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March 2003
ENGLISH

DG/SRL/99/006

TECHNICAL REPORT*

Prepared for the Government of Sri Lanka by
the UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Based on the mission of
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Solid Waste Consultant

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Abbreviations

acre	160 perches (~ 4047 m ²)
BOD ₅	5 days Biochemical Oxygen Demand
CEA	CENTRAL ENVIRONMENT AUTHORITY OF SRI LANKA
CETP	Common Effluent Treatment Plant
CFC	Common Facility Centre
COD	Chemical Oxygen Demand
Cr	Chromium
CRU	Chrome Recovery Unit
d	Day
DS	Dry Solids
EDB	EXPORT DEVELOPMENT BOARD
EIA	Environmental Impact Assessment
GTZ	GESELLSCHAFT FÜR TECHNISCHE ZUSAMMENARBEIT (TECHNICAL COOPERATION AGENCY, Germany)
ha	hectare (=100 m ² = 2.5 acres)
IDB	INDUSTRIAL DEVELOPMENT BOARD
IIDSP	Integrated Industrial Development Support Programme
IPRP	Industrial Pollution Reduction Programme
kg	Kilogramme
LDB	LIVESTOCK DEVELOPMENT BOARD
m	Metre
m ²	Square metre
m ³	Cubic metre
mm	Millimetre
MCA&ID	MINISTRY OF CONSTITUTIONAL AFFAIRS AND INDUSTRIAL DEVELOPMENT (FORMERLY MOID AND MEID)
MoU	Memorandum of Understanding
NLIDP	National Leather Industry Development Programme
NPC	National Project Coordinator
NPM	National Programme Manager
PSP	Private Sector Support Programme (GTZ)
REPO	UNIDO REGIONAL PROGRAMME OFFICE, Madras (India)
Rs.	Sri Lanka Rupees (US\$ 1 = approx. Rs 89.59)
SLTA	SRI LANKA TANNERS ASSOCIATION
SS	Suspended Solids
SLFA	SRI LANKA FOOTWEAR ASSOCIATION
Subc	Subcontractor
t	Tonne (1,000 kg)
t/d	Tonne per day
TD	Technical director (read technical manager)
TDS	Total Dissolved Solids
ToR	Terms of Reference
TS	Total Solids
UNDP	UNITED NATIONS DEVELOPMENT PROGRAMME
UNIDO	UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
w/m	work-month

Executive Summary

The project "DG/SRL/99/006 Assistance in pollution control and treatment of tannery wastes for the leather complex at Bata Atha, Ambalantota district, Southern Province, Sri Lanka" consists five interlinked projects:

- Establishment of the common effluent treatment plant (CETP) including laboratory
- Infrastructure development
- Relocation of tanneries
- Solid waste conversion units
- Capacity building of SLAT to manage the industrial park

UNIDO has been entrusted with providing technical assistance in establishment of CETP and the laboratory, based on Government and industry requests, to the maximum extent possible, this mission with timely backing from Vienna addressed issues relating to implementation of the other projects.

CETP & laboratory

1. Most of equipment is on site and the mechanical screen has been successfully tested (dry run).
2. Civil works CETP in progress and regularly monitored.
3. Most lab items on site, except for certain chemicals (insurance case with UNDP).
4. As there is some frontrunners -see below. A plan is made for priority items civil works to be able to cater for complete treatment effluents before CETP is completed, may need to arise.

Infrastructure is completed except treated effluent discharge and sea outfall. Non-technical problem in construction has to be solved by Government. A Strategy aiming at long-term solution is under implementation.

Industrial zone is not properly addressed. This implies that long-term sustainability in vicinity of Ramsar site may be hampered due to unplanned development and land use.

Conversion of most solid waste is either in trial stage - biogas - or ready for full industrial scale implementation - glue / leather board and composting.

Tannery relocation

1. Little financial support to the tanning industry relocating over 200 km has been provided.
2. Project gave extensive software assistance in tannery layout, water consumption reduction, and use of environmentally sustainable building materials, comprehensive collaboration with National Cleaner Production Centre started on cleaner processes.
3. Assistance provided to small-scale tanners in machine utilisation and increased collaboration.

At present 12 tanneries and 2 tanneries solid waste conversion units have confirmed their relocation to the industrial park. But the numbers differ from time to time. A small group of 2- 3 frontrunners will relocate first. ***It is recommended that there will be a close collaboration between those tanneries and the project to dovetail the co-ordination.*** Tannery solid waste conversion units need also to be co-ordinated with these frontrunners.

Capacity building for SLAT

1. Website -www.bataatha.com- attracts about 4000 visitors per month downloading over 100 MB.
2. Code of conduct and rules - revision 3 - on the website, management set up Industrial Park accepted by Board of Directors SLAT and under implementation, 3 meetings TAC organised.

Additional funds were received to extend the project till September 2003. Terminal TPR will be held around 4 September 2003.

Introduction

The main objective of the BATA ATHA LEATHER COMPLEX is to set up a common effluent treatment plant to treat the effluent to the standards as prescribed by the CENTRAL ENVIRONMENTAL AUTHORITY (CEA).

At present 12 tanneries and 2 tanneries solid waste conversion units have confirmed their relocation to the industrial park. Only few have started in earnest construction activities (see Photos in Annex). Others are still not very well prepared (Udya Coromandel, Lanka Leathers, United Leathers, NM Mohideen, Eco-Tan International), await bank-loans (Enviro, CLPL, Tanlanka) or await construction by others (Rallan Lanka, Kesri).

Interest has been evinced in setting up a glue unit (based on feasibility report prepared under the project), chemical mixing plants (Quinn - subsidiary of TFL and INDCHEM, both from India), common service centre (Om Sakthi, India) and other common services (Quinn).

Only after the complex is operational it will really be known how many companies will operate. Furthermore, it is evident that there will be a group of frontrunners, i.e. tanneries and possibly the leather board unit that will be the first to relocate resp. start. ***It is recommended that there will be a close collaboration between those tanneries and the project to dovetail the co-ordination.*** Tannery solid waste conversion needs also to be co-ordinated with these frontrunners.

The project "DG/SRL/99/006 Assistance in pollution control and treatment of tannery wastes for the leather complex at Bata Atha, Ambalantota district, Southern Province, Sri Lank" consists 5 interlinked projects:

- Establishment of the CETP including laboratory
- Infrastructure development
- Relocation of tanneries
- Solid waste conversion units
- Capacity building of SLAT to manage the industrial park

Whilst UNIDO has been entrusted with providing technical assistance in establishment of the CETP and the laboratory, based on Government and industry requests, and to the maximum extent possible, issues relating to implementation of the latter 4 projects have been addressed too.

The main objective during the consultant's mission was to deal with issues relating to the CETP (Chapter 2), laboratory (Chapter 3), solid waste conversion (Chapter 4), other project implementation related issues including infrastructure development, tannery relocation and capacity building of SLAT in environmental management (Chapter 5).

Other matters of importance to the leather and footwear industry are listed in Chapter 6. Chapter 7 gives the conclusions and recommendations. To keep the main body of the report as short as possible, references are made to relevant annexes, which give detailed information.

Terminal tripartite review meeting is tentatively scheduled for 4 September 2003. Draft APR has been attached (Annex 10). The present mission had a mid-term review in Vienna. It has been recommended by industry and the Government that the mission should be extended at least until CETP commissioning and completion of composting trials. Paucity of funds necessitated break in mission. Allocation has been made for about one work-month extension.

Common effluent treatment plant

Detailed CETP design by TEHProjekt.

Equipment

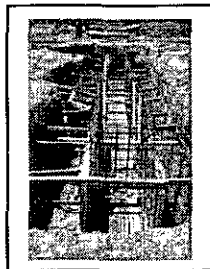
Purchase order has been placed on BIOTIM of India for turnkey supply of main CETP items, their installation etc. in September 2001. Two consignments have arrived till date at site (Annex -2).

Other items purchased include: hand-held tractor with trailer, reconditioned 4 tonne truck, scientific books, spectrophotometer and small chemicals. A request for transfer of equipment from project to users, SLAT (Pvt) Ltd. has already been sent to UNIDO (Annex -2). Other equipment relates to biogas unit, trees and filling material and pumps for the reed bed system.

Screen supplied by Italprogetti had been stored at site for long time. Based on discussion with Italprogetti's representative during Indian International Leather Fair (31 January - 5 February 2003), it was agreed that within exiting purchase order two missions could be scheduled. During first mission (June) the screen was successfully tested (dry run).

Drawing for control panel - MIMIC has been reviewed and comments were given to main equipment supplier (Annex 3).

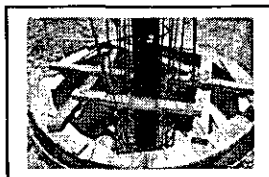
Civil works



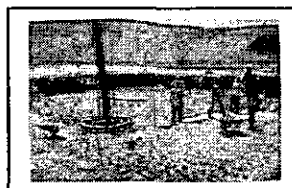
Inlet screening 12.06.2003



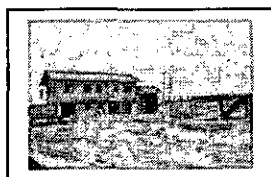
Inlet pumping station 12.06.2003



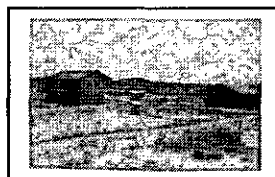
Primary settling tank 12.06.2003



Primary settling tank 12.06.2003



Management building 12.06.2003



Overview 12.06.2003

Photos above give an overview of the status of civil works on 12 June 2003. Work is progressing on items shown above, but it has also to start on others.

Due to non-availability and high cost sulphate resistant cement, a compromise was made that only for those parts of the treatment plant likely to come into contact with (very) low pH effluents and sulphate SRC would be used, viz. inlet channel, pumping station.

Main current issue concerning civil works is the slow progress of implementation by contractor. Though some delays were caused by unexpected heavy rains, the main reason for this slow pace is the fact that SLAT has made payments to contractor out of equity contributions and has still not obtained bank loan nor even bridging facility (at the time of preparation of this report i.e. end June 2003).

The project was extended in order to allow UNIDO to continue its co-ordinating and supervisory role. However, timely release of funds to the contractor has to be ensured by private sector counterpart.

To enable SLAT to obtain the bank loan UNIDO has been requested to transfer the title of all equipment received to SLAT (collateral).

Reed bed

Design report completed and used as the basis for the implementation of the reed bed. Design report will be placed on the web-site www.bataatha.com during return mission. Meantime reed bed is under construction.

Fish species (brackish water) has been identified as *Belontia Signata* (length about 18 cm). Species can be obtained by Ms. Anusha Kumari from Ruhuna University

Laboratory

Laboratory instruments, chemicals and glassware have been supplied to the site. However, many items are missing. UNDP has been requested to assist in preparation of insurance claim, and the National co-ordinator was requested to follow up.

MoU between Sabaragamuwa University and SLAT (Pvt.) Ltd. was signed on 22 February 2003 (Annex-4). MoU specifies areas of collaboration and research projects for BSc. students. It is expected that first two / three students will commence in November 2003.

Collaboration with Coastal Resources Management Project for testing of water at Kalametiya lagoon is likely. CETP lab can undertake at cost + (small) mark-up basis.\

Solid waste conversion

Trial was started with conversion of fleshing by dog chew manufacturer - Kesri. It was confirmed that fleshing cannot be used by the company - at least when using existing production process.

As production process appears to be rather water consuming, consultant requested National Cleaner Production Centre to investigate methods for reduction of water. NCPC report was accepted by Kesri in principle though it focuses on production improvement and not really on water reduction.

It was agreed that during final mission of consultant, UNIDO's Bata-atha project in collaboration with NCPC would focus on both aspects.

Manufacturing of glue from fleshing etc. SLAT placed an advertisement in the local paper. Several serious (paying) potential entrepreneurs obtained copy of feasibility report. One of those gave SLAT a letter of investor's interest. However, their financial plan for implementation has not been submitted yet.

Manufacturing of leather board from chrome shavings etc. Feasibility report has been taken up and project will be implemented on Plot Number 10 by Tradegate International Private Limited (with India support under a buy-back arrangement). Composting survey completed, report indicated that:

- Sufficient amounts of carbon sources are available nearby.
- Some local demand for compost
- A truck has been purchased for transport agricultural waste and compost.
- Basic operational instruction for composting has been made.

Other project implementation related issues

Infrastructure development

National Water Supply and Drainage Board (NWS&DB) contracted by Government of Sri Lanka has completed most of its work. Twice intake point had to be deepened. At present a local (fisher) man is being trained as caretaker / pump maintenance for intake point.

Electricity, 2 MW is reportedly available. It is not quite clear when the additional MW will be required and supplied.

Land development (terraces), internal road and storm water network is completed. Internal process water distribution system, internal drinking water distribution system, effluent collection and conveyance system is completed. The National consultant certified all this.

Disposal site design was copied from the actual Melvisharam (Tamilnadu, India) landfill and not from the designed Melvisharam landfill. In view of the fact that this is one of the first properly engineered landfill in Sri Lanka, consultant suggested that a second design should be prepared taking into consideration site climatic conditions and giving institutions etc. two different options. Report of second cell has been attached (Annex 5 - without AutoCAD drawings). Design of second cell will be laminated and placed on a board at the site.

Additionally based on request of SLAT, a report on operational procedures for the first cell of the landfill has been produced too. That report contains composting operations (Annex-6).

Discharge of treated effluent has been divided into pipeline to the sea and sea out-falls. Coast Conservation Department has approved designs. Tenders have been awarded and work had commenced. About 160 m of the discharge pipeline has been laid, but around February 2003 protests by badly informed local fishermen halted construction. Several meetings were convened; last public meeting was on 31 May 2003. This meeting chaired by Hon. Minister G.L. Pieris did not resolve the issue.

In close collaboration with MEDIPIP (NPC and Secretary) and SLAT consultant prepared a strategy paper (see below) that is now partially under implementation.

Provided Government solves issue of effluent discharge pipeline and sea outfall, and completes their construction, at present the infrastructure seems to be completed. Defects, if any, are likely to appear during the operational stages.

Relocation of tanneries

During the entire period need and justification for providing additional support to the tanning industry relocating over 200 km have been highlighted. Whilst industry typically focuses on financial assistance, technical software support rendered was much appreciated. In this respect basic designs were made and reviewed for most companies, such as Betans, CLPL, EcoTan, Enviro, Kesri, MAM, NMMohideen, Sultan, Tanlanka, Tradegate, Udaya Coromandel, and United.

Water consumption at a fixed maximum of 25 litres per kg of raw material was reduced as per design to 10 litres only.

Factory designs and building guidelines are under preparation. Annex 7 gives draft interim building guidelines.

Expert guidance through UNISTAR / UNV (UNDP) is still ongoing and the third mission of Mr. Silvio Repetto is scheduled for 9 September 2003.

Assistance is given to small scale tanners in collaboration improving efficiency of individual units and machine utilisation. Meetings are minuted by consultant.

Static Flaying Framework reduces waste at source, i.e. during flaying. Permission has been obtained from inventor for introducing system in Sri Lanka. One system has been made by one of the companies. It was agreed with all parties that ToR of one of the consultants (11-53) would include demonstration of the system.

Another factor in relocation is the absence of a practical implemental zoning policy (land use). Though an elaborated plan on the urban development authority of the entire Hambantota district exists, in practice it is quite unlikely to have any effect on the area surrounding the Bata-atha industrial park. As Bata-atha is relatively close to a bird sanctuary unplanned development surrounding the industrial park may negatively affect wildlife in the Ramsar site. UNDP confirmed that they would be very interested in having a proper land-use policy. It is not quite clear who will prepare project document.

An environment NGO listed their interest in independently monitoring performance of the Bata-atha industrial park and particularly its CETP. Currently their draft proposal is under review by consultant.

Internal discussion note sea discharge pipeline action programme

	Political level	Managerial level	Local level
MEDIPIP officials directly involved in implementation	1. Inform PM, Ministers, MPs to get political commitment	2. Brief government staff in the area on project design & implementation 2. Inform other government officials on project design & implementation 2. Encourage officials to build scientific opinion favouring sea discharge including 1/2 day workshop 2. Request expansion of monitoring committee (HDCC, Chairman TAC, Rekawa Dev. Found., Arunarula Env. Found., Small Fisheries Fed.). meeting place CEA office Matare/ SDA or DS Ambalantota	2. Engage services public relations company 3. Meetings with few selected officials 2. Community development projects through local based NGOs 2. Business incubator for leather goods / footwear inside B-A (building, UNIDO technical expertise, SLAT commercial aspects)
Private Sector	1. SLAT to inform PM directly to get political commitment 1. Request Chambers of Commerce of Industry to inform political leadership to get political commitment	2. Call for meeting TAC	2. Recruitment from the area 2. Community development projects through local based NGOs 1. Request HDCC to inform local leadership 3. "Open days" / invite selected official to visit the project 2. Prepare investment opportunity
UNIDO consultant	2. Request UNIDO, Vienna to inform political leadership 2. Request UNIDO focal point (FNCCI) to inform leadership	2. Brief managers of donor funded projects in the area 5. Assist study effects in sea of treated tannery effluent	2. Identify community development projects 2. Organise through ILO - SIYB business generating workshop for people from area 2. Organize CETP lab to do water analysis for CCD - ADB project 2. Organise study tour India for MEDIPIP selected officials / local leaders
CEA		2. Participate in briefings / present the legal path	4. Expand monitoring committee 3. Present to selected officials
Others?	2. To get political commitment	2. Obtain NAARA involvement	

Capacity building of SLAT for industrial park management

Website www.bataatha.com continues to get positive reviews. Downloads for the month June 2003 exceeded 100 MB, site attracted about 4000 visitors. Enquiries for foreign direct investment (FDI) also result. Major updates are regularly made.

The code of conduct and rules unanimously adopted has been fine-tuned two times. Revision 3 is on the website. It is used a.o. to attract FDI.

Management set up for the Industrial Park is adopted and vacancies are gradually filled by people from the area. Moratuwa University has expressed interest and is offering it as an MSc thesis. Some university expressed interest in energy benchmarking and audits.

The objective of the TAC was to ensure *sustainability* of initiatives taken at the Industrial Park after UNIDO's involvement and the end of the project. However, based on a.o. discharge pipeline issue, membership of TAC is changing towards more local representatives.

Baseline data collection in collaboration with Sabaragamuwa University gave some improbable results. Likely causes, instruments at university are neither calibrated nor in perfect condition. Hence, the lab at Bata-atha will be used as the base and students can be sent from Sabaragamuwa University.

Building guidelines have been prepared (interim report - Annex 8) and will be finalize on the basis of the national consultant, Dr. R. Attalega's report.

National Leather & Footwear Industry Development Programme.

The Consultant was a member of Task Force for leather with major contributions towards final report, and its presentation. As the consultant was also being kept abreast of developments in the footwear task force, he was requested to synchronise all different reports into one comprehensive document and present the same to the Honourable Minister G.L. Pieris and the task force members. Executive summary is given below in Annex 9.

Conclusions and recommendations

At present 12 tanneries and 2 tanneries solid waste conversion units have confirmed their relocation to the industrial park. Numbers differ from time to time. A small group of 2- 3 frontrunners will relocate first. It is recommended that there will be a close collaboration between those tanneries and the project to dovetail the co-ordination. Tannery solid waste conversion units need also to be co-ordinated with these frontrunners.

The project "*DG/SRL/99/006 Assistance in pollution control and treatment of tannery wastes for the leather complex at Bata Atha, Ambalantota district, Southern Province, Sri Lank*" consists of five interlinked projects.

- Establishment of the CETP including laboratory
- Infrastructure development
- Relocation of tanneries
- Solid waste conversion units
- Capacity building of SLAT to manage the industrial park

Whilst UNIDO has been entrusted with providing technical assistance in establishment of the common effluent treatment plant and the laboratory, based on Government and industry requests, and to the maximum extent possible, issues relating to implementation of the other projects have been addressed through the present project.

Additional funds were received to extend the project till September 2003. Terminal TPR will be held around 4 September 2003.

CETP

MODs have been issued for reed bed, tree purchases etc.

Most of equipment is on site

Mechanical screen successfully tested (dry run), design MIMIC control panel reviewed

Civil works CETP in progress and regularly monitored.

As there are some frontrunners -see above- plan has been made for priority items civil works to be able to cater for complete treatment effluents before CETP is completed, may need to arise.

Laboratory

Insurance case for missing lab chemicals is with UNDP (for onward transmission to UNIDO, Vienna). National co-ordinator will follow up with UNDP.

Solid waste

Feasibility report for glue manufacturing from tannery waste (fleshing, trimming) attracted interested of various investors. Awaiting complete proposal one such investor. EDB offered hardware support.

Manufacturing of leather board from chrome shavings etc. under implementation with EDB support.

Composting - methodology prepared, equipment purchased, once sludge is available, composting can start. Gasification pilot unit for tannery solid waste started, waste is first successfully liquefied and subsequently gassified.

Infrastructure

Infrastructure completed except treated effluent discharge and sea outfall. Problem in construction has to be solved locally by Government. In support of long term solutions project has identified comprehensive strategy and is implementing its part. Industrial zoning is not properly addressed. This implies that a long-term sustainability in vicinity of Ramsar site may be hampered due to unplanned development and land use.

Tannery relocation

Providing additional financial support to the tanning industry relocating over 200 km has not yet been forthcoming. Software assistance has been provided extensively under project (i.e. tannery lay-out, water consumption reduction, use of environmentally sustainable building materials) assistance provided to small scale tanners in machine utilisation and increased collaboration. Comprehensive collaboration with NCPC started on cleaner processes. External guidance UNISTAR / UNV (UNDP) - 3rd mission of Mr. Repetto September 03.

Capacity building for SLAT

Website -www.bataatha.com- attracts about 4000 visitors per month downloading over 100 MB.

Conversion of Industrial Park into ECO-Park with ERD. Also part of NLFIDP.

Code of conduct and rules - revision 3 - on the website.

Management set up accepted by Board of Directors SLAT and under implementation.

Three meetings TAC organised, more local organisation invited.

Annex 1

JOB DESCRIPTION



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Assistance in Pollution Control and
Treatment of Tannery Wastes
for the Leather Complex at Bata Atha

12 December 2002

JOB DESCRIPTION

DG/SRL/99/006/11-01/Rev. 3

Post title **Solid Waste Consultant**

Duration 2 months (fourth part of a split mission)

Date required January 2003

Duty station Colombo (Sri Lanka) – 60 days

Counterpart MINISTRY OF INDUSTRIAL DEVELOPMENT (MOID)

Duties The expert will specifically be expected to:

<i>Main duties</i>	<i>Expected duration</i>	<i>Location</i>	<i>Expected Results</i>
1. Coordinate activities of civil work contractor with those of equipment supplier for CETP.	12 days	Colombo, Bata Atha	Solid waste management strategy
2. Regularly review progress of the Bata Atha Leather Complex.	20 days	Bata Atha	Information on actual status of (civil) construction works
3. Follow up setting up a reed bed and monitor preparatory activities.	5 days	Colombo, Bata Atha	Preparations for reed bed
4. Identify an area for irrigation and other trials using treated effluent and make preliminary arrangements.	5 days	Colombo	Clear concept for using treated effluent for irrigation

<i>Main duties</i>	<i>Expected duration</i>	<i>Location</i>	<i>Expected Results</i>
5. Prepare a plan for re-introduction of cleaner tanning technologies in newly built tanneries.	4 days	Colombo	Plan for relocation of Cr-recovery units
6. Coordinate activities of tannery construction and government with those of CETP implementation.	6 days	Colombo	Streamlined action plan for tannery relocation
7. Regularly report on project progress in established formats, maintain the Bata Atha web site and make a new issue of the newsletter.	8 days	Vienna	Technical inputs and verified data required for actions to be taken

Qualification A specialist with university degree (preferably in civil or environmental engineering) or with proven experience in formulating and/or implementing projects related to tannery waste processing and by-products manufacturing. Previous experience in similar UNIDO projects and knowledge of the local conditions in Sri Lanka are assets.

Language English

Background information

Description of the sub sector in Sri Lanka

In the 1980s the leather industry had been increasing its production rapidly of finished leather, leather goods and footwear for domestic use and export. There is, however, a shortage of good grade raw hides and skins and the tanneries have been importing some quantities of raw hides and skins as well as semi-processed leather (wet blue and crust) for processing into finished leather in the country.

The locally available raw hides and skins are not of good quality, mainly due to branding, improper flaying and conservation methods. Most of the cattle farms and the slaughterhouses are located in the northern and western provinces in the country.

All the tanneries are discharging untreated waste waters to the river, to marshy land or to the sea, causing thereby considerable pollution, resulting in numerous complaints from the population affected, and becoming a matter of great concern to the government authorities concerned. In view of this situation, the production capacity of the tanneries in Sri Lanka has been set at the 1991 levels of output, which has hampered further expansion of the leather industry, both in leather processing and the down stream, labour intensive, industries for production of leather garments, shoes and leather goods production. As a result, the leather industry in Sri Lanka has not been able to expand in the last 5 to 6 years, whereas many of the neighboring countries continued expansion of the leather sector both in production and export (e.g. India, Bangladesh and Pakistan).

Production of light leather from bovine hides respectively sheep and goats
in selected countries of the region in 1990 and 1994 (in million square feet)

Year	Bangladesh		India		Pakistan		Sri Lanka	
	Bovine	Sheep/Goat	Bovine	Sheep/Goat	Bovine	Sheep/Goat	Bovine	Sheep/Goat
1990	66.9	50.0	556.0	537.8	131.3	132.2	9.2	2.3
1994	68.9	61.7	603.0	583.8	159.4	181.0	7.7	1.8

In addition to this the shortage of good quality raw hides and skins persisted.

Currently there are 14 private tanneries located in the Colombo area. These tanneries process from raw hides/skins to semi-finished leather and crust, or to finished leather. Of these 14 private tanneries, two are only doing vegetable tanning, others do both chrome tanning and vegetable tanning. There are some dry finishing tanneries too.

Problems to be addressed: present situation

The tannery industry in Sri Lanka comprises of 16 units of which except 3 units that are medium sized, all others are small-scale operations. These units are scattered around Colombo in the midst of residential areas. It is well known for discharging polluting substances into the environment, primarily in the form of effluent containing high organic load and chrome sulphate, ammonia and other salts.

ENVIRONMENTAL HAZARDS POSED BY TANNERIES

The process of tanning hides and skins results in both solid and liquid wastes. Solid waste generated when processing one ton of raw hide/skin is described below:

No.	Operation	Wastes [kg]
1.	Fleshings	300
2.	Trimmings	100
3.	Unusable chrome split	107
4.	Chrome shavings	99
5.	Chrome-off cuts	20
6.	Buffing dust	1
7.	Leather off cut	5
8.	Crust leather waste	5
	Total	637

In many countries for want of technology or commercial viability many of these solid wastes are dumped along with other municipal wastes or otherwise in the open causing serious problems of bad odour, release of toxic gas, presence of disease carrying flies and insects and contamination of soil and/or water bodies. The general quality of life in the vicinity of tanneries is adversely affected due to such indiscriminate disposal of solid wastes.

LIQUID WASTES

In converting raw hides/skins into leather, water is used. In locations where water is available in plenty tanneries tend to use excessive water without realizing that such excess use of water leads to poor uptake of chemicals and other inputs by the raw material and discharge of a substantial part of such chemicals and other inputs with the liquid effluent. For processing one kg of raw hide/skin into semi-processed leather between 15-25 liters of water is used and from raw to finish, 25-35 liters of water is used. The pollution intensity of the effluent discharged is likely to be higher if large amount of water is used. Discharge of untreated effluent in the surface or water bodies leads to contamination of soil, ground water and lake/rivers. Such contamination can cause serious health hazards to the population using such water. Accordingly uncontrolled tanning activities lead to serious environmental hazards.

The tanners were more concerned with their solid waste which created environmental hazards forcing the tanners to respect the legal provisions that came into force with the enactment of the National Environment (Protection and Quality) Regulation No 1 of 1990. All industrial enterprises are required to obtain a license

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Under this law from the CENTRAL ENVIRONMENTAL AUTHORITY (CEA) the agency responsible for enforcing this law.

In order to get an operating license the industry must provide information to the CEA regarding its location, type of production, process used, products manufactured, raw materials including chemicals used in processing these products, water consumption, source of fresh water, water treatment and final discharge, solid waste, atmospheric emissions, noise generated, energy requirements and any other information regarding reuse, recycling and projects for further expansion.

The CEA has established a new set of general standards for discharge of effluent into different kinds of receiving systems, like inland surface water, discharge on land for irrigation purposes, as well as discharge into marine coastal areas. There are some tolerance limits for certain industries, including tanneries. The table below presents the CEA established parameters required for tannery effluent.

Pollutant discharge standards for tannery effluent in Sri Lanka

Parameter*	Inland Water	Marine coastal waters
PH	5.5-9.0	5.5-9.0
Suspended solids (SS)	100	150
BOD	60	100
COD	250	300
Alkalinity (CaCO ₃)	750	---
Chloride	1000	---
Chromium (hexavalent)	0.5	0.5
Chromium (total)	2	2
Oil, grease	10	20
Phenolic compound	1	5
Sulphide	2	5

*Remark: All values (except pH) are in mg/l.

The existing industry was established in the days with no regulatory measures were prevalent. All except one tannery therefore do not have any pollution abatement and treatment facility. As the units are scattered in the Colombo area, it had been found not feasible to construct common effluent treatment facilities. CEA has accordingly fixed the production levels of the tanneries at the 1991 levels until a more permanent solution is found.

On the other hand nuisance specially the smell, caused by the discharge of untreated tannery and visible accumulation of tannery solid waste were attracting public agitation and protest against the industry. These tanneries located in the residential areas of the Colombo city do not have mechanisms in place except one industry (which was a public corporation later privatized) to mitigate or minimize the adverse environmental effects of tannery effluent and also to remove color and unpleasant odour as far as possible.

The current availability of raw hides and skins in Sri Lanka has been estimated at 1,100 tons/month or 44 tons/day, whereas the current production ceiling has been fixed at 28 tons per day of raw wet salted hides and skins. This implies a direct loss of 16 tons of valuable raw material daily. Based on the poor quality of the raw hides and skins and 200% duties of export of raw hides and skins, it is highly unlikely that all the 16 tons of raw material is being exported. In economic terms this means a considerable loss, first of all for the country as a whole, since one of the valuable natural resources is allowed to go waste, but on a more micro-level, rural farmers and small holders are getting low prices for their hides and skins (especially as compared to international standards) further depressing the off take of hides and skins and preventing alternative sources of income for the rural population.

The quality of raw hides and skins in Sri Lanka is very poor due to brand marking, tick marks and defects (flay cuts), resulting in low prices. Though a preferential scheme exists for paying higher prices for better quality, without sufficient production capacity to process the better grades and thus pay higher prices, the sector may not expand to its potential.

Direct employment generated by the tanning industry has been estimated by the MINISTRY OF INDUSTRIAL DEVELOPMENT (MOID) at 500. As a rule employment in downstream leather processing, viz. leather garments, leather footwear and leather goods is much higher. In addition downstream leather processing typically engages greater number of women. The restricted expansion in the sector hinders growth of leather

processing and especially downstream products such as leather garments, shoes and leather goods. This is a lost opportunity to reduce poverty to a certain extent.

Previous experience and lessons learnt

UNIDO has provided technical assistance under the UNDP supported and nationally executed project *SRL/91/019 Industrial Pollution Reduction Programme (IPRP)* to the tanning sector in Sri Lanka. Inclusion of the tannery sector in IPRP commenced in April, 1997 and focussed on the following activities:

- 1) Exposure to Sri Lankan tanners of what tanners in Tamil Nadu operating under similar conditions have done in cleaner tanning processes and effluent treatment by means of a study tour.
- 2) Common chrome recovery and reuse units for selected chrome tanning plants and two chrome recovery units fully operational before end of 1997.
- 3) Demonstration of cleaner tanning technologies at selected tanneries and workshop for all tanneries demonstrating improvements made.
- 4) Mission of two experts for preparation of a project report for the common effluent treatment plant at a new location. The present national project proposed, *SRL/99/006*, is elaborated on the basis of the findings and recommendations of these experts.

Under the Regional Programme for pollution control in the tanning industry in South East Asia UNIDO is currently implementing projects in China (*US/CPR/92/120*), India (*US/IND/97/124*), Indonesia (*US/INS/92/120*) and Nepal (*US/NEP/92/120*) on pollution control and treatment of tannery effluent. The Regional Programme Office (RePO) responsible for implementation and monitoring of these projects has been established in Madras (Chennai), India. Under the umbrella project (*US/RAS/92/120*) additional support is given in the abatement of pollution emanating from the tanning industry in China, India, Indonesia and Nepal. In addition, the following objectives are pursued through the umbrella project, i.e.:

- 1) Improvement of the status of women employed in the leather sector and its allied industries.
- 2) Improvement of occupational safety and health of the workers in the tanning industry.
- 3) Establishment of a pilot eco-label scheme.

The work plan of the present national project will be synchronized with the work plan of the parallel regional umbrella project *US/RAS/92/120* titled "Assistance in Pollution Control in the Tanning Industry in South East Asia".

Development Objectives: overall goal set by the government to address the development problem

The development objective of the project is to assist the leather industry in Sri Lanka to sustain and expand its activities without causing adverse impact on the environment of the Country.

Expected impact of the project

The project will address the environmental hazards posed by the tanning industry in Sri Lanka comprehensively. In so far as the disposal of the solid wastes generated in the tanning process is concerned the project will provide the tanners and the authorities a set of commercially viable project reports for conversion and profitable utilization of many of these solid wastes. With regard to those solid wastes which have no commercial value, the project will help safely dispose them in appropriately designed landfills. With regard to the liquid effluent generated by the tanneries the project will in the first place reduce the intensity of the effluent by helping the tanners improve tanning process. This will result in reduced water consumption and improved uptake of chemicals and other inputs by the raw material. This will be further strengthened by an efficient CETP which will treat the resulting liquid effluent from the tanneries to comprehensively meet all the discharge standards prescribed by the CEA for discharge of such treated effluent into marine coastal waters. The sludge that results from treatment of liquid effluent will be safely disposed in an appropriately designed landfill site at the proposed leather complex. In this manner all solid wastes and liquid effluent generated during tanning process will be entirely dealt with under this project there by making this industrial sector completely environmentally compatible.

At the end of the project activities, the situation expected is the following:

- a) 16 tanneries now in operation in residential areas of Colombo city will have been shifted to the new leather complex at Bata Atha;
- b) Colombo city will be relieved from unpleasant odour and solid waste generated by tanneries in many parts of the city resulting in a better environment;
- c) the water bodies in Colombo city will be free from effluent chemicals discharged by the tanneries.
- d) Bata-Atha leather complex will have a *Common Effluent Treatment Plant (CETP)* to treat the effluents discharge according to the standards prescribed by CEA;
- e) processing capacity will have been enhanced as a result of obtaining environment licenses which would eventually expand the leather industry from its currently restricted level of 1991;
- f) employment opportunities will have been increased with the expansion of the volume and the export markets;
- g) pilot trials for utilizations of treated effluent for irrigation in the leather complex will have been conducted and if successful continued;
- h) fully operational temporary safe landfill site for disposal of sludge with staff trained to operate and maintain it;
- i) detailed recommendations for a permanent solution for sludge disposal, partially based on experiments conducted will result;
- j) small laboratory established at the CETP to monitor the performance of the CETP with well trained staff to operated it;
- k) detailed feasibility reports (maximum four) on utilization/conversion of tannery solid wastes prepared and handed over to MOID and SLAT (PVT) LTD. for implementation;
- l) model tanneries and CETP to be used as examples for similar projects to be set up in Sri Lanka or elsewhere in the region.

With regard to specific performance indicators these may be measured in terms of the following parameters:

- X Water consumption in tanneries before and after the project.
- X The quality of effluent discharged by tanneries before and after the project.
- X The quality of the treated effluent vis-à-vis the standards set by CEA.
- X Disposal/utilizations of solid wastes before and after the project.
- X Quality of river (ground) water in areas where tanneries presently dispose effluent - before and after the project.

The major outcome of this project will be

- X Unhindered expansion of the industry in the next five years to realize its full potential without causing adverse environmental impact.
- X International acceptability of products made in Sri Lanka will enhance significantly.
- X Industrial development of Bata Atha, a backward area of the country, will take place.
- X Possibility of increased employment particularly of women in this area will result.

BA1101C.JD

Annex 2

EQUIPMENT

LIST OF EQUIPMENT				
Date of Purchase Order	Purchase Order No.	Description	Purchased from	Amount US\$
19/12/2000	05-0-43051Y	Self-cleaning rotating drum screen 200 m ³ /h	ITALPROGET TI (Italy)	38,106
8/07/2001	05-1-43041Y	Pocket multi-parameter analytical instrument set	WTW (Germany)	1,555
26/09/2001	05-1-43055Y (consignment 1 - delivered at site)	Diesel generator set 250 KVA, batteries, distribution board, cables, silencers, air supply, exhaust system, Floating surface high speed aerators/mixers 11kW SS shafts with all accessories, Blower with accessories 1700 Nm ³ /h; 0.6 bars; 45.0 kW; air filter, silencers, Bar screens SS 25 mm/10 mm/6 mm + rakes, all penstocks, solid waste containers.	Biotim-Polutech Ltd. (India)	99,270
26/09/2001	05-1-43055Y (consignment 2 - delivered at site)	Inlet submersible pumps (2) 200 m ³ /h; 11.60 kW; equalised effluent submersible pumps (3) 100 m ³ /h, 5.0 kW; Primary sludge submersible pumps (2) 40 m ³ /h, 5 kW; Activated sludge submersible pumps (2) 100 (50) m ³ /h; 5.00 kW; Coagulation tank high speed agitator SS 1.1 kW; Flocculation tank slow speed agitator SS 1.0 kW; Siphon 180 m ³ /h SS; Aeration system from blowers to aeration tank SS flanges, pipes SS, arched piece reducers, X-ends, manometer; Radial bridge scraper accessories in secondary sedimentation tank dia 14.00 m; 1.1 kW; radial speed: 2,5 m/min; slope: 1:15; electrical board; Radial bridge scraper, accessories in primary sedimentation tank dia 12m; scraper power = 1.1 kW; slope 1:15; electrical board HDPE pipelines (valves, fittings and pipe), cantilever crane, Main distribution board with reactive power correction unit; Distribution board 1, switches, protective and junction parts; Distribution board 2, switches, protective and junction parts; Lightning installation, earthing & EPMP	Biotim-Polutech Ltd. (India)	196,398
19/12/2001	05-1-43084Y	Books	Swann Technology Ltd., UK	1,466
Subtotal				365,806
24/04/2000	1377.00	Computers, HP scanner, printer, and other accessories	Everest Information System	137,900
07/10/2000	022	Toyota Hiace Project Vehicle	P.G.Martin	1,095,500
10/09/2001		Computer, printer & other accessories-sub office	Triangular Market	126,500
26/11/2001		Hand held tractor and tailor	Douglas & Sons Ltd	119,500
18/12/2001	KL.2138	4 tonne ISUZU truck with tipper	Indra Traders (Pvt) Ltd	1,132,088
Subtotal				2,611,488

Annex 3

MIMIC review

Dear Ravichandran,

Thank you for the MIMIC. It is indeed much better than the earlier version you showed us (KVE and myself). Please find below inclusion of Mladen Bosnic's comments and mine.

United Nations Industrial Development Organization, Vienna, Austria

General comments

- I) Scaling is not that important but it should be somewhat reflecting its actual size
- II) General colour changes from brownish to blue at the end. Sludge as a rule should be darker coloured than the effluent, particularly primary sludge
- III) Number of elements is not included in first phase. For this equipment just mention on Top Phase II (catalyst, Phosphate I & Phosphate II, flow measuring channel, end flow measuring)
- IV) Colour of fault indication in red and not blue

Legend to include

- A) Aerator (as per drawing on top of equalisation tank)
- B) Level switch

Motor in legend drawing to include red circle with white triangles, note all motor drawings should be the same (i.e. with red circles). However it may also be that this red circle means:

Main comment 1- it is not clear what should present two lights (red on the motor icon, and separately green as fault) for each motor? In my opinion it should be 3 lights; red for the stopped motor, green for the operated motor and one (yellow), but blinked (probably also connected to the alert system), for the fault (indication of the activated overload motor protection, or some other motor protection). It is possible to combine all three lights in one (special) LED!

Effluent inlet from manhole

Make the inlet clearer

Bar screen should be mentioned too.

- 1) Colour of box should be brown.
- 2) Straight line instead of with a bend

Inlet pumping station

Reduce size of inlet station by 1/4

Fine screen

Text fine screen at bottom in black

For red circle – see main comment 1

Remove Yellow Square on top

Equalization tank

Catalyst - see III above

Place divider in the middle and ensure parallel operation

Change text aeration tank -1, aeration tank-2 etc. to aerator-1, aerator-2 etc.

Include pump-3 (supplied as standby) in drawing (though as this was not commented on by MB it is a suggestion only)

Flow meter not included in drawing (though as this was not commented on by MB it is a suggestion only)

Alum - OK

Lime - OK

Poly-electrolyte to be added in flocculation tank (**2 units**)!

Primary settling tank - OK

Phosphate (**one unit**) to be added at end of primary settling tank (also III above)!

Aeration tank

Increase area of aeration tank 1 and 2, **show parallel operation.**

Sludge drying beds

Change drawing to make it look like a sludge drying bed and not a hopper type collection tank.

Main comment -2 the sludge drying beds are presented with the distribution channel and the ratio: width: height very unrealistic and unrecognisable. It will also be good to indicate somehow the evacuation of the dried sludge to the sludge disposal

End flow measuring

Simplify the drawing (see also III)

Main comment -3 Flow "Measuring channel" and "End flow measuring with flow measuring" are also presented very unrealistic. It is not visible how the measured value will be presented (in reality there are many possibility, depending of the applied measuring/indicating devices, and can not be suggested without the knowing of the applied device(s)). This is also the answer on your question concerning the reservation of the spaces for the "End flow measuring".

Siphon pit

Simplify drawing, if possible.

Outlet should be made clearer.

Best regards,

Valentin

Annex 4

MEMORANDUM OF UNDERSTANDING

between

**SABARAGAMUWA UNIVERSITY OF SRI LANKA,
FACULTY OF APPLIED SCIENCES**

and

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION'S (UNIDO)
BATA ATHA PROJECT OFFICE, COLOMBO**

and

SRI LANKA ASSOCIATION OF TANNERS (SLAT) PVT. LTD., COLOMBO

This Memorandum of Understanding (MOU) entered into this the of Two Thousand and Two between **Sabaragamuwa University of Sri Lanka, UVA Campus, Faculty Of Applied Sciences, Buttala 91100** (hereinafter referred to as **Sabaragamuwa University**) which expression shall where the context so admits include its successors and permitted assigns of the first part

and

United Nations Industrial Development Organisation's (UNIDO's), Bata Atha Project Office, Ministry of Enterprise Development, Industrial policy, Investment Promotion, 73/1 Galle Road, Colombo 3 (hereinafter referred to as Project Office) which expression shall not exceed the lifespan of the project DG/SRL/99/006 and permitted assigns of the second part

and

Sri Lanka Association Of Tanners (SLAT) Pvt. Ltd., Colombo, F-12 People's Park Shopping Complex, Colombo - 11 (hereinafter referred to as SLAT), which expression shall where the context so admits include its successors and permitted assigns of the third part

PREAMBLE

The Bata Atha Industrial Park (BAIP) is a dedicated industrial estate for the leather tanning industry and its affiliated industries (e.g. solid waste conversion and service units). Physical development at BAIP started in 2001 and major part is expected to be completed in mid 2002.

Tanneries that are currently located in the suburbs of Colombo are expected to move into the estate in the course of 2002. The relocation of the leather tanning industry out of Colombo to a new Leather Complex got on the drawing board more than 10 years ago. It was only after the United Nations Industrial Development Organisation (UNIDO) got involved in December 1999 that things started moving.

The objective of the relocation is to assist the leather industry in Sri Lanka to sustain and expand its activities without causing adverse impact on the environment of the Country. To this effect in BAIP, a common effluent treatment plant (CETP) for the tanning industry currently scattered in the suburbs of Colombo will be set up.

At present several parties are involved in the relocation;

The Government of Sri Lanka through the Ministry responsible for Industrial Development. Their main responsibility is infrastructure development and they in turn have contracted the work to various specialised parties

The industry to invest in new factories, a modernisation drives etc.

The industry apex organisation, SLAT (Pvt.) Ltd., set up to manage the effluent treatment facilities amongst others but whose brief has now been expanded to include management of the Industrial Park too

UNIDO is responsible for the design of the CETP, its brief had been expanded to include infrastructure design, industrial park management etc.

NORAD has been very supportive and financed the UNIDO contribution with the help of UNDP.

Recently, the Ministry responsible for industrial development is advocating the concept of ECO-parks in Sri Lanka, a concept that very well can be tailored to suit BAIP. The ministry as well as the industry has sought assistance of UNIDO to assist in the realisation of the ECO-park.

UNIDO has responded positively to the request whilst stressing the need for development of local skills and establishment of links with centres of expertise. The idea being that a pool of professionals with hands-on-experience in waste water treatment, sampling and analysis and solid waste conversion, to name a few, will be created and can be called upon when needed. In other words, UNIDO identified the need to establish institutional mechanisms to ensure sustainability of the industry, the BAIP, and possible further development of these.

Therefore, a meeting was organised at Sabaragamuwa University, UVA Campus, Buttala on 29th June 2001 and letters outlining envisaged co-operation were exchanged. It has been found to be most convenient to start collaboration with the Project Office, gradually expanding into direct collaboration with the industry. In the course of the year collaboration with the industry should be firmly established. In pursuance of these developments, this MOU is being signed between the three parties with the objective of formalising the proposed collaboration furthering sustainability of the industry and BAIP as well as supporting establishment of an ECO industrial park.

OBJECTIVES

1.1 The objectives of the joint project are:

Data collection. This comprises baseline data collection (soil, groundwater, climatic data, etc.) and monitoring against the baseline data.

Applied research projects. At present several possible research projects have been shortlisted, e.g. natural treatment systems, composting, solid waste conversion, occupational safety and health for the tanning industry and its affiliated industries. Most of these will have an application that is not confined to the leather sector.

Practical training. This entails a/o lab training (sampling, analysis), factory visits, wastewater plant monitoring and operation etc.

Curriculum development, e.g. leather chemistry etc.

All will be geared to establish a fruitful university-industry relationship aiding sustainability of the industry, BAIP, the possible development of these and establishment of an ECO industrial park.

1.2 The scope of the MOU is

- Inviting specific areas of collaboration
- Implementation of agreed upon areas of collaboration
- Monitoring of areas of collaboration
- Modification in areas of collaboration if so required
- Publicising areas of collaboration
- Expanding specific areas of collaboration

As far as turning BAIP into an ECO Park, additional assistance outside the scope of this MOU may, and is likely to, be required from time to time. This may be one of the expanded areas of collaboration referred to under f) above.

RESPECTIVE ROLES OF SIGNATORIES TO THIS MOU

Following documents will be considered as an integral part of this MOU:

Letter from the Bata Atha project office dated 2 July 2001
Letter from Sabaragamuwa University dated 7 September 2001
Letter from Sabaragamuwa University dated 16 November 2001

ROLE OF PROJECT OFFICE

General

Project Office's role is limited to the period of its operational existence. Its responsibilities are listed below:

2.1.2 Specific responsibilities

To initiate the contacts between the Sabaragamuwa University and SLAT
To liaise with above parties and to identify most fruitful areas of collaboration.
To facilitate establishment of contacts with parties not directly or presently involved in BAIP
To facilitate exchange of technical and non-technical information
To provide the maximum extent possible Sabaragamuwa University with technical reports and papers concerning projects that could have relevance for the collaboration.
To purchase / supply needed chemicals and equipment as per the list of the Sabaragamuwa University in as far as the limited finances allow.
To supervise and provide technical guidance in implementation of the MOU
To review work plan for implementation of individual projects as prepared by Sabaragamuwa University.

RESPONSIBILITIES OF SABARAGAMUWA UNIVERSITY

2.2.1 General

Sabaragamuwa University role is not limited to the location of the Faculty of Applied Sciences. Relocation of the faculty will not require renewal of MOU. Its responsibilities are listed below:

2.2.2 Specific responsibilities

To select suitably qualified well-motivated students to carry out research activities under the specific projects and ensure that these students are properly covered (e.g. medical).
To carry out chemical analysis of samples and prepare reports of analysis as per established standards with financial assistance of the SLAT whenever required by the Sabaragamuwa University.
Regularly report, at least once every month, on implementation of specific areas of collaboration under the MOU

Identify areas of possible interest for (applied) research and recommend these to signatories to this MOU including technical and non technical resources required
Prepare for individual projects detailed work plans and send these for review to other signatories.

In case of applied research projects, identify a well-balanced project team to supervise and / or implement the project.

Identify possibilities of curriculum development; make necessary arrangements (lecture rooms, student rosters etc.), in case special requirements are needed, forward list of requirements well in advance to other parties.

To make local arrangements for having special guest lectures or other types of information sharing on topics of interest.

Encourage / facilitate students doing research work at BAIP, particularly in relation to final thesis writing

In cases where no local expertise is available identify in detail the needs and convey these to other parties.

RESPONSIBILITIES OF SLAT

2.3.1 General

SLAT role is not limited to the relocation of the industry. It has been entrusted with operation and maintenance of the CETP as well as the BAIP. Its responsibilities are listed below:

2.3.2 Specific responsibilities

To provide access for other parties to facilities at BAIP

Identify possibilities for student research and / or university team' research that have a direct relevance and applicability at BAIP

Encourage recruitment of graduates who have completed research in topics relevant to BAIP

To the maximum extent possible arrange for transport enabling students to carry out practical assignments

To request project office, UNIDO or others for allowance of visit of technical resource persons for guest lectures or other activities in interest of the signatories to the MOU

To provide sufficiently qualified technical personnel to supervise / guide students in case of specific assignments

To provide sufficient counterpart inputs enabling students / researchers to carry on the duties as per the specific project

To provide as clean and safe working environment as may be expected of new industries.

To review needs and requirements in case of each specific project proposal and make modifications if and when required.

On a case-by-case basis arrange for transport and other facilities

Provide access to laboratory, use of chemicals and instruments provided internal laboratory rules are maintained.

To review work plan for implementation of individual projects as prepared by Sabaragamuwa University.

3 PRIVILEGES OF THE SIGNATORIES TO THE MOU

The signatories to this MOU, viz., Project Office, Sabaragamuwa University and SLAT shall have the following privileges.

Propagation of projects / projects and technologies within the country and outside. In the case of the Project Office, this may be done by UNIDO directly.

Visit of their representatives or their nominees to the Bata Atha Industrial Park at any time after signing of the MOU for monitoring or other academic purposes.

Use of the Industrial Park as a demonstration site.

Use of / access to website, www.bataatha.com, for dissemination purposes.

Training of students from the University in topics deemed of interest to the signatory parties.

Training of students / personnel from within or outside the country in waste water treatment, Industrial Park operation and maintenance, effluent analysis etc.

These privileges will continue even after the expiry of this MOU. The privileges enjoyed by UNIDO's Bata Atha Project Office can on agreement with other parties involved be extended to the Ministry of Enterprise Development, Industrial Policy and Investment Promotion, after the completion of the UNIDO project.

4 FINANCIAL ARRANGEMENTS

UNIDO's Bata Atha project office will provide equipment (instrument, chemicals) to initiate the data collection. The value of the equipment is at present worth over Sri Lanka Rupees 200,000.

UNIDO's Bata Atha project office will allow for reporting cost at about Rs. 40,000 enabling reporting as per acceptable reporting procedures.

DURATION

The validity of the MOU will be initially for a period of two years and can be extended subject to the parties agreeing to a revised MOU.

The collaboration shall be deemed to have commenced on the date of signing of the MOU and cease after 24 months, unless extended.

It has been understood that the Bata Atha project office will cease to exist in the near future.

If the progress of implementation is not according to progress - measured against agreed upon work plans, UNIDO's Bata Atha project office shall have the right to withdraw from the MOU.

SETTLEMENTS

All modifications/termination of the project shall be based on mutual discussions between UNIDO's Bata Atha project office, the Sabaragamuwa University and SLAT (Pvt.) Ltd.

PUBLICATIONS

Publications, display, if any, in respect of the MOU shall duly acknowledged the contributions made by UNIDO.

FORCE MAJEURE

Parties shall not be held responsible for non-fulfilment of their respective obligations under this MOU 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 Parties within one month of such occurrence or cessation. If the force majeure conditions continued beyond six months, the parties shall then mutually decide about future course of action.

NOTICES

All notices and other communications required to be served on the Party under the terms of this MOU, shall be considered to be duly served if the same shall have been delivered or left with or posted by Registered Post with Acknowledgement to the Party at the last known address of the business by the parties.

AMENDMENT TO THE MOU

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

ARBITRATION

In the case of UNIDO, which plays mainly a technical and advisory role, their technical co-operation is guided by well-established technical co-operation procedures and the arbitration clause therefore does not arise in their case.

NOW THEREFORE for and in consideration of the foregoing premises the parties have signed the MOU on this the day of, 2002.

For and on behalf of	For and on behalf of	For and on behalf of
UNIDO Bata Atha Project Office	Sabaragamuwa University	SLAT (Pvt.) Ltd.

(Valentin Post)	((Mr. C. Batuwangala)
International consultant	Dean / Faculty of Applied Science	Chairman

Witness:

1. A. Sugath	1.	1. N. Samarakoddy
	2.	2. Ashroff Razack

Annex 1

List of chemicals and equipment

Bata-atha Project Office

DG/SRL/99/006

List of Chemicals

List of laboratory chemicals

Item Number	Details	Quantity
1	Silver nitrate, AgNO ₃	100 g
2	Mercury II sulphate, HgSO ₄	250 g
3	Zinc acetate	100 g
4	Potassium sulphate, K ₂ SO ₄	500 g
5	Mercuric oxide	100 g
6	Ethanol, 95%	10 l
7	Sodium thiosulphate	500 g
8	Phosphoric acid, H ₃ PO ₄	2.5 l
9	Sodium fluoride	500 g
10	CuSO ₄	500 g
11	Bromocresol green	1 g
12	Sodium sulphide	500 g
13	Sodium bicarbonate	500 g
14	Antimony potassium tartarate, K (SbO) C ₄ H ₄ O ₆ . O . 5H ₂ O	250 g
15	Ammonium acetate, CH ₃ COONH ₄	500 g
16	Diphenyl amine indicator	100 g
17	Potassium bichromate, K ₂ Cr ₂ O ₇	500 g
18	<i>Silica gel (column)</i>	<i>1 kg</i>
19	<i>Silica gel (TLC)</i>	<i>500 g</i>
20	Acetone	10 l
21	Sodium hydroxide, NaOH	500 g
22	Ferrous ammonium sulphate	500 g
23	Potassium hydroxide	500 g
24	Silver sulphate, Ag ₂ SO ₄	25 g
25	<i>1,1,2 trichloroethane</i>	<i>2.5 l</i>
26	<i>1,2,2 trifluoroethane</i>	<i>2.5 l</i>
27	Sulphuric acid (d 20° : 1.83)	10 l
28	Hydrochloric acid, HCl	12.5 l
30	Nitric acid, HNO ₃ (d 20°: 1.33)	5 l
31	NaN ₃	5 l

All items in blue delivered on 21 February 2002.

Spectrophotometer - Model PD-303 from APEL Co., Japan, including the relevant accessories.

Annex 5

DESIGN SECOND CELL

Background

The first cell of the temporary disposal site at Bata-atha Industrial Park has been designed by the Central Engineering Consultancy Bureau¹ and has been reviewed by the UNIDO subcontractor under the project TEHProjekt².

Based on their technically accepted design, tenders were floated by the Ministry of Enterprise Development, Industrial Policy and Investment Promotion for the infrastructure works at the Bat-atha leather complex. As per report of UNIDO consultant³ it is international practice to construct new cells of landfills only after operational cells are getting filled.

During construction and based on the local climatic conditions UNIDO consultant suggested to simplify design of landfill. Subsequently during project steering committee it was decided that design for second cell landfill will be prepared by UNIDO consultant in collaboration with national consultant and presented to counterparts for implementation at suitable time. Design would be placed on boards outside the designed areas enabling visitors at site to compare two designs.

Design elements that have been maintained

2.1 Membranes and protective layers

After excavation clay will be laid to a depth of 300 mm (permeability minimum 1×10^{-7} m/s (when compacted to 90-95%)), which also acts as barrier for leachate transport.

On top of clay 1 mm thick HDPE sheet (permeation rate $\text{g/m}^2\text{-hr} < 0.9$, density $> 0.935 \text{ g/cm}^3$, tensile strength 337.5 kg/cm^2) is laid protected by 200 mm clay layer on top. HDPE sheet is anchored on top sides.

Drainage layer comprises of gravel (25-50 mm) bed of 200 mm cm (bottom) and perforated PVC pipes of 100 mm diameter embedded in it to convey the leachate from the cell to the collection pit (1% slope, side slopes inside are also 1%).

Drainage layer is covered by 100 mm sand layer and final bottom layer is 75 mm clay layer.

2.2 Leachate collection system

The leachate collection system is designed for the average rainfall collection condition.

$$Q_p = 0.278 * C * I * A$$

Where Q_p - Peak flow in m^3/s

C - Runoff Coefficient

¹ Final Technical Report for Infrastructure Development Leather Complex at Bata Atha (January 2001) Prepared by: N Rupasinghe, AWG Karunaratna, HM Nandasena for Ministry of Constitutional Affairs and Industrial Development

² Technical review on infrastructure designs and systems at Bata Atha Leather Complex - Final - TEHProjekt, February 2001

³ Report on sizing of temporary disposal site, V. Post assistance in pollution control and treatment of tannery wastes for the Bata-atha leather complex (DG/SRL/99/006), April 2001

I - Rainfall intensity in mm/hr

A - Catchment area in km²

Assume: C = 1.0; intensity of rainfall = 8 mm/hr; area of the tanks = 0.01 km²

$$Q_p = 0.278 * 1.0 * 8 * 0.01 = 0.0222 \text{ m}^3/\text{s} = 22.20 \text{ l/s}$$

Use 200 mm diameter uPVC pipe at gradient of 1.0% for conveyance of leachate. The maximum flow through the pipe is 46 l/s, which is capable of conveying the flow with average daily rainfall. It is expected that any higher flow due to intense rainfall may flood the lowest tank be the leachate will subsequently be gravitated to the inlet pumping station.

2.3 Stormwater collection system

Stormwater collection provisions have been made at the front stre (entrance), and next to future Cell 3. At this point in time there is no need to alter these.

2.4 Review

TEHProjekt reviewed the temporary sludge disposal system its entirety. Their conclusions was that: "Temporary sludge disposal is technically acceptable, but an increase in the capacity, new tanks for temporary sludge disposal must be constructed."

However, in view of experiences gained during the implementation of civil works at site including the landfill itself, UNIDO consultant after consultation with project authorities recommends a modified design for the second cell.

As per international standards, construction of second cell will commence during filling of the first cell. Actual starting date depends on time required for procedural matters before construction, construction time and fill up time of the first cell.

3 Modification in design

3.1 Slopes

Slopes of 1V:2 H have been constructed on 3 sides. On the front side where the ramp is to be located slope is 1V:3H. The ramp is in the form of a concrete layer placed on the concrete slope of 1V:3H.

Though total rainfall at site (see 1.2 above) is limited, intensity of rainfall coupled with smooth surface of HDPE sheet of 1mm thickness result in clay sliding from sides if not immediately placed under concrete. The latter will be difficult (impossible) during rainy spells.

Hence, in the second cell the slopes have been designed as follows 1V:3H on all 4 sides. As the bottom dimensions have been maintained area required is larger than in the design of the first cell.

3.2 Turfing

From the above it is obvious that the function of concrete is to maintain the slopes only. Based on site experiences, turfing is effective. Besides it is less expensive and more attractive looking option.

3.3 Ramp

The purpose of the ramp is to allow vehicles carrying waste coming into the cell during all seasons including heavy rain. Types of vehicles are hand-held tractor with trailer, tractor (compaction of waste) and light truck. The ramp will have a slope of 1V:5H. Material will be compacted soil (98% compaction), 150 mm thick gravel sub-base and 150 mm thick aggregate base course. Side slopes of the ramp are 1V:3H with turfing on sides.

3.4 Replacement of clay

Visually differences between local clay and soil were little. Hence, tests were carried out on local clay and local soil. Test results confirmed suitability of using local soil as a medium in the second cell. Permeability of local clay - vide test report University of Peredeniya 21 December gives coefficient of permeability $1.09 \cdot 10^{-7}$ m/s. Results of permeability test local soil CECB laboratory 8 April 2003 for undisturbed sample $8.58 \cdot 10^{-9}$ m/s and from selected sample site (Maximum dry density from Standard Proctor Compaction Test (0.90 and above)) minimum $4.66 \cdot 10^{-8}$ m/s.

4 Implementation of the design

Complete set of drawings have been prepared it is proposed that these will be printed, laminated and placed at the site with separate laminated copies in the SLAT management building.

REFERENCES

- Manual on tannery sludge landfill, V. Post, M. Swaminathan, M. Aloy, T. Poncet UNIDO, July 1999
- Safe landfill for disposal of sludge from tannery effluent treatment plants, K.V. Emmanuel, Jakov Buljan UNIDO September 2001
- Training manual on landfill of hazardous industrial wastes, UNEP, March 1994
- Safe landfill of tannery solid waste and sludge in Tamil Nadu, India, Pentti Rantala, UNIDO, December 1995
- Final Technical Report for Infrastructure Development Leather Complex at Bata Atha (January 2001) Prepared by: N Rupasinghe, AWG Karunaratna, HM Nandasena for Ministry of Constitutional Affairs and Industrial Development
- Technical review on infrastructure designs and systems at Bata Atha Leather Complex - Final - TEHProjekt, February 2001
- Report on sizing of temporary disposal site, V. Post assistance in pollution control and treatment of tannery wastes for the Bata-atha leather complex (DG/SRL/99/006), April 2001

Annex 6

OPERATION LANDFILL

1. Introduction

At present it is still not quite clear what types of tannery waste, other than sludge, will also be deposited in the landfill cell. Hence, a worst case scenario will be assumed, i.e. all tannery solid waste will be disposed. Concerted efforts are made to encourage tannery solid waste units to start operations in Bata-atha leather complex and as these are likely to be at least partially successful other solid waste disposal is given only for the first year.

However, some of the waste is highly putrefiable and special measures have to be taken before disposal. These are also included in the report.

Though CETP is designed to treat 1500 m³/d, to save on civil work construction costs and taking into consideration that full capacity of CETP will be reached at a later stage, sludge drying beds with a capacity of 750 m³/d are under construction.

Thus the operation and maintenance for the first year will be based on a worst case scenario concerning solid waste and maximum generation of sludge from 750 m³/d or a production of 30 t/d of raw material.

2. Wastes generated

Figures in Table 1 below are estimated based on current production processes and use of old machines. It can be anticipated that improvements in production processes will lead to larger amounts of unprocessed or semi-processed waste and less processed waste. Lime splits are not included as one company Kesri has confirmed their relocation to Bata-atha and their willingness to take all limed splits.

Table 1: Estimated quantity of solid waste generated (tonne / day)⁴

Raw material produced	30
Raw trimming / unusable hides	3
Fleshing	3
Unusable limed splits *	0
Hair (may not be recovered as solid waste. Depends on machines and processing methods used)	???
Wet blue trimmings	1.5
Chrome splits *	1.7
Chrome shavings	1.2
Vegetable shavings	0.4
Buffing dust	0.6
Dyed trimmings	0.9
Sludge (35% dry solids)	10.8
Total solid waste generated	23.1

* Amount of unusable limed splits and amount of chrome splits depends on choice for stage of processing. From environmental and production angles (cost saving, area increase) lime splitting is preferred.

3. Dimensions

⁴ Source: Calculated from solid waste management - background paper (strategy) V. Post, UNIDO (DG/SRL/99/006) June 2001

The bottom (top part) of the first cell of the landfill is made of clay. It has a bottom length of 75 m (side slopes 1:3 (ramp-side) respectively 1:2). Bottom width 20 m with side slopes of 1:2.

4. Transport

Under the project DG/SRL/99/006 a four tonne reconditioned truck (tipper - Isuzu make) was purchased. This has been fitted with side fences to cab height. Also a handheld tractor (12 HP) and wooden trailer with extension was purchased. As the distance from the sludge drying beds to the disposal site is less than 400 meters transport arrangement using handheld tractor normally suffice for sludge. The truck has specifically been purchased with a view of obtaining agricultural waste - particularly from banana plantations near Embilipitya (less than 50 km) as a carbons source for composting at site - see below.

5. Inner lay-out

It is recommended to divide the first cell of the landfill into separate areas. Based on evolving technologies waste products that currently cannot or are not converted may be converted in future and with proper segregation this can be facilitated. Thus;

Area of sludge disposal yard (1 - 24 in Table) is 20m x 30m with each cell having a dimension of 5m x 5m.

Cells I to IX will be used for disposal of raw trimmings whereas, fleshing due to their putrifiable nature will not be disposed.

Cells A - M will be used for unusable wet blue splits, chrome shavings and chrome trimmings.

Cells ~~03~~ - ~~08~~ will be used for disposal of buffing dust and finished shavings.

Cells a - e will be used for disposal of vegetable shavings. Non-numbered will only be used at a later stage.

Disposal will take place in cycles for each type of waste.

1	2	3	4
8	7	6	5
9	10	11	12
16	15	14	13
17	18	19	20
24	23	22	21
IX		J	I
VIII		K	H
VII		L	G
VI		M	F
V	A	2	E
IV	B	3	D
III	C	4	C
II	D	5	B
I	E	6	A

6. Composting

Based on Indian experiments (Model I)⁵ following composting using fleshing and sludge can be done: Composting sludge 1800 kg (w/w), banana leaves of other green waste 700 kg (w/w), straw (paddy) 300 kg, fleshing (w/w) 1400 kg, coir pith waste 400 kg, cow dung 250 kg.

Thus with daily generation of 3 tonne of fleshing, about 4 tonne of sludge, 1500 kg of biomass, some 600 kg of straw (paddy), 850 kg Coir pith waste and about 530 kg of cow dung is needed.

If neither coir pith waste nor paddy straw are available in sufficient quantities the amount of green biomass may be increased, however taking care that it is properly shredded.

Dimensions of the heap can be length 9m, width 1.5m and height 1.5m. Recommended walkways 3m width between length sides and 1.5m space between rows of heaps that composting yard can handle fleshing of 12 days. With estimated composting time of about 60 days an area of 50m by 48m is required.

Therefore the area most suitable for this is located next to the sludge drying beds (Phase II - expansion of sludge drying beds). This furthermore takes into consideration that additional sludge drying capacity if required can be obtained by using low cost filter presses from India that have recently been satisfactorily field tested in Southern India.

7. Disposal cycles

Disposal of sludge by handheld tractor-trailer and truck, after disposed sludge gets dried enough, the truck will run over it, in the process, compacting it. Due to this compaction, the effective capacity will increase (estimated by close to 100%).

Thus each sludge disposal cell with a capacity of 5m x 5m and filled up to height of 0.4m receives one day's production of sludge. Hence, cells 1-24 thus filled cater for about one month of sludge production. After filling the first layer (24 days filling time), the waste will be dumped over the first layer to a depth of 0.4m starting from 1 to 24. With height up to 2.8m and expected increase in disposal due to compaction this will suffice for well over one year of production. It is recommended to create a provisory ramp to sludge disposal yard, in case other waste is not converted.

The same procedure will be followed for other types of wastes though similar level of compaction cannot be expected there. However, it is quite likely that a leather board unit will be established at Bata-atha leather complex thereby reducing need for chrome shavings, trimmings and wet blue splits as well as vegetable shavings disposal.

⁵ Draft final report Composting of tannery sludge, Solomon Sampath Kumar, Jakov Buljan UNIDO March 2001

Annex 7

INTERM REPOR BUILDING GUIDELINES

Foreword

The Bata Atha leather complex is located in the Hambantota district in the extreme South of the island (approximately 200 kilometres south of Colombo). In the vicinity of Bata Atah is the Kalametiya Lagoon (part of a Ramsar site) and it is about 2 kilometers from the Southern coast, home to a thriving fishing community. At the same time unemployment in the area is high and the project will assist in providing alternative income earning possibilities other than fishing and agriculture. Nevertheless the sensitivity of the area does place an even higher emphasis on environmental issues and concerns.

In many respects the Bata-atha Industrial Park is unique in Sri Lanka. It takes into account local sensitivities at all stages of the project planning and implementation processes. Furthermore, it is a public-private sector partnership that comprehensively addresses current Government policies on private sector led economic development with the Government assuming the facilitating role.

In Bata-atha, the Government provides infrastructure facilities for development of a first class Industrial Park. Management and operation of the Industrial Park is in the hands of the private sector represented through their umbrella organisation SLAT (Pvt.) Ltd.

A next unique factor is that it is mostly implemented by national expertise, suitably aided with expertise from the United Nations Industrial Development Organization (UNIDO) through assistance of NORAD. The assistance of UNIDO quite often exceeded the formal agreements and the current document is a prime example of the combination of national expertise (BOI & national consultant) coupled with UNIDO assistance to the private sector (CC&R) derive at proper building guidelines for Bata-atha.

Though the guidelines are tailor-made for Bata-atha, I believe that the methodology for deriving at guidelines which are at the same time realistic, feasible and will be voluntarily implemented by the private sector using the subtle force of peer pressure. The Ministry of Enterprise Development, Industrial Policy and Investment Promotion hosts most of the agencies dealing with setting up, managing and operating industrial estates in the country. It will endeavour to continue public-private sector partnerships, with or without foreign assistance, to set up, manage and operate industrial estates in Sri Lanka in the future.

R.V.D. Piyatilake
Director Investment / National Project Coordinator
Ministry of Enterprise Development, Industrial Policy and Investment Promotion
Colombo, June 2003

General guidelines for building of factories at Bata-atha

Derived from guidelines of Board of Investment (BOI), Code of Conduct & Rules - revision 4 (www.bataatha.com), preliminary interim report national consultant Dr. Attalega.

Numbering below is as per General Guidelines for Factory Buildings - BOI.

The general guidelines given below are to be followed by all enterprises in the planning, designing and construction of factory buildings. The Architect/Engineer designing the factory complex shall also take into consideration inter-alia, the location, site conditions, services, required, number of workers, processes involved, raw materials used, factory effluents and solid waste to be disposed of etc., before finalising the building plans for review by the Bata-atha project office.

SECTION A - SITE REQUIREMENTS

Selection of Site

In selecting the site for the factory buildings of the proposed project, among other things, the following aspects should be taken into consideration:

The covered area of factory buildings and other ancillary structures such as warehouses and workshops.

Internal roads, parking areas, footpaths, loading and unloading space, and garden area.

Fire gap and fire escape routes.

Space and locations within the site for installation such as gas cylinders, transformers, water tanks, underground water sumps, treatment plants, storm water drains etc.

Transportation, availability of eating establishments, adequacy of infrastructure facilities such as power, water, telecommunication and means of discharging effluents if any, disposal of solid waste and storm water etc. also should be taken note of.

In addition, prevailing by-laws/regulation's in force in the area of the Local Authority, particularly those pertaining to road reservations, streetlights, construction of buildings and waste disposal which would affect the sitting of buildings and operation of the factory should be given due consideration.

SECTION B - BUILDING REQUIREMENTS

1. GENERAL

1.1. Factory Buildings and Services

All buildings and services shall be designed and constructed in accordance with accepted Codes of Practice and the Code of Conduct and Rules - Revision 4 and in conformity with the current Factories Ordinance.

1.2 Architectural Appearance and Quality

The building and other structures shall be aesthetically pleasing and of a high standard - please refer to Drawings 1 and 2. Major building components, type of finishes, (such as external finishes of walls), electrical fans, extractors, blowers, doors, windows, louvres, lighting points, air conditioners (if any) shall be clearly indicated in the building plans.

1.3 Final Ground and Floor Levels

Final ground and floor levels of the factory must be fixed in relation to the surrounding lay of the land, adjoining road levels, invert levels and location of the nearest manholes in order to ensure proper surface water drainage and sewage disposal.

1.4 Floor Space

No factory shall be over crowded so as to cause risk or injury to the workers. The space requirement should be decided upon taking into consideration the numbers and size of machinery that would be installed, discharge lines, space for work-in-progress, tables/work benches, bins and other equipment that need to be accommodated in the production areas, pathways, emergency exits and temporary storage requirements. The total covered area should take into account the production area required, stores space, office, canteen, toilets, service areas, first aid room, fire escape routes, maintenance space, tool room(s), workshops, boiler room, treatment plants, etc.

The amount of workspace allowed for each worker should be not less than 400 cu. ft. (11.32 m³). No space over a height of 14 ft. from the floor shall be taken into account when calculating this cubic space.

1.5 Storeyed Buildings

In storeyed factory buildings, in addition to the main stairway leading to the working area there shall be provided an additional stairway, which would serve as an escape route in case of fire. All stairways should be provided with railings and the top railing should not be less than 90 cm high. The completed structure consisting of anchor posts and railings should be of solid construction and should be capable of withstanding a point load of at least 90 kg applied in any direction at any point on the top rail.

1.6 Guarding of wall openings. Open-side floors, platforms and catwalks

All wall openings; open-side floors, platforms and catwalks should be suitably guarded by means of railing or fencing. Where there is a hazard of material falling from open-side floors, platforms etc., suitable protective measures should be adopted by the provision of toe-boards or screens of solid construction.

1.7 Boundary Walls

Boundary walls will be made out of coated wire mesh or natural vegetation.

1.8 Landscaping

The premises and road frontage should be well landscaped. Tree planting is encouraged.

1.9 Parking Areas and Access

Adequate parking areas and suitable access road should be provided within the site, so as to avoid parking of vehicles on the highway.

1.10 Security Lights

The factory compound shall be provided with adequate security lights

1.11 Exit Doors

Minimum of two exit doors in every floor or every big room should be provided.

1.12 Electrical Installations

All electrical installations shall be carried out to the satisfaction of the Ceylon Electricity Board

1.13 Miscellaneous

During the planning stages due consideration should be given to the expansion programmes of the project so that at later stages when the layouts are modified or the work force is increased changes required and the provision of amenities to the increased workforce do not become problematic. Materials of construction should be in accordance with specifications of Code of Conduct & Rules - Revision 4 (www.bataatha.com)

2. SANITATION & HEALTH REQUIREMENTS

2.1 Ventilation & thermal comfort

More detailed guidelines are under preparation by National Consultant - Dr. Attalega. For the time being section 2.1 BOI suffices.

Effective and suitable provision shall be made for securing and maintaining adequate ventilation in each workroom by the circulation of fresh air. The minimum fresh air required in a workroom where there are no contaminants to be removed from air shall be such to effect at least three air changes per hour.

Where natural ventilation through windows and other openings is found to be inadequate, mechanical ventilation either by exhaust of air or by positive ventilation or a combination of these two shall be provided. Relatively wide buildings could augment ventilation with roof ventilation. Where the desired temperatures and humidity cannot be obtained by mere ventilation, air conditioning should be resorted to. Air movement and distribution may be achieved by re-circulation of the inside and/or outside air by installing an adequate number of fans/blowers. The rate of air movement in the vicinity of workers shall be such as to give reasonable comfort without objectionable draughts. Effective provision shall also be made for maintaining a reasonable temperature in each workroom. The following methods are recommended for controlling temperature.

Isolation

Locate heat producing equipment such as furnaces so as to expose only a small number of workers to the hot environment. Where possible, enclose the work areas and supply conditioned air to enclosures.

Insulation

Insulation of the roof and providing ceilings would be very effective in controlling heat. Good results could also be achieved by painting roof sheets with heat reflective shades. In addition, hot surfaces of equipment such as pipes and vessels may also be insulated to reduce heat absorption/radiation.

2.2 Sanitary Conveniences

Adequate and separate sanitary conveniences shall be made available for workers of either sex with water accessible on tap. Where persons of both sexes are employed, sanitary conveniences for each sex shall be so screened so as to provide adequate privacy.

The minimum requirement is one sanitary convenience for every 25 workers (male or female). However, in the case of any premises where the number of males employed exceeds 100, sufficient urinal accommodation should also be provided on the basis of one urinal for every 50 males.

Sanitary conveniences should have adequate ventilation and lighting. Large windows and/or exhaust fans should be provided in passages and in open areas. Narrow, dark, ill-ventilated passages should be avoided.

2.3 Water Supply

Reference is made to Clauses 10 -13 CC&R, Revision 3 (Annexed).

Water Storage

Water storage tanks are not encouraged, as there is a central supply. Water required from fire fighting drawn directly from process water supply - valves will be specified by Consultant Dr. Attalega.

Washing Facilities

Separate washing facilities shall be provided for male and female workers. The minimum requirement is one wash basin for every 20 persons. Where troughs are provided they shall be tiled and shall be at least 2 ft. of straight trough for 20 persons.

Washing areas provided for female workers should be enclosed or screened so that the interior is not visible from any place where persons of the other sex work.

If so required, factories may include showers for the use of employees. Showers for the use of female workers shall be enclosed.

2.4 Lighting

Provision shall be made for securing and maintaining adequate lighting whether natural or artificial in every part of the factory where persons are working. In areas where persons are regularly employed the intensity of illumination shall not be less than 400 lux (40 ft. candles) at the height of 0.9 m from the floor. In other parts of the factory over, which persons employed pass, the intensity shall not be less than 50 lux (5 ft. candles).

The above are the minimum requirements. For operations that need sustained attention, higher illumination should be provided.

The following table gives the recommended illumination levels for certain operations;-

Workshop	- 400 lux
Sewing (finished good checking)	- 600 lux
Stores	- 50 lux

Lighting should be provided in such a manner as to avoid glare.

(3) FACILITIES TO WORKERS

Meal Room

The meal room shall be adequately ventilated and provided with sufficient tables and chairs to accommodate at least 30% of the workers at a time. The floor area of the meal room excluding the area

occupied by equipment, fittings and furniture other than tables and chairs or benches shall not be less than 0.9 m² per person.

Suitable washing facilities shall be provided within the meal room, together with provision for draining off excess water.

First Aid Room

Every factory should have a well-equipped first aid room, sited so as to be easily accessible from all parts of the working place. The door for the first aid room should be large enough to allow the passage of a stretcher. The floor and wall should be covered with smooth washable material easy to clean and adequate lighting and ventilation must be provided.

A footbath with running water together with a sink or a wash basin also shall be made available.

In factories where male and female workers are employed the first aid room should be capable of accommodating a minimum of two beds with suitable screening facility between beds.

For equipping the first aid room, a separate leaflet from the Senior Manager (Engineering Services of BOI) can be requested.

Alternatively, the occupational safety and health manual for tanneries prepared by UNIDO can be consulted - a copy is available at Bata-atha project office.

3.3 Changing Rooms and Lockers

Adequate lockers for personal belongings and suitable accommodation for changing clothes shall be provided in the factory premises.

3.4 Facilities for Resting

There shall be provided and maintained for the use of all female workers whose work is done standing, suitable facilities for resting. Sufficient to enable them to take advantage of any opportunities for resting which may occur in the course of their employment.

4. POLLUTION CONTROL

4.1 General

Reference to particularly clauses 7 - 9, CC&R Rev. 3.

4.2 Effluents

Adherence to Clauses 14-20 on pre-treatment, CC&R Revision -3.

4.3 Noise

Due consideration shall be given to install noise generating machinery on resilient foundations to reduce the vibration and noise generated by them. In addition they may be enclosed using suitable material to isolate the machinery so as to reduce the spread of noise to adjoining areas.

Clause 25 of CC&R refers to noise levels.

4.4 Smoke Emission

Smoke emissions from boilers, furnaces should be minimised.

4.5 Solid Waste Disposal

Clauses 38 - 45 of CC&rs refer.

4.6 Dust, Fumes & Vapour

Provision should be made for local exhaust ventilation system for the removal of any dust, fumes or vapour produced during any process in the factory.

4.7 Miscellaneous

In premises where there is oil spillage, such areas should be cemented and provided with drains and oil traps.

5. FIRE PRECAUTIONS

5.1 General

Adequate precautions should be taken to minimise the risk of fire within and outside the factory buildings.

Also reference to Clause 21 of CC&R, Rev. 3.

5.2 Fire Gap

No building or other structure including any projection shall be built within a distance of 6m from any of the boundary walls except with the prior approval of the SLAT Board. This passage shall be motorable right round.

5.3 Fire Extinguishers

Within the factory building, an adequate number of fire extinguishers and other fire fighting equipment shall be made available. In this regard, the Chief Fire Officer of the Fire Department of the Colombo Municipal council or any other specialist agency may be consulted.

5.4 Fire Escape

The factory buildings should have an adequate number of fire escape/exits. All doors of the factory building should open outwards.

5.5 Handling & Storing of Explosives

Where explosives and inflammable dust, gas or vapour substances are involved, adequate precautions should be taken, under expert advice, regarding their storage and handling.

5.6 Miscellaneous - safety for workers

Reference to Clauses 22 - 27 of CC&Rs, Rev. 3.

SECTION C APPROVAL PROCEDURE

(1) Certified Drawings

The overall design and the preparation of plans should be carried out under the supervision of a qualified Consultant. Civil engineering drawings should be signed by a Chartered / Civil / Structural Engineer or Chartered Architect. Electrical and Mechanical drawings should also be signed by a Chartered Electrical Engineer/Chartered Mechanical Engineer. The name, address and qualifications of the Engineer / Architect should be indicated in the plan.

Plans and specifications of all buildings and other civil structures, mechanical and electrical installations should be submitted to Bata-atha project before construction activity commences

1.1 Layout Plan - to be submitted in **one copy** to Bata-atha project office, who will transfer it at the end of its life-span to the individual factory.

This plan should indicate the areas allocated for production and recycling activities, stores, canteen and the areas earmarked for services, such as cleaning, washing etc.

1.2 Service plan to be submitted in **one copy** to Bata-atha project office, who will transfer it at the end of its life-span to the individual factory.

This plan should indicate the position of sewers, water lines, surface drains, water taps, location of fire hydrants and fire extinguishers, parking areas, and the location of boilers, if any. Structures required for effluent treatment will also be included in this plan.

Note - surface water drains should not be connected to the sewer system.

Structural drawings - not required for submission

Electrical drawings - not required for submission - individual factories should ensure that all safety measures are met.

This should indicate the proposed wiring of the building, electrical circuits, location of switch gear and their ratings, conduits, cables, sizes of conductors etc.

Mechanical drawings to be submitted in **one copy** to Bata-atha project office, who will transfer it at the end of its life-span to the individual factory.

One set of mechanical layout drawings indicating the locations of the machines, their names and horse power rating, the location of the boilers / high pressure vessels, position of the safety valves etc. should be submitted.

Other drawings - refer to Section 4.2 above.

Additionally **one copy** of the project report is to be submitted to Bata-atha project office, who will transfer it at the end of its life-span to SLAT.

Commencement of work - approval not required

Construction of buildings - views and comments from Bata-atha project office should be taken into consideration during construction of buildings. Individual factories are responsible for all local clearances.

(4) **Certificate of conformity** to be obtained from the local government authorities.

Annexure: The Code of Conduct & Rules for the Bata-atha Industrial Park

The Code of Conduct and Rules (CC&Rs) for the Bata Atha Industrial Park was unanimously adopted by the tanning industry in Sri Lanka on 1 November 2001. Revision 3 is the current CC&Rs.

General

1. All companies wishing to locate in the Bata Atha Industrial Park will be a signatory to the CC&Rs.
2. The Bata Atha Industrial Park is a dedicated industrial estate.
3. The Bata Atha Industrial Park is established for the environmentally sustainable development of the leather industry in the country.
4. The effluents generated by the tanning industry will be treated in a common effluent treatment plant and the discharge will conform to the standards prescribed by the Central Environment Authority.
5. No other activities will be allowed in the Industrial Park unless their presence contributes to the furtherance of the development of the Industrial Park.
6. In any event, any company wishing to undertake any activity other than tanning, will submit an application in writing to the Board of Directors of the Industrial Park and await written approval, prior to commencing any activities.

General environmental aspects

7. All companies will prepare an environmental policy. Preferably this will include an initial environmental review.
8. All companies will apply cleaner processing methods in their premises thereby reducing the volume and / or the quality of the effluent discharged into the effluent collection and conveyance system as well as to reduce the amount of solid waste generated and / or increase their reuse / conversion possibilities.
9. Companies shall not discharge waste water into the CETP that damages crops or affect soil or reuse possibilities of treated waste water and / or solid wastes that have been identified by the Board of Directors of the Industrial Park.

Water

10. The process water use of the companies as per the written declaration to SLAT (Pvt.) Ltd. management shall be adhered to unless and until more process water will become available.
11. Cost of operation and maintenance of the CETP and use of temporary disposal site will be based on amount of process water actually drawn for use in m³ subjected to Code 48. Added to this will be the cost of operation and maintenance of the process water supply system.
12. Companies will be encouraged to obtain water allocated to other companies as per the declaration, but which are not being used, provided they meet the cost as stipulated under CC&R 11 above.

13. Other than harvesting rain water within the own premises, e.g. from roof structures, Companies will not be allowed to obtain water sources from elsewhere unless the Board of Directors has given specific written approval to do so.

Pre-treatment

14. UNIDO subcontractor TEHProjekt Hidro d.o.o. has provided the basic design drawings for a pre-treatment system. The design drawings have been distributed to SLAT members / tanners. All tanneries will install, operate and maintain an adequate pre-treatment system so as to protect the discharge pipelines from clogging and blockages.

15. In each case, before actual construction starts of the pre-treatment system, the CETP technical manager will have to approve detailed design of the pre-treatment system. To this effect, the Board may request UNIDO under the existing project to make arrangements for this before submitting it to CEA for their approval.

16. Maintenance of the tannery collection and conveyance system falls within the objects of SLAT (Private) Limited and since this is directly dependent on tanners - members operating and maintaining adequate pre-treatment systems. For this purpose the CETP management has obtained the right to inspect the pre-treatment systems at any time with or without prior notice to the individual units and penalty Code No. 50 refers.

17. In case of sanitary effluent each company shall make an adequate pre-treatment provision (e.g. septic tank) before discharging sanitary effluent into the effluent collection and conveyance system. Wastes and waste water discharge

18. Companies shall not discharge wastes and waste water that damage the effluent collection and conveyance system and storm water collection and conveyance system by physical or chemical action.

19. Companies shall not discharge (tannery) effluent and sanitary waste water into the storm water collection and conveyance system.

20. Companies shall not discharge substances that upset the normal processes used in the CETP.

Safety

21. Companies shall not discharge constituents in wastes that are likely to create fire or explosion hazards.

22. Companies shall ensure that all national safety and work practices regulations are adhered to within and immediately outside the premises.

23. All companies shall have proper lightning protection arrangements installed inside their premises.

24. Companies shall install in their premises safety signs for which SLAT (Private) Limited will give tanners / members and other companies locating in the Industrial Park the basic design.

25. Noise levels shall be maintained at below 70 dB(A) from 06.00 to 18.00 hrs and 60 dB(A) between 18.00 hrs and 06.00 hrs at the boundaries of the site as per the Central Environmental Authority letter dated 11 January 1999 clause E.4.2. During construction other levels apply and members should take appropriate notice.

26. An emergency preparedness plan will be drawn up by SLAT inclusive of a comprehensive contingency plan. The plan will define accurately the types of incidents to be dealt with, the authority to activate the plan, duties and responsibilities of all parties involved.

27. All Companies will ensure that their employees are trained and aware of the plan and their responsibility since executing the plan. Copies of the plan shall be placed at suitable locations and consulted on a regular basis.

Building

28. All companies shall be encouraged to apply environmentally sound and / or reusable building materials.

29. In view of its detrimental effects to human health asbestos shall not be used as a construction and building material.

30. All buildings shall have easy access in case of fire or explosion hazards to specialised personnel dealing with these issues.

31. All companies shall have proper lighting and ventilation arrangements installed inside their buildings. Arrangements in this respect may include use of natural light, wind and solar energy.

32. Companies shall have proper sanitary facilities for its workers.

Land use

33. All units in the Industrial Park shall keep their premises and immediate surroundings in a clean state and maintain their green zones, turfed embankments etc.

Chrome management system

34. SLAT has been entrusted with the ownership, management and operation of two chrome recovery and reuse systems to be used as a common facility for all the tanneries relocating to the Bata Atha Industrial Park. These will be located on CETP -3.

35. In order to reduce the chromium content in the waste water, all relocating tanneries will need to have a chrome management system. The chrome management system may be of different types, such as direct recycling; high exhaust; chrome recovery and reuse; alternative tanning agents; and a combination of the above. The actual choice is left to the companies.

36. Chromium content in the combined effluent stream shall be fixed at a maximum allowable permissible rate to enhance the possibility of reuse of sludge. The exact amount will be proposed separately.

Lime splitting

37. Splitting in lime is in many ways superior to splitting in wet blue. TanLanka has indicated that it will do lime splitting. Other companies wishing to do lime splitting need to get permission from the SLAT Board.

Solid waste

38. All companies will be responsible for their own internal solid waste collection.

39. Companies will keep the solid waste segregated at all times within their own premises so as to increase prospects of current or future reuse / conversion.

40. All solid waste shall be temporarily stored in proper conditions thereby not causing any odour problem or health hazard, before the solid waste is collected.

41. No company will be allowed to take their solid waste outside the Industrial Park unless the Board has authorised the company to do so.

42. Companies are, however, encouraged to entrust the task to the Industrial Park management, which will collect solid waste and either take it to the conversion units and / or dispose it against a reasonable fee to be decided upon in due course and to be revised if circumstances so desire.

43. Companies wishing to set up a solid waste conversion unit will have to make a written application to the Board. In their application they have to describe in detail: the tannery solid waste to be used (including the quantity), other raw material inputs, the product to be made, the processes and machines to be used, the process water and energy requirements, quality of effluent likely to be generated, solid waste and air pollution to be generated if any, noise levels and so on. The Board will decide within one month of receiving the application about granting approval taking into consideration amongst others amount of solid waste generated and converted, by-products generated if any, other conversion units already existing, future prospects etc..

44. A temporary sludge disposal site will be established to dispose sludge from the CETP and tannery pre-treatment units as well as all solid waste from tanneries that is not converted.

45. In the temporary disposal site, sludge will be disposed separately from the tannery solid waste, so as to encourage future reuse.

Electricity

46. Application of alternative energy sources and / or energy saving devices or cooling systems shall be encouraged.

47. The declared written electricity use of the companies from main supply shall be adhered to unless and until more electricity will become available.

Incentives

48. Companies that are actively reducing the pollution load and / or have a low pollution load could be entitled to concessional rates on effluent treatment cost. Actual pollution load will be determined by analysis of samples of effluent conducted by the Chemist of the CETP. Actual and possible concessions on the rates will be determined by the Board of Directors at a later stage.

Penalties

49. For offences against Codes Nos. 7, 8, 11, 12, 15, 17, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32 and 33 the following rule applies. Offenders will first receive a warning from the Industrial park or CETP management and, if they are still not complying, the Board of Directors will authorise the Industrial Park and / or CETP Technical Manager to take appropriate remedial action at the cost of the offender.

50. For offences against Codes Nos. 9, 10, 13, 14, 16, 18, 19, 20, 21, 29, 35, 36, 37, 38, 39, 40 and 41 the following rule applies. Offenders will be instructed by the Industrial Park / CETP management to stop unauthorised practices immediately. Non compliance will lead to immediate repercussions, which may include cutting off the water supply Directors and / or the effluent discharge, which will be restored only upon an appeal to the Board of Directors and their subsequent decision.

Amendments

51. Amendments to the Code of Conduct and Rules are subjected to separate approval by the Board of Directors.

Executive summary

Global trends

Production base leather products (shoes, outerwear, bags, etc.) & non-leather footwear has shifted from OECD to low labour cost countries

Consumption is still high in OECD countries accounting for over 85% global imports

Key exporters: China, Indonesia, Thailand, Vietnam, Brazil, Turkey, India, Pakistan

Italy, Spain Portugal (OECD) still strong

On the whole future industry is promising in developing countries.

Current status of leather, leather product & non-leatehr footwear sector Sri Lanka

1. Manufacturing of leather (tanning)

Availability of hides & skins: 44,000 kg/d; currently processed: 28,000 kg/d; current direct employment: 500

2. Footwear

Total production: 30 Mn. Pairs; units: 12 large; 30 medium; 1000 small; downward trend turnover 1999 - 6800 Mn. Rs.; 2000 - 6620 Mn. Rs.; 2001 - 5500 Mn. Rs.; employment 30,000; export downward trend: \$33 Mn (2001); \$70 Mn (1997), \$27 Mn (1993)

3. Leather Goods

Units: 250; large 9; medium 30; rest small; market: local (incl. tourist); employment: 2000

Rationale for development leather & footwear sector in Sri Lanka

Growth sector favouring low labour cost countries with good labour records (safety standards, workers rights, absence child labour etc.), environmental record (vide Bata-atha leather complex)

Employment & export intensive industry

End quota system garments requires alternative opportunities for skilled (stitching) labour force

Capital (foreign direct investment) particularly in footwear sector moves fast if environment is conducive (Peace Dividend)

Leather sector is local resource based - relatively low import ratio of exports

All island links - resources & employment opportunities

Though sector in Sri Lanka at present is not very well developed, solid labour records and a sound export infrastructure exists. Hence, UNIDO was requested to identify all interventions needed to uplift the sector. This integrated programme - from raw material improvement to marketing final products incl. non-leather footwear was developed in 2000. It is updated by recommendations from taskforces for leather and footwear. With limited targeted interventions in human resources and infrastructure development within the overall current macro-economic and social context the sector will grow very rapidly.

Critical issues to be addressed

Low raw material quality; outdated technology tanneries; unsafe disposal tannery solid waste; ad-hoc inadequate human resources development; absence of modern training infrastructure including lab and CAD/CAM; few state-of-the-art technology footwear; no recent entrance world class players footwear sector; no footwear component industry; inadequate quality control systems; incoherent leather sector policies (including duty regime); ad-hoc safety at work; no clustering in footwear sector; limited start-up facilities leather goods

National Leather & Footwear Industry Development Programme (NLFIDP)

All critical issues are addressed in NLFIDP. It comprises 5 main components: Hides & skins quality improvement; *CETP in Bata-atha - ongoing*; Relocation of tanneries / CFCs (inc. Leather goods); Development Bata-atha into an ECO-park; Footwear & leather product development

Interventions hides & skins quality improvement

Increased awareness producers on value material & actual quality improvement including flaying & preservation

Infrastructure improved for hides & skins quality

By-products processing in slaughter house / or central facility

Policy review

Total duration: 4 years - first results within 1 year

CETP in Bata-atha leather complex

Infrastructure except discharge pipeline nearly completed

Common effluent treatment plant under construction

Factories under construction

Targeted completion date 30 September 2003

Interventions in relocation tanneries to Bata-atha & development leather goods there

Modernisation small tanneries

Common facility centres (tanning, by-products) resulting in quality improvement; equipment support will be repaid in a specially created revolving fund which proceeds will be used to continue hide improvement schemes

Cleaner production - EMS - ISO 14001 - for most tanneries and some leather product units

Leather goods business incubator & training will directly tackle high youth unemployment

Duration - 2 years

Conversion of Bata-atha leather complex into an Eco-park

Typical factories constructed from sustainable material with reduced energy load and improved working conditions

Several renewable energy sources integrated into the complex

Industrial governance facilities with active participation of local stakeholders

Duration - 1 year

Footwear (non-leather) & leather products

Policy review leading to conducive environment for Foreign Direct Investment geared to attract high quality/high volume players (e.g. Nike, Reebok) and fashion names (e.g. Gucci, Prada) - *peace dividend*

Establishment Footwear Development Institute handling training, fashion and market intelligence, product development, testing & certification

Upgrade rural training centres improve training and allow subcontracting

Establish footwear component manufacturing units

With Footwear Association and Export Development Board for selected units undertake marketing - product development, range building, trial orders, fairs

Assist cluster development (footwear village)

IDB training centre will be revitalised with PSP

Duration 4 years (results after 1 year)

Financial Plan

External aid (grant) US\$ 5,403,660 (i.e. Rs. 514,145,000)

Beneficiary contribution (private sector) Rs. 622,600,000

Total

Rs. 1,136,745,000

Implementation

NLFIDP - integrated with 5 linked projects

Executing agent MEDIP&IP in public -private partnership with industry associations

Implementation by UNIDO for which grant funding is sought

Simultaneous implementation greater impact

Implementation can start immediately and be completed within time frame

Expected benefits

Strong infrastructure for sustained development of leather based & non-leather footwear industries in Sri Lanka

Increased foreign direct investment /collaborative ventures with increased output, employment & export and improved workplace management

Quality of footwear & leather products made in Sri Lanka will enhance significantly and industrial development of Bata-Atha, a backward area of the country, will take place.

Safe clean environment

Overall economic development

In numerical terms as per task forces,

Employment (direct & indirect) increases tanneries 1500; leather goods 11,000; footwear 60,000.

Increase investment tanneries over 1 billion Rs. (excluding Foreign Direct Investment), leather goods over Rs. 400 million and footwear 3.5 billion Rs. Increase turnover footwear 18.5 billion Rs. and increase export 12.2 billion Rs.

Due to complexities hides and skins sub sector difficult to quantify but it is estimated that over US\$ 1 million per year will be transferred into rural areas.

Major impacts on footwear sector of anticipated investment global giants, e.g. Nike, Reebok, Gucci etc. can not be quantified at present.

Annex 9

THE ANNUAL PROJECT REPORT

For project: DG/SRL/99/006 – Bata Atha leather complex

Period covered: November 2001 – June 2003

PROJECT PERFORMANCE - CONTRIBUTION TO STRATEGIC RESOURCE FRAMEWORK (SRF) GOALS

<u>SRF Goal</u>	<u>SRF Sub Goal</u>	<u>Strategic Area of Support</u>
Environmentally sustainable development to reduce poverty	Sustainable environmental management and energy development to improve the livelihoods and security of the poor	Institutional framework for sustainable environmental management and energy development

Outcomes	Update on outcome	Annual outputs	Update on outputs	Reasons if below target	Update on partnership strategies	Recommendation and proposed action
<p>Enhanced awareness and improved capacity of local authorities, CBOs and private sector in environmental management and sustainable energy development</p> <p>Also awareness of the potential for employment through this project.</p>	<p>Awareness of local authorities, local chamber of commerce, provincial university, national finance institutions and industry partners enhanced in environmental management.</p> <p>Design and planning capacity environmental management strengthened of MEDIPIP⁶ and the industry.</p> <p>Awareness created with MEDIPIP and the industry on sustainable energy sources.</p>	<p>Recommend and introduce cleaner tanning technologies</p>	<p>At present locations: Water consumption reduced by 10%; salt recovery introduced; improved chemical utilisation recommended</p> <p>For Bata-atha: Individual factory layouts; Energy efficient building guidelines; water consumption reduction by 60%; selected common machine operations, trained workers in Chrome Recovery and Re-use. Chrome Recovery and Re-use has been established as an essential part of process.</p>	N/A	<p>MOU with Sabaramaguwa University signed 22.02.03</p> <p>HDCC⁷ for sensitisation (e.g. exhibition) and recruitment and training</p> <p>Sri Lanka Export Development Board – training, also co-sponsor of most training activities</p> <p>Footwear manufacturing association and leather goods association on local use of leather</p> <p>CRMP links with project (eco-tourism Kalametiya lagoon and water quality testing)</p> <p>Moratuwa University has been linked with the project for several</p>	<p>Efforts should lead to recognition, e.g. ISO 14001. Collaboration with NCPC started</p>
		<p>CETP⁸ of 1500 m³/d capacity operational and trained staff in operation and maintenance</p>	<p>Equipment at site, installation as turn-key</p> <p>Civil work in progress</p> <p>TM⁹ & CC¹⁰ trained, new semiskilled recruits from area undergoing training</p> <p>Reedbed (biological and tertiary treatment) under construction, design on website</p>	<p>Civil work not yet completed, cash flow hampered due to loan formalities.</p>	<p>Key elements of CETP to be completed before tannery start-up</p> <p>Reed Bed constructed wet lands etc.</p>	
		<p>Operational laboratory established</p>	<p>Equipment at site, many chemicals missing (insurance case)</p> <p>Civil work in progress</p> <p>CC and assistant trained</p> <p>Baseline data collection on-going</p>	<p>See above</p>	<p>Specialised lab fills a void in the area, process started for its use as an industry service centre</p>	
		<p>Operational safe temporary landfill site established. Permanent solution for sludge disposal recommended.</p>	<p>First model cell nearly completed.</p> <p>Low cost designed second cell completed; design details mounted on board at site.</p> <p>Report with operational instructions completed.</p>	<p>Exceeding output</p>	<p>Actual operation will generate highly relevant localised data for the country on landfill</p>	

⁶ MEDIPIP = Ministry of Enterprise Development, Industrial Policy and Investment Promotion

⁷ HDCC = Hambantota District Chamber of Commerce

		Projects for conversion of tannery solid wastes into by products developed and presented	Pilot biogas unit established at one tannery Leather board project started. Dog chew manufacturing plant is relocating. Entrepreneur evinced serious interest in glue project Development of entrepreneurs in investment of waste conversion projects. Composting method and yard agreed upon	Exceeding output (actual pilot / industrial units)	technical and research interventions. Foreign direct investment in tanneries, by-products and common services, and tannery chemicals.	Reduces waste by 2,000,000 kg /year.
		Pilot unit for utilisation of treated effluent established	CETP staff trained & local NGO involved Project report for pilot utilisation scheme Tree planting started Training of green workers for private factories.	Tree planting in control pilot and others, awaiting availability treated effluent	Input to Ministry Task Force (Leather & Footwear) strategy formulating for raw hide improvement and leather sector development.	Concept to be promoted with involvement CEA and universities

⁸ CETP = Common Effluent Treatment Plant

⁹ TM = Technical Manager

¹⁰ CC = Chief Chemist

PROJECT PERFORMANCE - IMPLEMENTATION ISSUES

(Listing of 3 main challenges experienced during implementation and proposed way forward)

Though all procedures were observed as per the laws of the land, actual construction work on sea discharge pipeline had been blocked for non-technical reasons. The issues involved arose from a misconception of the nature of treated effluents particularly in relation to marine life. Strategy paper has been prepared for tackling the issue, and is currently under implementation. However, the issue remains unresolved yet.

Financial assistance is required to help the industry to relocate and modernise. The most comprehensive proposal till date is the National Leather & Footwear Industry Development Programme, which is currently with the Government. This should be pursued / lobbied by counterparts to attract foreign funding at the earliest. Among the other options being pursued are suppliers credits and Untied Mixed Credits from the Norwegian Government in association with the SLEDB.

Despite delays encountered in relocation, it has to be emphasised that in an international context the relocation project is implemented in a relatively timely manner.

There seems to be a lack of confidence and negative perception in information received from certain quarters. This issue should be addressed comprehensively in a suitable manner. At this point in time best methodology has not been derived at.

RATING ON PROGRESS TOWARDS RESULTS

For outcome

Positive change, capacity built with counterparts, project used as a model by MEDIPIP, RCDC, CEA. Recognition from SAARC countries resulting in serious inquiries on foreign direct investment into the sector. Project has enhanced the image of the local tannery industry globally and in the South Asia Region.

Negative change

Unchanged

For outputs (**applied to each output**)

Cleaner tanning technologies

No

Partial

Yes, industry incorporated water saving designs, energy efficiency measures in their buildings, local contractors trained in energy and water saving, collaboration with NCPC.

CETP

No, operation will commence only in September

Partial, design / planning used by Central Environment Authority as a model, equipment at site, turn-key contract for installation issued and staff trained.

Yes, tertiary treatment system (reed bed) under advanced stage of construction. Additionally storm water treatment system designed and under implementation by the industry.

Laboratory

No

Partial, under advanced stage of construction, most of equipment at site, staff trained, insurance case missing items. Lab promotion for use by others (Sabaragamuwa University, Coastal Resource Management Project etc.) commenced.

Yes

Landfill and permanent solution

No,

Partial

Yes, 1st cell constructed, design for low cost 2nd cell mounted on site. Report with permanent solution finalised

Solid waste conversion

No

Partial

Yes, all solid waste will either be converted into by-products or safely disposed.

Reuse of treated effluent

No

Partial, trees are planted in control plot and pilot plot. Management and monitoring system in place. Subject for final thesis university student.

Yes

SOFT ASSISTANCE

Key activities

Industry has adopted all encompassing code of conduct and rules making it one of, if not, the first industrial estate in the world to have done so. The CC&R has been regularly reviewed and fine-tuned (current revision is 3) and placed on website www.bataatha.com

Building guidelines exceeds those of Board of Investment in their comprehensiveness have been prepared and are ready for publication on website. These guidelines include use of natural light and ventilation as well as application of thermal energy in production into account.

Unique individual tannery designs finalised (low water consumption), under implementation at site.

Memorandum of Understanding with Sabaragamuwa University on research and development signed (February 2003) and students training initiated (chemistry focus)

Several people from the area identified through Hambantota District Chamber of Commerce have been trained; HDCC assisting in recruitment staff.

Continued external assistance in machine operation and maintenance at no cost to the project nor to the Ministry or the industry

Extended collaboration with the National Cleaner Production Centre on cleaner processes and technology improvements

UNIDO Vienna HQ assistance obtained in reviewing already prepared tannery designs and footwear plans

Management set up Industrial Park accepted and under implementation.

Advance chrome management systems (recycling combined with recovery and reuse) have been prepared and adopted.

Small-scale units cooperation and use of common facilities initiated.

Website is extensively used - latest figures (May, June 2003) average over 4000 visitors per month downloading well over 100 MB.

Technical advisory committee has met 3 times so far and its membership is expanding and getting more localised.

Series of workshops on hides and skins improvement aiming at increasing value addition and providing inputs for labour intensive footwear and leather products industry.

Secretariat for SAARC workshop on leather manufacturing towards ISO 14001 placing Sri Lanka and the Bata-atha project in the limelight of the industry in South Asia.

Based on recommendations of Task Forces Leather and Footwear the national leather and footwear industry development programme has been updated and has been agreed by all stakeholders as the right document for fast and comprehensive development for the entire sector. Donor funding is sought.

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Increased interest (through industry links overseas) among the domestic players in modernisation.

Main constraints in progress

During implementation infrastructure funds were halted for nearly 6 months thus pushing back all time schedules.

Administrative delays and procedures in funds transfer virtually stopped DG/SRL/99/006 project activities for 6 months.

Financing for relocation and modernisation is critical and till date it has not been comprehensively addressed.

Non-scientific objections to sea outfall have raised doubts in smooth operations of the project particularly by foreign investors. Till date this issue is not solved though Government is in process of implementing a strategy addressing the issue.

Appropriate information flow is hampered by bad image of the industry. Many non-technical perceived objections are raised (this problem is not only confined to Sri Lanka tannery industry). Thus these require firstly awareness raising through discussions, reviews, training programmes etc.

Heavy rains, floods delayed CETP civil construction. Fund flow hampered due to cumbersome bank procedures.

No proper land use policies in areas surrounding Bata-atha have resulted in making adjustments within the complex without being able to address real issues such as external green belts, housing areas, etc.

LESSONS LEARNED

Correctly following legal process is not a guarantee for smooth implementation. Possibly community involvement has to be sought more directly and going beyond requirements under existing procedures. This process should actually commence with identification of site and the E.I.A. process.

Issues involved in relocation are often underestimated. It requires tremendous efforts in planning, designs and synchronising work plans. All these have to be technically correct!

Planning has to be developed into a model for other high water consuming industrial estates to be set up in the country. This should include appropriate land use policies too.

Ideally related areas should be targeted too, so as to uplift the sector which often employs the most downtrodden of society. Examples are hides and skins improvement (rural development and poverty alleviation) and leather products development (e.g. leather shoes, garments) often employing substantive number of people.

The concept of public-private partnership in developing activities needs a greater endeavor. (The motivation of the private sector are still suspect in the public mind).

Prepared by: *C. Batuwangala (national coordinator)* & *Valentin Post (consultant)*

THE ANNUAL PROJECT REPORT – OPTIONAL FEATURES

Narrative analytical section

Several factors did have a bearing on project implementation. These are listed under the various headings below.

Target beneficiaries

An exhibition showing the project design and objectives; leather and leather products was organised in Tangalle in January 2002.

Constructed wetland is a tested method of colour removal in treated effluent and is currently under construction.

Maintaining constructed wetland (reed bed), fish pond etc. will be some non-traditional income generating sources. Also reeds from wetlands have been tested and can be used for making pet products for exports.

Soft interventions carried out in the context of the project):

Technical advisory committee (TAC) has been expanded with mostly representatives of local community. It is used as a source of information and idea exchange. Further expansion of TAC entails more local representatives.

Dialogue with local NGOs has commenced through TAC. It is expanded at site through non-traditional income generating activities.

Factors that have impeded or enhanced implementation and achievement of results

Irregular flow of funds from all main implementing agents has caused delays at various times. Issue of new Government tenders (2002) was held up for nearly 6 months due to lack of funds.

Private sector work was hampered due to unavailability of low interest finances (e-friends). After intervention from project with active support by Ministry special tranche was made available for Bata-atha. This process however took nearly 5 months. Though funds are currently available disbursement has yet to start.

Project itself was without funds for nearly 6 months.

Implementation in 2003 has been hampered due to issue concerning sea outfall.

Partnerships

The IP is privately managed and located near pristine nature resources. This has paved the way for technical advisory committee to guide the IP management after the project has ended. To this effect the following parties have been approached and have in principle agreed to participate:

on management of industrial estates: Board of Investment (Executive Director Zones), Lindel Industrial Estate (Chief Executive Officer)

all other nominees directly deal with environmental aspects

Moratuwa University, University of Ruhuna and University of Sabaragamuwa.

Local NGOs

Management arrangements

Are the management arrangements of the project appropriate:

- Yes
 No

SLAT through legal agreement with MEDIP&IP will be owner of all CETP assets. It has set up a Management Unit under on site general manager. SLAT Board has already agreed on terms of income generation for sustained operation of CETP.

Are project resources (financial, physical and human) adequate in terms of:

- | | |
|---|---|
| (a) quantity? | (b) quality? |
| <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes |
| <input type="checkbox"/> No | <input type="checkbox"/> No |

Assistance for re-location awaited reimbursement process on-going

Sustainability

Likelihood of sustainability

High: Provided sea outfall is a place, and local community corporate as stakeholder. Direct employment generating in high unemployment area.

Medium: Land use policies (zoning) have to be addressed comprehensively (not only in Bata-atha)

Low

No

Are sustainability measures in place:

Yes: management set-up of industrial park partnership arrangements

No: land use policy not addressed all, sectoral programme (National Leather and Footwear Industry Development Programme) exists only on paper.

Does the project have an exit strategy

Yes - Turn-key installation of CETP with sea outfall, second best outfall alternative has been presented too.

No