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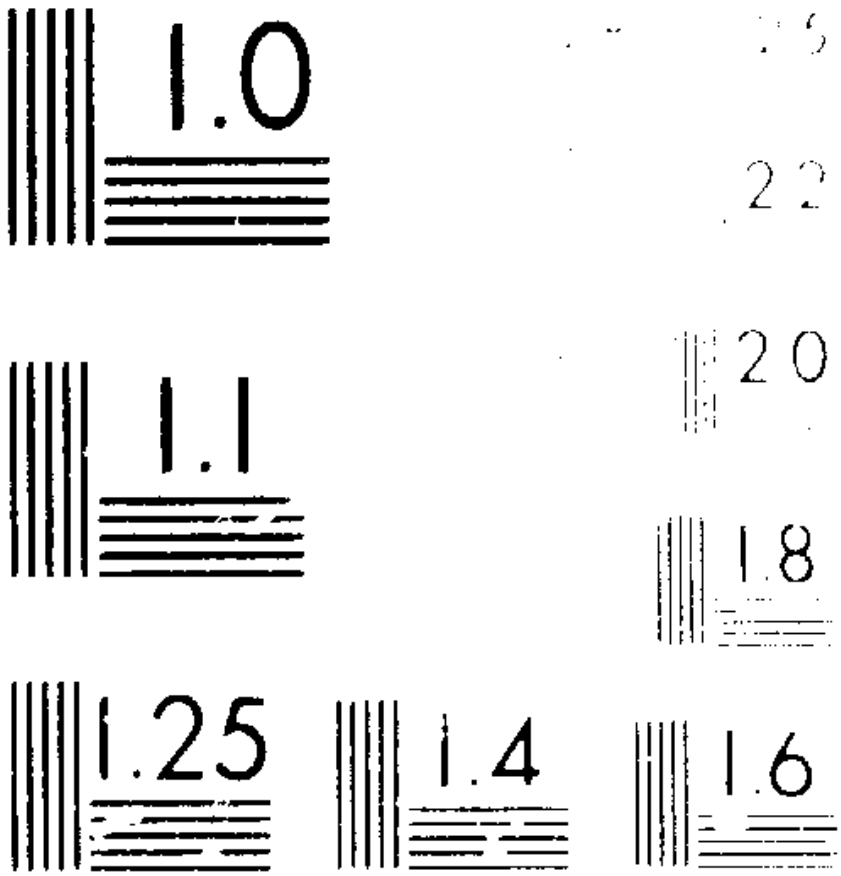
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UNIDO/IO/R.1
18 January 1982

ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT, AT ESTANCIA VELHA, RS, BRAZIL

US/BRA/80/166

Mission report*

Prepared for the Government of Brazil
by the United Nations Industrial Development Organization

Based on the work of David Winters,
expert in treatment of tannery effluents (team leader)

* This document has been reproduced without formal editing.

V.82-20591

1. SUMMARY

Within a two-week assignment at the Tannery School, Escola de Curtimento SENAI, (E.T.C.) at Estancia Velha, Rio Grande do Sul, and in close association with Mr. M. Nestvold, Senior Industrial Development Officer, Agro-industries Branch, Division of Industrial Operations, UNIDO substantive backstopping officer (who was present during the first week of the assignment), and closely co-operating with the Brazilian counterparts, the expert elaborated a revised work plan to allow rapid implementation of the project.

In particular revisions to the work plan were agreed upon in the following areas:

- Implementation time table;
- Detailed requisitions for initial pilot plant and laboratory equipment and supplies;
- Technical inputs required from external personnel assistance;
- Outlining possibility of major personnel input being procured by subcontract to a suitable specialist institute or company from the donor country (Italy);
- The suggestion is also made that tenders for equipment supplies be limited to Brazilian and Italian suppliers to ensure maximum utilization of Italian resources (subject to technical suitability and acceptable cost);
- Agreement with the counterpart agency on the additional local personnel required to implement and operate the pilot plant.

2. BACKGROUND INFORMATION

The project US/BRA/80/166, Assistance in the establishment and operation of a pilot demonstration plant for tannery effluents treatment at Estancia Velha, RS, was proposed based on the findings and recommendations of Mr. David Winters, adviser on tannery effluents, under project SI/BRA/79/801. The present large-scale project was approved for financing from UNIDF funds under a special purpose donor contribution by the Government of Italy.

The same adviser, Mr. Winters, was assigned a two-week preparatory mission to Brazil with the following duties:

"The expert will be attached to the Tannery School SENAI at Estancia Velha and will work in close co-operation with the Director and specialized staff of the Tannery School, representatives of SENAI and of the tanneries of the region. More specifically the expert will be expected to:

1. Assess the existing tannery effluent primary treatment facilities;
2. Recommend necessary equipment for the secondary treatment of tannery effluents to be requisitioned under the project's equipment component;
3. Elaborate a detailed work plan for the project's implementation, taking into consideration the donor country's wish to utilize to the maximum extent possible services and equipment available in Italy." (See Annex I)

The expert was on duty in Brazil from 26 October to 5 November 1981. He returned to his home on 6 November, spent three days preparing the mission report and the detailed equipment requisitions. He was debriefed at UNIDO Vienna on 19 and 20 November 1981 in connexion with his attendance, as a consultant, at the Leather Industry Working Group.

3. FINDINGS

(a) The newly established primary treatment plant attached to the Tanning School was seen in operation. The treatment system is made up of the following elements:

- separate waste sewers, for liquids of different characteristics;
- chrome recycling circuit;
- unhairing-lime recycling circuit;
- primary treatment, made up of the following unit operations: screening, equalizing and mixing, coagulation and flocculation, primary settling, sludge thickening and drying beds.

There were still some operational problems arising from time to time, mainly due to the varying and rather low production flow going through the School's small tannery.

Some basic redesign of the pilot plant was found necessary to reflect the actual adjusted production flow and effluent quantities found at the Tanning School.

(b) The exact relationship of the project and its management viz-à-viz the Tannery School is being actively discussed. The question of National Director of the project, the project's independence from and/or integration with the Tannery School were expected to be solved by SENAI during November 1981.

It was accepted that if new personnel is recruited for senior counterpart posts, it will be recruited before February 1982 so as to be available for the planned study tour.

(c) All parties believe that a study tour by Brazilian counterparts to see tannery effluent treatment plants in operation in Europe should be undertaken prior to completing the finalization of the design of the pilot plant. Such a study tour, of two weeks duration, by up to four Brazilian counterparts would be the most cost effective method for familiarization with current industrial practice in the area of industrial activity and will ensure a technically sound pilot demonstration plant.

Accordingly, only basic equipment will initially be requisitioned, as detailed in Annexes III, IV, V, and VI.

The balance of plant and equipment required will be determined after the study tour and, when available locally, purchased in Brazil.

4. RECOMMENDATIONS

The following amendments to the original project US/BRA/80/166 were recommended.

(a) Personnel Inputs:

In order to ease recruitment problems, aid timely implementation and give due consideration to the donor country's wish to maximize Italian inputs, it was agreed by all parties that the majority of personnel inputs should be obtained via a subcontract with an Italian institute/company specializing in this field. Description and scope of the work to be performed by the contractor are detailed under (c).

However, in order to ensure the necessary co-ordination of all inputs from UNIDO, Brazilian counterparts and contractors, it is considered essential that a Team Leader, familiar with UN operation and procedures

should be available on an intermittent basis. Additionally, a certain reserve for specialist consultants must be kept. Thus the revised UNIDO personnel inputs will be:

Team Leader	6 man-months
Consultants	3 man-months
Technologists under a subcontract	equivalent in value to the remaining man-months originally foreseen.

(b) Study Tour:

Provision for a study tour to Europe, covering visits to Italy and three other countries, must be made for up to four Brazilians for a period of two weeks. Estimated costs:

Air fares	US$ 2,500 x 4	US$ 10,000
Local travel	US$ 250 x 4	US$ 1,000
Daily subsistence allowance 14 days	US$ 70 x 4	US$ 3,920
		US$ 14,920
i.e. Total Cost Study Tour		US$ 15,000

(c) Subcontract for US/BRA/80/166, Responsibility of the Contractor, Description and Scope of the Work to be Performed by the Contractor

Given the aims, objectives, project outputs and project activities of US/BRA/80/166 as detailed in the Project Document signed 19 October 1981, together with the Project Implementation Time Table as detailed under item (d), the contractor shall undertake to supply the necessary experienced expertise to ensure the timely implementation and satisfactory subsequent operation of the pilot plant.

The experts supplied by the contractor shall undertake to advise and assist the Brazilian counterparts to attain, in particular, all the immediate objectives detailed in paragraph 3 (b), pages 3 and 4, of the aforementioned Project Document. The contractor's experts shall train the Brazilian counterparts in all aspects of the project's activities and shall undertake to provide all technical inputs implied to be provided by the external assistance in the aforementioned Project Document.

The contractor's experts in the field will accept technical guidance and orientation from the UNIDO Team Leader who will be available intermittently and will co-ordinate the project within the UNIDO operational patterns.

The contractor shall supply twenty-five man-months of expertise spread over an eighteen-month period (1 June 1982 - 30 November 1983), having at all times at least one expert, but not more than two experts, on duty at the Tanning School (E.T.C.) SENAI at Estancia Velha.

The areas of expertise required for the contractor's inputs are outlined below. It may, however, be agreed that the contractor may compose the required specialities, subject to approval by UNIDO's Team Leader.

Expertise Required:

20% of input (5 m/m)	Biologist, biochemist, sanitarian or other qualified person to be responsible for the production and control of the necessary biomass/aerobic organisms found necessary for the operation of the biological secondary treatment systems to be installed, namely, gravity filter, oxidation ditch, activated sludge and facultative lagoon.
40% of input (10 m/m)	Chemical engineer, chemist, technologist or sanitarian to be responsible for the day to day operation of the pilot effluent primary and secondary treatment plant. To have wide experience in the operation of effluent treatment plants and have particular knowledge of tannery effluent treatment. Must also be able to assist the project in offering extension services to the Brazilian tanning industry in the field of installation and operation of effluent treatment plants.

20% of input (5 m/m)	Technologist/chemist or other suitably qualified person able to initiate and operate an extension service to the Brazilian tanning industry in the fields of recycling with particular reference to beamhouse and tanning liquors.
20% of input (5 m/m)	Specialist in solid wastes, with practical experience in the processing and utilization of solid wastes (chrome free and chrome bearing), and the economic recovery of chemicals from tannery processing.

Note: The revised project budget covering the UNIDO inputs is attached as Annex II.

(d) Implementation Time Table:

	1981	1982											1983										
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
Team Leader Requisition Basic Equipment	-																								
UNIDO obtain Tenders		-																							
UNIDO orders Equipment			-																						
Plant Equipment delivered				-------																					
Prepare Study Tour (Team Leader)			-																						
Study Tour (Counterparts and Team Leader)				-																					
Finalize detailed Pilot Plant Design (Team Leader and Counterparts)					-																				
Order Balance Equipment (Brazil) (Team Leader)						-																			
Fielding of Subcontract Personnel (Dependent on Equipment Deliveries)														----------											
Installation of Pilot Plant														----------											
Operation of Pilot Plant																									

The balance of the Team Leader and consultants inputs will be utilized as/when found operationally desirable, in addition to inputs shown in the above implementation time table.

LIST OF ANNEXES

I. Job Description

II. Revised Project Budget

III. (a) Requisition for Basic Items Effluent Treatment Plant

(b) Notes for above

(c) Possible suppliers for above

IV. Requisition for Laboratory Equipment

V. Requisition for Laboratory Glassware

VI. Requisition for Laboratory Chemicals

UNITED NATIONS ANNEX I

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO 4 December 1981

Request from the Government of the Federative Republic of Brazil

INTERNAL

JOB DESCRIPTION

US/BRA/80/166/11-01/31.7.D

Post title Expert in the Treatment of Tannery Effluents/Team Leader

Duration Two weeks

Date required As soon as possible

Duty station Novo Hamburgo/Porto Alegre, R.S.

Purpose of project To work out a detailed work plan for the implementation of this project, the objective of which is to assist in the establishment and operation of a pilot demonstration plant for tannery effluents treatment at the Tannery School SENAI at Estancia Velha, Rio Grande do Sul, Brazil.

Duties The expert will be attached to the Tannery School SENAI at Estancia Velha and will work in close co-operation with the Director and specialised staff of the Tannery School, representatives of SENAI and of the tanneries of the region, and national counterparts. More specifically, the expert will be expected to:

1. Assess the existing tannery effluent primary treatment facilities;

2. Recommend necessary equipment for the secondary treatment of tannery effluents to be requisitioned under the project's equipment component;

3. Work out a detailed work plan for the project's implementation.

The expert will also be expected to prepare a final report, setting out the findings of the mission and recommendations to the Government on further action which might be taken.

..../..

Qualifications Extensive experience in the leather industry, with specialised knowledge of the treatment of tannery effluents and of the recovery of tannery waste materials.

Language English

Background Information Based on the findings of a previous mission to the country, the expert reported on the situation in R.S. regarding tannery pollution and measures proposed to reduce such environmental degradation. A detailed project proposal was prepared for the establishment and operation of a pilot demonstration plant for tannery effluent treatment at the Tannery School, Estancia Velha.

During this preparatory mission, the expert should work out - together with the national counterparts - a detailed work plan for the project's early implementation and also decide on the equipment required for the secondary treatment to be requisitioned under the equipment component of this project.

UNIDO

PROJECT BUDGET/REVISION

ANNEX II

3. COUNTRY	4. PROJECT NUMBER AND AMEND.	5. SPECIFIC ACTIVITY
BRAZIL	US/BRA/80/166 /B	31.7.D

10. PROJECT TITLE

Assistance in the Establishment and Operation of a Pilot Demonstration Plant for Tannery Effluents Treatment, at Estancia Velha, RS

15 / 10. PROJECT PERSONNEL / 11 EXPERTS / Post title	16. TOTAL		17. 1981		18. 1982		19. 1983		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01 Team Leader (Spec. in treatment tannery effluents)	6	37,800	0.5	3,150	3.5	22,050	2.0	12,600		
02 Consultants	3	18,900		-	2.0	12,600	1.0	6,300		
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
11-99 SUBTOTAL:	9	56,700	0.5	3,150	5.5	34,650	3.0	18,900		

21. REMARKS

excluding 14 per cent overheads amounting to US$ 58,030.

UNIDO

PROJECT BUDGET/REVISION

2. PAD NUMBER

4. PROJECT NUMBER US/BRA/80/166 /B	16. TOTAL		17. 1981		18. 1982		19. 1983		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
12.01 OPAS Experts										
13.00 Support Personnel										
14.00 Volunteers										
15.00 Experts Travel										
16.00 Other Personnel Costs		3,000		3,000						
17.01 Locally hired Experts										
17.02 Locally hired Experts										
19.00 Total Personnel Component	9	59,700	0.5	6,150	5.5	34,650	3.0	18,900		
20. SUBCONTRACTS										
29.00 Total Subcontracts Component		202,800		-		101,400		101,400		
30. TRAINING										
31.00 Fellowships										
32.00 Study Tours, UNDP C. Training/Meetings		15,000		-		15,000		-		
33.00 In-service Training										
34.00 Group Training (non-UNDP)										
35.00 Meetings/Consultations (non-UNDP)										
39.00 Total Training Component										
40. EQUIPMENT										
49.00 Total Equipment Component		137,000				137,000				
50. MISCELLANEOUS										
51.00 Operations — Maintenance										
52.00 Reports										
53.00 Sundries										
55.00 Hospitality (non-UNDP)										
59.00 Total Miscellaneous Component										
99. GRAND TOTAL:	9	414,500	0.5	6,150	5.5	288,050	3.0	120,300		

ANNEX III

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/1

PPCSA

MiSPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21-

Expendable Equipment ☐ 41- 0 1

Non-Expendable Equipment ☒ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
			PLEASE REFER TO ATTACHED NOTES & OUTLINE SPECIFICATIONS	
I	1		CATALYTIC TANK	3,500
II	1		AIR DIFFUSING UNIT	400
III	1		AIR DIFFUSION UNIT	500
IV	2		FLOAT CONTROL SWITCHES	250
V	1		PORTABLE MIXER	250
VI	1		pH CONTROL UNIT	3,000
VII	4		DOSING VESSELS	3,000
VIII	1		SELF CLEANING SCREEN UNIT	5,000
IX	2		1 H.P. FLOATING AERATORS	8,000
X	2		1 H.P. SUBMERSIBLE AERATORS	8,000
XI	1		ROTOR TNO Type for OXIDATION DITCH	4,000
XII	1		LINER suitable for above ditch (Butyl?)	500
XIII	1		ROTATING DISTRIBUTOR suitable for TRICKLING FILTER	1,000
XIV	1		PRESSURED SAND FILTER complete unit 1 M^3 hr.	4,000
			TOTAL C/F	41,400

SPECIAL INSTRUCTIONS:

See attached list - possible suppliers, however, Italian suppliers have priority.

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For: Escola de Curtimento SENAI
Rua Gregório Matos, 111
CX.P.4
93 600 Estancia Velha, R.S., Brazil

Shipping Documents for information to:
UNDP, CX. P 07-0285, Brasilia, Brazil

Target Date:

Original: DIO/PAC

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

ANNEX III

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/1

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts	☐ 21-
Expendable Equipment	☐ 41- 0 1
Non-Expendable Equipment	☒ 42- 0 1
Premises	☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
			PLEASE REFER TO ATTACHED NOTES & OUTLINE SPECIFICATIONS B/F	41,400
XV	1		PROTEIN PRECIPITATION TOWER	3,500
XVI	1		VERTICAL SEDIMENTATION TANK	4,000
XVII	1		MINI FILTER PRESS	6,000
XVIII	2		DOSING PUMPS 4 Heads Variable Flow	2,000
			TOTAL	56,900

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes

For:

Target Date:

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

Original: DIO/PAC

Form/IO 12/Rev.2 (9.80)

POSSIBLE SUPPLIERS

	Address	Telephone
1.	Beck Rua Rio Branco 235 Bairro Liberdade 93300 NOVO HAMBURGO R.S. BRASIL (Cx Postal 578)	95-39-94
2.	Hidrotechnica Rua Machado de Assis 159 PORTO ALEGRE R.S. BRASIL	23-95-28
3.	Staiger Industrias Metalurgicas S.A. Rua Consel Heiro Travassos 87 Caixa Postal 3005 90,000 PORTO ALEGRE R.S. BRASIL	22-30-61/40-16
4.	Tigrefibra Industrial S.A Rua Prof. Cristiano Fischer 1950 Partenon 90,000 PORTO ALEGRE R.S. BRASIL	23-36-55
5.	Worthington S.A. (Maquinas) Av. Cairu 1088 Cx Postal 723 PORTO ALEGRE R.S. BRASIL	42-43-00/01
6.	Techometal Rua Ricardo Gavenski 118 PORTO ALEGRE R.S. BRASIL	41-79-47
7	Engenharia de Tratamento de Aguas Ltda Rua Maura Azeveda 601 PORTO ALEGRE R.S. BRASIL	22-65-96 22-52-91
8	Companhia Metalurgica Barbara Rua Barao do Amazonas 1386 Cx Postal 1475 PORTO ALEGRE R.S. BRASIL	
9	Geremia Ltda Av Thomas Edson 2320 Cx Postal 325 Bairro Vicentina SAO LEOPOLDO R.S. BRASIL	92-18-75 92-32-87

ANNEX III

NOTES AND OUTLINE SPECIFICATIONS

BASIC PLANT REQUIREMENT

DEMONSTRATION/PILOT PLANT for SECONDARY TREATMENT

TANNERY EFFLUENTS TANNERY SCHOOL, ESTANCIA VELHA

R.S. BRAZIL

BASIC EFFLUENT PARAMETERS

Hide Input = 20 day at 20 Kg. = 400 Kg/day

Water Usage 50 L/Kg = 20 M^3/day

Flow Rate - Assuming continuous flow for general secondary treatments over 24 hours (pumped forward from an equalization/holding tank) = 0·83 M^3/hour say 1·0 M^3/hour. Maximum flow in some operations, e.g. screening may however reach a rate of 6/10 M^3/hr.

Beamhouse liquors, if given specialized treatments, e.g. catalytic oxidation and/or protein precipitation will be batch treatments of 2 M^3

Effluent Characteristics

Initial equalized liquor assumed to have :-

circa 2,000 mg/l $B.O.D._5$ (Recent analysis suggests lower level i.e. 1,000 mg/l)

4,000 mg/l Suspended Solids (S.S.).

Thus total daily load is circa 40 Kgs $B.O.D._5$ d

80 Kgs S.S. d.

currently following primary treatment installed pollution load is circa

500 mg/l $B.O.D._5$

500 mg/l S.S.

Thus daily load following primary treatment is circa

10 Kg $B.O.D._5$/day

10 Kg S.S. /day

N.B. For demonstration purposes it may be found expedient to run primary system at lower level of efficiency in order to have sufficient load to operate secondary treatment.

/Materials.....

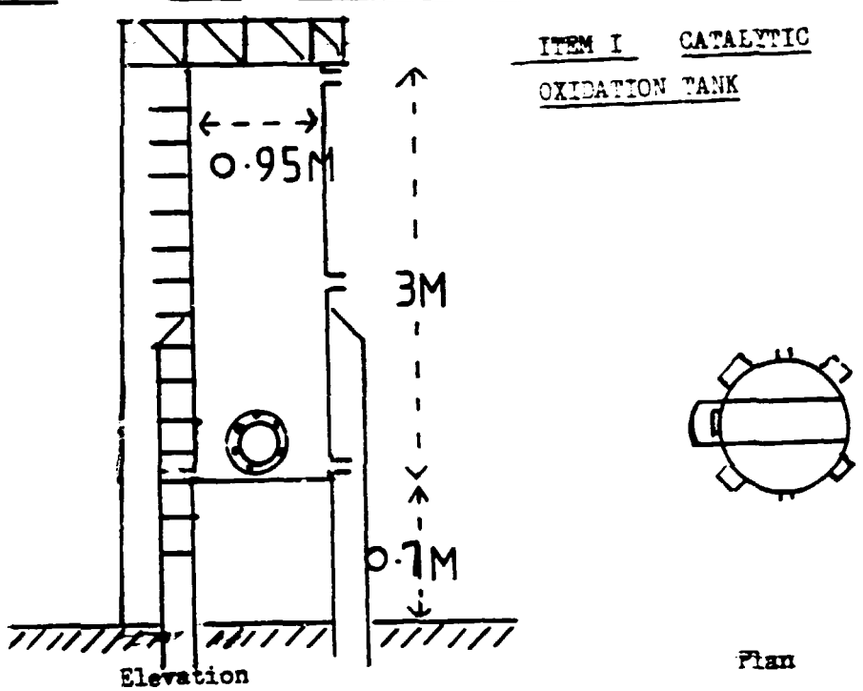
MATERIALS OF CONSTRUCTION

Due to the corrosive nature of the tannery effluent it is visualised that materials employed will be resin coated steel, stainless steel, P.V.C. Polyethylene, Fibreglass or other materials as found applicable, together with reinforcement to withstand the hydraulic load and mechanical action expected.

PLANT REQUIREMENTS

Plant to operate on 220 v - 60 cycles or 380 v 3 phase

Item I **1 OFF** **CATALYTIC TANK** (as sketch)



Suitable for use as vessel for catalytic oxidation (in conjunction with Items II or III)

To be self supporting, fabricated from stainless or suitably coated steel, in open topped cylindrical form with internal baffles to induce turbulence.

Effective volume to be 2 M^3

Fitted with 40 cm. access cover (manhole) near base

Fitted 4 flanges for 2" pipes

Complete with access ladder and viewing platform.

Item II 1 OFF AIR DIFFUSING UNIT Consisting of

4 Ejectors (similar to Flygt Ejectors No. 4803), together with suitable submersible air pump capable of supplying 5/10 litres/sec at 3 M depth

Item III 1 OFF AIR DIFFUSION UNIT Consisting of :-

6 x 17·5 cm No. 1 Sintered Alundum dome diffusers
6 x Extra Sintered domes
1 x Rotary Vane Air Blower to supply up to 250 M^3 Air/Hr.
1 x Motor to drive Air Blower (2 H.P.?)

Item IV 2 OFF FLOAT CONTROL SWITCHES

Liquid Level Control system incorporating level regulator and Level Control Unit (similar to Flygt ENH-10)

Item V 1 OFF PORTABLE MIXER

1·5 M shaft, 25 cm. paddles, 1 H.P. variable speed
(Shaft and Paddles in stainless steel)

Item VI 1 OFF pH CONTROL UNIT Comprising:-

a) ph Controller/Monitor capable of activating either of :-
b) 2 dosing pumps (acid/alkali) with controllable output up to 20 litres/hr
c) complete with polyethylene reservoirs (200 litres) and stands

Item VII 4 UNITS each DOSING VESSELS

1 M^3 open topped cylindrical vats (Stainless Steel or Fibreglass) fitted with variable speed stirring devices 10 - 15 cm. propellers.
Vats to be fitted with 2 x 2" flanges near top and bottom.

Item VIII 1 OFF SELF CLEANING SCREEN UNIT Complete with Wedge Wire (as Dorr-Oliver or Bauer), to handle maximum flow rate of 10 M^3/hr. Mesh as suitable for tannery wastes.

Item IX 2 OFF 1 H.P. FLOATING AERATORS

Stainless Steel - To have facility to reduce efficiency by up to 50% (Electrically or by change of paddles).

/Item X.....

Item X 2 OFF 1 H.P. SUBMERSIBLE AERATORS

(Smaller than Frings Type 75T)

Item XI 1 OFF ROTOR TNO type (or similar) for OXIDATION DITCH 0·75 m. Immersion 0·7 M. or less. Complete unit with motor and bridge. Supplier to ultimately submit outline design for suitable ditch of 50 M^3 capacity (Similar to Whitehead & Poole 200 Population equivalent unit).

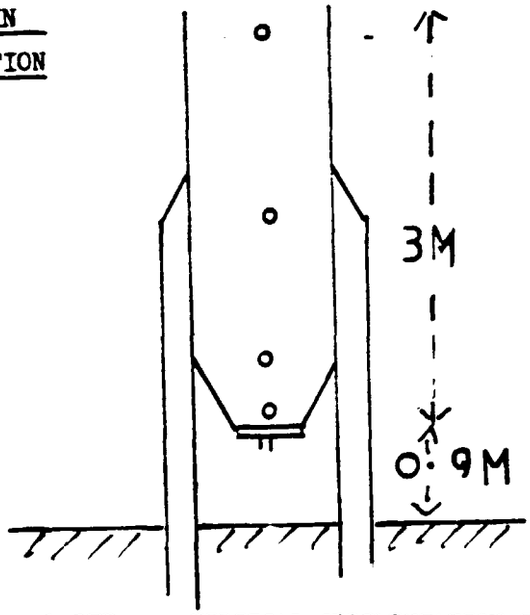
Item XII 1 OFF LINER suitable for above ditch (Butyl?)

Item XIII 1 OFF ROTATING DISTRIBUTOR suitable for TRICKLING FILTER of 4 M diameter 2 M^3/hr. flow

Item XIV 1 OFF PRESSURE SAND FILTER Complete unit 1 M^3/hr.

Item XV 1 OFF PROTEIN PRECIPITATION TOWER (as sketch)

PROTEIN PRECIPITATION TOWER



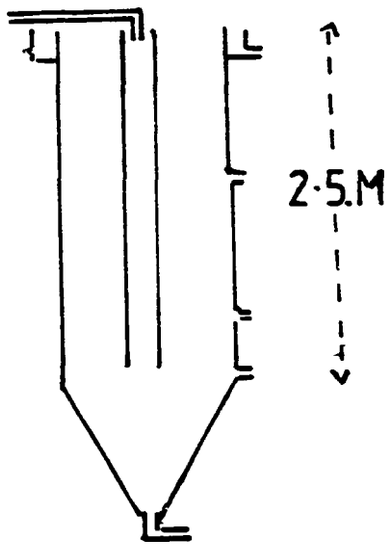
Open topped cylinder with truncated 60° Conic Base fitted with 45 cm. access/ discharge plate at base. Fitted 5 x 2" flanges. Complete with access ladder and viewing platform (not sketched).

Item XVI 1 OFF VERTICAL SEDIMENTATION TANK (see sketch)

Open topped cylinder with 60° cone, fitted 5 x 2" flanges, central entry. Discharge weir. Self supporting 0·7 m ground clearance.

/complete....

VERTICAL SEDIMENTATION TANK



Complete with access ladder and platform (not sketched).

Volume of cylinder (without cone) to be 3 hours retention 3 M^3

i.e. r = 0,62 m/h = 2·5

Item XVII 1 OFF MINI FILTER PRESS

Approx. size 12 chambers 0·5 x 0·5 m.

Item XVIII 2 OFF DOSING PUMPS

4 heads Variable flow (as Barbara Model SQ31)

ANNEX IV

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/2

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21-☐☐

Expendable Equipment ☐ 41- 0 1

Non-Expendable Equipment ☒ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
			LABORATORY EQUIPMENT	
			Suitable for 220V 60 cycle electricity supply	
			(References to Griffin 1980/82 catalogue)	
1	1	ea	Portable pH meter, Cat. No. PHK 290 N	700
2	4	sets	Electrodes to suit above, Cat. No. PHK-310 030 G	250
3	1	ea	Muffle furnace - auto temp. control - FSE, Cat.No. 520 210R	2,500
			internal dimensions 30x30 cm x 15 cm high	
4	4	ea	Soxhlet type heating units to hold 6 flasks (250ml),	2,500
			adjustable temp. control, Cat.No. EXP 390 090W	
5	1	ea	De-ionizing column 50/100 l/hr, Cat.No. DCF 570W	200
6	1	pack	Spare resin, Cat.No. DCF 590 010F	50
7	2	ea	Magnetic stirrers/heaters, 0/1500 rpm 1/10 HP motor/500-750W	600
			heat/heat control, approx. 20cm diameter, similar to	
			Cat.No. SWT 500.010L	
8	1	ea	Incubator, dimensions approx. 0.8m x 0.8m x 1.5m high	2,000
			similar to CatNo. INC 700 110M TOTAL	

SPECIAL INSTRUCTIONS:

Italian suppliers priority

Ship Via ~~Surface~~ Air To: Resident Representative of United Nations Development Programmes

For: Escola de Curtimento SENAI
Rua Gregório Matos, 111
~~CX.P.4~~
93 600 Estancia Velha, R.S., Brazil

Shipping Documents for information to:
~~UNDP, CX.P. 07-0285, Brasilia, Brazil~~

Target Date:

Original: DIO/PAC

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/2

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21-

Expendable Equipment ☐ 41- 0 1

Non-Expendable Equipment ☒ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
9	1	ea	Laboratory oven, fan assisted, temp. control ± -20°C to 150°C	1,500
			dimensions approx. 0.5m x 0.5m x 0.7m high, similar to	
			Cat.No. OVH -200.010H	
10	1	set	Kjeldahl apparatus, unit complete for digestion/distillation,	750
			heaters and frames etc. for 6 x 700ml flasks, similar to	
			Cat.No. NKS 820.010X	
11	1	ea	Fume tube for above, Cat.No. NKT 154 502R	75
12	1	set	Semi-automatic burettes 10ml (500ml reservoir), Cat.No.	100
			BWJ 530.070A	
13	2	set	Semi-automatic burettes 25ml (1-2 litres reservoir),	200
			Cat.No. BWJ 530.110X	
14	1	set	Semi-automatic burettes 50ml (1-2 litres reservoir),	100
			-- IF FUNDS AVAILABLE --	11,525
15	1	ea	Total organic carbon, complete unit - infra-red - Beckman?	
16	1	ea	Total dissolved solids by resistance, complete unit	
			TOTAL	

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For:

Target Date:

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

Original: DIO/PAC

ANNEX V

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

REQUISITION NUMBER 81/3

Activity Code

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21- [ ]

Expendable Equipment ☐ 41- 0 1

Non-Expendable Equipment ☒ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

CERTIFIED (FIMS): (Name) (Section) (Date)

IOD/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
:.			(References to Griffin 1980/82 catalogue)	
1	1	ea	Aspirator, plastic, 23 litres, Cat.No. ASP 560.010Q	20
2	36	ea	Basins, porcelain, 100ml, Cat.No. BWH 380.070Q	100
3	24	ea	Beakers, Pyrex, 100ml, squat spouted, Cat.No. BNB 300.090D	30
4	24	ea	Beakers, Pyrex, 250ml, squat spouted, Cat.No. BNB 300.130R	40
5	6	ea	Beakers, Pyrex, 500ml, squat spouted, Cat.No. BNB 300.170F	15
6	12	ea	Beakers, Pyrex, 1000ml, squat spouted, Cat.No. BNB 300.230N	45
7	6	ea	Beakers, Pyrex, 2000ml, squat spouted, Cat.No. BNB 300	40
8	30	ea	Crucibles, porcelain, 45ml, Cat.No. CWB 710.070U	50
9	30	ea	Crucible lids, Cat.No. CWB 720	50
10	6	ea	Cylinders, graduated glass, 50ml, CAt.No. CYL 300.070G	20
11	6	ea	Cylinders, graduated glass, 100ml, Cat.No. CYL 300.080A	20
12	6	ea	Cylinders, graduated glass, 1000ml, Cat.No. CYL 300.150Y	100
13	12	ea	Cylinders, graduated G/G stoppers 100ml, Cat.No. CYL 420.090B	60
14	12	ea	Cylinders, graduated G/G stoppers 1000ml,	200
			TOTAL	

SPECIAL INSTRUCTIONS:

Italian suppliers priority

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For: Escola de Curtimento SENAI
Rua Gregório Matos, 111
CX.P. 4
93 600 Estancia Velha, R.S., Brazil

Shipping Documents for information to:
UNDP, CX.P. 07-0285, Brasilia, Brazil

Target Date:

Original: IOD/PAC

Form/IOD.12/Rev.1 (4 80)

To be sent to Chief, IOD.PAC, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

REQUISITION NUMBER 81/3

Activity Code

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21- ☐☐

Expendable Equipment ☐ 41- 0 1

Non-Expendable Equipment ☐ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO — IO/AGRO — Name / Section / Date

CERTIFIED (FIMS): Name / Section / Date

IOD/PAC: Received / Returned

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
15	5	ea	Desiccators, glass 200 mm, and porcelain plates	300
16	10	ea	Flasks, volumetric, stoppered, 100ml, Cat.No. FHM 240.152K	50
17	10	ea	Flasks, volumetric, stoppered, 250ml, Cat.No. FHM 240.192V	60
18	72	ea	Flasks Erlenmayer, 250ml, Cat.No. FHB 360.130C	100
19	24	ea	Flasks Erlenmayer, 500ml, Cat.No. FHB 360.	200
20	12	ea	Extraction apparatus Saxhlet, complete (100ml extractor	700
			250ml, F/B flask, Davies condensor all G/G), Cat.No.	
			EXP 630.050C	
21	2	boxes of 25	Extraction thimbles 22 x 80mm, Cat.No. EXP 800.110T	30
22	2	"	Extraction thimbles 30 x 100mm, Cat. No. EXP 800.230J	30
23	12	ea	Flasks, conical filter 500ml, Cat.No. FHD 350.070S	100
24	24	ea	Flasks, Kjeldahl 700ml, Cat.No. FHD 430.	150
25	6	ea	Funnels, separating, pearshape 100ml, stoppered	100
			Cat.No. FPM 400.070F	
26	10	ea	Pipettes, bulb, 10ml, Cat.No. PMC 200.082E	20
			TOTAL	

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For:

Target Date:

Original: IOD/PAC

To be sent to Chief, IOD/PAC, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

REQUISITION NUMBER 81/3

Activity Code

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VELHA, R.S.
Title of Project

D. Winters (Team Leader)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts	☐ 21-[ ]
Expendable Equipment	☐ 41-01
Non-Expendable Equipment	☒ 42-01
Premises	☐ 43-01

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

CERTIFIED (FIMS): (Name) (Section) (Date)

IOD/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in U.S. dollars
27	10	ea	Pipettes, bulb, 25ml, Cat. No. PMC 200.112V	25
28	10	ea	Pipettes, bulb, 50ml, Cat. No. PMC 200.142M	30
29	10	ea	Pipettes, bulb, 100ml, Cat.No. PMC 200.152J	50
30	20	ea	Gauges, iron with asbestos centres, 150 x 150mm, Cat.No.	25
			GMX 310.030V	
31	12	ea	Bulbs, connecting, Kjeldahl, 5-6cm diameter	60
32	10	metre	Tubing rubber, bore 5.0mm, Cat.No. TWR 250.130V	10
33	10	"	Tubing rubber, bore 6.5mm, Cat. No. TWR 250.150P	15
34	10	"	Tubing rubber, bore 8.0mm, Cat.No. TWR 250.170J	20
35	10	ea	Clamps, retort, Cat.No. STE 300.010D	70
36	10	ea	Bossheads, Cat.No. STE 330.010F	35
37	10	ea	Imhoff cones, 1 litre	100
38	100	ea	Kemmener bottles, B.O.D. analysis, 300ml	200
				3,270
			Freight 20 %	654
			TOTAL	3,924

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For:

Target Date:

Original: IOD/PAC

Duplicate to Chief, IOD/PAC, UNIDO - P.O. Box 300, A-1400 Vienna, Austria

ANNEX VI

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

PRIMARY LABORATORY REAGENTS

PAGE 1 OF 3

REQUISITION NUMBER 81/4

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR ~~TANNERY EFFLUENTS TREATMENT~~ AT ESTANCIA VEHLA, R.S.
Title of Project

D. WINTERS (TEAM LEADER)
Projec. Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21-

Expendable Equipment ☒ 41- 0 1

Non-Expendable Equipment ☐ 42- 0 1

Premises ☐ 43 - 0 1

Check appropriate box

ALL ANALYTICAL REAGENT (A.R.) PURITY (unless otherwise noted).

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Projec. Document Component	Est. cost in US dollars
1	50	litres	Hydrochloric Acid	
2	3	Kg	Calcium Acetate	
3	10	litres	Acetic Acid - Glacial	
4	2	Kg	Sodium Thiosulphate	
5	100	gms	Iodine	
6	500	gms	Starch	
7	1	Kg	Potassium Bichromate	
8	500	gms	Mercuric Sulphate	
9	1	Kg	Silver Sulphate	
10	100	litres	Sulphuric Acid	
11	3	Kg	Ferrous Ammonium Sulphate	
12	10	gms	Phenazine ($C_{12}H_8N_2 \cdot H_2O$)	
13	250	gms	Ferric Sulphate	
14	100	gms	Ferrous Sulphate	
15	2	Kg	Manganous Sulphate ($MnSO_4 \cdot 7H_2O$)	
16	18	Kg	Sodium Hydroxide	TOTAL

SPECIAL INSTRUCTIONS:

Italian suppliers priority.

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For: Escola de Curtimento SENAI
Rua Gregório Matos, 111
CX.P.4
93 600 Estancia Velha, R.S., Brazil

Shipping Documents for information to:
UNDP, CX.P. 07-0285, Brasilia, Brazil

Target Date:

Original: DIO/PAC

To be sent to Substantive Branch, DIO, UNIDO - P.O. Box 300, A-1400 Vienna, Austria

Form UO.12/Rev.2(9.80)

ANNEX VI (Continued)

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/4

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE ☒

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VEHLA. R. S.
Title of Project

D. WINTERS (TEAM LEADER)
Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21- ☐☐

Expendable Equipment ☒ 41- 0 1

Non-Expendable Equipment ☐ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
17	5	Kg	Potassium Iodide	
18	2	Kg	Sodium Azide	
19	3	Kg	Potassium Fluoride	
20	100	gms	Ferric Chloride	
21	500	gms	Magnesium Sulphate	
22	1	Kg	Calcium Chloride (Anhydrous)	
23	100	litres	Petroleum Ether	
24	1	litre	Ortho Phosphoric Acid	
25	2	Kg	Boric Acid	
26	100	gms	Phenol Phthalien	
27	250	gms	Ammonium Chloride	
28	500	gms	Potassium Di Hydrogen Phosphate	
29	1	Kg	Potassium Mono Hydrogen Phosphate	
30	1	Kg	Sodium Mono Hydrogen Phosphate	
~~XXX~~	~~XXX~~	~~XXX~~	~~XXXXXXXXXXXXXXXXXX~~	
32	1·5	Kg	Potassium Sulphate	
			TOTAL	

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For:

Target Date:

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

Original: DIO/PAC

ANNEX VI (Continued)

UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (DIO/PAC)

REQUISITION NUMBER 81/4

PPCSA

MISPI No.

Date 30 November 1981

LOCAL PURCHASE REQUESTED ☐

HEADQUARTERS PURCHASE XX

ASSISTANCE IN THE ESTABLISHMENT AND OPERATION OF A PILOT AND DEMONSTRATION PLANT FOR TANNERY EFFLUENTS TREATMENT AT ESTANCIA VEHLA. R.S.

Title of Project

D. WINTERS (TEAM LEADER)

Project Manager/Requesting Officer

Project Number US/BRA/80/166

Sub-Contracts ☐ 21-

Expendable Equipment XX 41- 0 1

Non-Expendable Equipment ☐ 42- 0 1

Premises ☐ 43- 0 1

Check appropriate box

CLEARED (SUBST. OFFICE): M. Nestvold, SIDO (Name) IO/AGRO (Section) (Date)

FUNDS AVAILABLE (DIO/PAC): (Name) (Section) (Date)

DIO/PAC: (Received) (Returned)

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
33	250	gms	Copper Sulphate	
34	1	gm	Methyl Orange	
35	1	gm	Methylene Blue	
36	5	litres	Perchloric Acid	
37	2	litres	Nitric Acid	
38	0·5	litre	Mixed 5 Indicator (Meryk)	
39	250	gms	Silver Nitrate	
40	100	gms	Potassium Chromate	
41	2 boxes		EACH Lyphan Test Papers (Full Range)	
42	1	Kg	Asbestos Filter Powder	
43	4 boxes		Whatman Filter Paper No. 40 12 cms.	
			TOTAL	

SPECIAL INSTRUCTIONS:

Ship Via Surface / Air To: Resident Representative of United Nations Development Programmes.

For:

Target Date:

To be sent to Substantive Branch, DIO, UNIDO – P.O. Box 300, A-1400 Vienna, Austria

Original: DIO/PAC

Form/IO.12/Rev.2 (9.80)

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