



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

21576 IMPLEMENTATION
OF

CLRI/UNIDO/004/14

53p.
diagrams

ENVIRONMENTALLY CLEANER
TECHNOLOGIES

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

TERMINAL REPORT



XD9700132



PART - C

MECHANICAL DESALTING & SULPHIDE REDUCED LIMING



A PROJECT ASSIGNED BY

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION



IMPLEMENTED BY

CENTRAL LEATHER RESEARCH INSTITUTE

(Council of Scientific & Industrial Research)

ADYAR, MADRAS - 600 020, INDIA

FEBRUARY, 1996

R

**We regret that
some of the pages
in this report may
not be up to the
proper legibility
standards, even
though the best
possible copy was
used for scanning**

CONTRIBUTORS

Consultants:

Dr K V Raghavan
Mr J K Khanna
Mr K Parthasarathi
Dr P G Rao
Mr C Muralidharan
Mr B Sridharnath

Technical Support:

Mr T Rangasami
Mr B Ramanaiah
Mr M Suresh Babu
Mrs S. Booma Vasudevan
Mrs Uma Sastry

MECHANICAL DESALTING

MECHANICAL DESALTING

1. BRIEF DESCRIPTION OF THE PROJECT

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 liquor becomes very rich in chlorides. Presence of chlorides to a level of 60,000-65,000 mg/lt. 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 considerably reduces the chloride load in the soak liquors. CLRI has standardized this technology for implementation at commercial level in Indian tanneries.

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

3. METHODOLOGY ADOPTED

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

CLRI has standardised drum modification procedures, process conditions for desalting and recycling in pickling operations and assessment of effluent stream quality as part of its overall project contribution. CLRI will provide technical assistance and supervision during the implementation of the project.

4. MODE OF FINANCING OF THE PROJECT

UNIDO contribution on equipments	:	US \$ 5,000.00
CLRI Contribution for technology	:	Rs.0.04 million
User tannery	:	Rs.0.03 million

5. EXECUTION OF AGREEMENT BETWEEN CLRI & GENERAL AND INDUSTRIAL LEATHERS (GIL)

CLRI entered into an agreement (Annexure-1) with M/s General and Industrial Leathers (GIL) Pallavaram on 21.7.93 for setting up mechanical 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.
- (ii) The total capital cost of the project to be shared by UNIDO (limited to USD 5000) and M/s General and Industrial Leathers
- (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 operation of the proposed facility will be borne by M/s. General Industrial Leathers.

(6) CLRI - CLIENT INTERACTIONS

6.1 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 was identified for implementing the facility. A new pedestal (RCC) was erected by M/s GIL for installing the drum. CLRI had taken action to order (Annexure II - Purchase order) the drum which arrived at the site during December, 1993.

6.2 Process

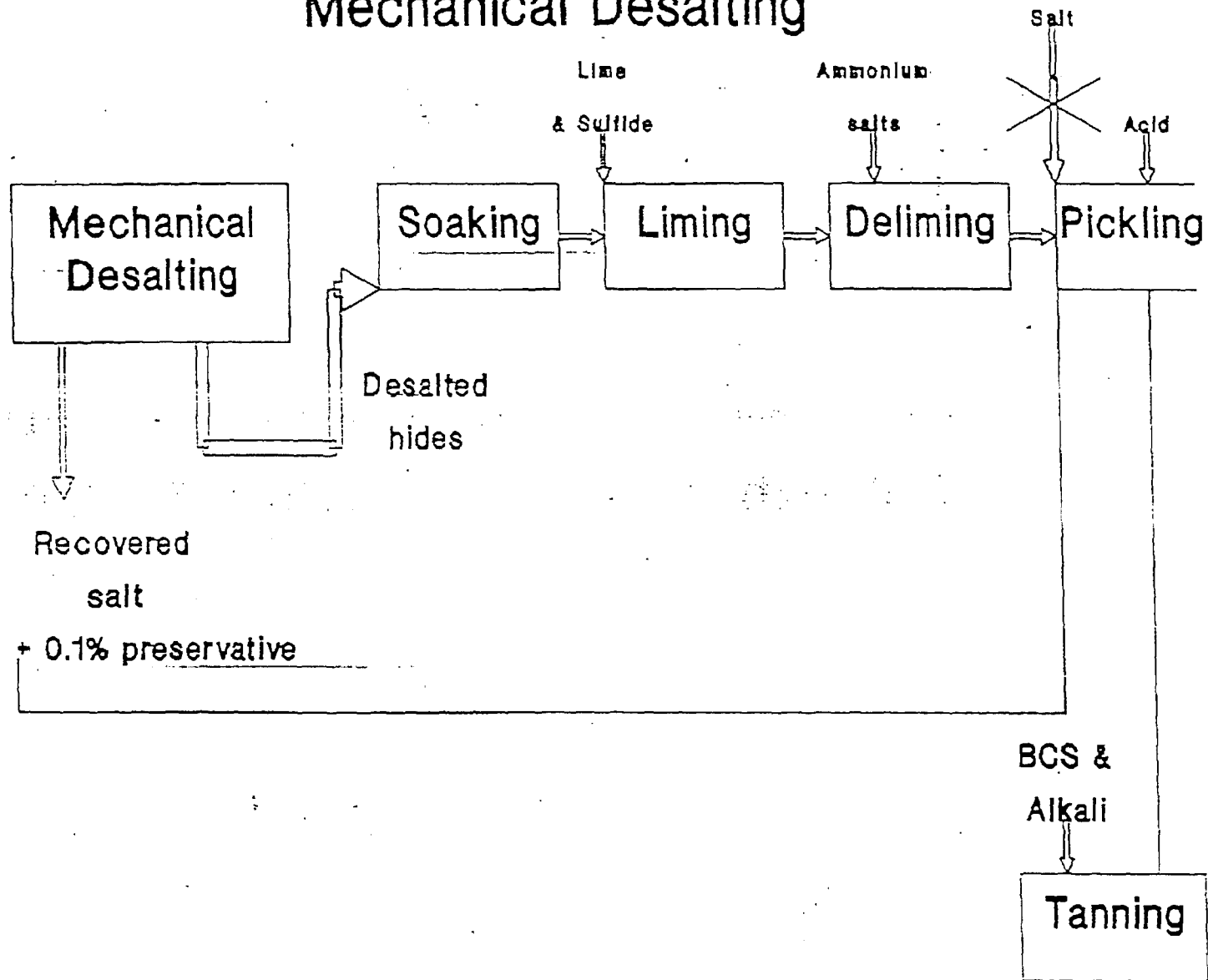
The wet salted hides are charged into the specially designed desalting drum. The stock is run for a specified period (one hour) at a particular RPM (3-4) to remove most of the salt from the wet salted hides. The hides are checked for salt content before sending for soaking and other processes. The collected salt is being disposed by M/s GIL as per the approved environmental practices after recycling recovered salt for other operations.

6.3 Establishment of Analytical Laboratory

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

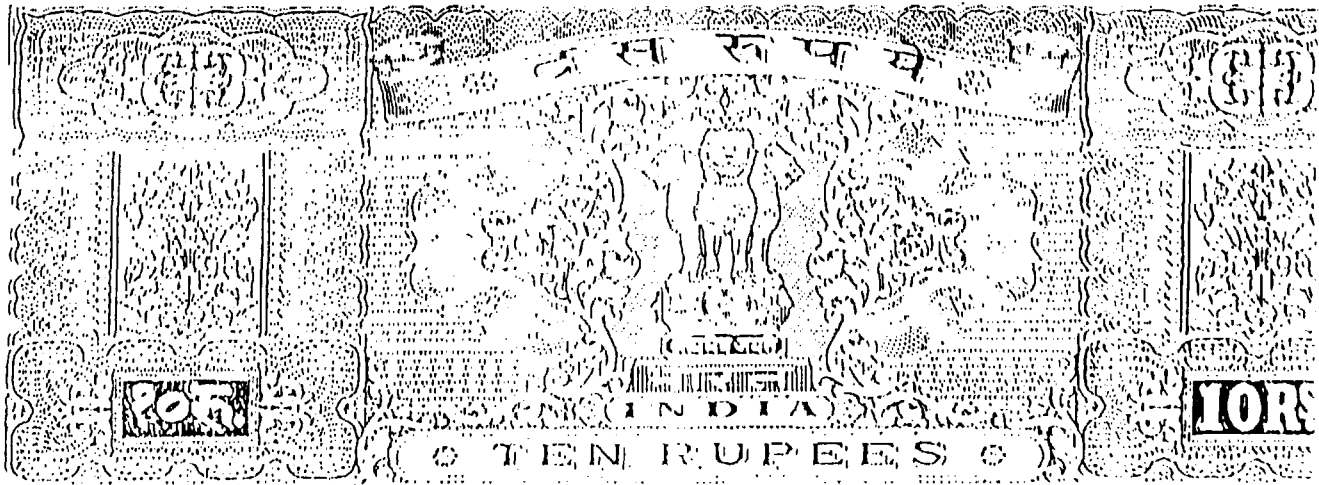
All the equipments and chemical reagents required for the laboratory were procured by CLRI and handed over to the user tannery. The analytical methods to be adopted for various unit operations related to this project has been explained and demonstrated to the user tannery.

Mechanical Desalting



ANNEXURE - I

A-6 No 13/93



DIRECTOR
C.S.I.R.
Madras-20

[Signature]
A.S. RAJUMAR
STAMP VENDOR
P. No. 1203/90
MADRAS

A-118
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 1960, having its registered office at Anusandan 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-600 020 (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, Chrompot,

THE GENERAL AND INDUSTRIAL LEATHERS PRIVATE LTD.



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 dissolved 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.

MW

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 recipe 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.

M.L.A. —

THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD.
Shekhar

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 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 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.

Wali
Contractor

THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD

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 successfully 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

THE GENERAL AND INDUSTRIAL LEATHERS PVT. LTD.

duly acknowledged that the work has been carried out by CLRI under a consultancy assignment from 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, earthquakes, strike lockouts, epidemics, riots, civil commotion etc. provided on the occurrence 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 occurrence 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 be 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 registered 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

Wan

THE GENERAL AND INDUSTRIAL LEATHERS (PRIVATE) LTD
J. P. Khanna

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.

MW
Commissioner
Central Leather Board
Adyar, Madras 600 020
Registration
No. 123456789

FOR THE GENERAL & SPECIAL LEATHERS (INDIA) LTD.
J. K. Kulkarni
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.

COUNTERSIGNED

THE GENERAL & INDUSTRIAL LEATHERS (PRIVATE) LTD.

Signature

Signature:

Designation

Designation

Seal

Seal

FINANCE & ACCOUNTS OFFICER
GENERAL LEATHERS RESEARCH INSTITUTE
ADYAR, MADRAS-600 020
Controller of Administration
Central Leather Research Institute,
Adyar, Madras-600 020

[Signature]
Managing Director

Witness(Name & Address)

Witness(Name & Address)

1.

1.

2.

2.

Date:

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.

FOR THE GENERAL & INDUSTRIAL LEATHERS (PVT.) LTD.

Shahman
Managing Director

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

ANNEXURE - II

UNDER CERTIFICATE OF POSTING

Telex : 041-2104 CLRI IN
 Answer back code : LESHRCII

Telephone : 412616
 Telegram : LESERCHI
 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.....

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**

PI/CLRI/1203 **7.4.93**

Sl. No.	Description	Qty. ordered	Rate Rs.	P.	Unit	Amount Rs.	P.
1.	MECHANICAL DEBALTING DRUM Separate sheet attached	1 No.	181000	00	each	181000.00	
	Delivery terms :						
	Duties and taxes :						

Rupces

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. / Sirl **P. G. Rao, Sr.**

[Form No. 14A-P]

Yours faithfully,

Sr. STORES & PURCHASE OFFICER

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

30(13)/UMIDO/93-Par/21

Adyar, Madras-600 020
Date: 16.9.73

To

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

Sl No.	Description	Qty Ordered	Rate Rs.	Unit	Amount Rs.
1.	<u>MECHANICAL DESALTING DRUM</u> Salwood fabrication, size 6' 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 phase machine unit 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 separate sheet attached

* PLEASE SEND LAYOUT DRAWINGS FOR CIVIL WORK.


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

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

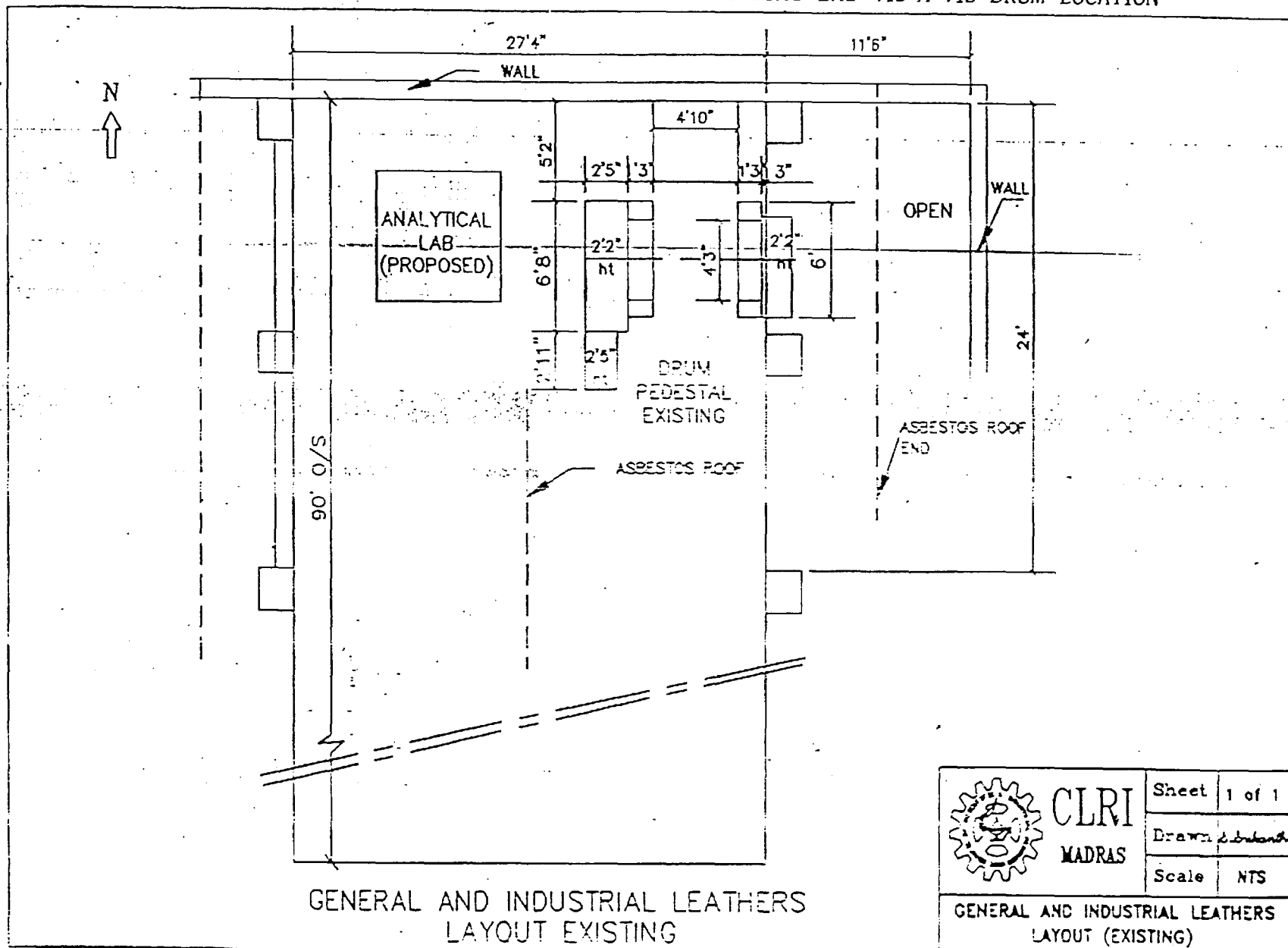
M/s. GENERAL INDUSTRIAL
LEATHER PVT.LTD.,
P.O.BOX NO: 19
Chromepet, MADRAS-44.

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. Warranty: 6 months on all manufacturing defects.

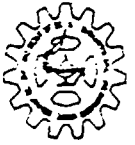

Sr. Stores & Purchase Officer

ANNEXURE - III

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



GENERAL AND INDUSTRIAL LEATHERS
LAYOUT EXISTING

 CLRI MADRAS	Sheet	1 of 1
	Drawn	<i>S. Srinivas</i>
	Scale	NTS
GENERAL AND INDUSTRIAL LEATHERS LAYOUT (EXISTING)		

ANNEXURE - IV

EXPERIMENTAL DETAILS OF DESALTING TRIALS CARRIED OUT AT
M/s. GENERAL AND INDUSTRIAL LEATHERS, MADRAS

TRIAL - I

Raw Material	:	Wet salted cow hides
Initial weight	:	51.5 kg.
Duration of desalting	:	1 Hour
Final weight	:	46.9 kg.
Salt recovered	:	4.6 kg.

TRIALS - II

Raw material	:	Wet salted buffalo hides
Initial weight	:	690 kgs.
Duration of desalting	:	1 Hour
Final weight	:	632 kgs.
Salt recovered	:	58 kgs.

ANNEXURE - V

TRIAL - I:

No. of hides	=	60
Initial weight of hides	=	658 Kg.
Drumming duration	=	60 minutes
RPM	=	6
Final weight of hides	=	604 Kg.
Weight of salt recovered	=	50 Kg.
% Salt recovered (on weight of hide)	=	8 (approx)

REMARKS:

- * The 4 kg difference in weight between the final weight of hides and salt recovered could be due to spillages.
- * Grain abberation was noticed at some places on the hides, which was confirmed on tanning. The cause was attributed to high speed of the drum. (Recommended RPM was 2-3). The supplier was asked to change the RPM of the drum to 3, before commencement of further trials.

TRIAL - II:

No. of hides	=	55
Initial weight of hides	=	586 Kg.
Drumming duration	=	60 minutes
RPM	=	3
Final weight of hides	=	548 Kg.
Weight of salt recovered	=	35 Kg.
% Salt recovered (on weight of hide)	=	6.5 (approx)

TRIAL - III:

No. of hides	=	65
Initial weight of hides	=	639 Kg.
Drumming duration	=	60 minutes
RPM	=	3
Final weight of hides	=	589 Kg.
Weight of salt recovered	=	47.5 Kg.
% Salt recovered (on weight of hide)	=	7.5 (approx)

ANNEXURE - V

TRIAL - I:

No. of hides	=	60
Initial weight of hides	=	658 Kg.
Drumming duration	=	60 minutes
RPM	=	6
Final weight of hides	=	604 Kg.
Weight of salt recovered	=	50 Kg.
% Salt recovered (on weight of hide)	=	8 (approx)

REMARKS:

- * The 4 kg difference in weight between the final weight of hides and salt recovered could be due to spillages.
- * Grain abberation was noticed at some places on the hides, which was confirmed on tanning. The cause was attributed to high speed of the drum. (Recommended RPM was 2-3). The supplier was asked to change the RPM of the drum to 3, before commencement of further trials.

TRIAL - II:

No. of hides	=	55
Initial weight of hides	=	586 Kg.
Drumming duration	=	60 minutes
RPM	=	3
Final weight of hides	=	548 Kg.
Weight of salt recovered	=	35 Kg.
% Salt recovered (on weight of hide)	=	6.5 (approx)

AMMONIA FREE AND CLEANER WET TANNERY OPERATIONS

SULFIDE REDUCED LIMING

CLRI

TERMINAL REPORT

SULFIDE REDUCED LIMING PROCESS

1. BRIEF DESCRIPTION OF THE PROJECT

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 tanneries at 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. The present project is aimed at extending the above technological benefits to tanneries in Pallavaram area.

2 .OBJECTIVES

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

3. PROJECT IMPLEMENTATION

CLRI technology package includes process restandardisation 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.

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. This 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 alkalinity and sulfide content emanate from such processing methods.

By using enzymes, in the case of skins, sodium sulfide can be 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 unhaird 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 amounts of sulfide.

5. MODE OF PROJECT FINANCING

1. Funds from UNIDO : US \$ 7,000
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

6. TRAINING

The user tannery staff have been trained on application of enzymes, modified operation in paddles and drums, product testing and evaluation and the analysis of effluents.

7. EXECUTION OF AGREEMENT BY CLRI AND M/s HAARTY LEATHER CO.LTD. (HLC)

CLRI had entered into an agreement (Annexure I) with M/s Haarty Leather Co.Ltd., (HLC) Pallavaram on 21.7.93 for the implementation of sulphide reduced liming process 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 Haarty leather co. limited (limited to Rs.0.06 million).
- 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

borne by M/s HLC.

8. BRIEF DESCRIPTION OF THE TECHNOLOGY

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

9. PROJECT IMPLEMENTATION

M/s HLC erected a new shed for implomenting the proposed technology. A copy of site plan is given in Annexure II. The analytical laboratory has been set up under this programme to provide the facilities for on the spot checking of waste water. CLRI had also taken action to place order for the facilities to be added at HLC. Copy of the purchase order is given in Annexure III. The equipments arrived at the site during March-April, 1994.

10. TRIALS CONDUCTED USING THE FACILITY

1. Wet runs

One batch load of cow hides was processed employing the CLARIZYME developed by the CLRI. Small quantities of sodium sulphide was added to obtain full removal of hair within the acceptable timeframe. The details are given in Annexure IV.

Simultaneoulsy, attempts are being made to prepare 1 tonne of CLARIZYME at the pilot plant facility of CFTRI, Mysore.

ii. Pre-commissioning runs

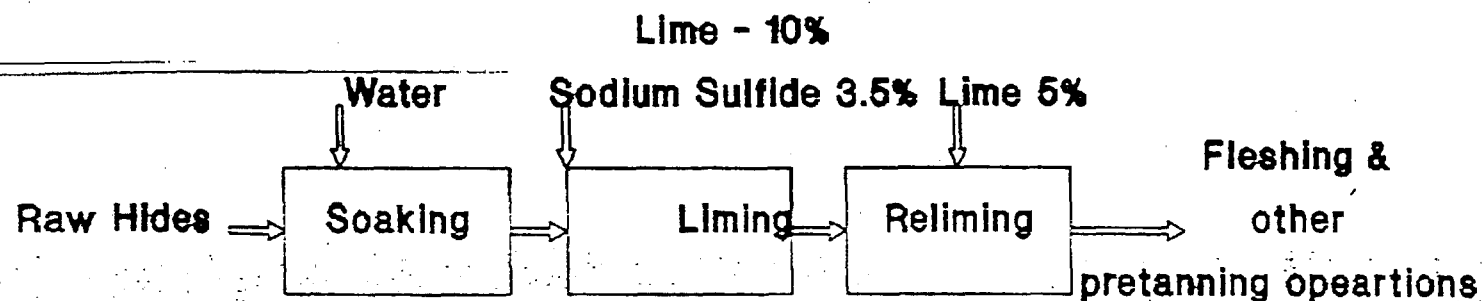
Due to non-processing of raw hides during the last 2-3 months

by the user tannery, pre-commissioning runs could not commence as planned earlier. Dr.Z. Kotasek, UNIDO Chief Technical Adviser and Mr.K. Parthasarathi, Head, CLRI Pilot Plant visited M/s Haarty Leather Co.Ltd. Pallavaram on 1st November, 1994 to finalise the programme of the pre-commissioning runs. The management of the tannery assured that adequate supply of the raw materials is expected during November, 1994.

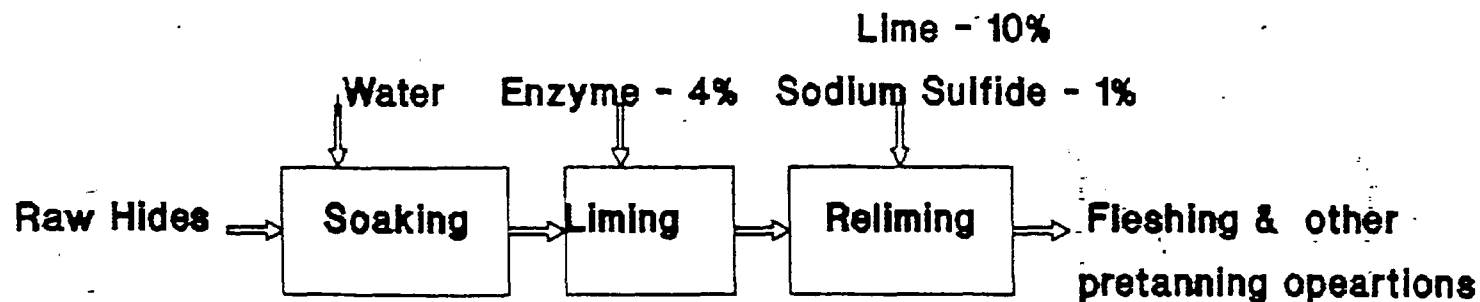
However, due to internal management problems, the company stopped its activities, hence further trials could not be carried out.

Sulfide Reduced Liming System

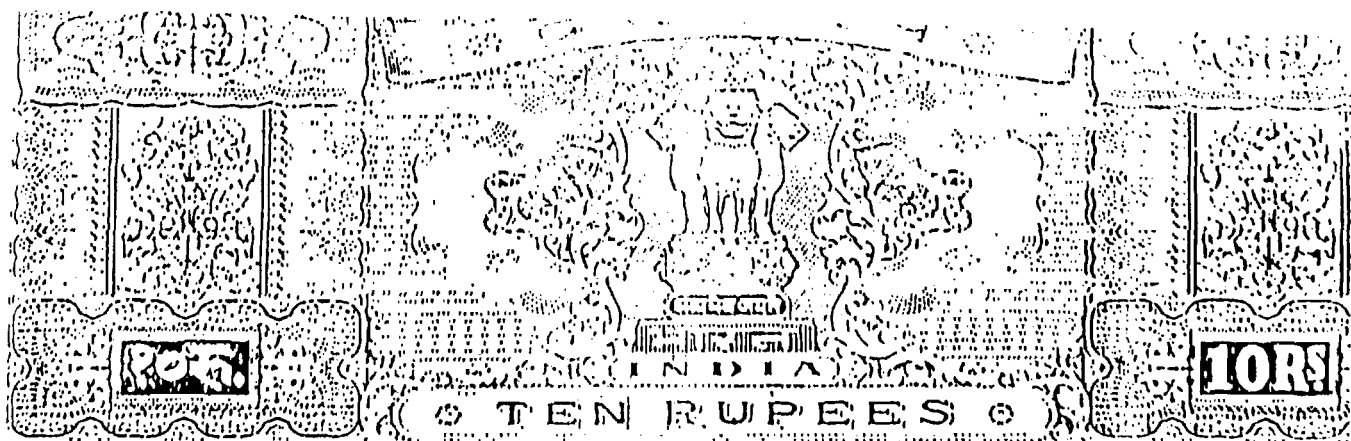
Conventional Processing



Sulfide - Reduced Liming



ANNEXURE - I



DIRECTOR
C.L.R.I
MADRAS-20

[Handwritten signature]

52
4117
6.7.93

A.S. RAJUMAR
STAMP VENDOR
/ No. 120/A/198
TRIVANIPURAM

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 (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-600 020 (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.

For HEARTY LEATHER COMPANY

[Handwritten signature]
Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

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

Wor 2
Controller of Administration
Central Leather Research Institute
Adyar, Madras-600 020

W
Partner.

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 HAARTY LEATHER COMPANY

WNS
Controller of Administration
Leather Research Institute
600 020

(W)
Partner.

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

- i. Operation manual
- ii. Process recipe 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 HAARTY LEATHER COMPANY

Nar
Controller of Administration
Central Leather Research Institute
Chennai, Andras-600 020

(Signature)
Partner.

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 demonstration 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 HAARTY LEATHER COMPANY

Haw
Controller of Administration
Central Leather Research Institute
- 600 020

LW
Partner.

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 HAARTY LEATHER COMPANY

(S)

Partner.

Adm

Administrative

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 successfully 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, earthquakes, strike lockouts, epidemics, riots, civil commotion

For HEARTY LEATHER COMPANY

M. J. J.
Controller of Administration
Central Leather Research Institute

W. J.
Partner.

etc. provided on the occurrence 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 occurrence 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

Mali / 0

lw

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

HEARTY LEATHER COMPANY

For HEARTY LEATHER COMPANY

Waw
Signature

COUNTERSIGNED

[Handwritten Signature]

Signature: *[Handwritten Signature]*

Partner

Designation

Control & Administration, Central Leather Research Institute, Adyar, Madras-600 020
Central Leather Research Institute, Adyar, Madras-600 020

Seal

Witness (Name & Address)

Witness (Name & Address)

1.

1.

2.

2.

Date:

Date:

ANNEXURE

Facilities to be created with counterpart funding from
M/s Harty 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 other accessories.
4. Installation of drums and other equipment.

MW
Administration
Central Leather Research Institute
Adyar, Madras-600 020

For HARTY LEATHER COMPANY

W
Partner.

ANNEXURE - II

UNION IDENTIFICATION OF POSTING

CENTRAL LEATHER RESEARCH INSTITUTE
(Council of Ministers, Government of India)

Order No. **30(12)/UNIDO/93-Sub**
Dated **8-9-93**

3

GOVERNMENT OF INDIA
Ministry of Engineering, Technology and Information
New Delhi

Dear Sir,
Please arrange to supply the articles mentioned below within 28 days of the date of this order.

No.	Description	Qty	Rate	Unit	Amount
1.	BULLHIDE REDUCED LIMING DRUMS (separate sheet attached)	1 No	178500-00	●	178500-00
	Terms & Conditions separate sheet attached				

Total **178500-00**

Local suppliers to this Institute should be notified at our STORES SECTION and not to any other section or institution.

Out-station supplies Mode of despatch

Subject sub-head Project No. **UNIDO**

Exp. sanctioned (under OM No) dated for Rs.

To

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

Sl No.	Description	Qty Ordered	Rate Rs.	Unit	Amount Rs.
1.	<u>BULKHEAD REDUCED LIMING DRIVE</u> Salwood fabrication size 8' dia x 6' width, with alternate pags and shelves Non-detachable and sliding S.S. Deer single piece machine cut gear with direct drive system for a speed of 4 RPM complete with motor and switches	1	173500-00		1,73,500-00
	Installation charges				5,000-00
					1,78,500-00

(Rupees one lakh seventy eight thousand five hundred only)

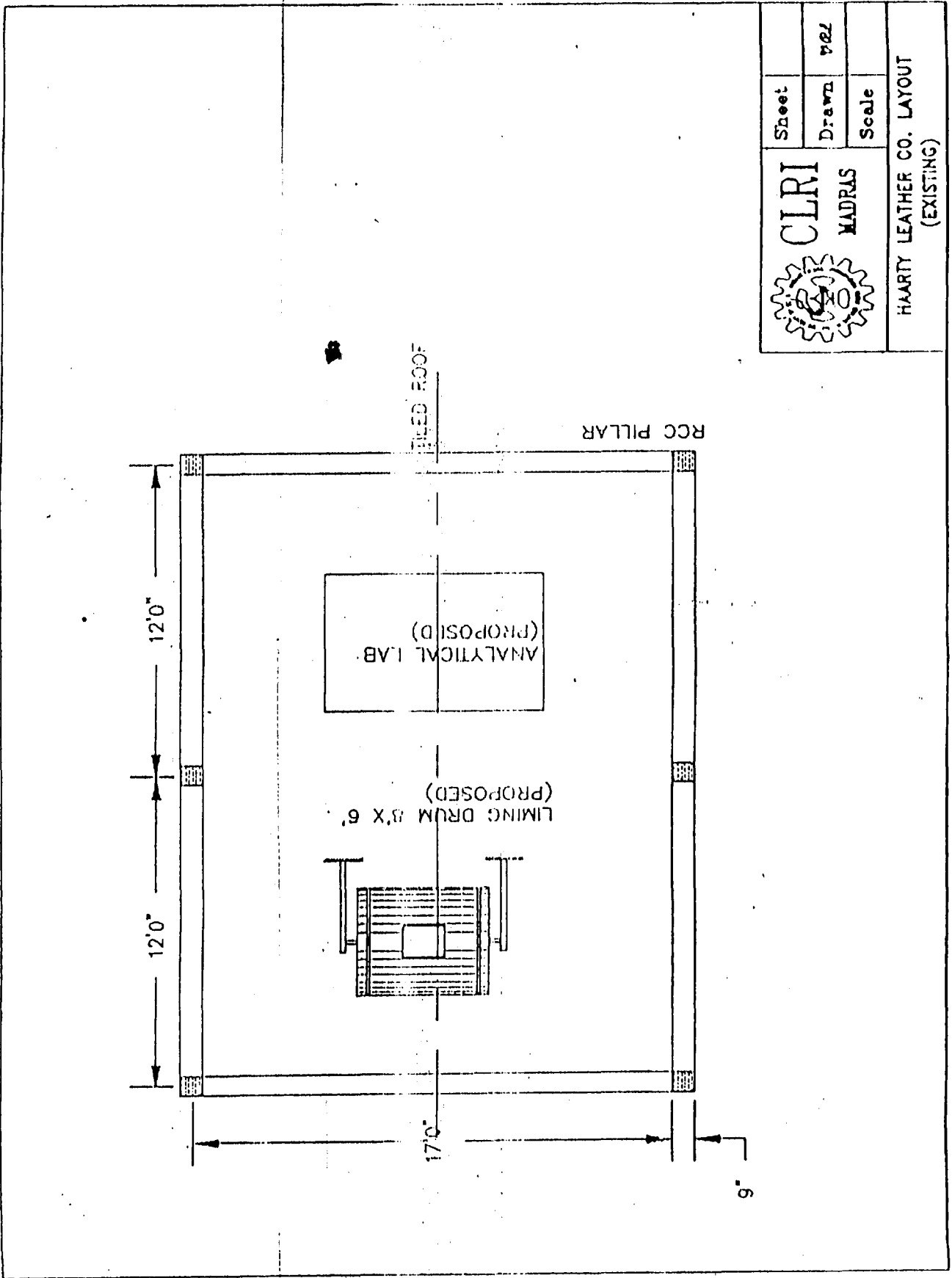
Terms and conditions separate sheet attached



SR. STORES & PURCHASE OFFICER

* PLEASE SEND LAYOUT DRAWINGS FOR CIVIL WORK

ANNEXURE - III

ANNEXURE 3.2 - SITE PLAN OF ANALYTICAL LAB AND LIMING DRUM



 CLRI MADRAS	Sheet	
	Drawn	P&Z
	Scale	
HAARTY LEATHER CO. LAYOUT (EXISTING)		

ANNEXURE -- IV

SULFIDE REDUCED LIMING SYSTEM

Raw Material : Cow hides weighing 250 kg.

SOAKIING (IN PADDLE):

Water : 400%)

Preservative : 0.25%)

Run for one hour and left overnight in paddle.

Next day, the skins are green fleshed and treated with soda ash to adjust to pH 9.0.

LIMING (IN PADDLE):

Water : 300%)

Enzyme : 4%) 5 mts/hr - for 24 hours

Preservative : 0.5%)

Wetting agent : 0.5%)

Next day, the hides are unhaird and transfered to the drum.

Water : 200%)

Sodium sulfide : 1%) 10 mts/hr - for 24 hours

Lime : 10%)

Next day, the hides fleshed, scudded and taken for further processing.