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REGIONAL PETROLEUM TRAINING CENTRE (PTC), SUMBE, ANGOLA

TRAINING NEEDS SURVEY

DP/RAF/88/062

ANGOLA

Technical Report\*

Prepared for the Government of the Republic of Angola  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Mr. K. Stoltenberg  
Consultant in Petroleum Training

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United Nations Industrial Development Organization  
Vienna

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WORK PLAN

**REVIEW AND REVISION OF CURRICULA. SELECTION AND DEVELOPMENT OF COURSES.**

1.0 BACKGROUND

1.1 Training Needs Survey

The Final Report from the Training Needs Survey was presented at the Energy Ministers Meeting in Arusha, Tanzania, on September 26th.

The Ministers endorsed the conclusions and recommendations from the National Consultants, consolidated in the Final Report.

The Ministers instructed TAU to immediately start the review and revision of curricula, and the selection and development of the new courses identified in the Survey Report.

This work will serve as a necessary input for the Project Document and Budget for the PTC Second Phase, covering the five years, 1989-1994. The Second Phase is planned to start 1st July 1989.

The findings and recommendations of the National Survey indicate certain consequences for the PTC strategy.

To better serve the needs of the SADCC countries, primarily engaged in downstream operations, the PTC course programme must be expanded to cover a wider range of activities based on shorter courses at higher entrance levels.

The courses shall cover specific petroleum-related subjects for employees that have completed their basic Vocational, Polytechnic or Professional training.

The School must also be prepared to arrange courses and seminars in the Member countries, either in central locations, or as in-house training or in cooperation with local schools and training institutions.

1.2 Tripartite Meeting

A Tripartite Meeting was convened in Luanda, Angola, on 3rd and 4th November 1988, to evaluate the first phase of the Project.

The meeting also discussed the financing of the Interim Period, first half year of 1989, and the further work required for revision of curricula and development of new courses.

The TAU Training Consultant was requested to propose a Work Programme and Budget for this work.

UNIDO had prepared a Draft Project Document. A Formulation Mission shall be appointed to work out the Final Document. The consultant was requested to participate in the Mission.

## 2.0 DEVELOPMENT OF NEW COURSES

### 2.1 Course Proposals

After the Tripartite meeting, the Director of PTC, Nunes E Sá and the TAU Consultant, travelled to the Petroleum Training Centre in Sumbe, 300 km. south of Luanda, to start up the work on identification of new courses.

Meetings were held with: Pedagogical Deputy Director J.J. Castelao, Methodological Deputy Director A. Russo, Interpreter F. Parreira, Comerint Team Leader A. Bottoni.

Based on the discussions and in cooperation with the TAU Consultant, the Comerint Team Leader prepared a series of course proposals and seminars that could form a basis for further discussions with representatives from SADCC countries and selection of future PTC programmes.

The entry level for the courses is based on a minimum of 12 years school, and some experience in similar or related occupations.

The majority of courses vary in length from one to two months, with some more advanced courses lasting 4, 5 and 6 months.

The preliminary list of courses is presented in Table 1. The course outlines are attached in Appendix 1.

### 2.2 Course Selection

To ensure acceptance of the new courses, and commitment from the Member States, the courses and programmes should be reviewed, designed and selected in cooperation between PTC, TCC, TAU and qualified representatives from the countries for which the courses are particularly relevant.

The courses selection committees should be appointed immediately.

### 2.3 External Courses and Seminars

The feasibility of arranging courses and seminars in Member countries, by PTC alone or in cooperation with local schools or institutions, should be examined and a tentative plan and programme proposed.

PROPOSED NEW COURSES

COURSE TITLE	DURATION MONTHS	ENTRY LEVEL		PREPARATION		IMPLMENT- ATION MM COST	PREPARATION + ONE IMPLEMENTATION
		SCHOOL YEARS	EXPERIENCE	MONTHS	MM COST		
Mechanical Supervisor	2	12	As Foreman	6	72,000	24,000	96,000
Electrical Supervisor	2	12	As Foreman	6	72,000	24,000	96,000
Instrument Technician	6	Polytechnic Certificate		5	60,000	72,000	132,000
Maintenance Electrician	4	12	5 Years	3	36,000	48,000	84,000
Firefighter	2	8	Industrial Plant	6	72,000	24,000	96,000
Firefighting Supervisor	1	12	As Firefighter	3	36,000	12,000	48,000
Laboratory Technician Petrochemicals & Aviation Prod.	5	A-Level Chemistry	Basic and Instru- mental Analyt.Chem.	12	144,000	60,000	204,000
Depot Management	2	12	Supervisory Activities	6	72,000	24,000	96,000
Computer Applications	1	12		3	36,000	12,000	48,000
Training of Trainers	2	12	Godd Proficiency	3	36,000	24,000	60,000
Maintenance Management	1½	Manager Maintenance and Workshop		4	48,000	18,000	66,000
Petr. Micro Economics	2	Certified Cost Accountant		6	72,000	24,000	96,000
Sum				63	756,000	366,000	1,122,000

TABLE 1

#### 2.4 Staff Requirements

The need for additional staff and external expert assistance must be assessed and consolidated in the interim budget and the budget for the second phase.

#### 2.5 Materials and Equipment

Additional materials and equipment needed in support of the training must be specified and consolidated in the budgets.

#### 3.0 CURRICULUM REVIEW AND REVISION

The curriculum at PTC underwent a major methodological reconstruction in 1987/88.

PTC is now offering the following main long-term courses:

- Production Operators
- Firefighting and Safety
- Electrical Maintenance
- Instrument Maintenance
- Mechanical Maintenance
  - . Motor Vehicles
  - . Plant and Machines
  - . Rotary Machines
- External Refinery Operations
- Administration
  - . Clerical
  - . Accounting

In addition to these main courses, six seminars or short courses have been prepared:

- Cathodic Protection
- Management Techniques
- Maintenance Planning
- Educational Engineering
- Pipeline Corrosion Control and Protection
- Introduction to Personal Computer  
(Use of Symphony Programme)

The new curriculum gives allowance for a flexible entry level, depending upon the trainees previous education and experience.

The full effect of this new programme has not yet been registered, as there are some courses and seminars that have not yet been implemented.

However, the new curriculum has received positive response from the oil companies, and the trainees have been highly rated.

The courses and seminars are evaluated after the first class of trainees have completed the course and revised if necessary.

There is therefore no need for any immediate revision of the curriculum.

Attention can now be directed towards an expansion of the new higher level short-term courses and seminars as requested by the National Consultants in their Training Survey Reports. Some of the existing textbook material will be revised and updated in accordance with technological developments.

Additional equipment for chemical analyses, firefighting training and computer applications will be required for the new courses.

#### 4.0 NATIONAL TEACHING STAFF

The development of a National/Regional Teaching Staff, is not only important for PTC and Angola, but also for the general level of technical development in the SADCC-region.

It is a Development Objective of this Project to develop PTC Management and Staff to a level of competence to manage the Centre by own resources.

In relation to National Teachers and Trainers this problem has been considerably underrated from the start.

A small committee should be appointed to undertake a fresh analysis of the problem with the objective of proposing a strategy and realistic plans for the recruitment of National Teachers.

#### 5.0 ORGANIZATION

To be able to complete this extensive development work and introduce new courses from the start of the next phase, close coordination and follow-up will be required.

To ensure that the courses meet the individual countries needs, selection and evaluation committees, including technical expertise, should be appointed without delay.

An overall coordinator should be appointed for the interim period. He will also be responsible to undertake/coordinate the feasibility study on course arrangements in other member countries.

#### 6.0 COST ESTIMATE

At this stage it is not possible to give an accurate estimate of costs related to the development of the new courses.

In the course descriptions the man months required for course development and implementation are given.



A rate per man month of USD 12,000.00 is used in the document "Project for Assistance to the Petroleum Training Centre (PTC) for the Interim Period (November 1st 1983 - June 30th 1989).

This rate should cover one return trip Italy-Angola, office support services, living and lodging expenses and work compensation.

The total cost estimate per course is given in Table 1.

Some trips within the SADCC-region will be required for presentation and revision of courses. These are not included.

New equipment will be required for the firefighting course, the course for laboratory technicians and for computer applications. This information will be available as an addendum to the Project Document.

#### 7.0 WORK PLAN

The Work Plan Schedule shown in Table 2 sums up the activities described in the previous chapters.

This Work Plan must be discussed with PTC, TAU and TCC and adjusted if required.

After approval it will form the basis for the further work to follow up the Recommendations from the Training Needs Survey and the endorsement by the Ministers meeting.

#### 8.0 BUDGET

The list of courses in table 1 does not cover all the courses suggested by the National Consultants in their Survey Report. It does, however, include the courses that should serve the majority of needs, and that are compatible with the PTC curriculum.

The final course development plan can only be given after consultation with the other Member States.

In the Interim Period development programme we propose to allocate a number of manmonths for development work, and select the courses in cooperation with TCC, TAU and PTC.

The planning of the further development work will be part of the Interim Period activities, with implementation of the plans during the Second Phase.

The development budget suggested here will be an addition to the Interim period budget for the regular school activities.

The major cost items are related to the services by the contractor to develop the new courses, and the coordination of the development work, and the future development planning by the Norconsult/TAU Training Consultant.

Procurement of equipment for the new courses is not included in the budget, as the equipment will not be required in the Interim Period. The equipment budget will be worked out as part of the Interim Period activities and added to the Project Document for the Second Phase.

Tentative Budget Proposal

	<u>US \$</u>
24 man-months course development	288,000.00
Printing/copying	10,000.00
Travels in SADCC Countries	7,000.00
Services of Norconsult Training Consultant, 6 man-months, including 2 travels Oslo-Luanda and within SADCC	90,000.00
Miscellaneous	5,000.00
	<hr/>
Sum US \$	400,000.00
	<hr/>

WORK PLAN

INTERIM PERIOD - SCHEDULE OF ACTIVITIES

ACTIVITY	1988			1989					
	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
PRESENTATION COURSE PROPOSAL		—							
APPOINTMENT PROJECT DOCUMENT MISSION		—							
FORMULATION PROJECT DOCUMENT			—————						
APPOINTMENT COURSE COMMITTEES				—————					
COURSE SELECTION AND PRIORITIES				—————					
FEASIBILITY STUDY EXTERNAL COURSES					—————				
COURSE DEVELOPMENT					—————	—————	—————	—————	—————
COURSE IMPLEMENTATION SCHEDULE						—————	—————		
SPECIFICATION EQUIPMENT AND MATERIALS					—————	—————			
BUDGET REVISION							—————	—————	
PREPARATION COURSE CATALOGUE							—————	—————	
ANALYSIS AND PLAN - RECRUITM. NAT. TEACHERS					—————	—————	—————		
ESTIMATE OF STUDENT ATTENDANCE							—————	—————	

**APPENDIX 1**

**COURSE TITLE: ADVANCED COURSE FOR MECHANICAL SUPERVISORS**

**CONTENTS:**

The organisation of an industrial plant  
Objectives of the maintenance function  
Main policies for maintenance:  
    On call  
    Preventive  
    Predictive  
Maintenance procedures for main standard equipment  
    Heat exchangers  
    Pressure vessels  
    Pumps  
    Compressors  
    Turbines  
The information system  
    Technical file  
    Sheets and forms  
    The flow of information  
Basic instruments for collection of information  
    Non-destructive tests  
    Visual inspection  
    Vibration analysers for rotating equipment  
Maintenance programming  
Workshop organisation and work planning  
Personnel organisation  
Supervisory skills  
Cost control  
Report writing

**DURATION: Two (2) months**

**LEVEL OF ENTRY:** 12 years of school  
Experience as mechanical foreman:  
    Motor vehicle maintenance  
    Pump maintenance  
    Mechanical maintenance

**OBJECTIVE:** After completion of this course and after an adequate period of on-the-job training, the candidates shall be able to cover the position of mechanical maintenance supervisor.

**TIME FOR PREPARATION:** Six (6) months

**COST ESTIMATE:**

Two man months of instructor time in Sumbe  
One round travel to Sumbe  
Preparation of new manuals for about 600 pages  
Printing of manuals for about 3000 pages.

**COURSE TITLE: ADVANCED COURSE FOR ELECTRICAL SUPERVISOR**

**CONTENTS:**

The organisation of an industrial plant  
Objectives of the maintenance function  
Main policies for maintenance:  
    On call  
    Preventive  
    Predictive  
Maintenance procedures for main standard equipment  
    Transformers  
    Motors  
    Generators  
    Switchgear  
The information system  
    Technical file  
    Sheets and forms  
    The flow of information  
Collection of information on working equipment  
    Visual inspection  
    Vibration analysers  
Maintenance programming  
Workshop organisation  
Work planning  
Supervisory skills  
    Personnel organisation  
    Personnel management  
    Cost control  
    Report writing

**DURATION:** Two (2) months

**LEVEL OF ENTRY:** 12 years of school  
Experience as electrical maintenance foreman

**OBJECTIVE:** After completion of this course and after an adequate period of on-the-job training, the candidates shall be able to cover the position of electrical maintenance supervisor.

**TIME FOR PREPARATION:** Six (6) months

**COST ESTIMATE:**

Two man months of instructor time in Sumbe  
One round travel to Sumbe  
Preparation of new manuals for about 600 pages  
Printing of manuals for about 2000 pages.

**COURSE TITLE: ADVANCED COURSE FOR INSTRUMENT TECHNICIANS**

**CONTENTS:**

Description of selected industrial processes in the oil field  
Reading of process and instrumentation diagrams (P & I)  
Theory of automatic control of process variables  
Pneumatic control systems  
Analogue systems  
    Basic components  
    Electronic cards  
    Integrated components  
    Calibration  
    Trouble-shooting and maintenance  
Analogue control systems  
    Basic components  
    Transducers  
    Typical loops  
    Calibration  
    Trouble-shooting  
Digital electronics  
    Basic components  
    Micro-processors  
    Programming of micro-processors  
Digital control systems  
    Basic components  
    Advanced digital control systems.

**DURATION: Six (6) months**

**LEVEL OF ENTRY: Polytechnic diploma in electronics**

**OBJECTIVE: After completion of this course and six months on-the-job training, the candidates shall be able to cover the position of electronic instrumentation maintenance technician.**

**TIME FOR PREPARATION: Five (5) months**

**COST ESTIMATE:**

Six months of instructor time in Sumbe  
Two weeks of instructor time in Sumbe to get acquainted with PTC equipment  
One round travel to Sumbe  
Printing of manuals for about 3000 pages  
Design of new manuals for about 1000 pages.

**COURSE TITLE: ADVANCED COURSE FOR MAINTENANCE ELECTRICIAN**

**CONTENTS:**

Review of Mathematics  
Review of Electricity  
Technical drawing; symbols and diagrams  
Electrical measurements, low voltage  
Electrical measurements, high voltage  
Electrical machines:  
    Transformers  
    Motors, AC and DC  
    Generators  
Electrical installations:  
    Lighting systems  
    Power transmission  
    Sub-stations  
Switchgear  
Trouble-shooting and maintenance  
    Electrical machines  
    Electrical installations

**DURATION:** Four (4) months

**LEVEL OF ENTRY:** 12 years school  
Five years experience in electrical work

**OBJECTIVE:** After completion of this course and a period of relevant on-the-job training, the maintenance electrician will be able to cover the position of electrical maintenance foreman.

**TIME FOR PREPARATION:** Three (3) months

**COST ESTIMATE:**

Four (4) man months of instructor time in SADCC  
One round travel to SADCC country  
Printing of manuals for about 3000 pages  
Travel of one expert to SADCC country to organise course.



**COURSE TITLE: COURSE FOR FIREFIGHTERS**

**CONTENTS:**

- Theory of combustion and fires**
- Fire extinguishing agents**
- Fire extinguishing equipment**
  - Selection**
  - Use**
  - Maintenance**
- Foams and foam-throwing equipment**
- Light water**
- Automobile firefighting equipment**
- Personal protection equipment**
  - Fire resistant overalls**
  - Anti-acid overalls**
  - Autonomous breathing systems**
    - Closed circuit**
    - Open circuit**
  - Gas masks**
  - Smoke throwers**
- Procedures for firefighting interventions**
  - Liquid hydrocarbons**
    - LPG**
    - Transformer oil**
  - Fire in closed ambient**
  - Fire in electrical ambient**
- Organisation of interventions**
  - Alarm system**
  - Personnel mobilisation**
  - Intervention plans**
- Instrumentation for control of hazardous atmosphere**
  - Explosimeters**
  - Oxygen meters**
  - Dräger bulbs**
- First aid**
  - Emergency treatment of open wound**
  - Emergency treatment of broken bones**
  - Treatment for asphyxia**
  - Treatment of heart collapse: mouth-to-mouth breathing**
  - Emergency transportation**
- Practical exercises**
  - Killing of fires with fire extinguishers**
  - Killing of big fires with water curtain protection**
  - Use of foam throwers**
  - Use of automobile equipment**
  - Firefighting in narrow space smoke chamber**
  - Use of atmosphere control instruments**
  - Preparation of intervention plans**
  - First aid simulations on human plastic model**
  - Maintenance of extinguishers**
  - Maintenance of personal protection equipment**

**DURATION: Two (2) months**

(Firefighters)

**LEVEL OF ENTRY:**      Eight (8) years of school  
                                 Experience of work in industrial plant

**OBJECTIVE:**      After completion of this course and after three months of on-the-job training, the candidates shall be able to cover the position of firefighter in an industrial plant, oil well or platform.

**TIME FOR PREPARATION:**      Six (6) months

**COST ESTIMATE:**

**Procurement of additional equipment:**

        Various size powder extinguishers

        Various size foam extinguishers

        Foam thrower

        Auto breathing equipment

        Smoke chamber

**Procurement of consumables**

        Foam agent

        Powder

    Two months of instructor time in Sumbe

    One round travel to Sumbe

    Printing of book for about 1000 pages.

COURSE TITLE: COURSE FOR FIREFIGHTING SUPERVISOR

CONTENTS:

Organisation of industrial plants  
Objectives of the firefighting dept.  
Organisation of the firefighting personnel  
Organisation of plant personnel for emergencies  
Programmes for maintenance of firefighting equipment  
Inspection and classification of hazardous areas  
Issue of safety authorisations  
    Open flame works  
    Work in closed areas  
    Others  
Preparation of intervention plans  
Inspection of fixed and mobile equipment  
Management of materials  
Department cost control

DURATION: One (1) months

LEVEL OF ENTRY: 12 years of school  
Experience as firefighter

OBJECTIVE: After completion of this course and six months of on-the-job training, the candidates shall be able to cover the position of firefighting supervisor.

TIME FOR PREPARATION: Three (3) months

COST ESTIMATE:

One month of instructor time in Sumbe  
One round trip to Sumbe  
Printing of books for about 1000 pages.

**COURSE TITLE: LABORATORY TECHNICIANS FOR PETROCHEMICALS AND AVIATION PRODUCTS**

**CONTENTS:**

Description of main processes and products in oil refining and petrochemistry

Product specifications

Selected standard analysis and tests for inorganic petrochemicals products:

Ammonia

Urea

Fertilisers

Waste water

Raw materials

Selected standard tests for oil derivatives

Density

Colour

Viscosity

Vapor pressure

Distillation

Cloud point

Smoke point

Ignition point, etc.

Description, calibration and use of analytical instrumentation:

Conductometers

Coulombmeters

Potentiometers

Spectrophotometers (visible, ir, uv)

Gas chromatographs

**DURATION:** Five (5) months

**LEVEL OF ENTRY:**

A level in chemistry with proficiency in basic and instrumental analytical chemistry.

**OBJECTIVE:** After completion of this course and a six-month period of on-the-job training, the candidates shall be able to cover the position of laboratory technician in an oil refinery a petrochemical plant or fuels depot.

**TIME FOR PREPARATION:** One (1) year (for purchase of equipment)

**COST ESTIMATE:**

- Purchase of analytical instrumentation mentioned in the contents section
- Five months of instructor time in SADCC country
- One round travel for instructor
- Printing of manuals for about 2000 pages.

**COURSE TITLE: DEPOT MANAGEMENT**

**CONTENTS:**

- Description of main processes in oil refining
- Products specification
- Description of the installations of an oil depot
- Organisation of an oil depot
- Procurement of petroleum products
- Tanker chartering
- Supply operations
- Management of stocks
- Economics of products transportation
- Marketing of oil products
- Dispatching
- Optimisation of resources
- Local petroleum regulations
- Cost accounting
- Bills accounting
- Cost control
- Use of a personal computer for administration activities
- Safety
  - Fire prevention
  - Firefighting organisation
  - Local safety regulations

**DURATION:** Two (2) months

**LEVEL OF ENTRY:** 12 years of school and multi-year experience in supervisory activities.

**OBJECTIVE:** After completion of this course and six months of on-the-job training, the candidates shall be able to cover the position of depot manager.

**TIME FOR PREPARATION:** Six (6) months

**COST ESTIMATE:**

- Two months of instructor time in SADCC country.
- One round travel to same country.
- Design of new manuals for about 500 pages.
- Printing of manuals for about 1000 pages.
- One personal computer with printer and electronic sheet programme.

COURSE TITLE: COMPUTER APPLICATIONS

CONTENTS:

- Classification of computers
  - Main frame
  - Mini
  - Micro
  - Pocket calculator
- Architecture of computers
  - Memories
  - ALU
  - BUS
- Components of a computing system
  - Computer
  - Memories
  - Printer
  - Plotter
  - Others
- Use of programmes on a personal computer
  - Word processor
  - Electronic sheet
  - Computer graphics
- Practical application of above programmes

DURATION: One (1) month

LEVEL OF ENTRY: 12 years of school

OBJECTIVE: At the end of this course, the candidates shall be capable of applying the PC programmes to their relevant fields of specialisation for:

- Filing of information
- Retrieving of information
- Report writing
- Performance of technical calculation
- Preparation of charts and diagrams

TIME FOR PREPARATION: Three (3) months

COST ESTIMATE:

- One PC (IBM compatible) for each candidate
- One month of instructor time in Sumbe
- One round travel to Sumbe
- Transportation of PC's
- Three programme packages as indicated above.

**COURSE TITLE: TRAINING OF TRAINERS**

**CONTENTS:**

- Definition(s) of training
- Scope of training
  - For newcomers (recently hired people)
  - Consolidation of existing knowledge
  - Upgrading of personnel
  - Updating of personnel
- Levels of training
  - Operators
  - Technicians
  - Supervisors
  - Managers
- Forms of training
  - Theoretical seminars
  - Classroom sessions
  - Practical on-the-job
  - Off-the-job (simulators)
- Evaluation of training needs
  - Analysis of organograms
  - Development programmes
  - Career development systems
  - Job performance analysis
- Training objectives
  - Identification
  - Definition
- Evaluation of training contents
  - Job analysis
- Training software
  - Manuals
  - Guides
  - Hand-outs
  - Audiovisuals
  - Training cards
- Design of training manuals
- Preparation of transparencies
- Procurement of other audiovisual aids
- Physical structures for training implementation
  - Classroom
  - Laboratories
  - Workshops
  - Simulators (Plants & equipment)
- Plan of the lesson
- Implementation of the lesson
  - Rules for maximum efficiency of oral illustration
  - Use of audiovisuals
  - Practical exercises
  - Tests for the control of retention
  - Tests for evaluation of performance of trainees
- Evaluation of trainees
  - Verbal tests
  - Written tests
  - Practical tests

(Training of trainers)

Criteria for evaluation  
Global evaluation of trainees

DURATION: Two (2) months

LEVEL OF ENTRY: 12 years of school with good proficiency

OBJECTIVE: At the end of the course, the candidates can be assigned to training assignments in their own specialisation.

TIME FOR PREPARATION: Three (3) months

COST ESTIMATE:

Two months of instructor time in Sumbe or other SADCC location  
One round travel to same location  
Printing of books for about 1000 pages.



**COURSE TITLE: MAINTENANCE MANAGEMENT**

**CONTENTS:**

- The organisation of functions in an industrial plant
- The maintenance function
  - Objectives
  - Resources
  - Organisation
- Maintenance policies
  - Preventive
  - Predictive
  - On call
  - Unpredictable
- Maintenance procedures
- Collection of technical documentation
  - Technical file
  - Technical office organisation
- The information system
  - Sheets and forms
  - The flow of information
- The specific work areas
  - Layout
  - Equipment
  - Work force
  - Organisation; work planning; times & methods
- The management of spare parts & materials
- The programming and planning of maintenance
- Cost control
  - Cost accounting
  - Cost analysis
  - Evaluation of standard costs
  - Budgeting
- Latest developments in maintenance organisation, manuals
- Integrated organisation management systems
- Computer-based organisation management systems
- Computer-based expert systems

**DURATION: Six (6) weeks**

**LEVEL OF ENTRY:**

- Workshop managers
- Mechanical, electrical, instrument maintenance managers

**OBJECTIVE:** To update maintenance managers and superintendents in maintenance organisation and management systems.

**TIME FOR PREPARATION: Four (4) months**

**COST ESTIMATE:**

- Six weeks of instructor time in SADCC location
- One round travel
- Design of new manuals for about 500 pages
- Printing of manuals for about 1000 pages.

COURSE TITLE:           PETROLEUM MICRO-ECONOMICS

CONTENTS:

Description of oil industrial activities, and their main products  
    Prospecting  
    Drilling  
    Production  
    Transportation  
    Refining  
    Retailing of Oil Derivatives  
    Petrochemistry  
Organisation of Personnel in Oil Industrial Activities  
    The Administration Function  
    The Finance Function  
Principles of Cost Accounting  
    General Cost Accounting  
    Industrial Cost Accounting  
    Analysis of Balances  
    Product Costing  
    Profitability Analysis  
Management of Stocks  
Economics of Oil Products Transportation  
Products Marketing  
Petroleum Regulations  
The Cost Control Function in Industrial Plants  
The External Auditing Function  
The Internal Auditing Function

DURATION: Two (2) months

LEVEL OF ENTRY:       General certificate in cost accounting.

OBJECTIVE:           At the end of this orientation seminar and relevant on-the-job training, the successful candidate shall be qualified for an administrative or cost accounting position.

TIME FOR PREPARATION:   Six (6) months

COST ESTIMATE:

Two months of instructor time in a SADCC country.  
One round travel to training location.  
Design of new manuals for about 500 pages.  
Printing of manuals for about 1000 pages.