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FINAL REPORT
RECOMMENDATIONS FOR PROCUREMENT OF
LANDSAT IMAGERY AND DIGITAL IMAGE PROCESSING SYSTEM
CÔTE D'IVOIRE REMOTE SENSING ASSISTANCE PROJECT
(PIO/T 624-0467-3-70044)

PREPARED FOR:

Regional Economic Development and Services Office
West and Central Africa
U.S. Agency for International Development
(REDSO/WCA/USAID)
Abidjan, Côte D'Ivoire

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Task Order 02

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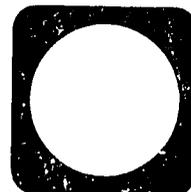


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I.O - SUMMARY

1.1. - Purpose of the Project

The purpose of the Côte d'Ivoire Remote Sensing Assistance Project is to assist the GOCI to increase natural resource benefits, reduce natural resource development costs and assist in conservation of remaining tropical forest resources, soil and water resources and biological diversity. To achieve this purpose, USAID's REDSO/WCA is providing assistance to the GOCI's Directorate and Control of Public Works/Autonomous Teledetection Unit (DCPW/ATU) to improve its abilities to produce, using remote sensing technology, high quality natural resources analytical and planning products in support of development in minerals, agriculture and forestry sectors. This assistance will be in the form of remote sensing imagery including Landsat TM and MSS digital data and Landsat TM digitally enhanced imagery, and a modern hardware/software system for digitally processing remote sensing imagery. These materials and equipment will compliment existing and planned remote sensing materials and capabilities in the DCPW/ATU, and has been fully coordinated with plans and programs of both the GOCI and other donors.

1.2. - Purpose of the Evaluation

This evaluation provides REDSO/WCA and DCPW/ATU with a report and attached materials prescribing a plan of action which defines imagery products and digital image processing system hardware/software specifications to facilitate their procurement by REDSO/WCA for DCPW/ATU.

In addition, the report includes a discussion for a comprehensive remote sensing data processing facility in which the REDSO/WCA provided commodities and equipments will play a pivotal role.

Technical support material used in the selection of specified commodities and equipment is appended or attached to this report.

Recommandations are provided for provision of technical assistance and services to facilitate timely procurement and delivery of the recommended commodities and to facilitate their most effective use in further enhancing DCPW/ATU's natural resource analysis and development planning programs.

1.3. - Key Issues and Questions

The consultants addressed a number of issues and questions in order to meet the objectives of the evaluation. Of primary concern were :

- What is the organization and staffing of DCPW/ATU ?
- What training has been provided, as well as planned, to both analytical and computer systems staff to support the planned facility equipment and material utilization and maintenance ?
- What are the capabilities of local and European repair and maintenance services for support of DCPW/ATU's current and planned equipments ?
- What are the principal application areas and what resources must DCPW/ATU have to carry out these applications on an operational basis ?
- What is existing at DCPW/ATU in regards to remotely sensed imagery and digital processing systems, both hardware/software ?
- What remotely sensed data are available and appropriate for DCPW/ATU acquisition and utilization at the present time ?

- What are the present and planned activities of participating donors ?
- How can REDSO/WCA's provision of commodity assistance most beneficially component these donor activities ?

The PIO/T statement of work defined tasks related to these issues and questions. A complete inventory and analysis of all hardware, software and imagery resources was planned prior to the formulation of specifications for recommended commodities. Shortly prior to the consultant's arrival in Abidjan, however, the REDSO/WCA Science and Technology Advisor was appraised of substantial efforts on-going at DCPW/ATU, which included an status and inventory of present facility capabilities and equipments, and preliminary design for the multi-donor supported facility upgrade.

Upon arrival in Abidjan, the consultants discussed with the REDSO/WCA Science Technology Advisor the preliminary facility design prepared by Ms Sabine THIRION, a consultant from the French Bureau of Geology and Mining Research (BRGM), with assistance from Mr. Marc VANTROYS, chief of the Data Processing Center at DCPW. Ms THIRION's preliminary report was in preparation(1). Upon review of their comprehensive efforts, the consultants were able to focus their immediate attention on indepth discussions concerning compatibility and technical appropriateness of the individual components of the total system design including, but not limited, to REDSO/WCA's participation. Particulary valuable was the opportunity to immediately address constraints associated with alternative hardware/software systems given the political constraints of participating, donors, availability of maintenance and service support to individual system components, and facility environment. The elevated professional coopération among REDSO/WCA and DCPW staff and consultants both facilitated and condensed the preparation of the present report and supporting materials. The preliminary work prepared was of excellent quality and has been incorporated by reference in the present report.

1.4 - Summary of Findings

1.4.1. - Institutional Findings

The Directorate of Control Public Works (DCPW) is a supra agency charged with planning, organizing, financing and supervising all public works activities in the Côte d'Ivoire. DCPW employees approximately 1 500 individuals and is responsible for a broad range of program activities related to such sectors as building design and construction, urban planning, agriculture, water resources, energy resources, transportation design and construction, etc...

Two groups within the DCPW providing technical services were involved in the present evaluation. The Data Processing Center is mandated to provide data processing support and services needs to the DCPW. The Center has a staff of 13 persons trained as data processing specialists, programmers, and operators, who provide technical assistance and liaison throughouh the organization. This liaison has been particularly evident and valuable in the design of the remote sensing image processing system design. The Center will continue to play an important and integrating role throughout installation, training and implementation phases.

1 Thirion Sabine, (march 1988) "Etude Technique en vue d'implanter une chaîne de traitement d'images satellitaires au Service Autonome de Télédétection, DCGTX (Côte d'Ivoire)" Document provisoire.

The Autonomous Teledetection Unit (ATU) was created as a central facility and capability to provide cartographic and supporting services and studies through the analysis of remote sensing data. ATU provides focused application of this technology to specific information needs and development project activities. The ATU is staffed with 22 persons including a chief, Dr. Mamadou FOFANA and six engineers trained in natural resources disciplines (two agronomists, 3 foresters and 1 geologist), nine field technician and six support staff. Programs and projects presently being conducted by the ATU are servicing the following GOCI agencies : Agricultural services, Urban Development, Public Works, Forest Service, Road Maintenance Service, Management Service, and the Soils Survey Service.

The principal mandated activities of the ATU include :

- preparation and updating of land use maps country-wide, at 1:200,00 scale
- preparation of thematic maps at multiple scale (up to 1:50,000) for deforestation hydrology, infrastructure, etc...
- annual mapping of areas damaged by brush fires
- ecological mapping and studies of lagoons, coastal erosion, savana phenomena, desertification, etc...
- studies of drainage basins for hydrologic management,
- structural geologic and hydrogeologic studies,
- change analyses of urban and rural zones,
- agricultural studies including cash crop estimation

The principal need for information which will support economic development, and particularly the production of food, is a focus of the DCPW/ATU. This demand includes information on natural resources, soils, water, végétation, climate and on cultural infrastructure, population and growth. These information needs link directly with the mandated activities of the DCPW/ATU. In addition, the increasing recognition that critical biological resources are threatened by uncontrolled development are specifically addressed in ATU's present and planned programs. ATU, in liaison with other departments within the DCPW, are providing the basic maps of the physical environment, including planimetric base maps, current and potential land use/land cover maps, and current and planned infrastructure requisite for effective development planning and implementation in the Côte d'Ivoire.

1.4.2. - Equipment and Material Resources

The Data Processing Center is presently supported by the following hardware/software elements through the DCPW :

- IBM 4331-2 mainframe CPU, approximately 10 networked PC work stations, 40 printers of various types,
- 6 lights pen tablets,
- 3 coordinate digitalizing tables,
- 1 micro Vax 2000

Plans are in the design phase for upgrading the Data Processing Center. Current consideration of a cluster of VAX 8250's, for example, has been an important factor in the current remote sensing image processing system design activities of Ms. THIRION and the consultants.

Within the Autonomous Teledetection Unit, present equipment capabilities include

1 ea PC/AT 80386 Goupil G5,

- 3 ea PC/AT 80286 Goupil G5,
- Number 9 card (color graphics),
- 1 ea RGB monitor AYDIN 19".

These PC-based microcomputers each have MS/DOS operating system, Windows dialog interface, MS/NET peripheral interface and PC.CARTO image processing software programs. A Tektronics 4696 color ink jet printer is the only presently available capability for hard-copy digital image output.

The DCPW/ATU is the archive for Landsat and SPOT data for the Côte d'Ivoire. Complete SPOT coverage has been requested through conventions with French agencies, requiring a total of 133 scenes for complete coverage. To date approximately 24 SPOT MS scenes have been received. Some interpretations have already been completed on 15 of these scenes and are underway on an additional 6 scenes, using 1/100,000 scale color photographic prints. No SPOT panchromatic data have yet been received. In addition, digital products for the SPOT data are being provided and usage was observed on the PC-image analysis systems (PC.CARTO).

Landsat 4,5 coverage requires 21 scenes for complete coverage of the Côte d'Ivoire. Recently, through GDTA-France, Landsat MSS scenes were provided through processing facilities at Telespazio, Italy. The color prints at 1/200,000 scale are of inferior quality and two have been returned as part of an inquiry by DCPW/ATU into the quality problem. Because of the print quality, the CCT's also provided for the Landsat MSS scenes had not been reviewed. The consultants examined a sample of the CCT data, using PC.CARTO, and found these digital data to be satisfactory.

The present shortage of Landsat and SPOT data available at DCPW/ATU is delaying otherwise significant analytical progress. The difficulties experienced to date in acquiring Landsat and SPOT data in a timely manner for use in map generation was cited in discussions at DCPW/ATU.

1.4.3. - Training and Technical Assistance

A variety of past and on-going training and technical assistance programs exist at DCPW/ATU and are components to each planned donor program. The quality and extent of activity within DCPW/ATU demonstrates the effectiveness and benefit of training and technical assistance experienced. Continued training of scientists, technicians and management personnel in the use of the remote sensing data products and processing equipments is essential to their adoption and effective use. There appear to be no significant constraints that would prohibit immediate use of proposed imagery and processing systems beyond standard orientation and training customary to their delivery and installation.

This does not minimize the need, however, for commitments by donors to support continued training and technical assistance. The proposed imagery and processing system are complex, highly sophisticated, and of the highest industry standards. These resources (imagery, hardware, software, etc...) are useless without a long-term commitment of recipients, vendors, and donors to support and maintenance, and to training. Training must be local, deal with local data, and must survive the initial period of enthusiasm over new products and systems.

1.5. - Recommendations

It is recommended that USAID/REDSO/WCA continue its present support of the multi-donor effort to coordinate equipment, material and technical assistance to the DCPW/ATU so as to minimize duplication and incompatibilities of remote sensing systems and programs on-going and planned in the DCPW/ATU. Specifically, near-term assistance under the Côte d'Ivoire Remote Sensing Assistance Project should include the timely provision of a digital image processing system, digital Landsat data, digitally processed Landsat TM, images and technical assistance to facilitate their procurement, processing, delivery, and orientation to care and usage. These are recommended as follows :

1.5.1. - Digital Image Processing System

USAID/REDSO/WCA procurement for DCPW/ATU of an I2S Model 75, system 600 image processing system. This system is manufactured by International Imaging Systems Inc (I2S) Milpitas, California.

Sole source procurement is required because of demonstrated unique capabilities ; compatibility for complete integration with the overall system design by Ms THIRION and DCPW personnel and financed by multiple donors ; its demonstrated performance record with French users who will be providing continued training and technical assistance ; availability of maintenance and service from France (with certain component service locally) ; and the fact that DCPW/ATU users/operators are presently being trained in France and the Côte d'Ivoire on this system's operation and use. These personnel will be responsible for operation at DCPW/ATU and are not experienced in the use of other USA manufactured systems.

To meet the overall multi-donor image processing facility plan's schedule, the I2S Model 75 system must be installed in mid-august, 1988.

Specifications developed for request of quotation from I2S are contained in a telex to I2S from REDSO/WCA on March 16, 1988 ; a copy is included in Appendix 3.

The present budget estimate for the I2S system, pending revised quotation, is \$ 194,000.

1.5.2. - Landsat Digital Data

It is recommend that USAID/REDSO/WCA procure for DCPW/ATU Landsat digital data for 14 1/4 TM scenes and 4 MSS scenes covering the Côte d'Ivoire. The sole supplier of Landsat data is the EOSAT Corporation, Lanham, Maryland.

Procurement may be facilitated through issuance of a PIO/T to Earth Satellite Corp, ChevyChase, Maryland, who has a USAID/W IQC. The specifications for data to be procured are contained in section 2.6 and in PIO/T materials prepared for REDSO/WCA. The estimated cost of the Landsat digital data is \$ 50,490.

1.5.3.-Digital Image Enhancement of Selected Landsat TM Scenes

It is recommended that the delivery of the Landsat digital data also include delivery of digitally enhanced photographic prints of selected Landsat TM images to enable immediate use and analysis to ongoing mapping projects concurrent with delivery, installation, and training of the planned facility. Thirty quadrants of the Landsat TM scenes to be procured have been selected by DCPW/ATU and REDSO/WCA for processing to produce high quality photographic prints at 1/100,000 scale. Procurement may be facilitated by insurance of a PIO/T to Earth Satellite Corporation. Specification for scenes to be processed are contained in Section 2.6 and in PIO/T materials prepared for REDSO/WCA. The estimated cost for the digital processing by Earth Satellite Corporation is \$33,000.

1.5.4.-Technical Assistance for Landsat Procurement and Delivery

Consideration has been given to not only the transport costs of the Landsat digital data and enhanced images, but also to concern about their safe transport to Abidjan and proper storage and utilization upon arrival at DCPW/ATU.

In addition, timely execution of the Landsat digital data order will be enhanced by technical assistance to coordinate and facilitate the EOSAT order, to arrange and execute their couriered delivery to DCPW/ATU (along with the enhanced image products) and to provide limited (2 days) instruction and technical assistance in their care, storage, and the initial use to resource mapping programs upon their delivery.

The estimated cost for this technical assistance is \$12,500. Details are provided in PIO/T materials prepared for REDSO/WCA.

1.5.5.-Summary of Near-Term Recommendations Costs

- March 1988, PIO/T for Evaluation and Specifications	\$ 20,000.
- I ² S Image Processing System	\$194,000.
- Landsat Digital Data	\$ 50,500.
- Enhanced Landsat TM images	\$ 33,000.
- Procurement and Delivery Technical Assistance	\$ <u>12,500.</u>

Total	\$310,000.
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2.0. - DISCUSSION OF TASKS

2.1. - Landsat Coverage of Côte d'Ivoire

Task 1 "Obtain and bring to Abidjan, the Côte d'Ivoire an EROS Data Center Satellite Imagery Computer Listing of Landsat V TM and MSS imagery for the 21 principal scenes covering the Côte d'Ivoire (Attachment 2)".

On the basis of the listing of twenty-one Landsat 4,5 scene locations covering the Côte d'Ivoire provided in the Scope of Work, Mr. Brooner requested from EOSAT Corporation, a complete listing of all Landsat Multispectral Scanner (MSS) and Landsat Thematic Mapper (TM) scenes acquired since 1 January 1984, with less than 50 percent cloud cover.

This listing was generated by EOSAT from the EROS Data Center database on 25 February 1988, and is current through the end of January 1988. This document is provided in Annex 1 to the present report. This listing includes data for 21 Landsat 4,5 Path/Rows as shown on Table 1.

Upon review of the listing and prior to travel to Abidjan, Mr. Brooner visited the EOSAT User Services Office, Lanham, MD, to review cloud cover extent and distribution as available on microfilm copies of the Landsat scenes. All MSS data and a limited amount of TM data are available on microfilm. Although microfilm images are of inferior quality, often precluding recognition of any terrain features, their purpose is to show cloud distribution which is generally apparent. Other atmospheric conditions, including atmospheric haze and dust, may not be apparent. Of the 266 Landsat MSS and TM scenes included on the listing, approximately on microfilm, 110 scenes were reviewed on microfilm and xerox copies were produced for review and final image selection at DCPW/ATU in Abidjan.

In addition, a computer listing of all NOAA AVHRR data acquired for the Côte d'Ivoire between July 1, 1987 and February 25, 1988 was obtained from NOAA/NESDIS, Camp Springs, MD. This listing and related materials are provided in Annex 2 to the present report.

TABLE 1

LANDSAT V COVERAGE, COTE D'IVOIRE

<u>Path</u>	<u>Row</u>	Approximate Percentage of Scene
		<u>In-Country</u>
195	53	10
195	54	50
195	55	50
195	56	70
196	53	40
196	54	100
196	55	100
196	56	80
197	53	60
197	54	100
197	55	100
197	56	90
197	57	20
198	53	60
198	54	90
198	55	100
198	56	40
198	57	10
199	53	30
199	54	10
199	55	10

2.2. - Donor activities at DCPW/ATU

Task 2 "In the Côte d'Ivoire, and with special focus on the World Bank (IBRD) and the United Nations Development Program (UNDP), determine what remote sensing assistance to the Côte d'Ivoire is planned or projected by other donors through 1990".

Development of the proposed image processing facility and associated technical assistance at the DCPW/ATU will be accomplished through the collaboration of five different donor agencies and the GOCI. The individual participations are summarized as follows :

- 1) USAID's Remote Sensing Assistance Project has agreed to a grant totalling \$ 310,000 over a three year period ending december 31, 1989, to provide DCPW/ATU the following :
 - a) Technical Assistance
 - b) Landsat imagery products
 - c) Digital image processing and analysis system
- 2) UNDP, through FAO, has agreed to a grant totalling \$ 275,000 over a three year period ending december 31, 1989, to provide DCPW/ATU the following :
 - a) Photographic laboratory processing equipment, materials and training
 - b) Image analysis and pilot project technical assistance.
- 3) The World Bank, through a technical assistance loan signed in 1981 and extended until March 31, 1988, contains a balance of 625 million F CFA, of which some 209 million F CFA are available to the remote sensing project to provide for technical assistance, SPOT imagery, computer equipment, and general operating costs.
- 4) The European Development Fund (FED) has agreed to a grant of 30 million F CFA corresponding to provision of an image processing system (PERICOLOR).
- 5) The GOCI, under a special 4 year budget for investments and equipment, as provided in the present year financing of approx 30 million F CFA for digital equipment and data processing (to include a digital film recorder).

The extent of present donor and GOCI financial support provides a unique and timely opportunity for DCPW/ATU to realize advanced facilities and capabilities commensurate with their operational requirements and programs. To realize the maximum effectiveness of this financial support, however, careful planning and coordination among the donors and GOCI is required, through DCPW/ATU, for the design and implementation of the total integrated remote sensing equipment, materials, technical assistance, etc...

Of particular note is the present absence of design specification and costs regarding the photolab facility to be provided by FAO. Because of the critical nature of the photolab facility in the ATU's overall facilities activity plans, it is presently not possible to assure the plans compatibility and appropriateness to the recommended image processing facility plan. Special attention must be paid to this aspect due to the critical importance of the photolab processing capability in the future activities of the DCPW/ATU.

Table 2, summaries pending sources and proposed expenditures by category and source totals as presently assumed.

T A B L E 2
 DISTRIBUTION OF FUNDING SOURCES FOR DEVELOPMENT AND ENHANCED
 OF THE AUTONOMOUS TELEDETECTION UNIT,
 DCPW, COTE D'IVOIRE

FUNDING SOURCE	TECHNICAL ASST. & MISC	EQUIPMENT (HW, SW, PHOTOLAB)	SATELLITE IMAGERY	INSTALLATION & TRAINING	OPERATIONS	TOTAL
USAID/REDSO/WCA	32,500.	167,000.	83,500.	27,000.		310,000.
UNDP/FAO	114,000.	101,000.	15,000.	45,000.		275,000.
IBRD (PAT) Exp. 3/31/88	263,333.	370,000.*	62,667.	*		696,000.
FED		100,000.				100,000.
G.O.C.I. Fy' 88		123,333.			163,000.	286,666.
TOTAL	409,833.	861,333.	161,167.	72,000.	163,000.	1,667,666.
% of total	24,6	51,6	9,7	4,3	9,8	100.

Source : Modified from S. THIRION, Provisional Report, 1988 ; and USAID/REDSO/WCA project materials

Notes : UNDP/FAO subject to increase/change based on Project Paper under review at DCPW

IBRD's Equipment includes installation & training costs.

FID's contribution of a Pericolor System is estimated by THIRION at Approx \$ 123,000.

2.3. - Equipment and Material Status

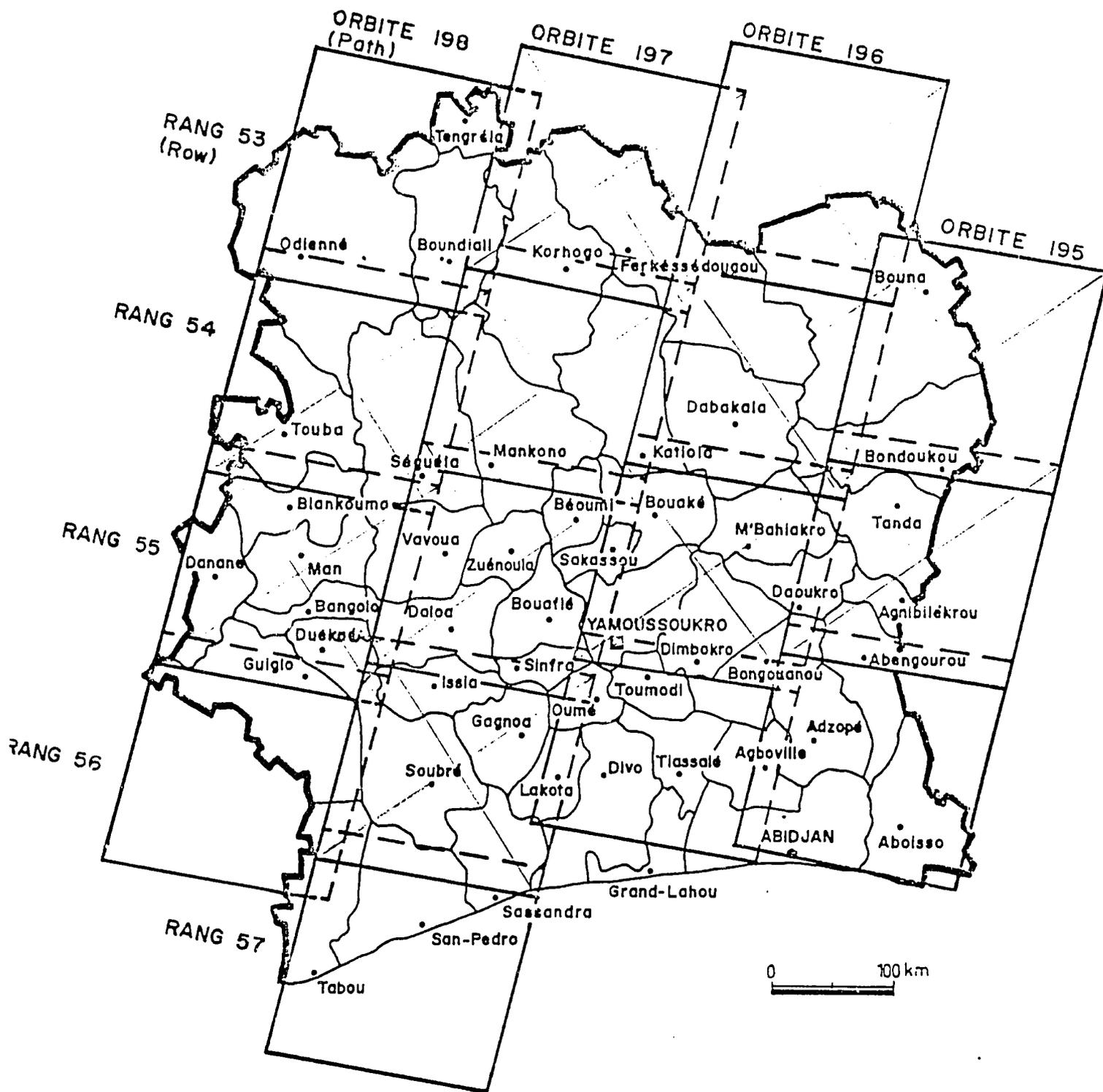
Task 3. "Prepare an inventory and assessment of condition and use of all significant existing hardware, software and imagery resources in the DCPW/ATU".

In support of the development of alternative configurations for the image processing facility at the DCPW/ATU, Ms S. THIRION (THIRION 1988) had already completed an exhaustive inventory of the present hardware and software status of both the ATU and its associated facility, the data processing unit of the DCPW (Centre Informatique). Listings and quantities of all individual hardware components and software packages are available in the THIRION report and summarized in section 1.4.2.

Coverage of Landsat data presently available at DCPW/ATU is listed on Table 3 and shown on Figure 1. This coverage includes Landsat MSS prints at 1/200,000 scale, processed by Telespazio for ESA/Earthnet in late July, 1987, and Landsat MSS CCT'S of the same dates. While the prints are of inferior quality, the histograms on the digital data appear normal in all four spectral bands. The present Landsat materials were provided to DCPW/ATU in august, 1987. Proposed new Landsat coverage to be provided by USAID/REDSO/WCA is discussed in section 2.6.

Present coverage of SPOT MS imagery is shown on Figure 2.

POSITIONNEMENT DES IMAGES LANDSAT 4 et 5 PAR RAPPORT AUX DEPARTEMENTS



LEGENDE

- Capitale d'Etat
- Capitale administrative et économique
- Chef lieu de département
- Limite d'Etat
- Limite département

FIGURE 1

DCGTX-SAT

EXISTENCE LANDSAT 4/5

**TABLE 3
EXISTING LANDSAT MSS SCENES
AT DCPW/ATU**

Landsat MSS Print

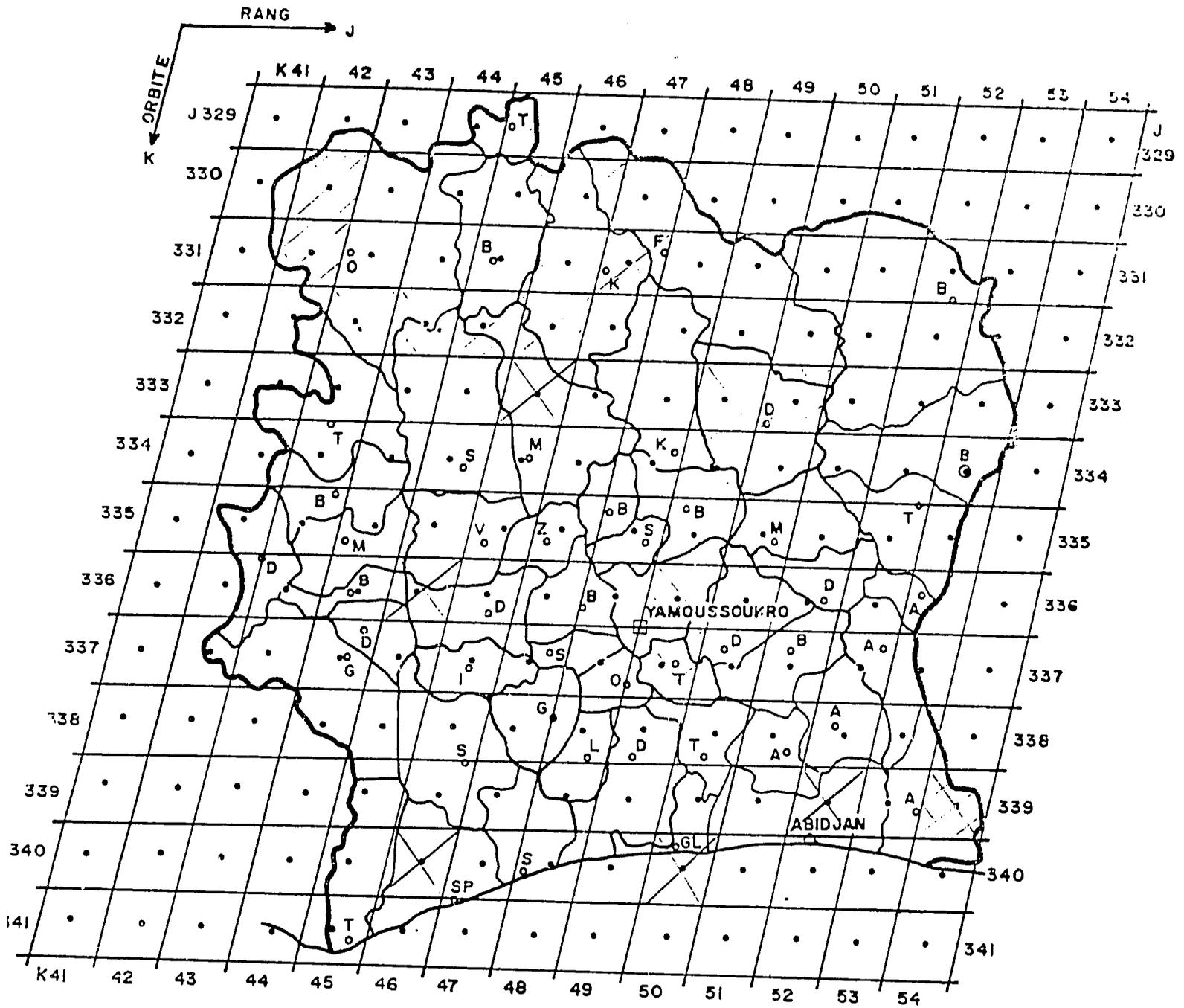
Path/row	Date
197/55	15 Dec 85
197/56	6 April 86
198/53	* Return to supplier
198/56	* Returned to supplier
195/55	20 Dec 86
197/54	15 Dec 85
197/53	17 Feb 86
195/54	25 Dec 85
198/55	24 Feb 86
196/55	13 Dec 84
196/54	1 jan 86
196/53	14 Mar 86
198/54	13 Apr 86

Note : All are "bulk" prints bands 1-3-4, 1/200,000 scale were produced (processed) by TELESPAZIO for ESA/Earthnet in late 1987.

CCT's for a sample of these scenes were reviewed.

Histograms appeared normal on all four bands.

PAR RAPPORT AUX DEPARTEMENTS



LEGENDE

- Capitale d'Etat
- Capitale administrative et économique
- Chef lieu de département
- Centre de scène SPOT
- Limite d'Etat
- Limite de département
- ▤ Découpage de scène SPOT
- ▨ Zone d'étude



*SPOT IMAGE
INTERPRETATION COMPLETE*



*SPOT IMAGE DCGTX-SAT
INTERPRETATION IN-PROGRESS*

0 100 km

FIGURE 2

*Summary of SPOT
Coverage in Côte d'Ivoire*

2.4. Imagery Type Needs

Task 4. "In conjunction with DCPW/ATU and REDSO/WCA technical personnel and taking into account budget limitations as well as the current and projected analytical and production capabilities and needs of DCPW/ATU, determine whether the imagery and analytical needs of DCPW/ATU would best be served by acquisition of Landsat MSS, Landsat TM, AVHRR and/or aerial photographic imagery under the Côte d'Ivoire Remote Sensing Project."

Mr. Brooner and Dr. Daus held several extended discussions with Dr. Mamadou FOFANA, his staff, and Ms. Sabine THIRION (BRGM/FRANCE) regarding current and planned program activities of the DCPW/ATU to provide a basis for defining appropriate imagery types. DCPW/ATU projects are executed within three technical departments ; Rural Development (Land Use) ; Water and Forestry ; and Mines and Geology. Personnel are trained and experienced in photointerpretation and imagery analysis techniques and procedures. Presently, interpretations and mapping activities in each Department are utilizing manual interpretation of SPOT MS prints, produced by CNES, at 1:100,000 scale.

The most common base map for DCPW/ATU analyses and products is 1:100,000, seconded by 1:50,000 for local area projects and 1:200,000 for generalized regional projects.

Spatial and spectral resolution characteristics of Landsat MSS and TM are well understood by DCPW/ATU personnel. They are familiar (in theory but not practice) with the extended application capabilities and potentialities provided by Landsat TM's spectral data to multiple and diverse analyses, e.g. land use surveys, vegetation mapping, geologic fracture/lineament analysis, mineralization analyses, etc./ Given the preferred mapping scale (1:100,000) the suitability of Landsat TM's spatial resolution (30 meters) is also well understood.

Dr. M. Fofana clearly expressed his desire to acquire, as a first priority, Landsat TM coverage for the entire Côte d'Ivoire, a desire also expressed by REDSO/WCA technical personnel (Mr. J. Goodson). Independently, the consultants fully concur that DCPW/ATU's imagery and analytical needs will be best served by Landsat TM. These data will be complimented by the nine Landsat MSS scenes currently available in CCT format at DCPW/ATU, and by SPOT imagery which is presently being provided to DCPW/ATU.

Several scene locations along the northeast and western frontiers of the Côte d'Ivoire cover only a small amount of the Côte d'Ivoire territory (generally less than 10 percent of scene in the C.I.). In these locations, both the consultants and DCPW/ATU concur that Landsat MSS coverage will be most appropriate given budgetary limitations and anticipated resource analyses needs and interests.

Dr. M. Fofana has indicated a future interest in conducting climatological investigations at DCPW/ATU, and expressed interest in AVHRR data provided by NOAA Polar Orbiting satellites to these related future studies. Although acquisition of AVHRR data is not planned at this time, nor recommended under the REDSO/WCA Remote Sensing Assistance Project, Mr. Brooner discussed with Dr. M. Fofana a variety of AVHRR related materials and documents, and listing of recently acquired AVHRR data over the Côte d'Ivoire, included as Annex 2 to the present report.

Aerial photography has been acquired for the entire Côte d'Ivoire for the production of topographic maps by IGN/FRANCE. This photography is typically of medium scale (1:60,000-1:70,000), and 20 or more years old.

It is available and used by DCPW/ATU as required. At the present time, there is no capability to acquire or process aerial photography in the Côte d'Ivoire, nor the region, and the costs for contracting aerial photography services from outside sources are prohibitively high. Under the present situation, aerial photography is not considered a viable alternative as a data source for resource mapping and analyses conducted by DCPW/ATU.

2.5. Imagery Product Needs

Task 5. "In conjunction with DCPW/ATU and REDSO/WCA technical personnel and taking into account budget limitations as well as the current and projected analytical and production capabilities and needs of DCPW/ATU, determine whether the production needs of DCPW/ATU would be served by acquisition of photographic products, digital products, or a combination of both".

Landsat TM and MSS products include standard photographic products, digitally enhanced imagery, and digital products defined as follows :

a) Standard photographic products available from EOSAT include a variety of black & white and color images on photographic film and paper. Black and white single band negatives and positives and color composite film positives are available at 1:1,000,000 scale. In addition, paper prints at 1:1,000,000, 1:500,000 and 1:250,000 scale are available for either single band black and white or color composite scenes. Larger scales including those used by DCPW/ATU (1:100,000, 1:50,000, etc..) are not available. Quality of standard photographic products is inferior to digitally enhanced imagery and would generally not meet the production needs of DCPW/ATU.

b) Digitally enhanced imagery is a high quality custom photographic product provided by end users and selected value-added organizations. These products involve advanced digital image processing, recording of digitally enhanced image data to on photographic film, and their subsequent photographic processing and reproduction. The proposed multi donor funded remote sensing facility to be placed at DCPW/ATU (section 2.7.) complete with digital image processing hardware and software systems, film recorder and photographic laboratory, will in the aggregate enable DCPW/ATU to procedure high quality digitally enhanced imagery. Such products are required to meet the production and analysis needs of DCPW/ATU.

c) Digital Products are computer compatible tapes (CCTS) provided by EOSAT for Landsat MSS and TM data. CCT's are available on qinch magnetic tape at either 1600 bpi or 6250 bpi, and either Band sequentiel (B5Q) or band interleaved (BIL) format. TM CCT's provided by EOSAT are for TM quadrants, whether a full scene or only selected quadrants are procured.

For the recommended image processing system at DCPW/ATU, the following specifications for Landsat MSS and TM CCTS are recommended :

(a) BPI - 6250

(b) format - BIL, ASCII corrected

Realizing that it may be several months or more following delivery and installation of the requisite computer image processing system, film recorder and photographic laboratory, for DCPW/ATU to operationnally produce high quality digitally enhanced imagery for application analyses and presentations, the consultant recommends that a select quantity of Landsat TM scenes be processed as high quality digitally enhanced images prior to delivery of digital data to DCPW/ATU.

The products should meet state-of-the-art industry standard (GEOPIC or equivalent) and be printed at 1:100,000 a larger scales for complete Landsat TM Quads. Availability of these products will enable DCPW/ATU to immediately begin analyses for multiple resource applications of the Landsat TM data and not be dependent on completion of the total facility (including photolab completion), will provide a "performance" standard for the new facility to achieve upon full implementation, and will provide usefull priority data for immediate presentation, display, application, etc...

2.6. - Image Selection and Product Procurement

Task 6. "In conjunction with DCPW/ATU personnel and taking into account the seasonal, spectral and resolutional variability inherent to the diverse analytical needs of the DCPW/ATU, prepare a list of specific scene identification numbers of existing imagery to be acquired ; prepare a list of special acquisition specifications for future imagery to be acquired ; and prepare a cost breakdown for acquiring this imagery as either photographic or digital products, or both, as appropriate."

Based on the current and projected analytical and production needs of DCPW/ATU, procurement of a combination of digital products (Landsat MSS & TM CCT's) and digitally enhanced imagery of selected TM scenes is recommended. Following careful review of the available Landsat 4,5 data as described in Task 1, above, 14 1/4 Landsat TM and 4 Landsat MSS scenes were selected for digital product (CCT) procurement. Individual scenes for recommended procurement are shown on Table 4 and Figure 3. This selection was prepared by Dr. Fofana and Mr. Goodson with REDSO and DCPW consultants' assistance.

Following agreement of this recommendation, Dr. Fofana and Mr. Goodson selected 30 Quads for commercially provided digital processing and enhancement of the digital Landsat TM data prior to the delivery of the CCT'S to DCPW/ATU. Selection criteria included recognition of priority areas for on-going and planned project analyses and budgetary limitations. The listing of scenes selected for digital processing is shown on Table 5 and Figure 4.

Although procurement of the identified Landsat MSS and TM data will not provide 100 % coverage of the Côte d'Ivoire due to persistent cloud cover on available imagery (Paths/Rows 198/56 and 198/57), these areas may be complemented by SPOT imagery to meet current and near-term analytical needs of the DCPW/ATU.

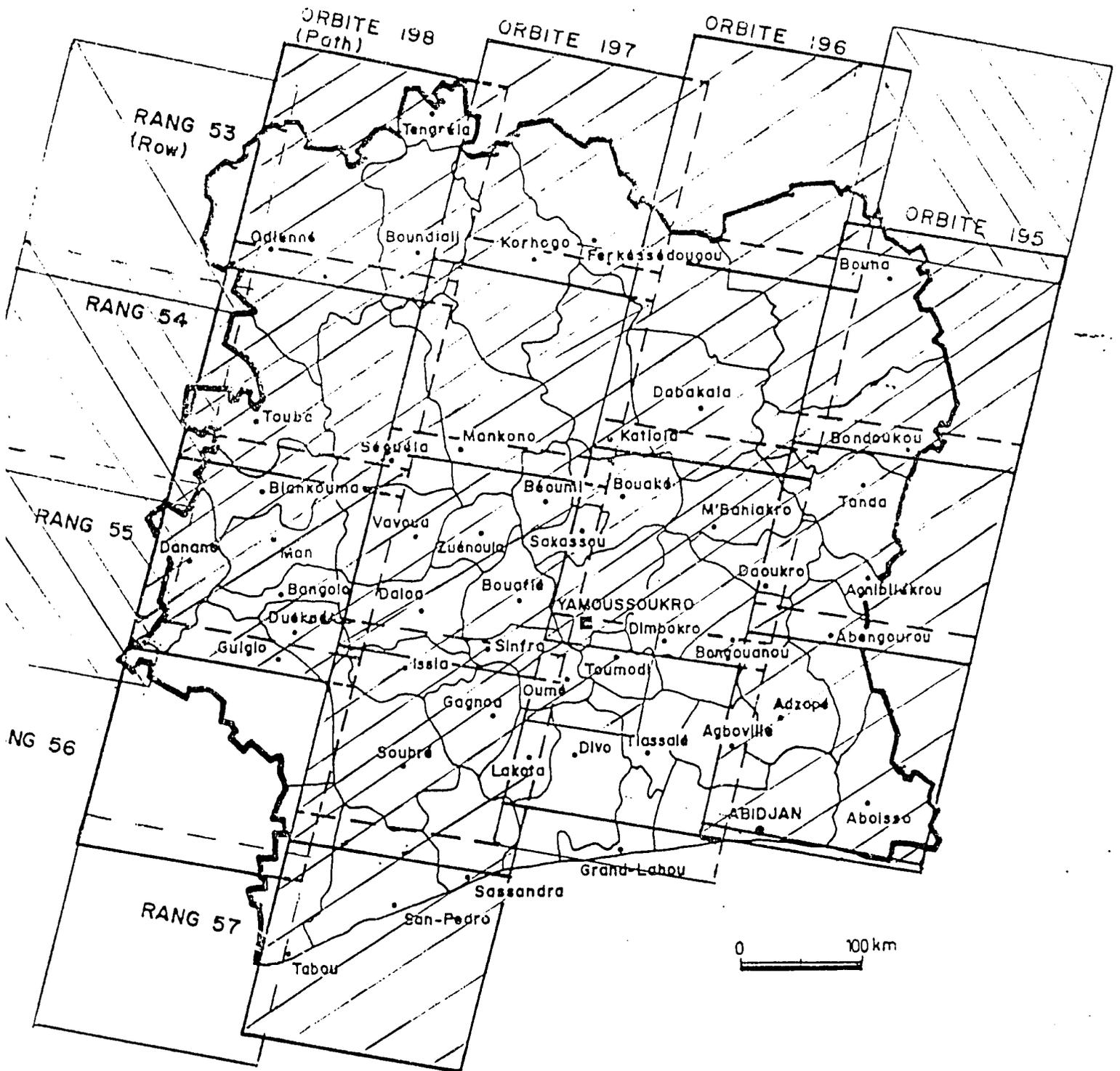
At the present, due to both the nearly complete coverage of suitable existing Landsat MSS and TM data, and current budgetary limitations, a program for special acquisition of Landsat data by EOSAT is neither required nor recommended. However, the consultants have advised both REDSO and DCPW/ATU technical personnel on the procedures for initiating Special Acquisition requests should this be desired in the future to meet specific project needs.

TABLE 4

Recommended Landsat TM and MSS scenes
for CCT Procurement

<u>DATA TYPE</u>	<u>PATH/ROW</u>	<u>DATE</u>	<u>SCENE N°</u>
MSS	195/53	18 JANUARY 1986	850688-09541x0
TM	195/54	18 JANUARY 1986	Y50688-09543x0
TM	195/55	18 JANUARY 1986	Y50688-09545x0
TM	195/56	31 DECEMBER 1987	Y41994-09510x0
TM	196/53	09 JANUARY 1986	Y50679-10003x0
TM	196/54	05 DECEMBER 1984	Y50279-10032x0
TM	196/55	22 DECEMBER 1987	Y41985-09562x0
TM QUAD	196/56/Q1	05 DECEMBER 1984	Y50279-10041x0
TM	197/53	16 JANUARY 1986	Y50686-10063x0
TM	197/54	16 JANUARY 1986	Y50686-10065x0
TM	197/55	16 JANUARY 1986	Y50686-10072x0
TM	197/56	16 JANUARY 1986	Y50686-10074x0
TM	197/57	16 JANUARY 1986	Y50686-10081x0
TM	198/53	07 JANUARY 1986	Y50677-10125x0
TM	198/54	07 JANUARY 1986	Y50677-10132x0
TM	198/55	04 JANUARY 1985	Y50309-10162x0
	198/56	No Acceptable Data Available	
	198/57	No Acceptable Data Available	
MSS	199/53	14 JANUARY 1986	850684-10185x0
MSS	199/54	14 JANUARY 1986	850684-10192x0
MSS	199/55	14 JANUARY 1986	850684-10194x0

POSITIONNEMENT DES IMAGES LANDSAT 4 ET 5
PAR RAPPORT AUX DEPARTEMENTS



LEGENDE

- Capitale d'Etat
- Capitale administrative et économique
- Chef lieu de département
- Limite d'Etat
- Limite département

FIGURE 3
DCGTX-SAT



LANDSAT THEMATIC MAPPER CCT's
LANDSAT MULTISPECTRAL SCANNER CCT's

TABLE 5
Landsat TM Quads Selected for Digital
Enhanced and Printing, 1:100,000

<u>PATH/ROW/QUAD</u>	<u>DATE</u>
195/56/1,3,4	31 DECEMBER 1987
196/55/1,2,3,4,	22 DECEMBER 1987
196/56/1	05 DECEMBER 1984
197/53/3,4	16 JANUARY 1986
197/54/1	16 JANUARY 1986
197/56/1,2,3,4	16 JANUARY 1986
197/55/1,2,3,4	16 JANUARY 1986
198/53/2,3,4	07 JANUARY 1986
198/54/1,2,3,4	07 JANUARY 1986
198/55/1,2,3,4	04 JANUARY 1985

2.7. - Digital Image Processing System

Task 7 "Taking into account the cost of imagery acquisition, budget limitations, existing hardware and software resources and needs, compatibility with existing hardware and software resources at DCPW/ATU, and future maintenance and repair constraints, prepare specifications for priority hardware and software to be purchased, shipped to Abidjan and installed at DCPW/ATU, and prepare a cost breakdown for acquiring this hardware and software."

The consultants' effort in this task was modified due to the focused coordination with DCPW and Ms THIRION, and the collaborative plan for the overall system configuration. A variety of plan scenarios were presented and discussed. Both mainframe and PC-based image processing systems were considered. Technical specification and cost materials were provided for the following systems :

- a) I2S, model 75, system 600, VAX configuration
- b) ERDAS, PC and VAX configurations
- c) TERRAMAR, PC and Sun configurations
- d) Decision Images, PC configuration
- e) Numelec, Pericolor 2001

Benchmark comparisons were provided by reference for ERDAS PC and Terramar-PC ; Ms Thirion's provisional report includes comparisons of ERDAS-PC, ERDAS-VAX and I2S-VAX. The final recommended system configuration, as shown on Figure 5, includes a VAX 8250 host CPU with UNIBUS and ETHERNET interfaces to a NUMELEC PERICOLOR 2001 and I2S model 75 via UNIBUS, and the existing PC-based systems (PC-CARTO) via ETHERNET.

The single component identified for USAID/REDSO donor participation is the I2S image processing system. Upon review of the total system design, the consultants concur in recommending USAID/REDSO procurement of this system.

Subsequently, the consultants and Ms Thirion prepared specifications for submittal, on March 16, 1988, to I2S for quotation. This request included the model 75 image processing hardware with (a) Warper Board, (b) Histogram Read Capability, (c) Virtual Roam capability, (d) 4 mB memory, and (e) 512 x 512 RGB display and I2S System 600 image processing software see Table 4).

The present cost estimate for this system including shipment, installation, start-up, and training, is \$ 192,795, as quoted by I2S to REDSO/WCA on March 22, 1988 (Appendix 3).

Table 7 provides a summary of the image processing facility components by funding source.

While Ms Thirion assisted the consultants in the preparation of the I2S image processing selection and specifications, the consultants also assisted Ms Thirion and Mr. VANTROYS in the film recorder selection specifications. Previously, the only consideration was an OPTRONICS P-1500, as shown on the overall system plan prepared by Ms Thirion (configuration 2). This is presently being reevaluated as quotations are pending for a CIRRUS LB-1000 laser film recorder. The latter provides substantially increased capabilities and is compatible with the overall system configuration. Although not part of USAID/REDSO's planned procurement, the film recorder was considered by the consultants because it is essential to the utility of the image processing system's output. Equally essential but not shown on the overall system plan, is the photographic processing facility as noted in section 2.2.

The schedule for the overall system installation in August 1988 requires expedited procurement of the I2S system as permitted by USG procurement regulations. This requires sole source procedures which are equally warranted by the unique capabilities and compatibilities provided by the I2S system to the overall plan.

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T A B L E 6
 IMAGE PROCESSING SYSTEM
 HARDWARE AND SOFTWARE SPECIFICATIONS
 AND PRICE QUOTATION FROM INTERNATIONAL IMAGING SYSTEMS
 INC., 22 MARCH 1988

<u>ITEM</u>	<u>QUANTITY</u>	<u>PRICE</u>
A. I2S Model 75 Console :		
M 75N BASE .	1	
7500-1INPUT		
7503 Videometer	1	
7510-1 Memory	8	
7511 Warper	1	
7532-1 Trackball	1	
RGB Monitor and Cables	<u>1</u>	82,835
B. I2S System 600 Software :		
600 COR	1	
600 TAP	1	
600 GEN	1	
675 GEN	1	
600 ADV	1	
675 ADV	1	
600 FLT	<u>1</u>	41,250.
C. Spare Parts Kit		
SPA-M75	<u>1</u>	35,710.
D. I2S Technical Installation Stat-up and Operator Training		
		27,000.
E. CIF (Insurance 120 % CF value)		
		6,100.
	Total	<u>\$ 192,895.</u>

TABLE 7
SUMMARY OF HARDWARE AND SOFTWARE AND RELATED
EQUIPMENT AND SERVICES FOR THE
DIGITAL IMAGE PROCESSING FACILITY, DCPW/ATU

Funding Source	ITEM	FF	F CFA	US \$
USAID/REDSO/WCA	125 Model 75 Hardware			82,835
	125 System 600 Software			41,250
	Installation			9,000
	Training			18,000
	Spare Parts Kit, M75			35,610
	CIF (insurance)			6,100
		1,156,770	57,838,500	192,795
IBRD	DEC/VAX Hardware, software, installation, training, transport ;			
	RFI DIDACTIM, software, installation, training; BENSON interface			
	Film recorder installation, training, and Spare Parts			
	Total	2,363,363	118,168,150	393,394
UNDP/FAO	Photographic Laboratory equipment, installation & training (Details Pending) Est. total	822,000	41,100,000	137,000
BSIE Cy 87	Power Supply/Regulator, 30 KWA Total	260,000	13,000,000	43,333
BSIE Cy 88	RFI Film Recorder Hardware, Interface and transport Total	755,095		125,850
FED	Numelec Pericolor System	760,500	38,025,000	126,750
	Total	6,114,732	305,736,600	1,019,122

Currency Conversions :

US \$ 1 = 6 FF. = 300 F CFA

Source : Modified from S. THIRIGNY, Provisional Report, 1988

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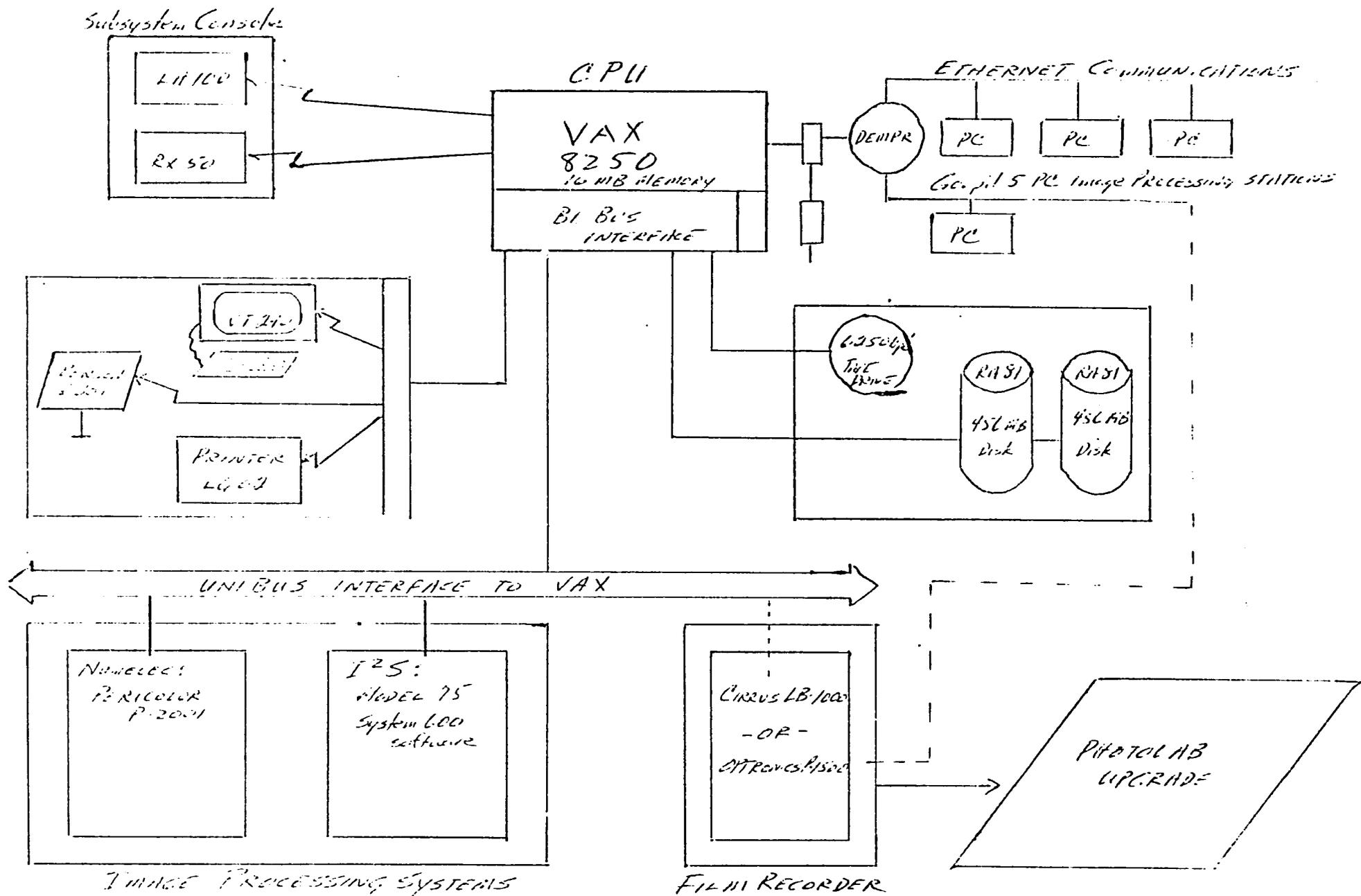


FIGURE 5. IMAGE PROCESSING FACILITY PROPOSED FOR DEPHILITII
 Modified from SHARON, 1988, Provisional Report.

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2.8. - Training and Technical Assistance

Task 8 "Determine what, if any, training constraints exist at DCPW/ATU that would prohibit immediate use of the imagery, hardware and software products for which specifications will be prepared by the consultant and propose an appropriate training package."

The Consultants did not encounter any significant constraints to successful implementation and operation of the recommended imagery products or digital image processing facility resulting from the present level of staff training and experience. In the configuration proposed for the digital image processing facility (refer to Figure 5) initial user access will be through PC-based work stations which are already in use in the present DCPW/ATU facility.

Through demonstration, several individuals on the staff have shown their ability to work well with present PC-image processing software. Specific to the component to be funded by USAID/REDSO, two training related aspects have convinced the Consultants that the facility design prepared by MsThirion and Mr. Vantroys, to include an I2S Model 75 image processor with I2S system 600 software, is optimal. The first aspect involves the tradeoff between the existence of documents or manuals in the language of the users versus the value of experience with the piece of equipment. Of the viable alternatives evaluated by the Consultants, including image processing systems by ERDAS, TERRAMAR, Decision Images, and I2S Model M 75 System 600, none were characterized by software or supportin documentation and manuals written in the French language. This situation strongly reinforced the necessity of selcting a system where there has been direct experience by the personnel who will be using the equipment in the DCPW/ATU context those individuals or agencies who will be providing technical assistance to DCPW/ATU personnel in the future. At the present time an individual, who will be assigned to the staff of the ATU upon completon of training in France, is undergoing training as an image processing system operation specialist. One of the pieces of equipement this person is being trained specifically in its use is an I2S Model 75, system 600, image processor.

LIST OF ACRONYMS

- USAID : United States Agency for International Development
- REDSO/WCA : Regional Economic Development Office, West Central Africa, USAID
- DCPW : Directorate and Control of Public Works (DCGTX -Direction et Contrôle des Grands Travaux)
- ATU : Autonomous Teledetection Unit (SAT - Service Autonome de Télédétection)
- TM : Thematic Mapper Image acquired by Landsat's 4 and 5
- MSS : Multispectral Scanner image acquired by Landsat's 4 and 5
- GOCI : Government of the Côte d'Ivoire
- IBRD : World Bank
- UNDP : United Nations Development Program
- FAO : Food and Agricultural Organization, United Nations
- FED : Development Funds from the European Economic Community
- BRGM : French Bureau of Geology and Mining Research, Orleans, France
- SPOT MS : Multispectral imagery acquired by French SPOT Satellite
- CNES : Centre National d'Etudes Spatiales, France
- AVHRR : Advanced Very High Resolution Radiometer
- NOAA : National Oceanic and Atmospheric Administration, USA
- CCT : Computer Compatible Tape

LIST OF CONTACTS

DCPW

Dr. Mamadou FOFANA	Chief, Autonomous Teledetection Unit
Mr. Marc VANTROYS	Chief, Data Processing Center
Ms. Sabine THIRION	Consultant from BRGM, France

REDSO/WCA

Mr. Jeffery W. GOODSON	Science and Technology Advisor
Dr. Arthur FELL	Regional Director
Mr. Harry HANDLER	Deputy Director
Mr. Gerald RENDER	Regional Contracting Officer
Mr. Thomas STEPHENS	Regional Procurement Officer
Mr. Andrew GROSSMAN	Commercial Attache, American Embassy, Abidjan

MISCELLANEOUS

Dr. DIABY Ibrahima	Director of Geology, Côte d'Ivoire
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A N N E X 1

Landsat Information and Coverage Listings for the Côte d'Ivoire.

Contents :

- 1 The Landsat program
- 2 Landsat Data Users Notes, vol 1, n° 2, july 1986
 vol 1, n° 3, october 1986
 vol 2, n° 2, june 1987
 vol 2 n° 4, december 1987
- 3 Landsat Technical Notes N° 1, august 1986
 N° 2, september 1987
- 4 Landsat Applications Notes vol 1, n° 1, june 1986
 vol 1, n° 2, september 1986
 vol 2, n° 1, february 1987
 vol 2, n° 2, march 1987.
- 5 Landsat Products and Services
 Inquiry form, Order form, reference aids, price list, purchase agreement
- 6 Landsat coverage listing of the Côte d'Ivoire ; January 1, 1984, through February 25, 1988 ; 50 % or less cloud cover ; Thematic Mapper and Multispectral Scanner.

A N N E X 2

NOAA : Advanced Very High Resolution Radiometer Information and Coverage Listing for the Côte d'Ivoire.

Contents :

- 1 Environmental Satellite Data and Information
- 2 NOAA Retrospective Satellite Data Price List and Ordering Procedures
- 3 NOAA Polar Orbiting Satellites
- 4 Listing of Available NOAA AVHRR
Data for Côte d'Ivoire ;
July 1, 1987 through December 31, 1987,
January 1, 1988 through February 22, 1988

TELEX

MARCH 16, 1988

DATE: MARCH 16, 1988
TO: I2S CORPORATION, MILPITAS, CALIFORNIA, USA
ATTN: STEVE LYTTLE, VICE PRESIDENT FOR INTERNATIONAL
SALES
TLX NO: 023172854

SUBJECT: REQUEST FOR IMMEDIATE HARDWARE/SOFTWARE
QUOTATIONS

1. REQUIRE IMMEDIATE QUOTATION IN US DOLLARS FOR YOUR
SYSTEM M75 WITH

- 1) WAPER BOARD
- 2) HISTORGRAM READ CAPABILITY
- 3) VIRTUAL ROOM
- 4) 4MB MEMORY AND 512 X 512 DISPLAY AND
- 5) SYSTEM 600 SOFTWARE.

INTERFACE WILL BE TO A VAC 8250 VIA UNIBUS. LOCAL
POWER IS 220VAC, 50HZ. ENTIRE BUILDING IS SURGE
PROTECTED.

2. SPECIFICATIONS ARE AS FOLLOWS:

- 1) INTERFACE FOR VAX: GPIT-1 (ONE); SDI-C15 (ONE);
DR/GP-C3 (ONE);
- 2) M75 CONSOLE AND: M75N BASE (ONE); 7500-1 INPUT
(ONE); 7503 VIDEOMETER (ONE); 7510-1 MEMORY
(EIGHT);
8511 WAPER (ONE); 7532-1 TRACKBALL (ONE);
- 3) MONITOR AND: VIDEO CABLES (ONE); CONRAC 7122
(ONE);
- 4) S600 SOFTWARE: 600COR (ONE); 600TAP (ONE); 600GEN
(ONE); 675GEN (ONE); 600ADV (ONE); 675ADV (ONE);
600FLT (ONE);
- 5) M75 SPARE: SPA-M75 (ONE) (PROVIDE SEPARATELY).

3. PLEASE PROVIDE SEPARATE QUOTE FOR SPARE PARTS AND
OPERATING SUPPLIES FOR ONE YEAR.

4. PLEASE INCLUDE ESTIMATE FOR I2S TECHNICAL
ASSISTANCE FOR INSTALLATION, START-UP AND OPERATOR
TRAINING AT TIME OF INSTALLATION, AND ADVISE AS TO YOUR
EXPERIENCE REGARDING ASSISTANCE REQUIRED. BE ADVISED
THAT INSTALLATION MUST REPEAT MUST BE DONE BY YOUR
FRENCH DISTRIBUTOR RFI (MAY CONTACT AT RFI/PARIS,
CHRISTIAN GUICHOU, TELEX 699559 ATTN: ITC RFI 7810;
TELEPHONE 331-303-21012).

5. PROCUREMENT WILL BE FIXED PRICE CONTRACT EXECUTED
BY USAID/REDSO/COTE D'IVOIRE. PROCUREMENT IS FINANCED
BY A.I.D. AND WILL BE SUBJECT TO U.S. GOVERNMENT AND
A.I.D. PROCUREMENT REGULATIONS. PRICE QUOTE MUST BE
CIF (AIR FREIGHT) ABIDJAN, COTE D'IVOIRE. PRICE IS
ALSO TO INCLUDE INSTALLATION, START-UP AND TRAINING.
PLEASE CITE COMMODITY, INSURANCE AND AIR FREIGHT COSTS
SEPARATELY.

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COMMODITIES MUST BE OF U.S. SOURCE/ORIGIN (A.I.D. GEOGRAPHIC CODE 000). AIR TRANSPORTATION MUST BE BY U.S. FLAG CARRIER OR THROUGH AIRWAY BILL OF LADING. INSURANCE IS ALL RISK, WAREHOUSE TO WAREHOUSE, AT 120% OF C&F VALUE. MANUFACTURERS STANDARD WARRANTY AND INSPECTION APPLY. ADDITIONALLY, PLEASE INCLUDE A PAYMENT SCHEDULE AND NOTE THAT ADVANCE PAYMENTS PRIOR TO SHIPMENT ARE NOT AUTHORIZED. CONTRACT WILL ALSO REQUIRE MANUFACTURERS PARTS LISTS, OPERATING INSTRUCTIONS, MAINTENANCE CATALOGUES, ETC..

7. PLEASE ADVISE IF AN EXPORT LICENCE FOR THIS EQUIPMENT IS NECESSARY. TITLE TO THIS EQUIPMENT WILL BE VESTED WITH THE RÉPUBLIQUE OF THE COTE D'IVOIRE.

8. REQUEST QUOTE ON EARLIEST POSSIBLE DELIVERY DATE TO ABIDJAN, COTE D'IVOIRE ASSUMING CONTRACT SIGNED MID-MAY 1988, BUT IN ANY CASE DELIVERY REQUIRED REPEAT REQUIRED NLT 31 JULY 1988. INSTALLATION WILL BE SCHEDULED FOR AUGUST 1988.

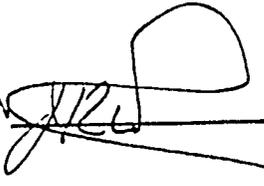
9. HARD COPY RESPONSE SHOULD BE DHL'D ASAP TO USAID/ABIDJAN.

10. IMMEDIATE TELEPHONE RESPONSE TO ABIDJAN, COTE D'IVOIRE REQUESTED AS FOLLOWS:
FOR TECHNICAL CLARIFICATION, CONTACT MS. SABINE THIERION, GOLF HOTEL, ROOM 211, ABIDJAN (225) 43-10-44 OR AT DCGTX (NUMBER BELOW). FOR CONTRACTING CLARIFICATION, CONTACT MR. GERALD RENDER, USAID/ABIDJAN, 41-40-55. FOR ADDITIONAL INFORMATION, OR SECOND CONTACT NUMBER FOR MS. THIERION, CONTACT DCGTX, ABIDJAN ATTENTION EITHER MAMADOU FOFANA OR MARK VAN TROYS AT 44-53-56. YOU MAY CABLE DCGTX AT: 26193 DCGTX CI COTE D'IVOIRE ATTN: SCE TELEDTECTION. ON ANY ISSUE, YOU MAY ALSO CONTACT JEFF GOODSON, USAID/ABIDJAN, AT THE USAID NUMBER ABOVE AND YOU MAY CABLE USAID/ABIDJAN AT: 27166 REDSOW CI.

11. WE APPRECIATE YOUR ATTENTION TO THIS REQUEST, AND MUST REITERATE IT'S URGENCY. TELEPHONE REPLY TO MS. THIERION REQUIRED NLT 4:00 P.M. (16:00 HOURS) YOUR TIME WEDNESDAY 16 MARCH.

FROM: JEFF GOODSON
SCIENCE AND TECHNOLOGY ADVISOR
REDSO/WCA

OFFICIAL BUSINESS

CLEARANCE: PADS:JWASHINGTON 

REDSOW CI
MAR 22 1988 2337

MILPITAS, CA
12S REF JL002.TLX
22 MARCH 88

TO: US EMBASSY
ATTN: JEFF GOODSON
SCIENCE AND TECHNOLOGY ADVISOR
COPY: RANDOLPH FASSIN, 12S - EUROPE
RE: PRICE QUOTE FOR M75, S600, SPARES

XX

1. THESE PRICES ARE FOR THE M75, S600, AND SPARES KIT, AS P
YOUR TELEX 17 MARCH.

M75	82,835
S600	41,250
INTSALL	9,000
TRAINING	18,000
CIF	5,000

TOTAL SYSTEM PRICE, CIF ABIDJAN, 156,085.

2. SPARES KIT IS 35,610.

CIF 1,100

TOTAL PRICE; SPARES KIT, 36,710.

3. THESE PRICE QUOTATIONS WILL BE SENT VIA COURIER, 22 MARC.
TO MR. GOODSON.

REGARDS,
JEFF LIEDTKE
SALES SUPPORT ENGINEER
INTL IMAGING SYSTEMS
TLX: 172854 12S MPTS
TEL: (408)432-3400
FAX: 408-433-0955

NNNN
MAR 22 23:40
REDSOW CI

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