

CLASSIFICATION  
**PROJECT EVALUATION SUMMARY (PES) – PART I**

Report Symbol U-447

<b>1. PROJECT TITLE</b> WATER RESOURCES & SOILS ANALYSIS	<b>2. PROJECT NUMBER</b> 603-0001	<b>3. MISSION/AID/W OFFICE</b> DJIBOUTI
<b>4. EVALUATION NUMBER</b> (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>603-82-02</u> <input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION		
<b>5. KEY PROJECT IMPLEMENTATION DATES</b> A. First PRO-AG or Equivalent FY <u>79</u> B. Final Obligation Expected FY <u>81</u> C. Final Input Delivery FY <u>83</u>	<b>6. ESTIMATED PROJECT FUNDING</b> A. Total \$ <u>542,000</u> B. U.S. \$ <u>542,000</u>	<b>7. PERIOD COVERED BY EVALUATION</b> From (month/yr.) <u>7/80</u> To (month/yr.) <u>11/81</u> Date of Evaluation Review <u>11/25/81</u>

**8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR**

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIC, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
<ul style="list-style-type: none"> <li>• To issue decree establishing Water and Soils Laboratory as independent entity with adequate operating budget within the Ministry of Agriculture.</li> <li>• To verify that all laboratory equipment is operational</li> <li>• To revise work plan in accordance with evaluation recommendations.</li> <li>• To initiate laboratory start-up operations no later than February 1982.</li> <li>• TDY USDA Soil Scientist for overlap with RDA and in preparation for continuing USDA intervention/support</li> </ul>	GROD  Contractor  Contractor/ US AID Contractor  USAID/AID/W USDA	1 Jan '82  Jan '82  Jan '82 Feb '82  Aug/Sept. '82

<b>9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS</b> <input type="checkbox"/> Project Paper <input type="checkbox"/> Implementation Plan e.g., CPI Network <input checked="" type="checkbox"/> Other (Specify) <u>Modify Contractor's Work Plan</u> <input type="checkbox"/> Financial Plan <input type="checkbox"/> PIO/T <input type="checkbox"/> Logical Framework <input type="checkbox"/> PIO/C <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> Project Agreement <input type="checkbox"/> PIO/P	<b>10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT</b> A. <input checked="" type="checkbox"/> Continue Project Without Change B. <input type="checkbox"/> Change Project Design and/or <input type="checkbox"/> Change Implementation Plan C. <input type="checkbox"/> Discontinue Project
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<b>11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)</b>  Mr Allen Hidlebaugh, SMS/USDA 	<b>12. Mission/AID/W Office Director Approval</b> Signature Typed Name <u>E.M. Amundson, AAC/DJI</u> Date <u>11/25/81</u>
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USDA TDY SOIL SCIENTIST REPORT OUTLINE

- I. Summary
- II. Evaluation Methodology
- III. External Factors
- IV. Project Inputs
- V. Project Outputs
- VI. Project Purpose
- VII. Project Goals
- VIII. Beneficiaries
- IX. Exhibits

## SUMMARY

While many parts of the overall goal are being met and surpassed, the start-up of the laboratory is behind schedule. To assure a fully functional laboratory prior to Dr Goebel's departure (Aug. '82) some change in scheduling and emphasis are needed.

Dr Goebel and Resources Development Associates are to be commended for the excellent training provided to the Djiboutian staff to-date and for the excellent working relations developed with various GRCD Ministeries, donor agencies and groups.

Portions of the overall project objectives achieved to date include the following:

1. Project start-up - completed comprehensive inventory of material received, development of plans for laboratory operations, supervision of construction/equipping of Laboratory. Ordering any needed supplemental laboratory materials, including required satellite imagery.
2. Establish a library as evidenced by compilation of book lists, acquisition of key soils texts.
3. Submission of adequate and timely annual plans, quarterly reports, and budget.
4. Conducted preliminary study of the morphology and classification of the soils of Djibouti as evidenced by field reconnaissance, training in writing soil descriptions and describing and sampling 45 soils.
5. Undertaken basic cartography- as evidenced by drawing the slope, watershed, and soil climate maps; drawing base map for random sample selection of Djibouti; drawing preliminary soils map of Djibouti; drawing 1:250,000 scale soil map of Djibouti; and 1:100,000 scale soil map of Southern Djibouti.
6. Conducted remote sensing training - as evidenced by aerial photo and satellite imagery interpretation; plus FAO Remote Sensing two week course in Rome completed by Aboubaker Douale Waiss.
7. Laboratory operations ad evidenced by preliminary training in water quality analyses.
8. Data analysis conducted via map measurements.

The tasks remaining and planned schedule to achieve the overall goals by 31 July 1982 (i.e. one month prior to project termination) consist of the following:

Dec	Vegetation identification training.
Dec-Feb	Optimally describe and sample 50 sites (Northern Djibouti). Minimal requirement 25 sites to serve as adequate base for final report.
Feb-Mar	Semi-detailed soil map training.
Mar	Soil use interpretation training.
Mar	Draw semi-detailed soil maps (1:25,000) of priority areas.
Mar-Apr	Training in soil testing.
May	Map measurement.
May	Establish and test lab. reporting modalities.
June	Conduct training in procedures for soil and water sample collection and means of distributing laboratory test results.
June-July	Soil and water sample analyses.
July	Summary, review, prepare final report.

Other tasks not presently scheduled in the contractor's work plan but which must be included are:

- Laboratory equipment set-up
  - (a) verifying equipment functional;
  - (b) effecting lab. operations not later than Feb. '82.
- Training in detailed soil mapping (1:5,000 scale) in priority areas (two sites should suffice).
- Deliver 2 professional papers (Cairo Symposium on Remote Sensing).

The last task was not planned for in the scope of work but was encouraged by the RDA as a means for publicizing GROD soils activities at the international level.

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The principal tasks remaining can be achieved, but some change in direction and emphasis is required. The evaluation recommends the following:

1. Concentrate virtually all field activities into the December thru mid-February time period to take advantage of the cooler temperature.
2. As soon as the generator arrives, install air conditioners and check out all analytical equipment in the laboratory to make sure it is functional. Target date is January, with any defective parts to be requested thru RDA representative to hand-carry to Djibouti when he comes in February.
3. Initiate test operation of all laboratory equipment the third week of February with one or both of the Djiboutian staff members to be in the laboratory receiving training and undertaking continuing soil and water analysis for the remainder of Dr Goebel's stay. This will assure efficient operation of the laboratory by the time of Dr Goebel's departure.
4. Any field soil survey tasks that are not accomplished by mid-February are to be delayed until next winter's cool season. The TDY USDA Soil Scientist tentatively scheduled to visit Djibouti during January 1983 could provide any needed technical support to the soil survey.
5. It is understood that there will be need for some field work after mid-February to respond to other donor needs and for special CROD requests, but time devoted to these activities must be minimized in order to assure the achievement of a fully functioning laboratory.

Virtually all components of the PIO/T scope of work for the Water and Soils Laboratory project will have been achieved by the time the contractor delivers the expanded version of the final report (Jan. '83). The few remaining soil survey tasks can be accomplished by the Djiboutian staff with any needed technical backup to come from TDY USDA soil scientist. Backup is envisioned for periods of two weeks every four months thru January 1985.

## EVALUATION METHODOLOGY

USDA TDY Soil Scientist Allen Hidlebaugh conducted the mid-term evaluation of the Water and Soils Laboratory Project. The evaluation addresses the performance of the contractor (Resources Development Associates) against the "Statement of Work" provided in the PIO/T. The PIO/T is used rather than the project paper because of the intervention of the West Germans in the water part of the project. The PIO/T delineates the up-to-date objectives and contractor's tasks.

The scope of the evaluation included review of all requirements stated in the PIO/T and comparison of these with documents submitted by the contractor's representative, Dr Joseph Goebel, to-date. Manuscript (unpublished) soil maps, slope maps, watershed maps, soil climate maps and associated legends and descriptions were reviewed.

Three days were spent in the countryside looking at present garden sites and areas with potential for agricultural development that have been identified to-date. Various facets of the different types of soil surveys being used by Dr Goebel and the Djiboutian staff were examined during these field trips. These included examination of maps, soil descriptions, classification of taxonomic units, discussions of geology, composition of mapping units, etc.

A limited time was spent in examining the equipment and supplies in the water and soils lab. The pH and conductivity meters were the only instruments operational to-date. The remaining equipment will become operational in the near future.

Time was spent in discussing all aspects of the project with Dr Goebel and the Djiboutian staff members. A point was made of having discussions with Aboubaker Douale Waiss and Farah Omar without Dr Goebel to give them the opportunity to fully express their personal views.

The evaluator observed Aboubaker Douale Waiss and Farah Omar describing, sampling and classifying soil profile and describing soil mapping unit, with inclusions, identifying vegetation and estimating extent of vegetation and surface cover of stones.

The evaluation is based on all of the observations and documentation available during the evaluation period in Djibouti. (See attached exhibit.)

## EXTERNAL FACTORS

The PIO/T for the Water and Soils Project projected the equipping of the laboratory and the on-the-job training to lab. assistants to be initiated during the first six months of contractor's designated soil scientist's time in Djibouti. The laboratory is not operational after an elapsed time of sixteen months. External factors contributing to this delay follow:

Major construction is complete. Air conditioners installed earlier would not operate correctly because of electric cycle problems. One machine burned out. New air conditioners have been purchased and will be installed as soon as the generator now on order arrives. This generator will solve any problems related to electric cycles and conversion of 230 volt to 110 volt. Other lab. equipment will be dependent on the functioning of this generator. The original commodity order requested 220/50 or 110 with transformer. The latter of course does not effect cycle changes - hence the problem and delays in getting equipment operational.

There have been some routine administrative problems within Genie Rural. These problems have proved irritating but have not jeopardized achievement of the project's objectives.

Delays in shipment of U.S. manufactured laboratory supplies, particularly chemicals, is a serious problem. Shipments of field soil survey equipment have also been subject to similar delays.

Although the GROD has fielded qualified staff critical to this project per se in an extremely timely and adequate manner, delay in getting the Djiboutian staff called for in the PIO/T have also contributed to some delay in the project. Ideally the following additional staff should have been acquired in the first year of the project and to date are not yet present : hydrogeologist, water chemist, hydrologist and a clerk for the library. Admittedly, since the original project scope (Project Paper) was reduced to allow for intervention of West German technical assistance in water resource inventory, these personnel are not directly critical to meeting the immediate objectives of this project, but, if not obtained could adversely effect the overall institution building goals of the U.S. Government Soils and West German hydrological efforts.

The PIO/T requires that soils investigation and mapping be accomplished on several scales. Some substitution of scales was required to match existing base maps. There had been delays in obtaining copies of existing base maps.

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The participants during the evaluation besides Mr Hidlebaugh were Dr Goebel, Resources Development Associates, and Mr Amundson, AID Affairs Officer.

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PROJECT INPUTS

USAID has provided funds to the Water and Soils Laboratory Project totalling \$542,000. These funds have been sufficient to provide for one resident U.S. personnel for 24 person months and to provide for commodities and other costs incidental to project.

The Government of the Republic of Djibouti's contribution to the project has been substantial. GROD has provided facilities for the laboratory consisting of 4 rooms totalling 150 m<sup>2</sup>. This provides an office, a chemical laboratory, an analytical equipment room and a cartographic room for the soil survey. In addition, space has been provided for soil sample preparation, storage and disposal. GROD is also providing water, electricity, telephones, maintenance for the building and facilities, and six parking spaces for laboratory use. GROD has provided the following personnel to-date:

A qualified degree trained pedologist for soils inventory and survey. He is also charged with general supervision of the laboratory to include analyses and planning.

A laboratory technician to conduct the soil and water analyses and maintain laboratory facilities.

USAID inputs have consisted primarily of provision of essential commodities, i.e. laboratory equipment and supplies, chemicals, vehicles and support to the contractor in form of housing and general support. Technical support in the form of one full time resident soil scientist was furnished via a direct cost reimbursement contract to Resources Development Associates. One full-time resident soil scientist was provided without TDY back-up from a remote sensing expert and other to be identified experts, because AID contracting officer concurred in Resource Development Associates (Contractor) contention that Dr Goebel had the necessary background to cover these needs as well as his principal role as soil scientist. The evaluator concurs in this decision provided Dr Goebel's expertise continues to be confined solely to soils, remote sensing and general laboratory operations as presently conceived.

In regard to inputs, in summary AID funding has been adequate and timely. Regarding delays encountered these are attributable to the nature of U.S. source commodity procurement. Similarly the Water and Soils Laboratory use of funds based on a review of their records shows prompt and proper use of funds provided. A budget summary follows:

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BUDGET SUMMARY

WATER RESOURCES & SOILS ANALYSIS PROJECT 603-0001

	<u>Obligated</u>	<u>Disbursed</u>	<u>Pipeline</u>	<u>Total</u>
<u>Tech Services</u>				
P.C. (Issen)	1,603	1,603	-	1,603
PIO/T 90002 (RDA)	334,000	174,000	160,000	334,000
	(335,603)	175,603	(160,000)	(335,603)
 <u>Commodities</u>				
PIO/C 900013 (Land-Rover)	16,000	16,000	-	16,000
PIO/C 90005 (Lab. Equipment)	62,000	62,000	-	62,000
PIO/C 9006 (Daihatsu)	8,000	8,000	-	8,000
PIO/C 90007 (A/C's)	3,000	3,000	-	3,000
PIO/C 90013 (Chemicals Franklin)	25,000	14,000	11,000*	25,000
	(114,000)	(103,000)	( 11,000)	(114,000)
 <u>Other Costs</u>				
PIL-0005 (House Renovations)	2,132	2,835	- 702	702
PIL-0014 (Housing Rental)	35,000	33,000	2,000	35,000
PIL-0006 (Housing Maintenance)	18,219	18,219	- 600	18,219
PIL-0020 (Recon. Flight)	527	527	-	527
PIL-0022 (Maps 1:100,000)	3,600	2,881	719	719
PIL-0024 (Housing, rental Maintenance)	17,000	-	17,000	17,000
	( 76,478)	( 58,062)	( 18,417)	( 76,478)
 <u>Total</u>	 526,081	 336,665	 189,416	 526,081
 <u>Contingency</u>			 16,000	 542,000

\* Approximately 7,000 will be expended;  
Balance 4,000 returned to contingency.

## PROJECT OUTPUTS

The project contractor was expected to provide an annual plan of operation and quarterly progress reports. Two annual plans of operation and quarterly progress reports were available for review. A status report prepared as of January 1981 for the Minister of Agriculture was also available. Manuscript (unpublished) maps, legends and descriptions were available for examination.

Based on the above, the USDA TDY Soil Scientist (evaluator) measured progress as the tendency towards achieving the end-of-project targets as stated in the FIO/T. The findings were as follows:

1. Establishing and operating a water and soils laboratory.

- (a) Facilities

The facilities are adequate. Construction delays and lack of dependable electric power at 230 and 110 volts have delayed project, but presently do not pose any severe limitation in view of RDA procured and soon to be delivered generator. The main problem has been one of cycles. Much of the equipment is functional at 60 Hz only. Transformers provided are not useable. Hence the need for a generator to supply correct, uniform voltage, cyclage.

The laboratory layout has proceeded smoothly for the most part except for a misunderstanding about the electrical outlets in the center of the main laboratory table. Although the work stand is not aesthetic it is functional.

Nearly all of the laboratory equipment ordered is in place. Most of it has not been set up or properly tested. A mini-computer is scheduled to arrive in January. This instrument should certainly assist an understaffed lab., admittedly now quite sophisticated, to properly manage its data input/output.

- (b) Supplies

Ordering of chemicals and other supplies, after contractor's arrival, from U.S. sources, rather than from France, has probably delayed start-up operations of particularly critical testing in the lab. U.S. sources were opted for at contractor's request to insure uniformity, quality of chemicals

and hence that of eventual analysis. Only time will tell if this was a sound decision.

(c) Operation of Lab.

The PIO/T called for having the lab. operational within six months of contractor's arrival. Sixteen months after the contractor's arrival the lab. is not operational. Most everything is in place but additional time will be required to have everything properly functioning.

This is one area where the contractor must concentrate his immediate efforts in the time remaining even if it means delays and reduction in certain aspects of overall soil survey of Djibouti.

2. Soil Survey of Djibouti.

(a) Detailed Mapping (1:10,000)

Very limited progress in mapping present and prospective garden sites to date. Albeit number of sites per PIO/T should be reduced by half while simultaneously tasking contractor to enlarge scale to 1:5,000 to provide needed detail.

(b) Medium Scale (1:50,000)

Very limited work has been accomplished in this segment of the work plan. Some training has been provided to Djiboutian staff, and two areas with possible prospects for gardens were mapped at a scale of 1:25,000 for the United Nations High Commission. These areas are Chekkeyti and Sabbalou. With remaining time emphasis should be devoted to field soil survey at this scale, 1:25,000 only.

(c) Small Scale (1:200,000)

Availability of basemaps at 1:200,000 was a problem. Contractor chose in place of the 1:200,000 to utilize available base of 1:250,000 and procure 1:100,000 scale maps. (The latter having been acquired with project funds, the former donated by GRCO.) With these bases an exploratory soil survey of the Nation has been developed at a scale of 1:250,000. The base is from LANDSAT imagery. The Contractor has completed 1:100,000 scale soil maps (reconnaissance) for southern Djibouti and has also prepared supplemental maps .. slope, watershed, soil climate.

The above mapping activity (scale 1:200,000) was listed as third in priority of the soil surveys in the PIO/T. However, the greatest progress has been made on this activity. There is some justification for this in that exploratory and reconnaissance soil surveys are very valuable in determining where areas with agricultural potential exist and thus where the medium scale and detailed mapping should be concentrated.

The random sample approach used for constructing both of these maps is a sound one and is providing a great deal of information on the soils of Djibouti. The soils being described from the 100 random sites will represent the majority of the soils in Djibouti and the descriptions and soil samples will provide the basis for establishing soil series for use in the soil survey of Djibouti.

Soil descriptions and other data being collected is of sufficient detail to permit classification of taxonomic units into the USDA Soil Taxonomy. Djiboutian staff have already evidence of sufficient training to properly classify the soils of Djibouti.

#### (d) Soil Survey Reports

Training in soil survey report writing and in making interpretations of soils for various uses is scheduled for next spring.

Soil maps will be printed or otherwise reproduced in black and white. However it is recommended that 2 or 3 copies be hand colored (preferably by an artist) for use by the Minister of Agriculture. Given observed skills of Lab. technician Farah, it is suggested that he personally transfer the final map to several color enhancements at a later date - time permitting.

### 3. Library

Progress in establishing library containing pertinent reference books and documents has been made. Reference books are in process of being ordered. The projected clerk will be responsible for the library.

Most of the materials in the library will be in French, but some books and papers in English will also be available.

4. System for water and soils data collection.

A system has been established for identification of samples and for the orderly progression (i.e. routing samples) thru the laboratory. The system has as one of its key components identification of the location from which the sample was taken.

Training is being provided in developing standard forms for reporting lab. data and for standard lab. reports.

5. System for data dissemination to farmers and other users.

Although a general presentation re possible modalities for user service has been made to the Minister of Agriculture as of this date no definitive plan has been established. Training will need to be provided to the Extension Service if they are going to be responsible for this task.

A part of this segment is of course the series of soil survey reports and laboratory reports to be prepared in the next few years.

## PROJECT PURPOSE

The overall purpose of the Water and Soils Laboratory project is to institutionalize within the MOA Rural Engineering Service the capacity to (1) analyse ground and surface water quality as well as to compile, catalogue and disseminate hydrological information, and (2) classify soils, prepare soils maps and provide evaluation concerning the proper utilization of soils.

In practical terms, farmers can be advised on soil treatments to obtain sustainable yields. Achievement of this project purpose should impact on the sector goal of developing an information base for use by the GROD in national agricultural planning, and its dissemination to farmers through the agricultural extension service.

By the end of the project, the laboratory staff of the Rural Engineering Service :

- possess equipment and technical expertise to independently analyse all water and soils types in Djibouti;
- have necessary data upon which to base recommendations for water/soil use for crop production and provide guidance for subsequent soils/water resource analyses in the field;
- have undertaken a soil inventory and developed a land classifications system in selected priority areas.

In the evaluator's estimation, given observed progress the purpose will be achieved provided certain adjustments, change of emphases, are made in the immediate future.

It is the reviewer's opinion that a more viable progress towards institutionalization can be achieved if the laboratory is established as an independent entity possessing its own budget within the Ministry of Agriculture. Its continued functioning as a branch of a de facto implementing service (Genie Rurale) would in the long-run jeopardize its ability to provide objective analyses.

The contractor and USAID, have brought this to the Government's attention, and as of this submission, the Government is formally entertaining the proposal to establish by decree the Water and Soils Laboratory under the MOA effective 1 January 1982.

This administrative action if forthcoming, will probably have as much or more bearing on the achievement of the project purpose and goal than any other single factor.

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### PROJECT GOALS

Although not specifically addressed in any documentation, the project goal (as far as Djibouti is concerned) is to expand agricultural production (irrigated gardens) to the level that the country can make significant progress in realizing import substitution, primarily in vegetables and fruits.

This goal probably can not be achieved in its entirety in the near future.

At issue here is the economics of developing an agricultural base in Djibouti. This project will serve to provide a data base for decision makers. However, in the ultimate analysis it is not soils, nor necessarily even water that will prove the limiting factor but rather the investment costs versus the returns.

## BENEFICIARIES

The immediate target group is a Djiboutian infrastructure capable of addressing the needs of present and future Djiboutian farmers. While this project will not have a direct impact in and of itself, it will, coupled with other donor furnished data gathering (water), hopefully provide a solid base upon which the Government of the Republic of Djibouti can make rational and positive decisions regarding diversification into the agricultural sector and more importantly have maximum impact per dollar invested.

EXHIBITS

The exhibits enclosed are as follows:

1. Outline for Contractor's final report, summary version.
2. Discussion of Contractor's final report, expanded version.
3. Scenario for winding up U.S. involvement in the Djibouti Water and Soils Laboratory Project.
4. Training requirements.
5. Bibliography.

OUTLINE FOR CONTRACTOR'S FINAL REPORT -

SUMMARY VERSION DUE DATE - JULY 31, 1982

TO CONSIST OF ABOUT 50 PAGES PLUS EXHIBITS

- I. Executive summary of project to-date - about 5 pages (this is to be a section highlighting the important findings of the project. Intended for use by top staff in Djiboutian Government and by top staff in USAID and State Department).
  
- II. Background Statement - about 1 page (this section will present information on how the Water and Soils Laboratory Project came into being).
  
- III. Introduction - 2-3 pages (details of contractor's arrival, initial staffing by Djiboutian Government, planned duration of project, etc.).
  
- IV. Discussion - about 40 pages plus exhibits.
  - A. Plan of Study - about 5 pages  
(Discuss what was expected and how contractor has addressed the project).
  
  - B. Water and Soils Laboratory - about 15 pages plus sample data sheets and other exhibits.
    1. Setting-up the laboratory
      - a. facilities
      - b. equipment
  
    2. Operation of the laboratory
      - a. sample collection
      - b. sample preparation
      - c. water analyses - include example of data sheets with explanations
      - d. soil analyses - include example of data sheets, with explanations
      - e. examples of soil and water interpretations provided to farmers and others.

C. Soil Survey of Djibouti - about 15 pages, plus exhibits

1. Approach used by contractor

2. Types of soil surveys

- a. exploratory ... 1:250,000 scale
- b. reconnaissance ... 1:100,000 scale
- c. semi-detailed ... 1:25,000 scale
- d. detailed ... 1:10,000 or less scale

3. Supplementary maps

- a. slope
- b. watershed
- c. soil climate

4. Soil interpretations

(Examples of interpretations provided to farmers or others along with soil survey maps and descriptions of mapping units.)

V. Training needs .. about 1 page

A. Short term training for Djiboutian staff (one to six months duration).

B. Other.

VI. Continuation of Assistance to Water and Soils Laboratory

A. Duration and type of assistance required.

1. Technical assistance
2. Equipment and supplies
3. Other assistance.

VII. Other comments and recommendations by contractor.

VIII. References.

IX. Exhibits.

CONTRACTOR'S FINAL REPORT - EXPANDED VERSION

This report is due 1 January 1983 and is to consist of about 150 pages plus exhibits.

The outline for this version of the final report would be very similar to the outline for the "summary version". The principal difference would be the expanded treatment of two of the major sections - "Waterand Soils Laboratory" and "Soil Survey of Djibouti". These sections need to discuss transfer of information to farmers and others via the Extension Service or other means. Recommendation should be made relative to staffing needs for the laboratory and soil survey portions for the next five years. A plan of work for the next year would be included.

Supporting documents (exhibits) to be included with the report include any completed laboratory reports; listing of books and documents in library; various scale soil surveys with legends, soil mapping unit description, interpretations, and classification of taxonomic units; supplementary maps, including slope, watershed, soil climate, with legends and descriptions of mapping units.

SCENARIO FOR WINDING UP U.S. INVOLVEMENT IN THE  
DJIBOUTI WATER AND SOIL LABORATORY PROJECT

July 1982 -

Prepare and submit final report - Summary Version. This version of the final report is due July 31, 1982. It consists of about 50 pages excluding the exhibits. Dr Goebel and Aboubaker Douale Waiss are to jointly prepare this report.

August 1982 -

Phase down of Contractor involvement in project. Dr Goebel to depart on or about 30 August 1982. USDA TDY Soil Scientist to Djibouti for 6 person weeks, with two weeks to overlap with Dr Goebel. This TDY is essential to ensure a smoother transition phase-over to USDA intervention and its short-term periodic technical support.

January 1983 -

The expanded version of the final report from the Contractor is due 1 January 1983. This report is to consist of about 150 pages plus exhibits. Ideally Dr Goebel will hand carry report to Djibouti the first two weeks of January 1983.

A USDA TDY Soil Scientist will concurrently arrive in Djibouti for first two weeks in January 1983 to overlap with Dr Goebel and will remain for two additional weeks to complete the final evaluation of the project.

April 1983 thru January 1985 -

Two week TDY's of USDA Soil Scientist to Djibouti once every four months. This is essential to provide technical back-up for Djiboutian staff at the Water and Soils Laboratory responsible for operation of the lab. and conducting the soil survey of Djibouti.

July thru September 1983 -

Aboubaker Douale Waiss to the United States for USDA Short Course (two months). During his trip to the U.S. Aboubaker will select a university for his graduate study. He will select his course of study in consultation with major professor and determine what his thesis project is to be. On his return to Djibouti it is expected that Aboubaker will begin work on his thesis project. It is expected that his thesis project will be completed by the time he returns to the U.S. for the academic portion of his Master's study program.

Summer 1984 -

Farah Omar to U.S. for three months of refresher training in U.S. Water and Soils laboratories. The laboratories will probably be the U.S. Geological Survey's Water Laboratory in Denver, Colorado and the Soil Conservation Services National Soil Survey Laboratory in Lincoln, Nebraska.

Fall 1984 -

Aboubaker Douale Waiss to United States to complete Master's program. It is expected that this will take about 16 months.

Spring '84 -

It is expected that the GROD will engage someone to temporarily handle Mr Farah tasks as he assumes those of Mr Aboubaker.

## TRAINING REQUIREMENTS

1. Short term training of 1 to 6 months
  - (a) Laboratory assistant - Farah Omar  
About 3 months refresher training in Water and Soils Laboratories in the United States - U.S. Geological Survey's water lab. and National Soil Survey Lab.
  - (b) Water chemist - (not selected yet) depends on candidate selected.
  
2. Graduate Study of 1 to 2 years.
  - (a) Pedologist - Aboubaker Douale Waiss.  
Aboubaker is expected to pursue a Master's program in soil chemistry with academic work to begin approximately in the Fall of 1984 with work on thesis project commence about one year earlier.
  - (b) Hydrogeologist - (not selected yet) depends on the candidate selected.
  - (c) Hydrologist - (not selected yet) depends on the candidate selected.
  
3. Undergraduate Study of 4 to 5 years.
  - (a) Pedologist ) Candidate should be selected within the
  - (b) Chemist ) next two years so that academic training
  - (c) Hydrologist ) can be accomplished within about five
  - (c) Hydrologist ) years. The Water and Soils Laboratory
  - (c) Hydrologist ) needs additional trained staff to be
  - (c) Hydrologist ) prepared to work in the laboratory or
  - (c) Hydrologist ) soil survey phases of the program.

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