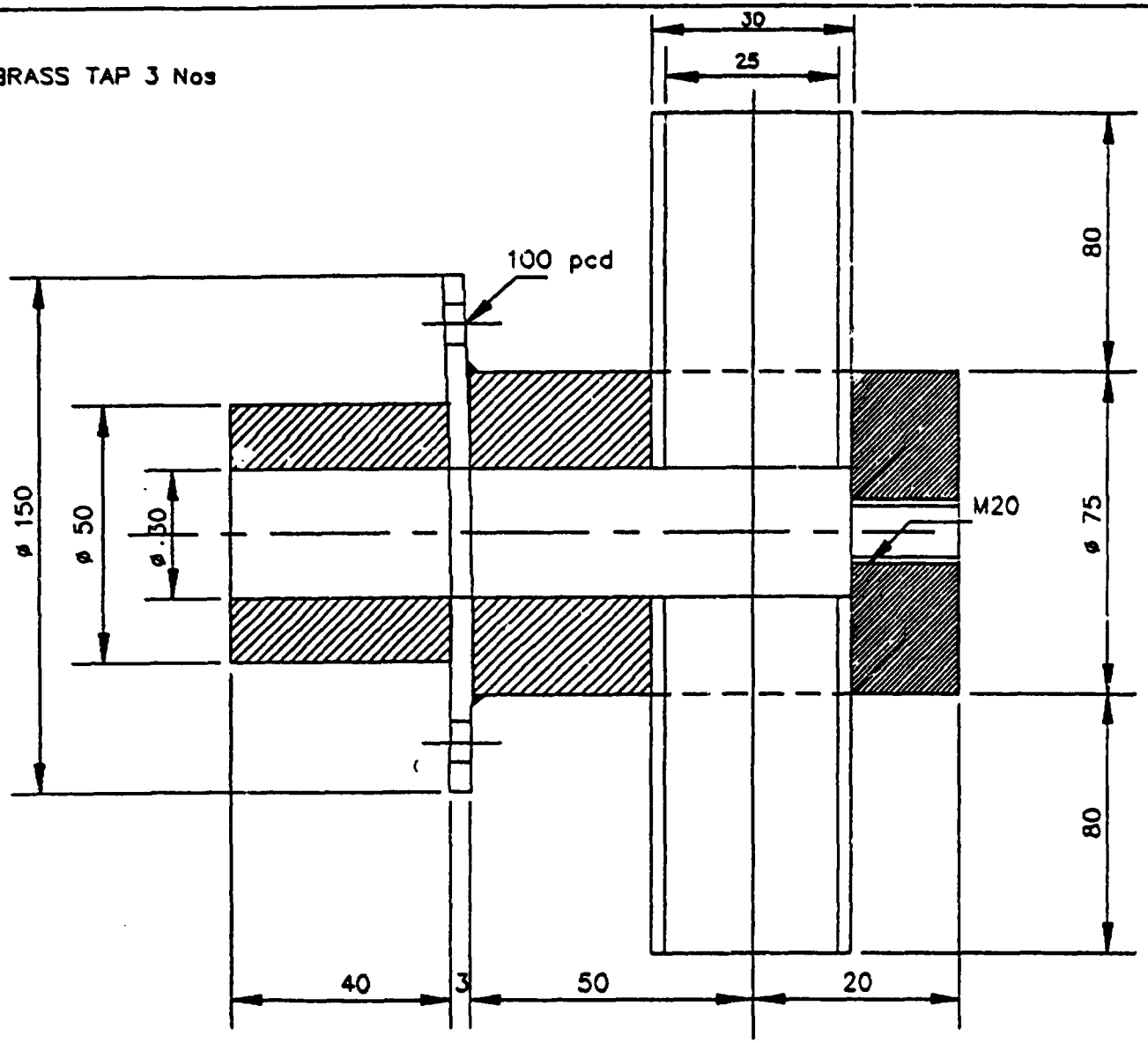


FIG. 4 (d) FRP Taps for collecting float

BRASS TAP 3 Nos



Scale = NTS

MTL = BRASS

Qty = 12 Nos

Sheet 4 of 4

FIG. 4. (e) TAP FOR COLLECTING FLOAT

UNI1243

Pallavaram tanneries and the proposed CET under erection. Tamil Nadu Pollution Control Board, M/s KH tannery at Ranipet and other institutions connected with cleaner technology project implementation.

The CLRI project team arranged CO-2 deliming and pickle free chrome tanning technology demonstrations from 26-29 July 1993 at the pilot tannery facility. Prof Munz participated in the demonstration and explained the advantage of the new technologies to the tanners who attended the meeting.

Prof Munz held series of discussions with CO-2 gas manufacturers on the bulk gas supplies and the proposed cost structure.

1.9. Overall progress of work till the end of January 1994

As can be seen from the information reported in the above sections and from the previous reports sent to UNIDO, the following tasks have been completed in this project:

i) Preparation of process flow scheme and instrumentation diagrams.

ii) Preparation of layout drawings (Fig. 5).

iii) Selection of implementing agencies for the erection of chemical tank farm and piping.

iv) Placing of orders for all equipments.

v) Collection of design data for prototype development of the accessories to be provided to the existing drums (Table 3) to facilitate online monitoring of the float characteristics.

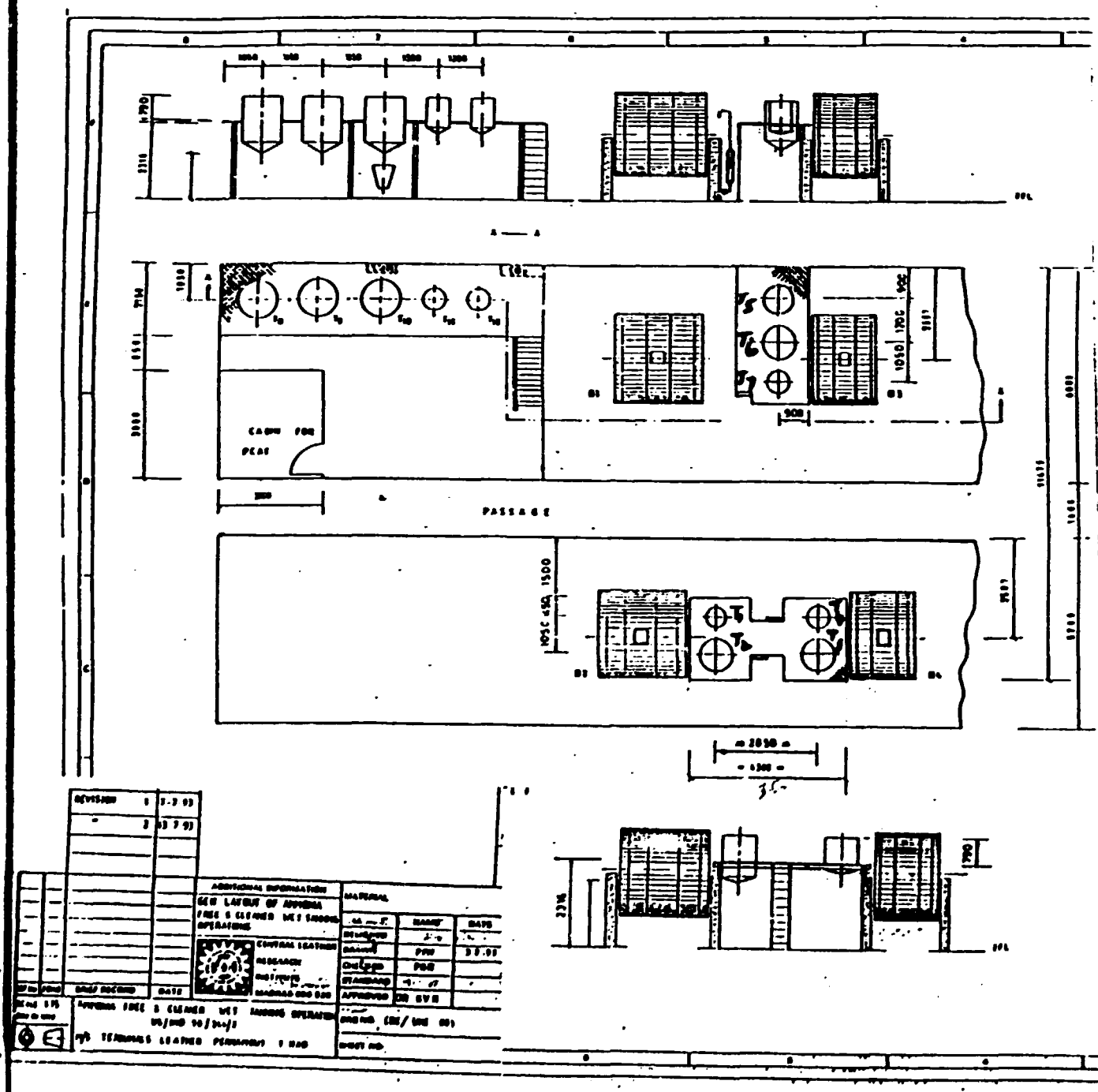


FIG. 5 . Layout and details of structural details

TABLE 3

DRUM DETAILS OF M/S. TEJOOMALS TANNERY

Project Name: Implementation of Ammonia free and cleaner Tannery Wet Operations. under UNIDO programme

	Pickling	Deliming	Post Tanning D1	Post Tanning D2
1. Drum diameter	8'	8'	8'	8'
2. Drum length	8'	8'	6'	6'
3. Star diameter	27"	3'	3'	2'8"
4. Wall thickness (Drum)	1 1/2"	1 1/2"	1 1/2"	1 1/2"
5. Drum to roller centre	6 1/2"	6 1/2"	6 1/2"	7"
6. GAP	1 1/2"	2"	2 1/2"	2 1/2"
7. Pillar size				
Length	5'	5'	4'7"	5'2"
Width	15"	15"	15"	15"
Height	3'5"	3'5"	3'5"	3'5"
8. Band distance from the end	2"	2"	2"	2"
9. S/Roller size C to C	20"	20"	20"	1'11"
dia	8"	8"	11"	11"
10. Manhole size	18"	18"	18"	18"
Centre hole size	10"	12"	11"	13"
11. Ground to centre height	5'	5'	5'	5'
12. Wood to centre height	1'6"	20"	18"	18"

All the equipments were received by the end of November 1993. During the interim period, the installation of control room (Fig. 3), working platforms, drum modifications and the supporting strucures for the chemical tank farm were implemented. Pilot scale trials were conducted at CLRI to restandardise the process parameters to match the processing requirements of the user tannery. Carbondioxide deliming trial runs were held in July 1993 at the CLRI pilot tannery to demonstrate the technology to the personnel of the user tannery and other interested leather proccssing units for wider implementation of this technology. As stated earlier, Prof K H Munz visited CLRI from 19th July to 2nd August 1993 to participate in the above demonstration runs. Civil works and installation of major equipments were completed till January 1994.

TECHNO ECONOMIC ANALLYSIS OF IMPLEMENTING CLEANER TECHNOLOGY IN LEATHER PROCESSING

Capacity of the plant : 2000 skins
Process : Raw to finish
No of shifts : 2 of 8 hrs duration each

Proposed Cleaner Technologies

- Carbon dioxide deliming
- Input and output monitoring facility for chemical and water additions
- High exhaust chrome tannages and high performance syntans for better chrome management
- Inplant process control measures

(Rs. in millions)

Sl. No	Description	PLANT EMPLOYING: Conventional Technology	PLANT EMPLOYING: Cleaner Technology
1.	Fixed capital on land & building including effluent treatment plant	11	11
2.	Fixed capital on plant & machinery (pl. see Annexure II for breakup of addition cost for cleaner technology)	9.4	12.4
3.	Working capital	15.0	14.5
4.	Total capital investment	35.4	37.9
5.	Manufacturing cost		
5.1.	Variable cost		
	Raw skins	39.0	39.0
	Chemicals	16.4	14.8
	Utilities	2.1	1.9
	Salaries & wages	2.6	2.6
	Total variable cost	60.1	58.3
5.2.	Fixed costs		
	Repairs & maintenace	0.8	1.0
	Depreciation	1.2	1.4
	Interest on capital(@ 19% on FC and 22% on WC)	7.1	7.5
	Plant overheads	0.4	0.5
	Administrative & selling expenses	8.0	8.0
	Total fixed capital	17.50	18.4

ANNEXURE I (Contd)

Sl. No	Description	PLANT EMPLOYING: Conventional Technology	PLANT EMPLOYING: Cleaner Technology
7.	Annual manufacturing cost	77.6	76.7
8.	Annual turnover (pl. see Annexure IA for the product mix and its cost structure)	97.00	97.6
9.	Gross return	19.4	20.9
10.	Percent net return on total capital investment after 40% taxation	32.88	33.08*

* By implementation of the environmentally cleaner technologies as highlighted in previous section, about 33% of time can be saved as compared to a conventional process. If the tannery works 3 shifts in place of 2 shifts, the production can be doubled and the resulting economic returns will be still higher as compared to conventionally operated tannery.

ANNEXURE IA

IMPROVEMENT IN FINISHED LEATHER QUALITY

Sl.No	Commercial grade	CON	CT	Cost Rs/sq.ft
1.	ABC	15	15	45
2.	DEF	25	25.25	40
3.	TR1, TR2, TR3	30	30.75	34
4.	Lining	30	29.0	18

CON : Conventional Technology

CT : Cleaner Technology with Process Controls

COST BENEFIT ANALYSIS FOR IMPLEMENTING CLEANER TECHNOLOGY THROUGH AN ADD-ON FACILITY TO AN EXISTING TANNERY

Capacity : 2000 skins/day

		Rs. in million
A.	**Additional cost of equipment for cleaner technology implementation**	
	- Capital cost of plant and machinery	2.6
	- Design and Engg knowhow	0.4
	Total :	3.0
B.	**Additional annual operating costs**	
	Maintenance :	0.20
	Depreciation :	0.20
	Interest on capital :	0.40
	Total annual costs	0.80
C.	**Benefits**	
	Savings in chemicals/effluent treatment charges :	1.6
	Savings in utilities :	0.2
	Enhanced sales realisation due to consistent quality/ improvements (1%) :	0.6
	Total savings	2.4
	Net profit/yr (after taxation)	0.96
	Pay back period	3 years

BROAD SPECIFICATIONS OF EQUIPMENTS
PROJECT : AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

(Rs in million)

Item No.	Equipment/Facility		Estimated Cost User's Counter-part contribution	UNIDO Component
1.0.	**CIVIL WORKS**			
1.1.	Working Platform	)		
1.2.	Process Control Room	)	0.175	-
1.3.	Drain System	)		
2.0.	**DRUM MODIFICATIONS**			
2.1.	Drain side entry modification	)		
2.2.	Vent Line	)	0.100	-
2.3.	Liquor drawing facility	)		
2.4.	Pump Around System			
2.4.1	Centrifugal Pumps (Polypropylene; 70 Lpm; Head 2 meters H_2O)	5 Nos	-	0.075
2.4.2	pH Transmitter (Range 0-14; Accuracy $\pm$ 0.1pH; 4-20 mA Output)	5 Nos	-	0.125
2.5.	CO_2 Deliming System			
2.5.1	CO_2 Gas Cylinders (50 kgs; 10 kg/cm^2 ; Seamless; Steel with Pr Regulator and flow meter)	2 Nos	-	0.020
2.5.2	CO_2 Absorber/Saturator	1 No	0.030	-
2.5.3	Weighing Balance for CO_2 Cylinder (100 kgs)	1 No	0.020	-
3.0.	**CHEMICAL STORAGE TANKS WITH NOZZLES**			
3.1.	HDPE/FRP Storage tanks	)		
	- 1000 lits	5 No)		
	- 250 lits	3 Nos)		
		)		0.100
3.2.	HDPE/FRP Storage tanks with stirrer (RPM 400) and suitable supports (cap 250 l)	4 Nos)		

BROAD SPECIFICATIONS OF EQUIPMENTS (Contd)

PROJECT : AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

(Rs in million)

Item No.	Equipment/Facility		Estimated Cost User's Counter-part contribution	UNIDO Component
4.0.	**PUMPS AND COMPRESSORS**			
4.1.	Air Compressor with storage Tank; Oil filter etc) (5-7 m^3 /hr; 8-10 kg/cm^2)	1 No	-	0.025
4.2.	Chemical Addition System Pump (Polypropylene: 100-150 Lpm; Head 10 meters H_2O)	1 No	-	0.035
4.3.	Chemical Transfer Pumps (Polypropylene; 50 Lpm: 5 meter H_2O	5 Nos	-	0.150
5.0.	**PIPING AND FITTINGS**		0.100	-
6.0.	**LIQUID ADDITION SYSTEMS**			
6.1.	Chemical Addition System			
6.1.1	Load Cell, Strain gauge type 500 kg capacity with + 100 gm accuracy		0.020	-
6.1.2	Load Cell tank with stirrer and supporting structure ; capacity 500 liters		0.050	-
6.2.	Water Addition System			
6.2.1	Steam Injection water heater system with RTD (Cap 500-600 lpm; outlet water temp 65° C; Inlet/Outlet flange size 3")	1 No	-	0.060
6.2.2	Motorized Steam Control Valve (3")	1 No	-	0.025
6.2.3	Flow Indicator Controller (Cap 100-500 lpm)	1 No	-	0.040

BROAD SPECIFICATIONS OF EQUIPMENTS (Contd)

PROJECT : AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

(Rs in million)

Item No.	Equipment/Facility		Estimated Cost User's Counter-part contribution	UNIDO Component
7.0.	**CONTROL VALVES AND INSTRUMENTS**			
7.1.	2-Way SS Ball Valves	30 Nos	-	0.250
7.2.	2-Way SS Plunger-Valves (Dia : 1 1/2 and 3"; 4-20 mA)	15 Nos	-	0.200
8.0.	CONTROL MODULE 80386 Main processor with 25-40 MHz clock speed with 80387 Coprocessor, 1 MB main memory 40 MB Hard Disc and other add on cards, relays, etc.	1 Unit	-	0.750
9.0.	**ELECTRICAL ACCESSORIES**	1 kit	0.100	-
10.0.	**INSTALLATION AND OTHER MISCELLANEOUS COSTS**		0.155	-

krr

PROPOSED WORK PLAN FOR IMPLEMENTATION OF AMMONIA FREE AND CLEANER WET TANNING OPERATIONS

Starting date : 1st October 1992

(MONTHS)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Finalization of contract with the user tannery	XXXX															
2. Projected cost estimates including work plan to be sent to UNIDO			XXXX													
3. Equipment specifications to be sent to UNIDO			XXXX													
4. Basic Engineering package preparation				XXXX												
5. Selection of Implementation Agency					XXXX											
6. Equipment procurement					XXXX	XXXX	XXXX	XXXX	XXXX							
7. Civil works								XXXX	XXXX	XXXX						
8. Installation of equipment and testing										XXXX	XXXX	XXXX				
9. Commissioning												XXXX	XXXX			
10. Demonstrations and Report Preparation														XXXX	XXXX	

MILESTONES

1.	Finalisation of contract with the user tannery	: 25 Nov 1992
2.	Projected cost estimates including work plan to be sent to UNIDO	: 23 Nov 19..
3.	Equipment specifications to be sent to UNIDO	: 30 Nov 1992
4.	Design package preparation	: 31 Jan 1993
5.	Ordering of equipments	: 01 Feb 1993
6.	Receipt of equipment/local fabrication	: 30 Jun 1993
7.	Selection of Implementing Agencies	: 15 Mar 1993
8.	Civil works completion	: 30 Jul 1993
9.	Installation of equipments	: 30 Oct 1993
10.	Testing and Commissioning	: 30 Nov 1993
11.	Demonstration to other tanneries	: 31 Dec 1993

ANNEXURE VI

Copy of the Agreement

Signed with M/s.Tejoomals

AGREEMENT

BETWEEN

TEJOOMALS Leather Division
PERNAMBET

AND

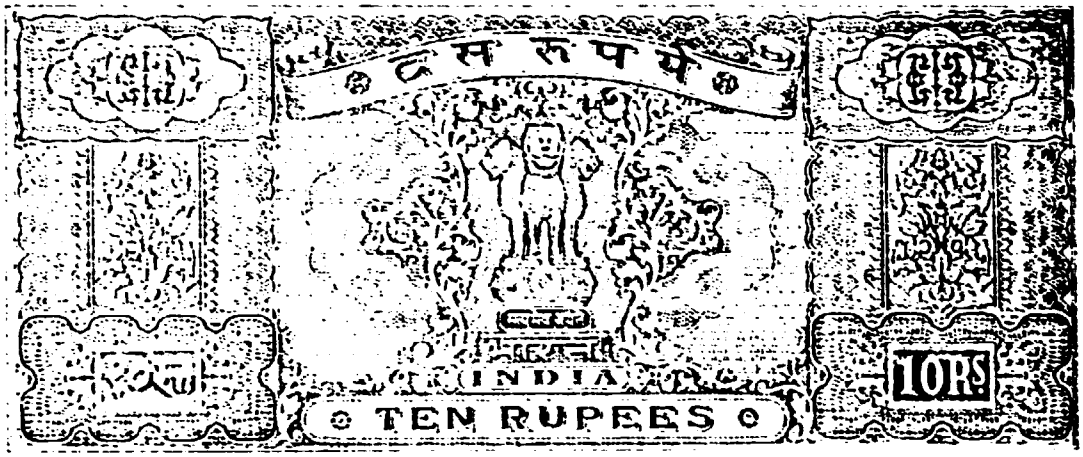
CENTRAL LEATHER RESEARCH INSTITUTE
MADRAS

FOR

IMPLEMENTATION OF ENVIRONMENTALLY CLEANER TECHNOLOGY UNDER THE UNIDO PROJECT NO. US/IND/90/244/2

TEJOOMALS Leather Division,
Ambur Road,
Pakkiapalli,
Pernambet.

Central Leather Research
Institute
Adyar
Madras 600 020



DIRECTOR
C.L.R.I.
MADRAS-20

V. PRABHAKAR RAO, M.A
STAMP VENDOR.
L. NO. 0581/92
No. 8, III Cross Street,
Kasturibai Nagar, Adyar, Ms-20.

1161
8.5.93

C.1. **THE AGREEMENT** This first May 96

C.1.1. THIS AGREEMENT made and entered into force this One thousand nine hundred and Ninety three between Council of Scientific & Industrial Research, a Society registered under the Societies Registration Act XXI of 1860, having its registered office at Anusandhan Bhavan, 2, Rafi Marg, New Delhi 110 001, (hereinafter called CSIR which expression shall where the context so admits include its successors and permitted assigns) through the Central Leather Research Institute, Adyar, Madras-600 20(hereinafter referred to as CLRI)

C.1.2. M/s TEJOOMALS LIMITED, Ambur Road, Pakklapalli, Pernambet, a Company registered in India under the

For TEJOOMAL'S

N. SATYANARAYANA
Controller of Administration
Central Leather Research Institute
ADYAR, MADRAS-600 020

Companies Registration Act 1950 and having its registered office at 13/1 A, Mirza Ghalib Street, Calcutta (hereinafter called as **TEJOOMALS** which expression shall where the context so admits includes its successors and permitted assigns) of the other part.

C.2. **PREAMBLE**

United Nations Industrial Development Organisation(UNIDO) Vienna(hereinafter referred to as UNIDO) has identified Central Leather Research Institute, Adyar, Madas-600 020 under Project No.US/IND/90/244/2 as the agency for implementation of Environmentally cleaner technology at selected tanneries in India. CLRI in consultation with UNIDO has chosen **TEJOOMALS** as the host organisation for setting up demonstratoion facility costing approximately Rs.30 lakhs (hereinafter referred to as ACTIVITY) for ammonia free and cleaner wet tanning operations (hereinafter referred to as TECHNOLOGY. The basic objectives of the proposed ACTIVITY AND TECHNOLOGY TRANSFER are:

i. to reduce ammonia, chromium and other toxic chemical/biological load in the tannery waste leather through improved in process measures and implemention of cleaner technoligies.

ii. to achieve better water management

iii. to minimize rejects and batch to batch variation of leather quality through improved in-process control measures.

For TEJOOMAL'S LEATHER DIVISION

Director

N. SATYANARAYANA
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ADYAR, MADRAS-600 020

iv. to create better working environment and improved house-keeping in tannery wet section.

v. to minimize occupational health hazards of chemical handling and processing techniques.

vi. to provide on-job training to the host tannery personnel in operation and maintenance of the new facilities.

C.3. SCOPE OF THE AGREEMENT

The agreemnent details the terms and conditions, for CLRI undertaking the activity for the TEJOOMALS, the financial arrangements, rights and obligations of the parties hereto, pertaining to the ACTIVITY.

C.4. FINANCIAL ARRANGEMENT

C.4.1 TEJOOMALS shall earmark a sum of Rs. 10,00,000/- (Rupees ten lakhs only) towards the counterpart implementation costs (30% of the project cost) for implementing the items listd in Annexure-I.

Rs.5,00,000/- to be paid to CLRI on singing the agreement

Rs.5,00,000/- to be pledged for making payment for procurement of equipments/facilities and services as specified by CLRI from time to time during the implementation of the proposed ACTIVITY.

C.4.2 TA, DA CHARGES

The TEJOOMALS shall in addition to charges as above pay to CLRI for the personnel deputed in connection with work peraining to the ACTIVITY, provide boarding and lodging and

For TEJOOMAL'S LEATHER DIVISION

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local hospitality at the work place.

C.5. RESPONSIBILITIES OF CLRI

C.5.1 CLRI shall undertake the ACTIVITY in accordance with the scope of work detailed in the Annexure I to the agreement.

C.5.2 CLRI shall complete the ACTIVITY including submission of the Final Report within 15 months of signing the agreement.

C.5.3 The period for completion of ACTIVITY could however, be extended to such further period as may be required and mutually agreed between the parties without any liability on the part of CLRI.

C.5.4 CLRI shall provide design engineering including equipment specification for the implementation of ACTIVITY.

C.5.5 CLRI shall provide technical assistance during equipment procurement, installation, commissioning and demonstration.

C.5.6 CLRI shall provide the following documentasion for the proposed facility:

i) Operation manual

ii) Process recipie for environmentally cleaner technologies

iii) Safety manual

iv) Instructions for operation and maintenance of all the critical equipments

v) Specification of chemicals, specially needed for implementation of environmentally cleaner technologies.

C.5.7 CLRI shall provide training to the personnel of TEJOOMALS (number to be mutually agreed upon) on the following aspects:

i. CO_2 gas handling and flow monitoring

For TEJOOMAL'S LEATHER DIVISION

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Central Leather Research Institute
अड्यार ADYAR, चेन्नई MADRAS-600 020

ii. Controlled addition of water and chemicals with appropriate instrumentation

iii. Online monitoring of process parameters

iv. Operation of pH control system attached to the drum

v. Safe handling of chemicals and rotating equipments

vi. Data logging and information retrieval

vii. Time sequencing of process operations

C.5.8 CLRI shall demonstrate three batches of the TECHNOLOGY to the TEJOOMALS.

C.6. RESPONSIBILITIES OF THE TEJOOMALS

C.6.1 The Tejoomals shall supply at its own cost the requisite quantity of chemicals/raw materials to CLRI within ten days form the date of such a request by the CLRI

C.6.2 The Tejoomals shall provide free access to the CLRI and UNIDO personnel to visit the site as and when required.

C.6.3 The TEJOOMALS shall allow demonstration of the operational aspects of the control and other systems and the efficacy of the TECHNOLOGY to the interested representatives of the leather industry as recommended by CLRI/UNIDO. This facility shall be made available for demonstration for a period of 3 years and can be extended on mutual agreement with UNIDO/CLRI. The exact time and duration of each demonstration shall be finalized by CLRI in consultation with TEJOOMALS.

C.6.4 TEJOOMALS shall also participate in techno-economic assessment of the TECHNOLOGY AND ACTIVITY.

For TEJOOMAL'S LEATHER DIVISION

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Central Leather Research Institute
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C.6.5 TEJOOMALS shall nominate a coor.. ator who shall be the contact person for CLRI from time to time to monitor the progress of the project.

C.6.6 TEJOOMALS shal also provide all basic data/details/information/manuals available with them and as required by CLRI in respect of their existing facilities and technologies.

C.6.7 TEJOOMALS shall, consequent to the ACTIVITY undertaken by CLRI and upon implementation of results thereto, disclose to CLRI benefits accrued to it in techno-economic and other terms for information.

C.6.8 TEJOOMALS shall provide adequate personnel/equipment support for CLRI personnel and CLRI will not be responsible for any unwilful damage caused to the property/machinery of the TEJOOMALS during the couse of this project.

C.6.9 TEJOOMALS shall provide necessary financial support for the procurement of all the machinery, equipment and facilities as per directions of CLRI within the budgeted amount as highlighted in C.4.1 and shall be responsible for its maintenance and operation.

C.6.10 The equipments and facilities to be procured from UNIDO funds will be in UNIDO's name till all obligations under this agreement are fulfilled by TEJOOMALS. The transfer of assets to TEJOOMALS will then follow.

C.7 EFFECTIVE DATE, DURATION AND TERMINATION OF AGREEMENT

C.7.1 The agreement shall be effective form the date of signing the agreement and shall remain in force for the period of 15 months form the effective date.

for TEJOOMAL'S LEATHER DIVISION

Director

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C.7.2 During the tenure of the agreement parties hereto can terminate the agreement either for violation of any of the clauses of the agreement or other work by giving one month notice in writing to the defaulting party. Failure of either party to terminate the agreement on account of breach or default by the other shall not constitute a waiver of the party's right to terminate this agreement.

C.8. SETTLEMENTS

C.8.1 In the event of termination of the agreement vide C.7.2 the rights and obligations of the parties hereto shall be settled by mutual discussion the financial settlement shall take into consideration not only the expenditure incurred but also the expenditure committed to UNIDO by CLRI.

C.9. CONFIDENTIALITY

C.9.1 During the tenure of the agreement and for a period of 7 years of its expiry, both CLRI AND the TEJOOMALS (including their sub-contractors if any) shall treat as strictly confidential and prevent disclsure thereof of all the information and data exchanged/generated under this agreement for any purposes other than that in accordance with this agreement.

C.10. GENERAL PROVISIONS

C.10.1 The CLRI shall during the tenure of the agreement or thereafter, be free to take up, without any prejudice to the TEJOOMALS, consultancy work similar to or same as the ACTIVITY, for other parties on terms and conditions a it may decide upon.

For TEJOOMAL'S LEATHER DIVISION

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C.11. COMPLETION OF ACTICVITY

C.11.1 The ACTIVITY shall be deemed to have been successfully completed on submission on the Final Report as stated hereinbefore by the CLRI to the TEJOOMALS.

C.12 PUBLICATIONS

C.12.1 Publications, if any, in respect of the ACTIVITY shall be in the names of S & T personnel of CLRI connected with the ACTIVITY. In all publications (papers, reports etc.), it will be duly acknowledged that the work has been carried out by CLRI under a consultancy assignment form the TEJOOMALS.

C.13 FORCE MAJEURE

C.13.1 Neither party shall be held responsible for non-fulfilment of their respective obligations under this agreement due to the exigency of one or more of the force majeure events such as but not limited to Acts of God, war, flood, earthquakes, strike lockouts, epidemics, riots, civil commotion etc provided on the occurance and cesation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurance or cessation. If the force majeure conditions continued beyond six months, the parties shall then mutually decide about the future course of action.

C.14 NOTICES

All notices and other communications required to be served on the TEJOOMALS under the terms of this agreement, shall be considered to be dully served if the same shall have been delivered to left with or posted by registered mail

For TEJOOMAL'S LEATHER DIVISION

Director

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to the TEJOOMALS at its last known address of business. Similarly, any notice to be given to the CLRI shall be considered as duly served if the same shall have been delivered to, left with or posted by registered mail to the CLRI at its registered address in New Delhi.

C.15 **ARBITRATION**

C.15.1 Except as hereinbefore provided, any dispute arising out of this agreement, shall be refered to the arbitration of two arbitrators, one to be appointed by each party to the dispute, and in case of difference of opinion between them to an umpire appointed by the said two arbitrators before entering on the reference, and the decision of such arbitrators or umpire, as the case may be shall be final and binding on both parties. The venue of arbitration shall be at such place as may be fixed by such arbitrators or umpire and the arbitration proceeding shall take place under the Indian Arbitration Act, 1940

C.16 **AMENDMENTS TO THE AGREEMENT**

C.16.1 No amendment or modification of this agreement shall be valid unless the same is made in writing by both the parties or their authorised representatives and specifically stating the same to be an amendment of this agreement. The modifications/changes shall be effective from the date on which they are made/executed, unless otherwise agreed to.

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For TEJOOMAL'S LEATHER DIVISION

Director

SEAL OF PARTIES

In witness thereof the parties hereto have signed this agreement on the date, month and year mentioned hereinbefore. Parties

For and on behalf of CLRI	For and on behalf of TEJOOMALS
	For TEJOOMAL'S LEATHER DIVISION
Signature	Signature
Designation	Designation Director
Seal	Seal
Witnesses (Name & Address)	Witnesses (Name & Address
1	1
2	2
Date	Date

N. SATYANARAYANA
Controller of Administration
Central Leather Research Institute
ADYAR, MADRAS-600 020

COUNTERSIGNED

Finance & Accounts Officer
Central Leather Research Institute
Adyar, Madras-600 020

ANNEXURE I

Facilities to be cereated with counterpart funding from TEJOOMALS

1. Civil works covering working platform, control room and drain system.
2. Drum modifications
3. CO_2 deliming accessories
4. Pipings and fittings
5. Accessories to liquid system
6. Electrical/electronic accessories
7. Installaction and other miscellaneous jobs.

For TEJOOMAL'S LEATHER DIVISION

Director

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CHROME RECOVERY AND REUSE

CHROME RECOVERY AND REUSE SYSTEM

2.1. OBJECTIVE

Introduction of cleaner and environmental friendly technologies like chrome recovery and reuse system to reduce the pollution generated in the process of leather manufacture.

OUTPUT

Implementation of fully operational appropriate chrome recovery and reuse system in a selected tannery/central place at Pallavaram, which is cost effective and suitable for local conditions.

2.2. ACTIVITIES

- Studying the presently prevailing chrome tannage, the quality of spent floats and analysis of the chrome content.

- Design of chrome tanning exhaust liquor collection and fully operational chrome recovery systems, evaluation of its ability.

- Tendering through UNIDO, installation, commissioning of the chrome recovery plant and standardizing the system for reuse.

- Demonstration of process and techno-economic viability.

2.3. EXPECTED RESULT

- Minimize the wastage of about 150 tonnes of basic chromium sulphate per year into the environment from Pallavaram tanneries.

- Protection of environment and meeting pollution control standards.

- Saving of about Rs 2.5 million worth chemicals by introducing cost effective system.

- Minimize the operation and maintenance cost of central effluent treatment system.

- Minimize the disposal problem of the chrome contained sludge.

2.4. PRINCIPLE OF CHROME RECOVERY TECHNOLOGY

The technologies for chrome recovery and reuse adopted in the developed countries (i.e. Italy) with sophisticated control units like automatic chemical dosing, filter press for sludge dewatering etc., can not be replicated in India due to traditional nature of the tanning process applied, characteristics of the effluents, their discharge pattern, technical manpower capabilities in tanneries, local field conditions etc. Therefore, an appropriate technology developed by CLRI in association with Haskoning/TNO under Indo-Dutch co-

operation on environment and adopted in Kanpur tanneries is proposed to be implemented in Pallavaram as a part of UNIDO assisted project. The principle and technology of chrome recovery system includes:

- Segregation and collection of waste chrome liquor
- Pre-treatment and chromium precipitation using Mgo as alkali
- Decanting of supernatant liquor
- Redissolving the precipitated chromium with sulphuric acid
- Reuse of the recovered chromium in tanning process along with required quantity of fresh chromium salt

2.5. CAPACITY OF THE SYSTEM

In Pallavaram, about 15 m^3 of exhaust chrome liquor is discharged per day. The Arafat Tannery which is having processing of 5.6 tonnes of hides from raw to wet blue/day discharges about 7-8 m^3 of exhaust chrome luqior per day, it is more than 40% of the total exhaust chrome discharge from Pallavaram tanneries. The chrome recovery system with about 9 m^3 capacity per shift with capability to handle 18 m^3/day in 2 shifts can meet the entire Pallavaram tanneries requirements including future expansion upto 20% capacity.

2.6. BRIEF DESCRIPTION OF THE PROPOSED SYSTEM

A 18 m^3/day capacity chrome recovery and reuse system was installed at M/s Arafat Tannery at Pallavaram near Madras city. It is the biggest wet blue tannery and discharges about 7-8 m^3/day of exhaust chrome liquor. The needs of the Arafat Tannery and other tanneries in Pallavaram area will be met by operating the system in two shifts of each 8 hours. The waste chrome liquor from the Arafat Tannery, where chrome recovery unit is installed, will be transported through a pipeline to the recovery unit and the chrome liquors for the neighbouring tanneries will be transported by tankers. Necessary intermediate storage facility will be created for the purpose in the chrome recovery system. A suitable working arrangement is being evolved in consultation with the Pallavaram tanners for smooth implementation, operation and maintenance. The work is in progress in this direction.

2.7. TRAINING

CLRI will provide onsite training to the tanneries to carry out sample analysis, operation and maintenance of the chrome recovery system and reuse of the recovered chromium. A training module will also be prepared and provided to the concerned tanneries and UNIDO.

2.8. TIME SCHEDULE FOR PROJECT IMPLEMENTATION

The implementation was originally estimated as 10 months. The revised estimate indicate an extention of delay of 5 months.

2.9. AGREED MODE OF FINANCING

The cost of this demonstration project is partially shared by the user industries as detailed below. This is to ensure their technical as well as financial involvement in the project.

CAPITAL INVESTMENT

i. UNIDO CONTRIBUTION

Equipment and installation of chrome recovery system	USD 46.000/-

ii.TANNERIES CONTRIBUTION

a) Civil work for chrome recovery system in Arafat Tannery	Rs. 25,000
b) Civil works for collection of chrome liquor at individual tanneries	Rs. 2,50,000
c) Tractor and trailor with tanker for transportation of waste chrome liquor by the user tanneries	Rs. 4,00,000

iii. CLRI (MADRAS) CONTRIBUTION

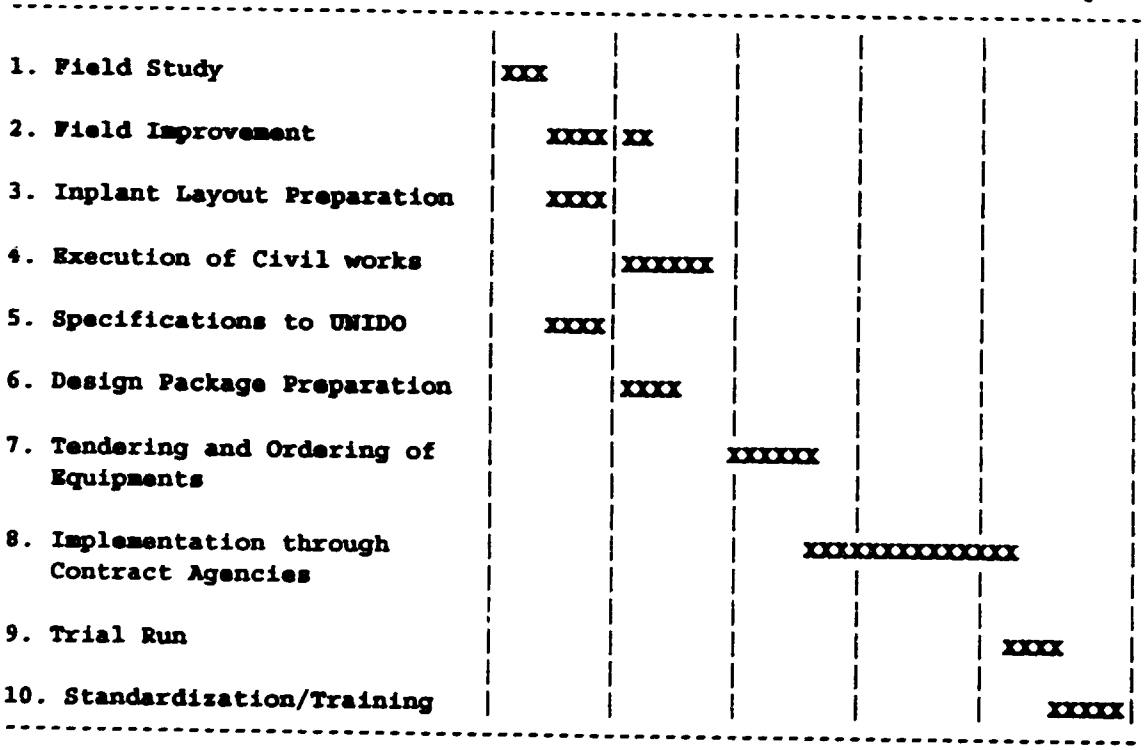
Knowhow and design engineering Fee	Rs. 2,00,000

O and M Cost

Operation and maintenance costs will be borne by the user tanneries.

UNIDO PROJECT : US/IND/90/244/2

TIME SCHEDULE FOR IMPLEMENTATION OF CHROME RECOVERY AND REUSE SYSTEM



2.10. COST PROJECTIONS FOR NORMAL OPERATION DURING TWO SHIFTS

1a. Total chrome tanning processing capacity in Pallavaram tanneries = 4000 tonnes of skins/hides/year

b. Total number of working days = 270 days

2. Use of chromium salt (BCS) = About 320 tonnes/year

3. Wastage of Chromium Salt = 120-130 tonnes/year

(i.e. about 35-40% is discharged in wastewater)

4a. Chrome liquor discharge in Arafat tannery = 7-8 m^3 /day

b. Chrome liquor discharge in other tanneries = 7-8 m^3 /day

Total exhaust chrome liquor discharge = 14-16 m^3 /day

5. Capacity of chrome recovery system = 18 m^3 /day at the rate of 9 m^3 per shift

6. Capital cost of the chrome recovery and reuse system

Civil works in main unit (Arafat Tannery)	: Rs.2,50,000 (By host tannery)
Equipment for Chrome recovery system including installation	: Rs. 13,00,000 or 46,000 US$ (By UNIDO)
Cost of tractor & trailor with tanker	: Rs. 4,00,000 (By Tanneries) [Alternatively hiring Tractor and Trailor is considered]
Civil works for collecting exhaust liquor in individual tanneries	: Rs. 2,50,000 (By Tanneries)
Know how and Engineering Fee	: Rs. 2,00,000 (By CLRI)

Annual operating costs	Cost in Rupees.
Maintenance	30,000
Labour	30,000
Chemicals (MgO,H2So4 etc.)	4,00,000
Electricity	20,000
Miscellaneous	25,000
Total annual plant operating cost	5,05,000
Financial costs towards investments	3,20,000
Depreciation	2,70,000
Additional transportation cost using Tankers/Trailors	90,000
7. Total annual cost	11,85,000

Total annual cost for 100 tonnes = Rs. 11,85,000

(OR)

Recovery cost of chromium is about Rs 11,000 per tonne, 40 tonnes in Arafat Tannery and about Rs. 12,500 per tonne for the use of 60 tonnes by other units due to additional transportation cost.

Benefits

8. Value of chromium recovered for 100 tonnes at about Rs 20,000 per tonne (i.e. 10% reduction in cost price) = Rs. 20,00,000

9. (8-7) Gross profit/year = Rs. 8,15,000

10. Net profit excluding taxation etc. = About Rs.4,80,000

11. Percentage of net return on total investment = About 25%

12. Pay back period = 3-4 Years

Note : One U.S. Dollar = 28 Indian Rupees approximately

From the cost benefit analysis it can be observed that the cost of recovered chromium works out in the range of Rs. 11,000 to Rs. 12,000 per tonne, against the fresh chromium salt which costs more than Rs. 22,000 per tonne. The pay back period of the entire system about 3-4 years.

2.11 Execution of Agreements

2.11.1 CLRI-AFT-PTIETC Tripartite MOU

The CLRI had entered into an agreement (Annexure 2.1) with M/s Arafath Tannery (AFT), Pallavaram and M/s Pallavaram Tanners Industrial Effluent Treatment Company (PTIETC), Madras on 15th September 1993 for the establishment and operation of chrome recovery plant at the premises of M/s Arafath Tannery. A representative of Tamilnadu Pollution Control Board, Madras and Dr Z Kotasek, Chief Technical Adviser, UNIDO signed the document as witnesses. The agreement covers:

i) Knowhow, design engineering and technical assistance for erection, commissioning and technology implementation by the CLRI.

ii) The total capital cost of the project to be shared by the UNIDO (limited to USD46,000) and M/s Arafath Tannery (Rs.0.25 million).

iii) The required land, building, chrome liquor storage and drainage facilities and other fixed capital items to be provided by M/s Arafath Tannery. Operating costs including raw materials, chemicals, power, etc. will also be borne by this Company.

iv) The chrome recovery system can also be used by the other tanneries to be decided by PTIETC on terms and conditions mutually agreed upon.

v) PTIETC will (a) ensure the construction of collection tanks in individual tanneries for the segregated exhaust chrome liquors, (b) provide transport facilities for the liquor transportation from them to the chrome recovery plant, and (c) execute civil works for approach road and additional storage tanks as required at M/s Arafath Tannery.

2.11.2 Multiparty MOU between AFT, PTIETC and Pallavaram Tanners

The MOU outlines the spirit of cooperation and the technical and financial conditions for collection, transport, reprocessing and reuse of chrome liquors of Pammal-Pallavaram-Chrompet Area with the chrome recovery plant to be set up at M/s Arafath Tannery under the UNIDO programme to be functioning as the nucleus. The fulfilment of this MOU (Annexure 2.2) will be supervised and actively supported by the TNPCB, CLRI and UNIDO whose representatives signed the MOU as witnesses. The scope of the MOU is as follows:

i) Development and implementation of a single and efficient collection system of the spent chrome tanning liquors from the tanneries participating in this programme.

ii) Installation of intermediate storage facility at AFT to receive the chrome liquors from the other tanneries.

iii) Transportation of chrome liquors by PTIETC.

iv) Fixation of cost price structure and formulation of payment and accounting conditions by PTIETC.

v) Reprocessing of chrome liquors by AFT at agreed processing cost.

vi) Provision for processing of chrome liquors from non-member tanneries of PTIETC at a mutually agreed processing cost structure.

ANNEXURE 2.1

Agreement with AFT and PTIETC

MEMORANDUM OF UNDERSTANDING

AMONG

CENTRAL LEATHER RESEARCH INSTITUTE, MADRAS

AND

M/S PALLAVARAM TANNERS INDUSTRIAL TREATMENT COMPANY
MADRAS

AND

M/S ARAFATH LEATHER (TANNERY) MANUFACTURERS, MADRAS

FOR

ASSISTANCE IN TREATMENT OF TANNERY EFFLUENT,
CHROME RECOVERY & REUSE SYSTEM

UNDER

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
ASSISTED PROJECT

MADRAS-20

V. [illegible]

800
13.9.93

MEMORANDUM OF UNDERSTANDING

ASSISTANCE IN TREATMENT OF TANNERY EFFLUENT TAMIL NADU, INDIA CHROME RECOVERY AND REUSE SYSTEM IN PALLAVARAM/ PAMMAL, MADRAS

This Memorandum of Understanding (M.O.U) made and entered into force this ..15... day of ..September.. this One thousand nine hundred and ninty three between 1. Council of Scientific & Industrial Research (CSIR), a Society registered under the Societies Registration Act XXI of 1860 having its registered office at Anusandhar Bhavan. 2, Rafi Marg, New Delhi-110 001 through the Central Leather Research Institute (CLRI), Adyar, Madras-600 020;

AND

2. M/s Pallavaram Tanners Industrial Effluent Treatment Company Ltd (hereinafter called PTIETC), 19-A, 7th Main Road, New Colony, Chromepet, Madras-600 044;

EFFLUENT [illegible] CO. LTD.

[illegible]

AND

3 M/s Arafath Leathers (TANNERY) Manufacturers Thiruneermalai Road. Chromepet. Madras-600 044.

PREAMBLE

Under United Nations Industrial Development Organization (UNIDO). Vienna assisted project No. US/IND/90/244(2) in cooperation with Tamil Nadu Pollution Control Board (TNPCB), Madras-600 004. CLRI has been assigned with the task of implementing chrome recovery and reuse system in around Pallavaram & Pammal area for the benefit of tanneries in Tamil Nadu. It has been agreed upon that area by M/s Arafath Tannery, PTIETC, CLRI and TNPCB to implement the chrome recovery and reuse system in the premises of M/s Arafath Tannery for the benefit of M/s Arafath Tannery and other chrome tanneries in Pallavaram/Pammal area as detailed below as a part of the agreement terms with UNIDO in implementing Cleaner Technology Programme by CLRI.

ROLE OF CLRI & FINANCIAL COMMITMENT

1. CLRI shall carry out a detailed study the prevailing chrome tannage. sampling (3 sets) and analysis of chrome content from the segregated exhaust chrome liquor from M/s Arafath Tannery.

2. CLRI shall prepare design. layout preparation and drawings for exhaust liquor collection drainage in M/s Arafath Tannery and fully operational chrome recovery and reuse system including evaluation.

3. Technical and Engineering capital assistance (mechanical. piping. screens. electrical and instrumentation) for fabrication. erection. commissioning and standardising

chrome recovery and reuse system (about 18 cu.m per day capacity) in M/s Arafath Tannery premises to be used by M/s Arafath Tannery and other tanneries to be decided by PTIETC.

4. Demonstration of chrome recovery and reuse process and techno-economical viability and training.

5. The total indicative cost towards the technical and capital assistance (mechanical, electrical and instrumentation) by CLRI through UNIDO for implementation of chrome recovery and reuse system in M/s Arafath Tannery would not exceed be about Rs 15.0 lakhs.

RESPONSIBILITIES OF M/S ARAFATH TANNERY & FINANCIAL COMMITMENT

1. ARAFATH shall provide about 300 sq.m land duly levelled and a covered shed of about 120 sq.m with A.C. sheet roof.

2. Shall provide civil works towards drainage re-arrangement for collecting the segregated chrome liquor.

3. Shall ensure Construction of collection/storage tank of about 15-18 cu.m capacity below ground level to receive the exhaust chrome liquor from (M/s Arafath) Tannery.

4. Shall take necessary action for initial deposit, if any, to the Electricity Board for providing power supply to the chrome recovery system.

5. M/s Arafath Tannery shall provide at their cost raw material (hides/skins), chemicals, power, etc during the trial runs and continue to utilise the chrome recovery and reuse system

6. The indicative capital cost towards the civil works in M/s Arafath Tannery would be Rs 2.5 lakhs.

ROLE OF PTIETC/BENEFICIARIES & FINANCIAL COMMITMENT

1. Shall ensure construction of collection tank (8-12 cu.m) in individual user tanneries for the segregated exhaust chrome liquors.

2. Shall take responsibilities for hiring/purchasing tractor and trailor with tanker (4-8 cu.m capacity) attached with pump set to transport the exhaust chrome liquor from the individual user tanneries to the chrome recovery system in M/s Arafath Tannery premises and re-distribution of recovered chrome liquor to the respective tanneries. The cost of such hiring/purchase of tractor/trailor will be frone by PTIETC.

3. Provide civil works for approach road, additional collection/storage tanks facility in M/s Arafath Tannery premises and containers for storing the recovered liquor for distribtution to the respective tanneries at their own cost. In addition, any other civil works required at M/s Arafath Tannery for using the chrome recovery system for other beneficiaries and reuse arrangement in the respective tanneries shall be borne by the PTIETC/respective tanners.

GENERAL ITEMS

1. The civil works for constructing the collection tank in each tannery would range from Rs 30,000 - 50,000 depending upon the capacity. The civil works towards approach road, extra storage tanks in M/s Arafath Tannery premises for the use of other tanneries would range from Rs 1.5 - 2.5 lakhs. If it is proposed to purchase the tractor and trailer with

tanker and pumping facility, it would range from Rs 4-5 lakhs.

2. M/s Arafath Tannery shall permit the CLRI project staff or authorised agency to carry out the inventory, sample collection, inspection during the chrome recovery system execution, trial operations, etc and provide all data to CLRI on the type of process, processing capacity, future experimental/demonstration programme etc as required by CLRI and UNIDO.

3. The chrome recovery system will be implemented by CLRI in a period of about six months after the completion of the civil works by M/s Arafath Tannery as per the CLRI design drawing and time schedule. The civil works are expected to be completed in two months. After trial run, CLRI will provide technical guidance and free laboratory support to M/s Arafath Tannery in standarising the reuse process for about Four lots. M/s Arafath Tannery shall employ or engage competant personnel to operate the Chrome Recovery System

4. M/s Arafath Tannery shall be responsible for the safe custody of all the supplies made by CLRI and shall provide safety measures for the structures, mechanical equipments etc during the erection and future operation of the system.

5. M/s Arafath Tannery and other beneficiaries shall attend the periodical meetings arranged by CLRI/TNPCB/UNIDO/PTIETC and maintain the plant as per the guidelines of CLRI.

6. M/s Arafath Tannery/PTIETC shall acknowledge the contribution of the CLRI/UNIDO in the Display Board, Advertisement etc. and demonstrate the chrome recovery

process to the visitors nominated by CLRI/UNIDO/TNPCB during the period of MOU and after its expiry also.

7. The sole right of the technical know-how of the chrome recovery and reuse system vests with CLRI. M/s Arafath Tannery/PTIETC/user tanneries shall not disclose directly or indirectly any information and data exchanged/generated under this M.O.U for any purpose without the consent of CLRI.

8. If for any reason M/s Arafath Tannery/PTIETC are not able to comply with the time schedule or follow the CLRI's guidelines or UNIDO withdrawing the financial support CLRI at its discretion after informing TNPCB shall have the liberty to withdraw its involvement, take back all the materials supplied at M/s Arafath tannery premises and terminate the M.O.U. after giving a months notice in regards.

9. The working schedule/financial arrangements for utilising the chrome recovery system installed at M/s Arafath Tannery premises by other tanners will be sorted out mutually by M/s Arafath Tannery and PTIETC. CLRI will provide technical guidance in the matter.

10. The validity of this M.O.U is for a period of one year from the date of signing the M.O.U. and can be extended at the specific written request of either of parties.

11. In case of any dispute, the matter will be referred to the sole arbitration of Director General, Council of Scientific

and Industrial Research (CSIR). Delhi or his nomineee(s) whose decision shall be final and binding on the parties to this M.O.U.

CLRI
N. SATYANARAYANA
Controller of Administration
केन्द्रीय चर्म अनुसंधान संस्थान
Central Leather Research Institute
अड्यार ADYAR, चेन्नै MADRAS-600 020

M/s Arafath Tannery

PTIETC

Countersigned by

TNPCB

UNIDO CTA

ANNEXURE 2.2

MOU between AFT
and PTIETC

MEMORANDUM OF UNDERSTANDING

This deed of Memorandum of Understanding is executed at Madras on 17[15]/20th September, 1993 by the parties mentioned hereunder:

M/s. Pallavaram Tanners Industrial
Effluent Treatment Company Ltd. (further PTIETC)
1-A, 7th Main Road,
New Colony,
Chrompet,
Madras 600 044
represented by the Managing Director — 1st Party

M/s. Arafath Leathers (TANNERY)
Manufacturers Thiruneermalai Road,
Chrompet,
Madras 600 044. (further ARAFATH Tannery) — 2nd Party
represented by the Managing Partner(s)

Tanneries-Members of the above PTIETC
using chromium salts in their tanning
processes (further Tannery (s))
represented by the Chief Executives of
each individual tannery — 3rd and further party.

for the objectives explained below:

PREAMBLE:

As per the joint UNIDO-INDIA project US/IND/90/244 "Assistance in Treatment of Tannery Effluents" objective/output 2.2/2 a fully operational chrome recovery unit will be installed in the selected clusters of tanneries with the cost effectivness of the process being suitable for local conditions. During 1991 the Pallavaram clusters of tanneries has been selected as a suitable place for the development of the above component of the project. During the subsequent year of 1992 the ARAFATH Leathers (Tannery) manufacturers has kindly offered its factory site and financial-as well as technical involvement for the implementation of the Chrome Recovery Plant. The conditions, responsibilities and involvement under which this plant will be implemented have been formulated in a tripartite cooperation agreement of the main partners CLRI, PTIETC and ARAFATH Tannery and signed by them in the form of the separate Memorandum of understanding.

For the efficient utilisation of the installed Chrome Recovery Plant and for the achievement of the positive environmental impacts a regular collecting and delivery of the spent chrome tanning liquors from the tanneries of the cluster has to be established and regularised.

The Memorandum of understanding as below characterises the spirit and the conditions for the close "environment and economy friendly" cooperation between all partners involved in the collecting, transport, reprocessing and reuse of the Chromium liquors of the Pammal-Pallavaram-Chrompet area. The implementation of the project and the fullfilment of the Memorandum will be supervised and actively supported by the Project agencies/witnesses namely by the CLRI, TNPCB, and UNDIO.

AIM OF THE MEMORANDUM:

1) to improve treatment performance of the newly established CETP at Pallavaram by diminishing considerably discharge of Chromium Salts into the tannery effluents of the cluster .

2) to reduce content of Chromium in treated effluents as well as in the effluent sludges enabling their future use in agriculture, forestry and for soil conditioning.

3) to develop an efficient and reliable chrome recovery process and reuse of the recovered chromium salts in tanning and retanning operations of the tanneries.

4) to develop the collection-, delivery, recovery-and reuse of chromium salts as an economically viable process and profitable business unit.

5) to create better working environment and to improve house-keeping in the tanneries as well as in the adjacent areas.

6) to demonstrate the environmental, technological and economic feasibility of the chrome recovery cycle to the tanners and visiting experts from India and abroad.

RESPONSIBILITIES OF THE PARTIES:

Tannery:

1) development and implementation of a simple and efficient collection system of the spent chrome tanning liquors from the drums (paddles etc. enabling to collect 85-90% of the tanning float as a minimum.

2) installation of the adequate storing, corrossion resistant tank of the spent chrome liquors enabling to collect 5 days chrome tanning liquors discharge of the tannery as minimum. Storing tank will be provided with screening or filtrating facilities (1-2 MM Gap), corrossion resistant pumps (capacity 15-20 Mins/Tank), and simple volume measuring devise.

3) Strict prevention of the admixture of the spent chrome liquors with the other spent liquors of the tannery such as soaking-, deliming-and bating effluents and washing waters.

4) Introduction of the systematic evidence about the volume and quality(°BK) of spent liquors delivered to the Cr-recovery plant.

5) Informing the head of the Cr-recovery plant about any significant change in the pickling-and tanning process which could have a significant impact on the Cr-recovery process (use of Al-or Zr salts, use of Cr-syntans or high exhaustion chromium complexes etc.)

6) Evaluating the technological feasibility of the reuse of the recovered chrome baths in the production of the tannery (as an addition to the pickle, as retanning-or split tanning agents, as semichroming tanning agent etc.)

Each Member-Tannery agrees that:

- the implementation cost of the points 1-6 will be fully covered by the tannery itself.

- the spent chrome liquors will be collected, stored and offered for the delivery to the Cr-recovery plant free of cost.

Development of the tanning/retanning process based on the reuse of the Cr-recovered bath will be in the sole responsibility of the tannery.

PTIETC

1) Development of the organisational structure and business principles for the tripartite business motivated cooperation between Tanneries, Chrome-recovery plant and PTIETC in which:

- Tannery will collect and offer all cr-liquors for reprocessing and will reuse the reprocessed Cr-baths in its production operations (if possible).

- PTIETC will transport spent chromium liquors from the donor tanneries to the Cr-recovery plant and will provide delivery of the reprocessed chrome liquors to the tanneries or other customers.

- Cr-recovery plant at ARAFATH Tannery will reprocess delivered chromium reactors into a chrome tanning bath of standard concentration of Cr_2O_3, standard basicity and consistent acidity and concentration of NaCl.

2) Proposal and adoption of the cost price structure and formulation of the payment-and accounting conditions for:
   - transport of the spent Cr-liquors from the tannery to the chrome recovery plant.
   - retransport of the Cr-recovered bath to the tannery/customer
   - transfer/sale of the reprocessed Cr-bath by ARAFATH TANNERY TO PTIETC or to the customers.

   It is recommended to express the cost and price structure in Rs.per Kg. of Cr or Cr_2O_3 of standard basicity (33°Sch.)

3) Purchase of the transport facilities for the delivery of spent Cr-liquors to the Cr-recovery plant and for retransport of the reprocessed Cr-baths to the customers/tanneries.

   Recommended mode of transport:
   tractor (35 HP) and 4 wheel trailer 6 x 12" with 2 SINTEX UPPS - ... total capacity 4000 + 2000 l = 6000 l and one el. pumping set (ei. caple 70 M)- anticipated investment cost of Rs.0.5-0.6 MIL.

4) Provision for testing of Cr-liquors and baths (as advised under point 2) at the testing and control laboratory of the CETP-Pallavaram.

5) Ensuring profitability of the Cr-recovery process by adopting realistic profit margins for all three partners.
   Recommended delivery price of the reprocessed Cr-bath should be by 15-20% lower when compared with the market price of the standard Cr-tanning agents.

ARAFATH TANNERY

1) Reprocessing of the delivered and homogenised Cr-spent liquors into a Cr-tanning bath of standard concentration and basicity of Chromium-salts guaranteeing the consistent quality and good tanning properties of the bath by strictly observing the technology and advise of CLRI.

2) Installing a simple and efficient system of collecting spent chrome liquors in Arafath tannery with a relevant pipe-line and pumping system for direct pumping of the Cr- liquors into equalizing tanks of the Cr-recovery plant.

3) In cooperation with PTIETC and CLRI selecting and appointing the Manager-in-charge and the operator(s) capable to run efficiently the Cr-recovery plant and ensuring their training in all operational aspects of the plant.

4) In cooperation with CLRI and PTIETC developing and stabilizing testing- and control system of all inputs and outputs of the plant enabling a reliable evaluation of its performance and quality of the outputs.

5) Controlling the operational cost of the process and ensuring the profitability of the plant and price: quality competitivness of the product.

6) Developing efficient maintenance and house keeping of the plant and associated facilities and allowing for demonstration of the Cr-recovery technology and training in the operation-and management of the process.

EFFECTIVE DATE, DURATION AND TERMINATION OF AGREEMENT

The above understanding shall be effective from the date of signing by all parties and shall be in force until withdrawal of any of the party-signatory of the memorandum.

During the tenure of understanding any party can terminate the agreement giving three months notice and not explaining reasons for such decision. However the previous discussion of parties before such decision is taken is highly recommended and requested. No financial, legal or other claims or consequences will be derived or accepted from such termination.

SPECIAL CONDITIONS:

1) Items supplied or installed under UNIDO assistance will be kept under separate inventories with proper maintenance and care until transferred into the ownership of the plant or PTIETC.

2) The sole right of the technical know-now of the chrome recovery and reuse system vests with CLRI. M/s. Arafath Tannery/PTIETC/user tanneries shall not disclose directly or indirectly any information and data exchanged/generated under this M.O.U. for any purpose without the consent of CLRI, UNIDO and TNPCB.

3) The collecting, processing and reusing system of Chromium liquors will be developed and stabilized within 3 months after commissioning of the Cr-recovery plant.

4) New Member-Tanneries will be invited after their accepting the conditions stipulated in the Memorandum.

5) The processing of the chromium liquors or chromium hydroxide sludges offered or delivered by the non-members of the PTIETC will be considered on its merit and decided jointly within 30 days from the application date by the Board of Directors of PTIETC and Management of the Arafath Tannery. The environmental aspects and the economic feasibility of each application will be the guiding factors of the final decision.

All parties involved in this project will strive to achieve the compliance with the Indian Standards for discharge of treated effluents on land for irrigation or inland surface water as applicable. However the actual performance of the plant depends on the volume and composition of effluents discharged and the conditions of the plant and treatment technology at the time of testing. The UNIDO and the other project agencies therefore cannot accept the responsibility for the environmental performance and for meeting the pollutant discharge standards monitored by the environmental enforcement authorities of India.

The understandings in the memorandum have been reached for the purpose of implementing, and are subject to Project Document US/IND/90/244 "Assistance in Treatment of Tannery Effluents".

We affix our signatures as a token of having agreed the responsibilities and conditions explained above.

20/9/93

PTIETC
Managing Director
1st Party

ARAFATH TANNERY
Managing Partner
2nd Party

TANNERY (S)
Chief Executive
3rd and further Party
(See Addendum)

TNPCB
Member Secretary
Witness

CLRI
Deputy Director
Witness

UNIDO
Chief Technical Adviser
Witness

Madras 20th September 1993.

ADDENDUM

ADDENDUM TO THE MEMORANDUM OF UNDERSTANDING

UNIDO-INDIA PROJECT : US/IND/90/244

OBJECTIVE/OUTPUT 2.2/2: CHROME RECOVERY PLANT AND REUSE OF REPROCESSED CHROME BATHS.

TANNERY-MEMBER	PARTY	SIGNATURE DATE
M/s. Marson Tanning Industries No.12, Anna Road, Pallal - 600 075.	3rd Party	
M/s. Izharul Huque & Co. No.35, Anna Salai, Nagalkeni, Chromepet, MADRAS 600 044.	4th Party	
M/s. Chimbatore Chrome Tanning Co. 10/31 P.P. Amman Koil Street Chromepet Madras 600 044.	5th Party	20/9
M/s. S.Abdullah & Sons 2, Thavalai Shop Chromepet, Madras 600 044.	6th Party	
M/s. Arafath Leathers No.2 Thirumeermalai Road Chromepet, Madras 600 044.	7th Party	17/9/93
M/s. East Euro Leathers 112, Anna Main Road, Nagelkeni, Chromepet, Madras 600 044.	8th Party	
M/s. Graphico Leathers No.1 Anna Main Road Nagelkeni, Chromepet, Madras 600 044.	9th Party	
M/s. Govindarajulu Naidu Co. Naidu Shop Kadma Nagar, Madras 600 044.	10th Party	
M/s. Gordon Woodroff Ltd. Dargа Road, Pallavaram, Madras 600 043.	11th Party	

SULFIDE REDUCED LIMING

3.0. SULFIDE REDUCED LIMING PROCESS

3.1. PREAMBLE

The use of processing equipments like paddles and drums in place of conventional pits reduces the total time and input of water and chemicals during unhairing and liming of hides. Employment of enzymatic unhairing techniques further reduces the chemical load in the waste water from beam house operations. CLRI has implemented the above options on trial basis in commercial tanneries in Ranipet, Ambur and Vaniyambadi.

Sulfide content of spent liquors can be reduced substantially by using enzymatic techniques for unhairing. By employing paddles and drums in liming and reliming operations, apart from reducing sulfide concentrations, substantial time savings could be achieved . In the case of liming in drums, considerable savings in water was also achieved during trial investigations which led to reduced quantity of effluent/spent liquor. **Tables 1 and 2** highlight techno-economic benefits of the proposed scheme. The proposed project is aimed at extending the above technological benefits to tanneries in Pallavaram area.

3.2. OBJECTIVES

* to partially/completely remove sulfides in spent liquors
* to reduce COD/BOD levels in beamhouse waste waters

TABLE 1 : PROJECTED TECHNO-ECONOMIC BENEFITS OF SULFIDE REDUCED LIMING

CAPACITY	:	1000 SKINS/DAY
APPROX. WT.	:	1500 Kg
PROCESS	:	LIMING ONLY

Rs in Million

	Conventional pit liming	Liming in paddles with enzymes/ reduced sulfide in drums
Fixed capital on plant and machinery	0.05	0.30
Chemicals used:		
Lime	20%	15-20%
Sodium Sulfide	3-3.5%	1.5% (max)
Enzyme	-	2.0% (max)
Cost of chemicals/yr	0.36	0.24
Annual cost of effluent treatment	0.07	0.05

TABLE 2 : COST BENEFIT ANALYSIS (PROJECTIONS)

CAPACITY : 1000 SKINS/DAY

PROCESS : LIMING ONLY

		Rs in Million
A.	Additional fixed cost for Sulfide reduced liming system :	0.190
B.	Additional annual operating costs:	
	Maintenance :	0.013
	Interest :	0.034
	Electricity :	0.005
	Depreciation :	0.019
	Total :	0.071
C.	Benefits:	
	Savings in chemicals/yr :	0.120
	Savings in effluent treatment/yr :	0.023
	Total :	0.143
	Gross profit/yr :	0.072
	% Net return (after Tax) on additional investment :	20% (approx)

- to minimize sludge formation from dissolved hair
- to overcome unpleasant odour due to build up of H_2S
- to reduce energy cost for treatment of effluents
- to achieve better strength characteristics for leather
- to obtain better quality and cleaner hair for industrial applications
- to achieve cleaner working environment inside the beam house

3.3. PROJECT IMPLEMENTATION

CLRI technology package includes process restandardization in paddles/drums, process recipes along with time sequencing, prescription of appropriate spot quality control measures and monitoring of effluent quality.

CLRI has provided project engineering assistance and overall supervision during the installation and commissioning of add-on facilities in the selected tannery.

3.4. PROCESS

Conventionally, unhairing of skins is done by applying a paste containing 10-15% lime and 2-3% sulfide on flesh side and piling the skins for 6-10 hours. The hair/wool is then scrapped off using a blunt knife.

The skins are subsequently relimed using pits. In the case of hides, liming is normally done in pits using about 600% water, 20% lime and 3-3.5% sodium sulfide. Large quantities of effluent with high alakalinity and sulfide content emanate from such processing methods.

By using enzymes. in the case of skins, sodium sulfide can be more or less eliminated and the effluent will be free from sulfide. Enzyme is made in to a paste by mixing with lime and then applied on flesh side of skins similar to sulfide painting. Unhairing of skins can be done in paddle also with reduced sulfide and enzyme. The unhaired skins can subsequently be relimed in paddles. In the case of hides, liming is carried out in drums with 100-150% water, 10-12% lime and 1-1.5% sodium sulfide. The resultant effluent will have very small quantities of sulfide.

3.5. MODE OF PROJECT FINANCING

1. Anticipated funds from UNIDO : USD 7000.00
2. Know-how and Design charges to be absorbed by CLRI as counterpart expenditure : Rs 0.04 million
3. Contribution from User Tannery : Rs 0.06 million

3.6. WORK PLAN

The proposed work plan is highlighted in Table 3.

3.7. TRAINING

The user tannery staff are being trained on application of enzymes, modified operation in paddles and drums, product testing and evaluation and the analysis of effluents. The duration of the training is 7-10 days and the number of persons to be trained will be mutually agreed upon by CLRI and the host tannery.

3.8. Execution of Agreement by CLRI and M/s Hearty Leather Co Ltd (HLC)

CLRI had entered into an agreement (Annexure 3.1) with M/s Hearty Leather Co Ltd (HLC), Pallavaram on 21.07.93 for the implementation of sulphide reduced liming rocess at the existing facility of M/s HLC. The agreement covers:

i) The know-how, design engineering and technical assistance for erection, commissioning and technology implementation by the CLRI

ii) The total capital cost of the project to be shared by UNIDO (limited to USD 7000) and M/s Hearty Leather Co Ltd (limited to Rs. 0.06 million)

TABLE 3

THE SCHEDULE FOR IMPLEMENTATION OF CLEANER TECHNOLOGIES
STARTING DATE : 1ST OCTOBER 1992

	MONTH									
Activity	0	1	2	3	4	5	6	7	8	9
II. Sulfide Reduced Liming										
1. Field Study	xxxx									
2. Specifications to UNIDO	xxxx									
3. Equipment Ordering		xxxx	xxxx							
4. Installation				xxxx	xxxx					
5. Commissioning						xxxx	xxxx			
6. Demonstration and Training									xxxx	xxxx

iii) The required space and civil works for the proposed project will be identified by M/s HLC. The CLRI will provide appropriate design engineering information. Operating costs to implement the new technology including raw materials, chemicals, power etc., will be borne by M/s HLC.

3.8.2. Brief description of the Technology

The wet salted hides are soaked by the conventional method and sent for liming and unhairing. Unhairing is done employing several options including enzymatic method. The waste water obtained from these options is checked for sulphide content. The hides are then delimed and then sent for further processing operations to cross check the hide quality.

3.8.3. Status of the Project Implementation

M/s HLC have already erected the new shed for implementing the proposed technology. A copy of site plan is given in Annexure 3.2. The analytical laboratory is being set up under this programme to provide the facilities for spot checking of waste water. CLRI has also taken action to place order for the facilities to be added at HLC. Copy of the purchase order is given in Annexure 3.3. The equipment is expected to arrive at the site during March-April 1994.

ANNEXURE 3.1

Agreement with M/S Hearty Leather Co. Ltd. (HLC)

INDIA

TEN RUPEES

DIRECTOR
C.L.R.I
MADRAS-20

4117
6.7.93

A.S. RAJKUMAR
STAMP VENDOR
L. No. 1201/[illegible]
[illegible]

C.1 THE AGREEMENT

C.1.1 THIS AGREEMENT made and entered into force this 21st day of July One thousand nine hundred and Ninety three between Council of Scientific and Industrial Research, a Society registered under the Societies Registration Act XXI of 1860, having its registered office at Anusandan Bhavan, 2, Rafi Marg, New Delhi-110 001, (thereinafter called CSIR which expression shall where the context so admits include its successors and permitted assigns) through the Central Leather Research Institute, Adyar, Madras-600 020 (hereinafter referred to as CLRI).

C.1.2 M/s Hearty Leather Company having office at No.15, Ramamurthy Street, Nehru Nagar, Chrompet, Madras-600 044, a company registered in India under the Companies Registration Act 1950 (hereinafter called as M/s Hearty Leather Company which expression shall where the context so admits includes its successors and permitted assigns) of the other part.

Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

For HAARTY LEATHER COMPANY

Partner.

C.2 PREAMBLE

United Nations Industrial Development Organisation (UNIDO), Vienna (hereinafter referred to as UNIDO) has identified Central Leather Research Institute, Adyar, Madras-600 020 under the Project No.US/IND/90/244/2 as the agency for implementation of Environmentally Cleaner Technology at selected tanneries in India. CLRI in consultation with UNIDO has chosen M/s Hearty Leather Company as the host organisation for setting up demonstration facility costing approximately US $ 6000 (herein referred as ACTIVITY) for sulphide reduced liming process (herein referred to as TECHNOLOGY). The basic objectives of the proposed ACTIVITY AND TECHNOLOGY TRANSFER are:

1. to partially/completely remove sulphides in spent liquors.
2. to reduce COD/BOD levels in beamhouse waste waters.
3. to minimize sludge formation from dissolved hair
4. to overcome unpleasant odour due to build up of H_2S
5. to reduce the energy cost for treatment of effluents.
6. to achieve better strength characteristics for leather
7. to obtain better quality and cleaner hair for industrial application.
8. to achieve cleaner working environment inside the beam house.

C.3 SCOPE OF THE AGREEMENT

The agreement details the terms and conditions for CLRI undertaking the activity for the HEARTY LEATHER COMPANY, the financial arrangements, rights and obligations of the parties hereto pertaining to the ACTIVITY.

For HEARTY LEATHER COMPANY

Partner.

2

Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

C.4 FINANCIAL ARRANGEMENTS

C.4.1 Hearty Leather Company shall earmark a sum of Rs.60,000/- towards the counterpart implementation costs for implementing the items listed in Annexure - I.

Rs. 30,000/- to be paid to CLRI on signing the agreement.

Rs. 30,000/- to be pledged for making payment for procurement of equipments/facilities and services as specified by CLRI from time to time during the implementation of the proposed ACTIVITY.

C.4.2 TA/DA CHARGES

The Hearty Leather Company shall in addition to charges as above pay to CLRI for the personnel deputed in connection with work pertaining to the ACTIVITY, provide boarding and lodging and local hospitality at the work place.

C.5 RESPONSIBILITIES OF CLRI

C.5.1 CLRI shall undertake the ACTIVITY in accordance with the scope of work detailed in the Annexure I to the agreement.

C.5.2 CLRI shall complete the ACTIVITY including submission of the Final Report within 15 months of signing the agreement.

C.5.3 The period for completion of ACTIVITY could however be extended to such further period as may be required and mutually agreed between the parties without any liability on the part of CLRI.

C.5.4 CLRI shall provide design engineering including equipment specification for the implementation of ACTIVITY.

C.5.5 CLRI shall provide technical assistance during equipment procurement, installation, commissioning and demonstration.

For HEARTY LEATHER COMPANY

Partner.

Controller of Administration
Leather Research Institute
600 020

C.5.6 CLRI shall provide the following documentation for the proposed facility:

i. Operation manual

ii. Process recipie for environmentally cleaner technologies.

iii. Safety manual.

iv. Instructions for operation and maintenance of all the critical equipments.

v. Specification of chemicals specially needed for implementation of environmentally cleaner technologies.

C.5.7 CLRI shall provide training to the personnel of HEARTY LEATHER COMPANY (number to be mutually agreed upon) on the following aspects:

i. Drum Liming with lesser percentage of sulphide instead of paint liming followed by paddle liming.

ii. Reduced quantity of sulphide in the drum for cattle/buffalo hides, than required for the conventional process.

iii. Enzymatic unhairing by painting followed by liming the drum with small percentage of sulphide to remove the residual hair if necessary.

C.6 RESPONSIBILITIES OF M/S HEARTY LEATHER COMPANY

C.6.1 The Hearty Leather Co. shall supply at its own cost the requisite quantity of chemicals/raw materials to CLRI within ten days from the date of such a request by CLRI.

C.6.2 The Hearty Leather Co. shall provide free access to the CLRI and UNIDO personnel to visit the site as and when required.

For HEARTY LEATHER COMPANY

Partner.

Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

C.6.3 The Hearty Leather Co. shall allow demonstration of the operational aspects of the control and other systems and the efficacy of the TECHNOLOGY to the interested representatives of the leather industry as recommended by CLRI/UNIDO. This facility shall be made available for demonstration for a period of 3 years and can be extended on mutual agreement with UNIDO/CLRI. The exact time and duration of each demonstraation shall be finalized by CLRI in consultation with M/s Hearty Leather Company.

C.6.4 Hearty Leather Co. shall also participate in techno-economic assessment of the TECHNOLOGY AND ACTIVITY.

C.6.5 Hearty Leather Co. shall nominate a coordinator who shall be the contact person for CLRI from time to time to monitor the progress of the project.

C.6.6 Hearty Leather Company shall also provide all basic data/details/information/manuals available with them and as required by CLRI in respect of their existing facilities and technologies.

C.6.7 Hearty Leather Co. shall consequent to the ACTIVITY undertaken by CLRI and upon implementation of results thereto, disclose to CLRI benefits accrued to it in techno-economic and other terms for information.

C.6.8 Hearty Leather Company shall provide adequate personnel/equipment support for CLRI personnel and CLRI will not be responsible for any unwilful damage caused to the property/machinery of the Hearty Leather Company during the course of this project.

C.6.9 Hearty Leather Company shall provide necessary

For HEARTY LEATHER COMPANY

Partner.

Controller of Administration
Central Leather Research Institute
600 020

financial support for the procurement of all the machinery, equipment and facilities as per directions of CLRI within the budgeted amount as highlighted in C.4.1. and shall be responsible for its maintenance and operation.

C.6.10 The equipments and facilities to be procured from UNIDO funds will be in UNIDO's name till all obligations under this agreement are fulfilled by Hearty Leather Co. The transfer of assets to Hearty Leather Company will then follow.

C.7 EFFECTIVE DATE, DURATION AND TERMINATION OF AGREEMENT

C.7.1 The agreement shall be effective from the date of signing the agreement and shall remain in force for the period of 15 months from the effective date.

C.7.2 During the tenure of the agreement parties hereto can terminate the agreement either for violation of any of the clauses of the agreement or other work by giving one month notice in writing to the defaulting party. Failure of either party to terminate the agreement on account of breach or default by the other shall not constitute a waiver of the party's right to terminate this agreement.

C.8 SETTLEMENTS

C.8.1 In the event of termination of the agreement vide C.7.2 the rights and obligations of the parties hereto shall be settled by mutual discussion the financial settlement shall take into consideration not only the expenditure incurred but also the expenditure committed to UNIDO BY CLRI.

For HEARTY LEATHER COMPANY

Partner.

C.9 CONFIDENTIALITY

C.9.1 During the tenure of the agreement and for a period of 7 years of its expiry, both CLRI AND THE HEARTY LEATHER COMPANY (including their sub-contractors if any) shall treat as strictly confidential and prevent disclosure thereof all the information and data exchange/generated under this agreement for any purposes other than that in accordance with this agreement.

C.10 GENERAL PROVISIONS

C.10.1 CLRI shall during the tenure of the agreement or thereafter, be free to take up, without any prejudice to the HEARTY LEATHER COMPANY, consultancy work similar to or same as the ACTIVITY for other parties on terms and conditions as it may decide upon.

C.11 COMPLETION OF ACTIVITY

C.11.1 The ACTIVITY shall be deemed to have been successully completed on submission on the Final Report as stated hereinbefore by CLRI to the HEARTY LEATHER COMPANY.

C.12 PUBLICATIONS

Publications, if any, in respect of the ACTIVITY shall be in the names of S&T personnel of CLRI connected with the ACTIVITY. In all publications (papers, reports etc.), it will be duly acknowledged that the work has been carried out by CLRI under a consultancy assignment from the HEARTY LEATHER COMPANY.

C.13 FORCE MAJEURE

C.13.1 Neither party shall be held responsible for non-fulfilment of their respective obligations under this agreement due to the exigency of one or more of the force majeure events such as but not limited to Acts of God, war, flood, earthquaates, strike lockouts, epidemics, riots, civil commotion

For HEARTY LEATHER COMPANY

Partner.

Controller of Administration
Central Leather Research Institute

etc. provided on the occurence and cessation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurence or cessation. If the force majeure conditions continued beyond six months, the parties shall then mutually decide about the future course of action.

C.14 NOTICES

All notices and other communications required to be served on the HEARTY LEATHER COMPANY under the terms of this agreement, shall be considered to be duly served if the same shall have been delivered to left with or posted by registered mail to the HEARTY LEATHER COMPANY at its registered address in Madras.

C.15 ARBITRATION

Except as hereinbefore provided, any dispute arising out of this agreement, shall be referred to the arbitration of two arbitrators, one to be appointed by each party to the dispute, and in case of difference of opinion between them to an umpire appointed by the said two arbitrators before entering on the reference and the decision of such arbitrators or umpire, as the case may be shall be final and binding on both parties. The venue of arbitration shall be at such place as may be fixed by such arbitrators or umpire and the arbitration proceeding shall take place under the Indian Arbitration Act, 1940.

C.16 AMENDMENTS TO THE AGREEMENT

C.16.1 No amendment or modification of this agreement shall be valid unless the same is made in writing by both the parties or their authorised representatives and specifically stating the same to be an amendment of this agreement. The modifications/changes shall be effective from the date on which

For HEARTY LEATHER COMPANY

Partner.

they are made/executed, unless otherwise agreed to.

SEAL OF PARTIES

In witness thereof the parties hereto have signed this agreement on the date, month and year mentioned hereinbefore.

Parties For and on behalf:

CLRI

Signature

Designation

Witness(Name & Address)

1.

2.

Date:

Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

HEARTY LEATHER COMPANY

For HEARTY LEATHER COMPANY

Signature: Partner.

Designation

Seal

Witness(Name & Address)

1.

2.

Date:

ANNEXURE

Facilities to be created with counterpart funding from M/s Hearty Leather Company

1. Civil works covering foundation, float modification and drain system.

2. Control laboratory and testing equipment like pH meter, chemical balance, heaters etc.

3. Electrical and othor accessories.

4. Installation of drums and other equipment.

For HEARTY LEATHER COMPANY

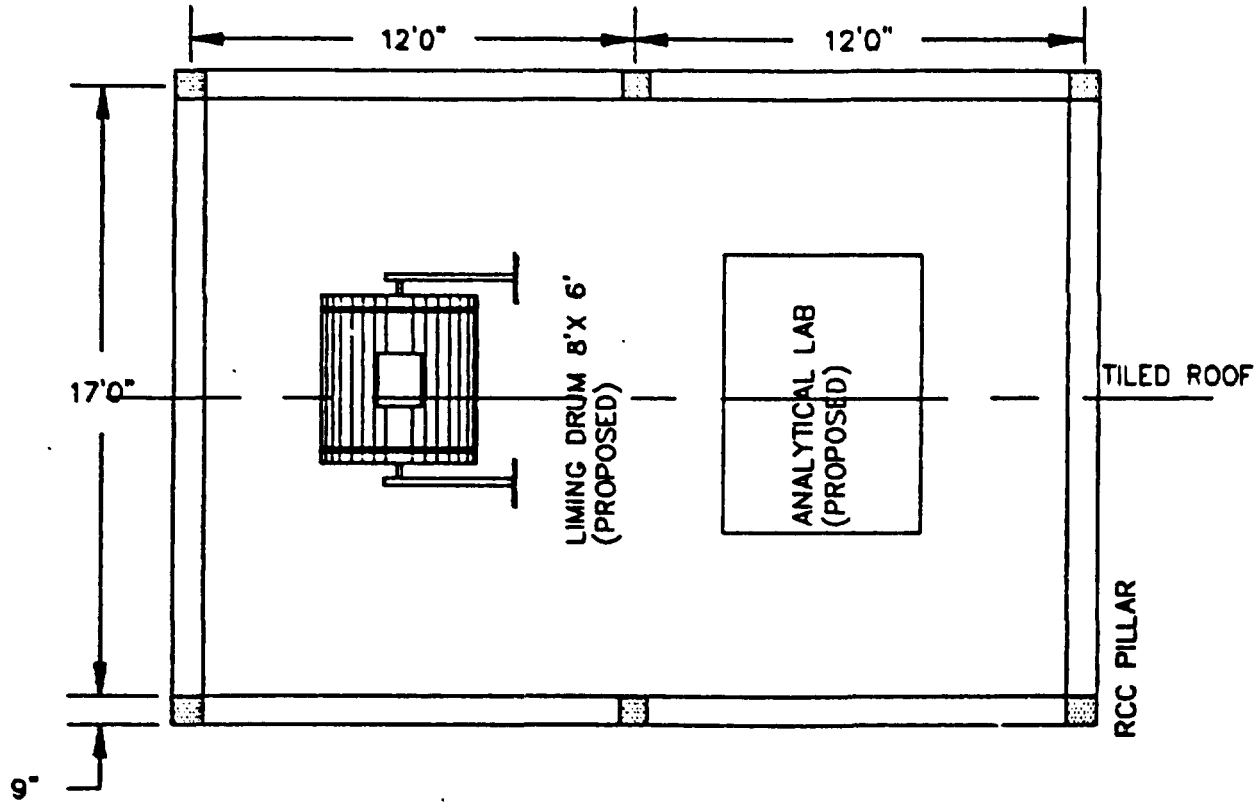
Partner.

Administration
Central Leather Research Institute
Adyar, Madras-600 020

ANNEXURE 3.2

Site Plan of Analytical Lab and Liming Drum

ANNEXURE 3.2 - SITE PLAN OF ANALYTICAL LAB AND LIMING DRUM



CLRI MADRAS	Sheet	
	Drawn	
	Scale	

HAARTY LEATHER CO. LAYOUT
(EXISTING)

UN11415

ANNEXURE 3.3

Purchase Order for Sulphide Reduced Liming Drum

UNDER CERTIFICATE OF POSTING

Telegram : LESERCH

CENTRAL LEATHER RESEARCH INSTITUTE

(Council of Scientific & Industrial Research)

ADYAR, MADRAS-600 020.

Order No. 30(13)/UNIDO/93-PUR

Dated 8-9-93

3

To M/s. CONVYARA ENGINEERS
31 Engineering Fabrication Consultancy
No.No.18, Ramappa Nagar
Perungudi, Madras-600 096, (600096)

Ref. Your quotation No. PI/CLRI/1206 dated 7-4-93

Dear Sirs,

Please arrange to supply on or before 3 months the articles noted below strictly on the terms and conditions.

Sl. No.	Description	Qty. ordered	Rate Rs. P.	Unit	Amount Rs. P.
1.	SULPHIDE REDUCED LIMING DRUMS (Separate sheet attached)	1 No	178500-00	@	178500-00
	Terms & Conditions separate sheet attached				
	Delivery terms :				
	Duties and taxes :				

Rupees One lakh seventy eight thousand five hundred only — Total 178500-00

Local suppliers to note that the materials should be delivered at our STORES SECTION and not to any other section or individual.

Out-station supplies : Mode of despatch

Budget sub-head ...... Project No. UNIDO

Exp. sanctioned vide OM No. ...

dated .... for Rs. ....

No.30(12)/UMIDO/93-Pur

Adyar, Madras-600 020
Date:

To

M/s.GOVIYARA ENGINEERS
Engineering, Fabrication, Consultancy
No.38, Ramappa Nagar
Perunguid, Madras-600 096.

Sl No.	Description	Qty Ordered	Rate Rs.	Unit	Amount Rs.
1.	SULPHIDE REDUCED LIMING DRUMS				
	Salwood fabrication size 8' dia x 6' width, with alternate pegs and shelves Non-detachable and sliding S.S.Door Single piece machine cut gear with direct drive system for a speed of 4 RPM complete with motor and switches	1 No	173500-00	@	1,73,500-00
	Installation charges				5,000-00
					1,78,500-00

(Rupees one lakh seventy eight thousand five hundred only)

Terms and conditions seperate sheet attached

SR.STORES & PURCHASE OFFICER

* PLEASE SEND LAY OUT DRAWINGS FOR CIVIL WORK

CENTRAL LEATHER RESEARCH INSTITUTE
(Council of Scientific & Industrial Research)
Adyar, Madras : 600 020

File No.30(12)/93/UNIDO/Pur Dt:8.9.93

TERMS AND CONDITIONS

1. CST charges Extra, 4% against concessional sales tax certificate

2. Excise duty extra, as applicable at the time of delivery ED gate pass to be provided.

3. Delivery and installation at

M/s. GENERAL INDUSTRIAL
LEATHER PVT.LTD.,
P.O.BOX NO: 19
Chromepet, MADRAS-44.

4. No advance payment can be released without a bank guarantee. Full payment will be released immediately after satisfactory installation and demonstration is arranged by you, at the above site.

5. Delivery period - 3 months from the date of our order

6. Wararanty: 6 months on all manufacturing defects.

Sr.Stores & Purchase Officer

MECHANICAL DESALTING

4.0. MECHANICAL DESALTING

4.1. PREAMBLE

Wet salting is widely adopted curing method for hides and skins in India. Normally, 35-40% of salt (based on the weight of raw hides/skin) is used for curing of hides and skins. Nearly, 80-90% of this salt is carried over to processing and the resultant soak liquid becomes very rich in chlorides. Presence of chlorides to a level of 60,000-65,000 mg/lit is not very uncommon in the soak liquors. High concentration of chlorides and other dissolved salts in the tannery effluent necessitates larger space requirements for solar evaporating pans and also enhances the treatment costs.

Mechanical desalting will considerably reduce the chloride load in the soak liquors and will accordingly reduce its load in waste water. CLRI has standardized this technology for implementation at commercial level in Indian tanneries.

4.2. OBJECTIVES

* to partially prevent salt from entering waste water streams
* to minimize ground water contamination
* to reduce dissolved solids (chlorides) in waste stream
* to create better working environment

4.3. METHODOLOGY ADOPTED

Salt is removed by using a drum or a beater. For Indian conditions, existing drums in Indian tanneries can be modified and used to mechanically remove the salt from wet salted skins.

CLRI is providing engineering information for drum modifications, process conditions for desalting and recycling in pickling operations and assessment of effluent stream quality as part of its overall project contribution. CLRI is also providing technical assistance and supervision during the implementation of the project.

4.4. EQUIPMENT REQUIRED AND APPROXIMATE COST

	(Rs in million)
Modified drum	: 0.10
Collection tray	: 0.03
Miscellaneous equipments	: 0.05
Total :	0.18

4.5. MODE OF FINANCING OF THE PROJECT

UNIDO contribution on equipments	: USD 5,000.00
CLRI contribution for technology	: Rs.0.04 million
User Tannery	: Rs.0.03 "

4.6. EXPECTED RESULTS

* Normally, 20% (w/w) salt is used for curing skins and 35% (w/w) salt is used for curing hides
* Of this, nearly 35% (i.e. 7% in the case of skins and 12% in the case of hides) can be removed from hides/skins
* This salt can be reused for pickling/recuring with an addition of 1% preservative.

4.7. WORK PLAN

The proposed Work Plan is highlighted in Table 1.

4.8. TRAINING

The user tannery staff are trained on modified operation of drum for proper desalting, testing and methods of salt reuse.

4.9. Execution of Agreement between CLRI and General and Industrial Leathers (GIL)

CLRI entered into an agreement (Annexure 4.1) with M/s General and Industrial Leathers (GIL), Pallavaram on 21.07.93 for setting up chemical desalting facilities at their site.

The agreement covers:

i) Know-how, design engineering and technical assistance for installation, commissioning and demonstration of the technology by CLRI

TABLE 1

THE SCHEDULE FOR IMPLEMENTATION OF CLEANER TECHNOLOGIES
STARTING DATE : 1ST OCTOBER 1992

	MONTH							
Activity	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I. Mechanical Desalting								
1. Field Study	xxxx							
2. Specifications to UNIDO	xxxx							
3. Equipment ordering		xxxx						
4. Installation			xxxx					
5. Commissioning				xxxx	xxxx			
6. Demonstration and Training						xxxx	xxxx	

ii) The total capital cost of the project be shared by UNIDO (limited to USD 5000) and M/s General and Industrial Leathers (limited to Rs.0.40 million)

iii) The civil works related to the project will be executed by M/s GIL. The operating costs including raw materials, chemicals, power etc., required for the operation of the proposed facility will be borne by the company.

4.9.1. The CLRI team visited the premises of GIL for 3 times to inspect the site, to finalise the civil drawings and to oversee the civil work implementation. A newly erected shed has been identified for implementing the proposed facility. A new pedestal (RCC) has already been erected by M/s GIL for installing the drum. CLRI has taken action to order (Annexure 4.2) the drum which is expected to arrive at the site during December 1993. A copy of the purchase order for the drum is given in Annexure 4.2.

4.9.2. Process

The wet salted hides are charged to the specially designed desalting drum. The stock is run for a specified period and RPM to remove most of the salt

from the wet salted hides. The hides are checked for salt content before sending for soaking and other processes. The collected salt is being disposed by M/s GIL as per the approved environmental practices after recycling part of the salt for other operations.

4.9.3. Establishment of Analytical Laboratory

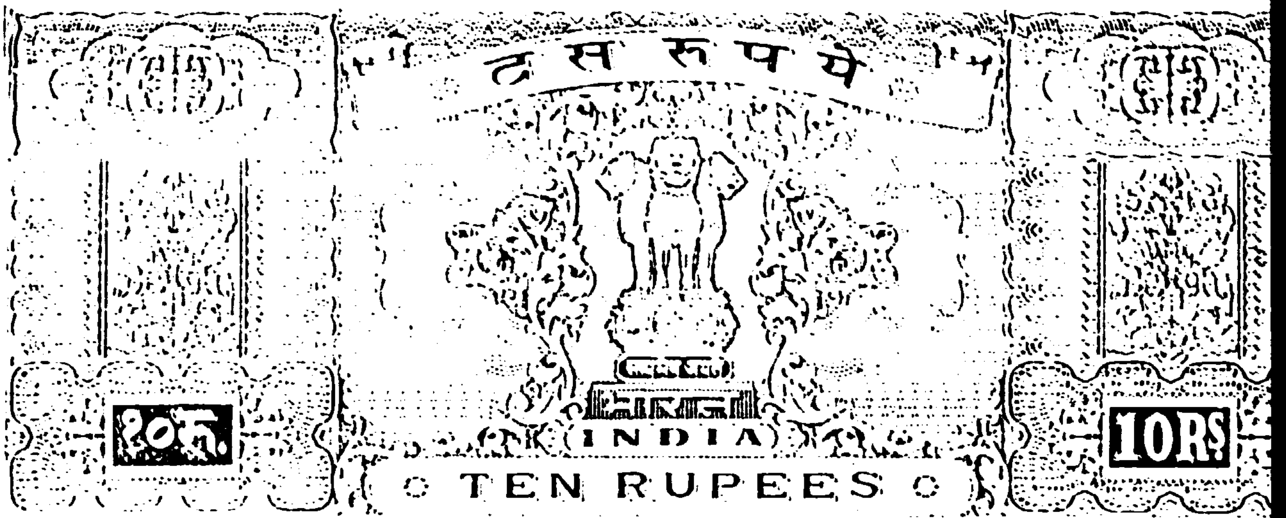
The project activity also covers the establishment of analytical laboratory at the premises of M/s GIL. Annexure 4.3 provides the location of the proposed analytical laboratory vis-a-vis drum location.

ANNEXURE 4.1

Agreement with M/S General and Industrial Leathers (GIL)

A.G.No 13/93

10



DIRECTOR
C.L.R.I.
MADRAS-20

A.S. RAJKUMAR
STAMP VENDOR
L.No. 1383/ /90

4118
6.7.93

C.1 THE AGREEMENT

C.1.1 THIS AGREEMENT made and entered into force this 21st day of July One thousand nine hundred and Ninety three between Council of Scientific and Industrial Research, a Society registered under the Societies Registration Act XXI of 1860, having its registered office at Anusandan Bhavan, 2, Rafi Marg, New Delhi-110 001, (thereinafter called CSIR which expression shall where the context so admits include its successors and permitted assigns) through the Central Leather Research Institute, Adyar, Madras-600 020 (hereinafter referred to as CLRI).

C.1.2 M/s THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. a Company registered in India under the Companies Registration Act and having its registered office at P.O.Box No 19, Chrompet,

Madras-600 044 (hereinafter called as THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD.) which expression shall where the context so admits include its successors and permitted assigns) of the other part.

C.2 PREAMBLE

United Nations Industrial Development Organisation (UNIDO) Vienna (hereinafter referred to as UNIDO) has identified Central Leather Research Institute, Adyar, Madras-600 020 under the Project No.US/IND/90/244/2 as the agency for implementation of Environmentally Cleaner Technology at selected tanneries in India. CLRI in consultation with UNIDO has chosen THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. as the host organisation for setting up demonstration facility costing approximately US $ 6000 (herein referred as TECHNOLOGY). The basic objectives of the proposed ACTIVITY AND TECHNOLOGY TRANSFER are:

1. to partially prevent salt from entering waste water streams.
2. to minimize ground water contamination.
3. to reduce dissol ved solids (chlorides) in waste stream.
4. to create better working environment.

C.3 SCOPE OF THE AGREEMENT

The agreement details the terms and conditions for CLRI undertaking the activity for the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. the financial arrangements, rights and obligations of the parties hereto pertaining to the ACTIVITY.

C.4 FINANCIAL ARRANGEMENTS

C.4.1 THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. shall earmark a sum of Rs.40,000/-(Rupees forty thousand only) towards

the counterpart implementation costs for implementing the items listed in Annexure - I.

Rs. 20,000/- to be paid to CLRI on signing the agreement.

Rs. 20,000/- to be pledged for making payment for procurement of equipments/facilities and services as specified by CLRI from time to time during the implementation of the proposed ACTIVITY.

C.4.2 TA/DA CHARGES

The General and Industrial Leathers Pvt.Ltd. shall in addition to charges as above pay to CLRI for the personnel deputed in connection with work pertaining to the ACTIVITY, provide boarding and lodging and local hospitality at the work place.

C.5 RESPONSIBILITIES OF CLRI

C.5.1 CLRI shall undertake the ACTIVITY in accordance with the scope of work detailed in the Annexure I to the agreement.

C.5.2 CLRI shall complete the ACTIVITY including submission of the Final Report within 15 months of signing the agreement.

C.5.3 The period for completion of ACTIVITY could however be extended to such further period as may be required and mutually agreed between the parties without any liability on the part of CLRI.

C.5.4 CLRI shall provide design engineering including equipment specification for the implementation of ACTIVITY.

C.5.5 CLRI shall provide technical assistance during equipment procurement, installation, commissioning and demonstration.

C.5.6 CLRI shall provide the following documentation for the proposed facility:

i. Operation manual

ii. Process recipie for environmentally cleaner technologies.

iii. Safety manual.

iv. Instructions for operation and maintenance of all the critical equipments.

v. Specification of chemicals specially needed for implementation of environmentally cleaner technologies.

C.5.7 CLRI shall provide training to the personnel of The GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. (number to be mutually agreed upon) on the following aspects:

i. Removal of salt by using a specially designed drum.

ii. Reusing of recovered salt in pickling.

iii. Assessment of effluent stream quality-mechanical desalting.

C.6 **RESPONSIBILITIES OF M/S GENERAL AND INDUSTRIAL LEATHERS PVT.LTD.**

C.6.1 The General and Industrial Leathers Pvt.Ltd. shall supply at its own cost the requisite quantity of chemicals/raw materials to CLRI within ten days from the date of such a request by CLRI.

C.6.2 The General and Industrial Leathers Pvt.Ltd. shall provide free access to the CLRI and UNIDO personnel to visit the site as and when required.

FOR THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD.

C.6.3 The General and Industrial Leathers Pvt.Ltd., shall allow demonstration of the operational aspects of the control and other systems and the efficacy of the TECHNOLOGY to the interested representatives of the leather industry as recommended by CLRI/UNIDO. This facility shall be made available for demonstration for a period of 3 years and can be extended on mutual agreement with UNIDO/CLRI. The exact time and duration of each demonstration shall be finalized by CLRI in consultation with M/s General and Industrial Leathers Pvt.Ltd.

C.6.4 The General and Industrial Leathers Pvt.Ltd. shall also participate in techno- economic assessment of the TECHNOLOGY AND ACTIVITY.

C.6.5 The General and industrial Leathers Pvt.Ltd. shall nominate a coordinator who shall be the contact person for CLRI from time to time to monitor the progress of the project.

C.6.6 The General and Industrial Leathers Pvt.Ltd. shall also provide all basic data/details/information/manuals available with them and as required by CLRI in respect of their existing facilities and technologies.

C.6.7 The General and Industrial Leathers Pvt.Ltd. shall consequent to the ACTIVITY undertaken by C LRI and upon implementation of results thereto, disclose to CLRI benefits accrued to it in techno-economic and other terms for information.

C.6.8 The General and Industrial Leathers Pvt.Ltd. shall provide adequate personnel/equipment support for CLRI personnel and CLRI will not be responsible for any

unwilful damage caused to the property/machinery of the The General and Industrial Leathers Pvt.Ltd during the course of this project.

C.6.9 The General and Industrial Leathers Pvt.Ltd. shall provide necessary financial support for the procurement of all the machinery, equipment and facilities as per directions of CLRI within the budgeted amount as highlighted in C.4.1. and shall be responsible for its maintenance and operation.

C.6.10 The equipments and facilities to be procured from UNIDO funds will be in UNIDO's name till all obligations under this agreement are fulfilled by the General and Industrial Leathers Pvt.Ltd. The transfer of assets to The General and Industrial Leathers Pvt.Ltd. will then follow.

C.7 EFFECTIVE DATE, DURATION AND TERMINATION OF AGREEMENT

C.7.1 The agreement shall be effective from the date of signing the agreement and shall remain in force for the period of 15 months from the effective date.

C.7.2 During the tenure of the agreement parties hereto can terminate the agreement either for violation of any of the clauses of the agreement or other work by giving one month notice in writing to the defaulting party. Failure of either party to terminate the agreement on account of breach or default by the other shall not constitute a waiver of the party's right to terminate this agreement.

Contractor

For The General & Industrial Leathers (Private) L

C.8 SETTLEMENTS

C.8.1 In the event of termination of the agreement vide C.7.2 the rights and obligations of the parties hereto shall be settled by mutual discussion the financial settlement shall take into consideration not only the expenditure incurred but also the expenditure committed to UNIDO BY CLRI.

C.9 CONFIDENTIALITY

C.9.1 During the tenure of the agreement and for a period of 7 years of its expiry, both CLRI AND THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. (including their sub-contractors if any) shall treat as strictly confidential and prevent disclosure thereof all the information and data exchange/generated under this agreement for any purposes other than that in accordance with this agreement.

C.10 GENERAL PROVISIONS

C.10.1 The CLRI shall during the tenure of the agreement or thereafter, be free to take up, without any prejudice to the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. consultancy work similar to or same as the ACTIVITY for other parties on terms and conditions as it may decide upon.

C.11 COMPLETION OF ACTIVITY

C.11.1 The ACTIVITY shall be deemed to have been successully completed on submission on the Final Report as stated hereinbefore by the CLRI to the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD.

C.12 PUBLICATIONS

Publications, if any, in respect of the ACTIVITY shall be in the names of S&T personnel of CLRI connected with the ACTIVITY. In all publications (papers, reports etc.), it will be

duly acknowledged that the work has been carried out by CLRI under a consultancy assignment form the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD.,

C.13 FORCE MAJEURE

C.13.1 Neither party shall be held responsible for non-fulfilment of their respective obligations under this agreement due to the exigency of one or more of the force majeure events such as but not limited to Acts of God, war, flood, earthquaates, strike lockouts, epidemics, riots, civil commotion etc. provided on the occurance and cesation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurance or cessation. If the force majeure conditions continued beyond six months, the parties shall then mutually decide about the future course of action.

C.14 NOTICES

All notices and other communications required to be served on the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD. under the terms of this agreement, shall be considered to be4 duly served if the same shall have been delivered to left with or posted by registered mail to the THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD., at its rogistored address in New Delhi.

C.15 ARBITRATION

C.15.1 Except as hereinbefore provided, any dispute arising out of this agreement, shall be referred to the arbitration of two arbitrators, one to be appointed by each party to the dispute, and in case of difference of opinion between them to an umpire appointed by the said two arbitrators before entering on the reference and the decision of such arbitrators or umpire, as the

case may be shall be final and binding on both parties. The venue of arbitration shall be at such place as may be fixed by such arbitrators or umpire and the arbitration proceeding shall take place under the Indian Arbitration Act, 1940.

C.16 AMENDMENTS TO THE AGREEMENT

C.16.1 No amendment or modification of this agreement shall be valid unless the same is made in writing by both the parties or their authorised representatives and specifically stating the same to be an amendment of this agreement. The modifications/changes shall be effective from the date on which they are made/executed, unless otherwise agreed to.

Central Leather Research Institute
Adyar, Madras 600 020

For THE GENERAL LEATHERS (PRIVATE) LTD.
Managing Director

SEAL OF PARTIES

In witness thereof the parties hereto have signed this agreement on the date, month and year mentioned hereinbefore.

Parties For and on behalf:

CLRI	THE GENERAL AND INDUSTRIAL LEATHERS PVT.LTD.
Signature	COUNTERSIGNED PRINCIPAL ACCOUNTS OFFICER CENTRAL LEATHER RESEARCH INSTITUTE ADYAR, MADRAS-600 020
Designation	
Seal	Controller of Administration Central Leather Research Institute Adyar, Madras-600 020
Witness(Name & Address)	
1.	
2.	
Date:	

	THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD.
Signature:	Managing Director
Designation	
Seal	
Witness(Name & Address)	
1.	
2.	
Date:	

ANNEXURE

Facilities to be created with counterpart funding from M/s General and Industrial Leathers Pvt.Ltd.

1. Civil works covering foundation, float modification and drain system.
2. Control laboratory and testing equipment like pH meter, chemical balance, heaters etc.
3. Electrical and other accessories.
4. Installation of drums and other equipment.

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For THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD.

Managing Director

Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

ANNEXURE 4.2

Purchase Order for Mechanical Desalting Drum

UNDER CERTIFICATE OF POSTING

Telex : 041-21814 CLRI IN
Answer back code : LESERCH

Telephone : 412614
Telegram : LESERCH
Fax : 44-411389

CENTRAL LEATHER RESEARCH INSTITUTE

(Council of Scientific & Industrial Research)

ADYAR, MADRAS-600 020.

Please address all communication quoting this order No. & date to the Director, CLRI and not in the name of any Officer.

Order No.....

Dated..... 30(13)/93/UNIDO/PUR/21
15.9.93

To.....
M/s. GOVIARA ENGINEERS,
No. 38, Ramappa Nagar, Perungudi,
MADRAS 600 096.

Ref. : Your quotation No..... dated.....
PI/CLRI/1205 7.4.93

Dear Sirs,

Please arrange to supply on or before..... the articles noted below *strictly on the terms and conditions stated on the reverse.*
3 months

Sl. No.	Description	Qty ordered	Rate Rs. P.	Unit	Amount Rs. P.
1.	MECHANICAL DESALTING DRUM Separate sheet attached	1 No.	181000 00	each	181000.00
	Delivery terms :				
	Duties and taxes : Separate sheet attached				
	Rupees			Total	
	One lakh eighty one thousand only.				181000-00

Local suppliers to note that the materials should be delivered at our STORES SECTION and not to any other section or individual.

Out-station supplies : Mode of despatch

Budget sub-head ... Project No.....

Exp. sanctioned vide OM No.....

dated ...for Rs.....

Indent No... ... Dated .....

Copy to :

1. Sr. Fin. & Accounts Officer 2. Stores Officer
3. Indentor Dr. / Shri ... P.G.Rao,Sc.,

Yours faithfully,

Sr. STORES & PURCHASE OFFICER

(Form No. 14A-P)

CENTRAL LEATHER RESEARCH INSTITUTE
(Council of Scientific & Industrial Research)

No.30(13)/SSIDO/93-Pur/...

Adyar, Madras-600 020
Date: ...

To

M/s.GOVIYARA ENGINEERS
Engineering, Fabrication Consultancy
No.38, P...appa Nagar
Perungudi, Madras-600 096.

Sl No.	Description	Qty Ordered	Rate Rs.	Unit	Amount Rs.
1.	MECHANICAL DESALTING DRUM Salwood fabrication, size 8'x dia 6' width, with alternate pegs and shelves and holes drilled on the periphery of the drum (as per your drawing) Non-detachable and sliding S.S.Door of standard size(opening 550mm x 450mm) Single piece machine cut gear with direct drive system for a speed of 4 RPM - complete with motor and switches	1 No	176000	each	1,76,000-00
	Installation charges				5,000-00
					1,81,000-00

(Rupees one lakh eighty one thousand only)

Terms & conditions seperate sheet attached

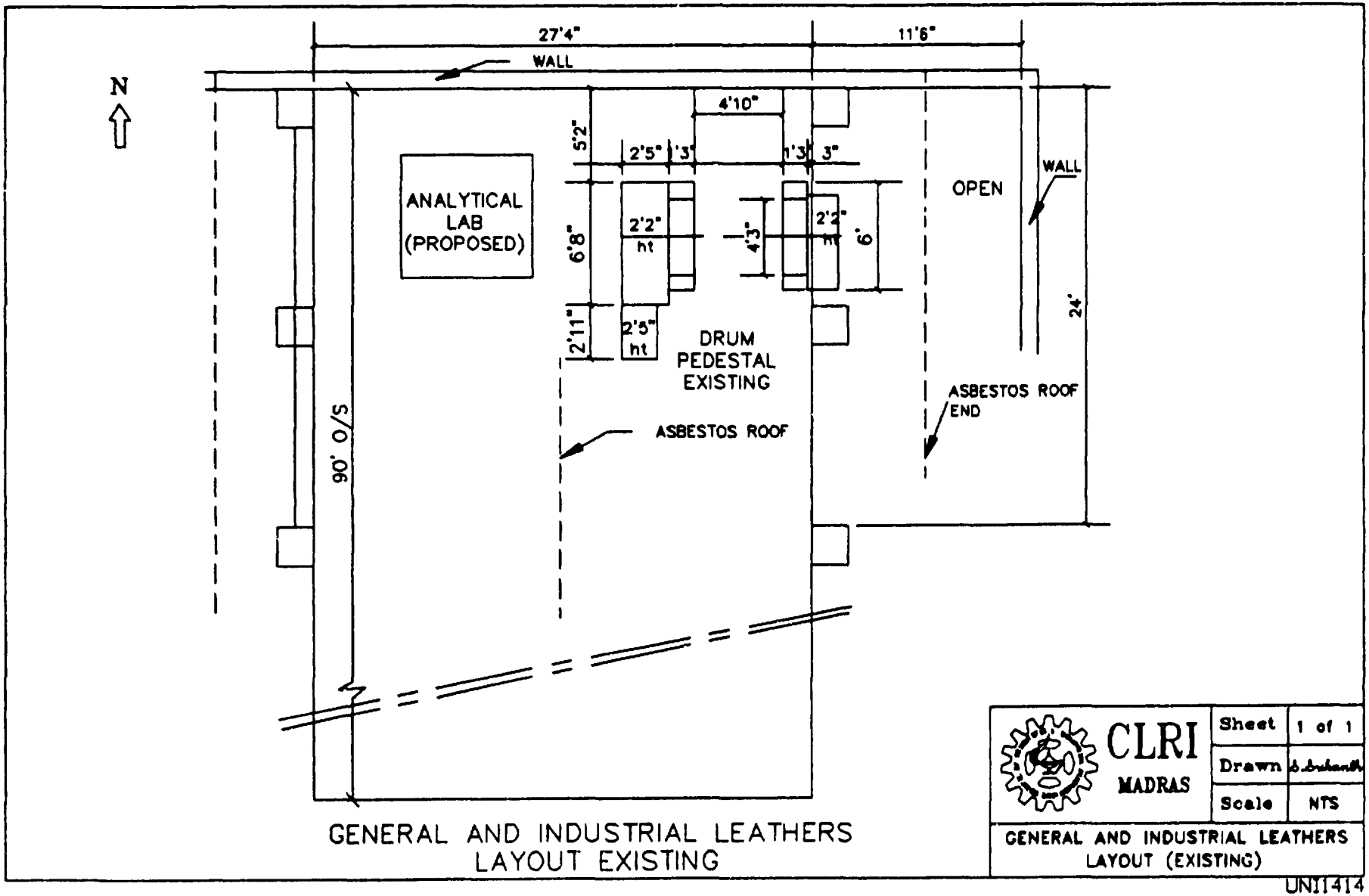
* PLEASE SEND LAYOUT DRAWINGS FOR CIVIL WORK.

STORE AND PURCHASE OFFICER
Central Leather Research Institute
ADYAR, MADRAS - 600 020.

ANNEXURE 4.3

Location of the Analytical Lab

ANNEXURE 4.3 - LOCATION OF THE PROPOSED ANALYTICAL LAB VIS-A-VIS DRUM LOCATION



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