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REPORT OF SURVEY TEAM

PROJECTED AID RESEARCH PROGRAM ON IMPROVED FOREST PRODUCTS UTILIZATION IN LATIN AMERICA

By

ALAN D. FREAS
B. FRANCIS KUKACHKA
and
EUGENE F. LANDT

Forest Service
U.S. Department of Agriculture

August 1965

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TABLE OF CONTENTS

	Page
Letter of Transmittal	i
Introduction	1
Background	2
Summary and Recommendations	4
Part 1--Collection, identification, and evaluation of Latin American timber species	5
Part 2--Inventory of forest products utilization practices and potentials in selected Latin American countries	10
Suggestions for Implementation of Project	12
AID - Forest Service Agreement	12
AID - Forest Service - Country Agreement	16
Appendix 1 - Explanatory Airgram to AID Missions	1-1
Appendix 2 - Itinerary of Forest Service Team	2-1
Appendix 3 - Interviews	3-1
Appendix 4 - Contacts During Trip	4-1
Appendix 5 - Part 1 of Proposed Program	5-1
Appendix 6 - Part 2 of Proposed Program	6-1
Appendix 7 - Proposed Budget for Five Countries	7-1
Appendix 8 - Proposed Budget for Three Countries	8-1

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST PRODUCTS LABORATORY
MADISON, WISCONSIN 53705

IN REPLY REFER TO: 1530

August 24, 1965

Dr. John D. Wilkes, Science Director
Office of Technical Cooperation and Research
Agency for International Development
Department of State
Washington, D.C. 20523

Attention: Mr. S. W. Bergen
Office of Research and Analysis/TCR

Dear Sir:

I am happy to enclose, herewith, the report of the Forest Service team which, between April 10 and May 19, visited a number of Latin American countries with the broad objective of establishing a research project to aid in the increased utilization of Latin American forest resources. In each country we talked with the AID missions and with representatives of government and industry institutions in the forestry field. We were extremely pleased, throughout our trip, to find solid agreement on and an enthusiastic response to the objectives of the proposed research program and numerous offers to cooperate in the work.

The report gives our recommendations for research in two aspects of forest products utilization. As a result of earlier observations, we concentrated on these two aspects and our recent discussions in the countries confirmed that they require emphasis at this time.

The first is to increase knowledge of the forest resource, specifically by scientific identification of species and laboratory evaluation of the properties of the wood of authentically known species. It is not too much to say that ignorance of these properties now prevents, or at the very least, seriously hampers the full economic use of this resource, not only in the obvious case of the many species about which little or nothing is known, but even in the case of species already commonly used or exported. We are, therefore, recommending work in species collection-identification-wood property evaluation in the next 5 years in Peru, Brazil, Venezuela, Colombia, and possibly Ecuador. Peru, with a good head start in the collection work, provides experience to draw on and could also offer training in collection methods for the other countries.

We believe that a second line of investigation is needed on current utilization practices and potentials in these countries, not only to make use of the new basic knowledge to be gained of species properties, but also to outline other current needs for improving utilization in each country. An intensive study, country by country, is required of present processing and other practices in the forest industry itself and of the uses to which wood is now put in the domestic economy and as a product for export markets. Here, again, our observation is that almost everywhere the potential of the resource is not being realized owing to poor utilization practices and the very limited awareness of the advantages of wood for many purposes, as in housing. The type of study recommended would serve in each country as a guide for later specific projects to improve current practices involving training and building-up of institutions and agencies, further research, and other technical assistance to industry. We are recommending that these utilization studies be made in the same five countries, starting with Peru. As with the research on properties of species, country nationals and institutions would be involved to the greatest possible extent. It is hoped that these studies could be done in at least several countries within, say, 2 years, so that specific projects based on their findings could begin promptly thereafter.

We had hoped to be able to make rather specific arrangements for establishment of the project in particular countries. However, we learned early in our discussions that obtaining the necessary signatures on a formal document is a long-term project. Accordingly, we limited our efforts to obtaining verbal expressions of interest by officials at levels sufficiently high to give reasonable assurance of commitment, even though they might not be empowered to sign a formal document. In Peru, however, we went into considerably more detail, since the Peruvian Forest Service has been engaged in work of the same type for several years, is thoroughly experienced in it, and has great enthusiasm. We agreed with the AID personnel in each country that we would send them details of the proposed project which they could furnish to the interested agencies and by means of which they could conduct the negotiations necessary for completing a memorandum of understanding.

Included as an appendix to the report is an approximate budget. As you can understand, the figures therein are based on our best judgment at this time and cannot be considered as exact. We feel, however, that they furnish a suitable base for a preliminary evaluation of the project and perhaps for establishment of a PASA. We are proposing alternatives, should it not be possible to establish the full project at once.

Finally, as I told Mr. Bergen, we are extremely appreciative of the fine cooperation which, without exception, we received from all of the missions.

Sincerely yours,

Alan D. Freas

ALAN D. FREAS
Assistant to the Director

REPORT OF SURVEY TEAM

PROJECTED AID RESEARCH PROGRAM ON IMPROVED FOREST PRODUCTS UTILIZATION IN LATIN AMERICA

By

ALAN D. FREAS[1]
B. FRANCIS KUKACHKA[2]
and
EUGENE F. LANDT[3]

INTRODUCTION

This report presents recommendations to AID for a group of research projects to improve the economic use made of Amazonian and other forest areas of five Latin American countries (Peru, Brazil, Colombia, Venezuela, and Ecuador).

It is based on a survey in these countries by the authors in April-May 1965. Their aim was to learn where specific projects could be set up in the immediate future in collaboration with the forestry institutions of these countries.

Two approaches to the basic objective were discussed during the trip. The first involved the scientific identification of species and subsequent laboratory evaluation of selected properties of authentically identified wood samples, with particular emphasis on species of current commercial value and on properties directly related to potential uses. This type of work is basic to the intelligent utilization of the forest resource by providing the basic knowledge of wood properties essential for efficient use. This is necessarily a long-term project which will also have long-term benefits, but usable findings on wood properties would begin to be available after about the first 2 years.

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[1] Assistant to the Director, Forest Products Laboratory, Forest Service, U.S. Department of Agriculture, Madison, Wis.

[2] In Charge, Wood Structure and Identification Research, Forest Products Laboratory, Forest Service, U.S. Department of Agriculture, Madison, Wis.

[3] Principal Wood Technologist, Forest Service, U.S. Department of Agriculture, Washington, D.C.

The second involved investigations of the products for which timber species are now being used and of the technical level of utilization. Here, the emphasis is on assessing the efficiency of current uses and utilization practices in order to learn how much of the full potential of particular species and of the broad forest resource is actually being realized. This type of investigation is to lay the groundwork for later specific projects in technical assistance to the forest industries and in research. Such studies may be expected, in a relatively short time, to develop information on many of the needs of the forest industries and thus rather quickly to show where improvements in utilization could be made and the types of assistance projects required to do so.

It may be said that these approaches struck an extremely responsive chord with those visited. Enthusiasm was especially evident for the proposed work on identification of selected species.

It should be noted that this report, and the proposed program, deal only with utilization research aspects of the very broad problem of wise, productive use of Latin American forests. Other aspects, such as genetics, silviculture, reforestation, and inventory are beyond the scope of our assignment, although we recognize their importance. We should, however, point out that Part 1 of our proposal has important implications with respect to forestry. For example, work in genetics, silviculture, and reforestation should be directed toward those species of greatest utility--Part 1 of the program is designed to assist in directing foresters to such species. As another example, forest inventories based on local common names are likely to be misleading--Part 1 expands the base for proper botanical identification in the forest and thus enhances the opportunity for more meaningful forest inventories.

BACKGROUND

South America has the largest single forested area in the world, most of it inaccessible and remote from population centers and, hence, unused to a great extent. Much of the forest consists of heterogeneous stands with many species that so far have not found their way into the world market or into local utilization. In populated areas, the original forest disappeared generations ago because of the shifting-burning agricultural practices. As a result, the land has been seriously denuded and damaged, and erosion is a major problem. The native forests have been replaced to a minor degree by exotics, and much of South America will have to depend increasingly on plantation-grown trees. In areas where native species are used, only a

few have an important local market, and this is based largely on their reputation for durability. There are undoubtedly many other species with similar durability which could serve the same purposes but which are not now used,as well as many nondurable species which could be treated and rendered equally useful for many purposes. At the present time, South America is a net importer of wood products, primarily in the form of pulp. With improvement of forestry and forest products utilization practices, it could become a net exporter.

The existence of this tremendous resource and the relatively small contribution it makes, currently, to the economy of the South American countries excited the interest of AID and the U.S. Forest Service--an interest which extends back several years. Accordingly, in 1962, at the request of AID, Dr. B. F. Kukachka and Dr. J. F. Saeman, both of the Forest Products Laboratory, Forest Service, USDA, visited several countries of Latin America to study the broad problems of forest products utilization in Latin America with a view to recommending research projects which could attack these problems and lead to improved utilization of the vast forest resources of the region. The details of their observations are recorded in "Report on Investigations in South America Related to the Projected AID Program in the Field of Forest Products Utilization."

The report recommended establishment of three research projects. These were:

Project 1 Research on little-known timber species of Latin America in relation to their industrial utilization locally and abroad.

Project 2 Studies on the preparation of high yield pulps.

Project 3 Forest products utilization research and marketing in Venezuela.

The first contemplated collection of herbarium and wood samples in various countries. From the herbarium samples, exact botanical identification could be made. Selected properties would be evaluated on the wood samples to provide indications of potential uses. This project thus would provide initial information on a variety of species which would indicate those species on which more extensive evaluation for particular uses was justified. It would provide, thus, the foundation for rational utilization.

The second project contemplated research by a Latin American specialist on a pulping research project of specific interest to Latin America. The work,

to be done at the Forest Products Laboratory in Madison, would not only provide research results of direct usefulness, but would provide training to improve the technical competence of a South American.

The third project contemplated assignment of an American utilization specialist to one country to determine the important needs for technical information in the principal wood-using industries of Venezuela and to determine to what extent the marketing situation might be improved. The man would assist in the development of a unit within the country to serve as liaison between research and industry and to assist in solving the technical problems of industry.

The Forest Products Laboratory was assigned responsibility for developing, with AID, a research program based on the findings of the Kukachka-Saeman report. After a period of discussion and development, arrangements were made for a trip to discuss the program with possible cooperators in the countries concerned. An airgram (Appendix 1) was sent to several countries to inform them of the proposed trip and its purpose and to confirm country interest.

The authors of this report were selected as members of the team to make the trip. Their itinerary is given in Appendix 2.

The report describes briefly the results of the team's interviews at various locations, their conclusions from these interviews, and their considered recommendations for establishment of a research program.

SUMMARY AND RECOMMENDATIONS

The team visited some 25 institutions located in 13 cities in 7 countries. The results of our interviews are given in Appendix 3. This section of the report, therefore, gives only our broad reactions and the recommendations resulting from them.

Throughout the trip, we found agreement that the greatest deterrent to increased utilization of the Latin American forest resource was the lack of knowledge of the resource, in terms of both quantity and properties (i.e., of both available volumes of various timber species and the properties of the wood of each species). The first has been recognized as indicated by the presence of several UN Special Fund Projects to survey the timber resource in specific areas. The second, however, has been recognized but acted upon only to a limited degree. At a number of locations, attempts are being made to evaluate properties of various species. In many cases,

however, the value of the work is negated by inexact identification of the material being evaluated.

The concept of studies on species identification and the evaluation of wood properties, advanced by Kukachka and Saeman in their 1962 report was therefore confirmed and substantial enthusiasm was found in every country visited. Some individuals were concerned about the difficulty involved in the collection of flowers and fruit from large trees. We recognize the problems, of course, but such collection work is being done regularly in Peru and has been done over the past 4 years. The Peruvian Forest Service has developed the necessary techniques and equipment and would be a good source of training for personnel of other countries.

Our brief views of the wood-processing industry, and conversations with various individuals, led us to the conclusion that considerable study of utilization practices and potentials is also justified on a country basis. Such a study in each country would provide a valuable base for future work by AID missions in providing technical assistance and in uncovering complex problems which require detailed research. That is, after study requiring about 2 years in each country, it could provide a base for future assistance and for future research projects to promote more efficient and productive use of forest resources.

Accordingly, we recommend a two-part program summarized in the following pages and given in detail in Appendices 5 and 6.

Part 1 - Collection, identification, and evaluation of Latin American timber species

Phase A - Collection. --Collections of complete herbarium material and wood samples will be made by local agencies. The country would agree to furnish competent personnel. Funds to cover necessary expenses--salary, transportation, overhead, and special equipment as needed--would be furnished in part by AID and in part by the country. Costs will undoubtedly vary by country, but as a general guide, the costs of the current collection project in Peru using PL-480 funds are on the average of $20,000 per year, including first-year expenditures for equipment. Detailed cost estimates for each country should be obtained by the AID Missions after review by the local agencies of the detailed proposal for the Part 1 work (Appendix 5).

Exact collection locations will depend on obtaining agreement from countries. Tentatively, we suggest the following:

Amazon Basin: Currently represented by seven collection stations at different elevations in eastern Peru under supervision of Servicio Forestal y de Caza. Peruvian data will be applicable to much of Amazonian Bolivia, Brazil, Ecuador, Colombia, and Venezuela. Additional collection stations should be established at Manaus (Central Amazon) under the direction of Instituto Nacional de Pesquisas da Amazonia (INPA) and in the Belem area under direction of Instituto de Pesquisas e Experimentação Agropecuárias do Norte at Belem. Industry cooperation is anticipated at Manaus and Belem, Brazil, and at Iquitos, Peru.

Pacific slope of NW South America: Forest type of similar composition extends from NW Peru to Costa Rica. Collections are now under way in the Tumbes Department of Peru and additional sites should be established in Colombia and Ecuador. Industry cooperation is anticipated in the Tumaco and Buena Ventura areas of Colombia and very probably also in NW Ecuador.

Venezuela: The Amacuro Delta in particular and possibly also the Guayana highlands. The latter area has been investigated by the Forest Products Laboratory in Merida and tests made on 100 trees. However, complete herbarium materials were not collected from each tree nor were all the trees of commercial size.

Phase B - Identification

Multiple sets of herbarium vouchers will be submitted to the Forest Products Laboratory, Madison, which in turn will distribute them among the principal herbaria of the United States. Duplicate sets will also be maintained in the country of collection. Exact botanical identification will be made by specialists in the family involved (difficult groups as the Sapotaceae) or by specialists on the flora of the country in question.

Phase C - Evaluation

Technically unknown timbers. --We recommend that preliminary evaluations on all samples be made at the Forest Products Laboratory, Madison. We recommend, further, that a consolidated presentation of results be made by means of periodic progress reports by the Madison Laboratory. In order to develop or improve competence within the countries in evaluation procedures, we recommend that personnel from each country with the proper basic technical training be assigned to the Madison Laboratory to participate directly in the evaluations under the supervision of Forest Products Laboratory specialists and thus to learn in detail the necessary procedures. This

training can then serve as the basis for training of others when they return to their home laboratories. Their participation would not be limited to the preliminary evaluation, but would include also the more complete evaluations mentioned below.

Evaluation (timbers currently utilized). --In a number of instances, certain species are currently used to a greater or lesser degree so that at least general information is available, or preliminary data are available from some source. Generally, however, full data are not available to permit broad-scale utilization. Examples of such species are the so-called "virola" which finds considerable use currently in the U.S. and Peruvian mahogany.

In such instances, we would eliminate the preliminary evaluation and go directly to a relatively full-scale evaluation. We would, of course, still require complete botanical materials to be taken from each of five trees of each species selected. Evaluation would include strength properties, durability, machinability, seasoning, and veneering as required for projected uses.

Initially, we recommend:

Swietenia, Juglans, Ceiba, Virola and Amburana from eastern Peru; Dialyanthera, Brosimum, and Campnosperma from Tumaco area of Colombia and NW Ecuador; and Virola from the Belem area of Brazil and from the Amacuro Delta of Venezuela.

Supplemental Notes on Part 1

In some instances, training in collection procedures will be required as will also training in evaluation procedures. In the case of the former, we believe that this can be accomplished through participation by country trainees with established collection parties in Peru. In the latter case, we believe that training, together with production of results, could best be accomplished by sending a series of men from each country to Madison to actually make the evaluations on woods from their countries under the supervision of Forest Products Laboratory specialists. We would suggest 1 year per man, at which time he would be replaced by another man. The men selected should be either wood technologists or engineers with training or experience in wood.

Administrative control would be maintained through semiannual progress reports and through periodic on-the-ground inspection trips by FPL staff personnel.

Preliminary evaluation studies could be initiated at Madison rather promptly on the wood of 45 trees collected under the current PL-480 project in Iquitos, Pucallpa, and Tingo Maria, Peru. These woods are currently enroute to Madison.

A minimum period of 5 years is suggested for Part 1. This period is suggested as the minimum in which usable results in suitable volume could be produced. This comes from the fact that considerable time is involved in the collection phase alone. Even after trees are selected and marked in the forest, it is necessary to wait for the flowering and fruiting phases in order to collect the flowers and fruits (vital parts of the herbarium collection) before felling of the tree. Thus, a tree may have to be observed for a year or more before full collections are possible. With the time thus involved, together with that involved in preparation and shipment of samples, it is felt that evaluations on a significant number of species could not be accomplished in less than 5 years, although some results would undoubtedly become available in 2 years or so.

A longer period for the project would, of course, be desirable, and one could argue convincingly for a project period of 10 years. To some degree, however, AID support for the project can be considered as a catalyst to get the work under way on a sound basis and the hope is that the countries would carry on after cessation of AID support. This is, we think, more than a vague hope, based on experience in Peru. There, after experience under a PL-480 project, the Peruvian Forest Service planned to continue the work after the PL-480 funds ran out. Their activity would necessarily be at a reduced level, but the important point is their determination to continue.

For reasons explained in Appendix 5, we recommend that evaluation tests be made at Madison. We feel, however, that this part of the activity should ultimately be taken over by the countries concerned. Here again, we view the proposed project as a catalyst, and it is for this reason that we suggest active participation at Madison by country personnel to provide needed training. Venezuela has a going forest products laboratory (under-staffed, to be sure) and Peru has one in formation. Both would benefit importantly from such training and would be in a position to carry on the evaluation work after the project closes. The other countries do not have national laboratories, but possibly other institutions, such as the Technological Research Institute at São Paulo, could become involved.

The proposed 5 years of research would, at the end of the project, produce substantial benefits covering a wealth of information obtained in a relatively short time at a relatively small cost in proportion to the value to be derived both currently and in the future:

(a) Technological and botanical data on a number of species now in commercial use but on which data are partially or completely unavailable. Such data will permit more intelligent and efficient use of the species and may point to additional uses and hitherto untapped markets.

(b) Technological and botanical data on unknown species of commercial size which, on the basis of local knowledge, seem to occur frequently in the forest. Such data will point the way to potential uses.

(c) Technological and botanical data on unknown species of presently unknown frequency which, again, will point to potential uses.

(d) A team of well-trained people in each country with the skills and incentive to extend the work after the project closes.

(e) The data mentioned in (a), (b), and (c) will provide materials and information on timber which is basic to all phases of forestry research. Forest inventories and preinvestment surveys are generally impractical without precise botanical knowledge, and forest management, production, and marketing cannot function properly without knowledge of wood properties.

(f) Wood properties evaluation studies which would indicate the best course for future or more intensive research for local laboratories already established or for those contemplated.

(g) Personnel in each country who are intimately associated with the project would of necessity and automatically become highly proficient in the dendrology of their area, and undoubtedly would be the personnel involved in preinvestment surveys and timber inventories.

(h) Wood and herbarium specimens would provide material for the training of foresters and botanists of the country. Authentic materials of this type are generally unavailable at the present time.

(i) Collected materials would be of long term utility and available to specialists, students, anatomists, and others for the purposes of monographic studies, development of local and regional floras, and studies in systematic anatomy. Because the herbarium material and wood specimens would be housed in the botanical institutions of the country under consideration as well as the major institutions of the United States, Europe, and the Orient, they would be available for study on a world-wide scale. Herbarium and

wood specimens can last indefinitely if properly cared for, and this is attested to by the fact that such materials over 200 years old are in existence and are still in excellent condition.

Note on Peru

Peru may be considered a pilot country. The experience it has gained during the past 4 years will be used to advantage in getting the work started. For example, we are requesting that the final report of the present Peruvian PL-480 project contain a section which can be separately published, and which will describe in detail the procedures they have used in their collection work. This, in conjunction with direct training, will provide invaluable assistance to other countries.

Considering the work already accomplished in Peru, the end of a 5-year AID project will effectively mark the end there of 10 years of work. At the end of this period, we may expect to have: complete data on the wood properties of perhaps five currently used, but not technologically studied, species; preliminary data on perhaps 500 species; and more complete data on a number of species indicated earlier as prômising from the preliminary data.

Part 2 - Inventory of forest products utilization practices and potentials in selected Latin American countries

It is axiomatic that a full library of fundamental information on properties of forest tree species will not insure utilization either of the information or of the forest resource itself. We recommend, therefore, that a man with broad background in forest products utilization be stationed at a suitable location in Latin America to study and to report fully on current utilization practices and on presently unrealized potentials in selected countries. His work would provide a basis for applying the fundamental information to be derived from Part 1, as well as outlining other needs for improving utilization in each country.

The basic job would be to determine, in at least a broad way, the uses to which wood is now put, the species currently used for various applications, applications in which wood might be used but is not now, techniques currently used in wood processing and deficiencies in such techniques and hindrances to expanded use in the form of laws, taxes, regulations, and tradition.
We do not feel that we can now, on the basis of our survey, set out a detailed plan of work. We would, therefore, propose to lay down broad guidelines and permit the individual selected to develop a detailed working plan after some on-the-ground investigation.

We would, of course, like to see such a study conducted in the five countries being considered--Venezuela, Colombia, Ecuador, Peru, and Brazil. However, the magnitude of the task and the best method of attack are not immediately apparent. Accordingly, we recommend that initial effort be in Peru, with headquarters in Lima. The man selected should have 3 to 6 months to develop a specific plan for this work in Peru and to recommend the number of people required to accomplish the task within a reasonable period--say 2 years. The location of additional men, if any, would be based on his recommendations. After some experience with the utilization study in Peru, the investigation could be extended to the other four countries.

Although it is difficult to predict probable progress, we would, at this time, suggest a period of about 2 years for each country for Part 2.

We would expect Part 2 to produce, for each country:

(a) A more complete knowledge of the species now being used by forest products industries, and the applications and products to which the species are being put;

(b) An evaluation of utilization techniques in existing forest products industries;

(c) A knowledge of the industries needing specific kinds of technical assistance;

(d) A knowledge of potential uses for wood not currently being exploited;

(e) Proposals for additional research in forest products utilization;

(f) In some cases, an analysis of existing problems and proposed solutions. That is, a problem may be so clear and enough information may be already available to make it feasible to prepare an analysis and proposals for solution; in effect, a small-scale assistance project as a side issue of the main project and a demonstration of the efficacy of such assistance.

Obviously, some results from this research will appear during the conduct of the study and could be put to use prior to completion of the study. For example, as the study progresses, needs for technical assistance may become apparent which can immediately be proposed to the AID Missions.

SUGGESTIONS FOR IMPLEMENTATION OF THE PROPOSED RESEARCH

As indicated earlier, the Forest Service team did not obtain final commitments as to implementation of the research program described. From our standpoint, such commitments were impossible, lacking final AID approval and funding of the program. From the standpoint of those to whom we talked, a commitment was not possible without going through a considerable number of time-consuming formalities. Thus the problem remains of reaching agreement between the Forest Service and AID as to the scope of the program and then of arranging with the countries involved for cooperation in the work. This section of the report deals with possible ways of solving this problem.

AID-FOREST SERVICE AGREEMENT

General Features

The Forest Service has already agreed informally to furnish technical and administrative supervision over the program, and agreement within most echelons of the Forest Service has been reached as to the desirability and feasibility of the proposed research. The Director of the Forest Products Laboratory has agreed informally to undertake the proposed evaluation and training aspects, assuming AID funding of all costs.

Budget

An exact budget cannot be developed without detailed review of the requirements by the countries involved to permit them to estimate their costs. For purposes of discussion, and perhaps even for development of a PASA, an approximate budget for the full program as we now envision it has been developed and is shown in Appendix 7.

Priorities

It may be that this program cannot be supported, for budgetary or other reasons, in all five of the countries mentioned earlier. We have, accordingly, developed priorities as among these countries for the Part 1 work. The reasoning behind these priorities is given below. An alternate budget covering

establishment of Part 1 in three (instead of in five) countries is given in Appendix 8. We assume that Part 2 will be implemented for the same groups of three or five countries in which the Part 1 work is done.

Priority 1 - Peru. --Peru is given first priority because it has been conducting a herbarium and wood collection project for the past 4 years and material is now available for preliminary evaluation of unknown and little-known species and also for comprehensive testing of those species which are known to the lumber trade but which have not been tested. Briefly summarized, in Peru 560 trees are marked for collection; herbarium collections have been made from 346 trees; complete collections are available from 152 trees; wood specimens are available from 99 trees; wood from 43 trees is at the Forest Products Laboratory. Three collection areas are in the Amazonian lowlands at Iquitos, Pucallpa, and Tingo Maria. Two stations are at somewhat higher elevations in the Amazon at Chanchamayo and Satipo. One station is located in northwestern Peru on the Pacific slope.

Training of personnel in wood evaluation could be initiated at Madison with the individuals working with the wood specimens becoming available from Peru. This would be of immediate benefit to the newly organized Peruvian Forest Products Laboratory (Instituto de Investigaciones Forestales) at La Molina which is as yet not doing testing work, but will be equipped to do so in about a year or so.

Information about the woods of the Peruvian Amazon would be of immediate commercial benefit to the wood-using industry of the Pacific coastal region of Peru because, with completion in less than 1 year of all-weather highways now being built, lumber can be brought into Lima and other western markets more cheaply, and information regarding its properties will be essential. Previously, only the more costly timbers, such as mahogany, cedar, and walnut, could economically be brought into the Lima market. The completion of these road links will encourage also a rapid development of the lumber industry in interior cities and towns--in Pucallpa and Tingo Maria as well as southward toward Cuzco.

Because of the experience gained by the various collection units in Peru, they are in a position to serve as training centers for collectors from other countries participating in this project.

Priority 2 - Brazil. --In the Brazilian Amazon, the most important producing region at the present time is in the Amazon Delta (Belem area). Collections

of timber species for an evaluation of technically unknown species, as well as an evaluation of commercially used species, could be conducted here by the Instituto de Pesquisas e Experimentação Agropecuárias do Norte. This Institute is well versed in herbarium collection procedures but has not collected from commercial-sized trees. They have also outfitted and led numerous collecting expeditions in the Amazon area (particularly for the New York Botanical Garden) and are well qualified to perform the work.

The Amazon Delta is, at present, the principal timber producing region, in terms of volume, of the entire Amazon Basin. Numerous small producers are located here, but the largest are two American firms, Madeiras Tropicais and Companhia Amazonas. The former is producing lumber only, while the latter produces both lumber and veneer. The very large firm of Bruynzeel (Dutch) will soon start construction of a large veneer and plywood plant which is expected to be the largest in the region. Production in the region is based on Virola, represented by several species which are practically unknown technically although they are in great demand in the United States. The Forest Products Laboratory receives requests, almost daily, from U.S. dealers and manufacturers for information relative to these species. However, for all practical purposes, this information is not available. It is recommended that a comprehensive testing program be initiated on the Delta species of virola, in addition to the limited evaluation survey of lesser known or unknown species. Note: Clarification is needed here between the terms "virola" and "Virola." In the U.S. lumber trade, the term "virola" applies to the wood of the genus Dialyanthera originating in southwestern Colombia. The term "Virola" is the name of the botanical genus Virola which comprises a group of species native to the Amazon Basin.

Collections of wood and herbarium material are being made in the Manaus area by the National Research Institute of Amazonia (INPA) but the herbarium materials are generally not complete and the trees are of a diameter considerably below that desirable for wood evaluation studies. Very little effort would be required here to initiate the marking of trees of required quality and dimensions and wood collection could begin approximately 8 months after the project is started. The project in this area would be limited to an evaluation survey of little-known or unknown species.

Priority 3 - Colombia. --Colombia has no established research unit in the Amazon at the present time, although the Instituto de Ciencias Naturales de la Universidad Nacional is in the process of developing a unit at Leticia. This city is on the Amazon in extreme southeastern Colombia at the junction of Brazil and Peru. Establishment of the project in Colombia could aid materially in the development of this Colombian unit and add a much needed collection area to the project.

Aside from the Amazon, the other area of Colombia which should be included for collection is the area around Tumaco on the Pacific slope in southwestern Colombia. Appreciable quantities of virola (Dialyanthera) lumber and limited quantities of sande (Brosimum) and sajo (Campnosperma) are exported to the United States at the present time. Because these species have not been investigated, we would recommend full-scale testing of these species at the Forest Products Laboratory at Madison.

Portco Colombiana S.A., a lumber company in this area, has offered full cooperation and use of its facilities for felling and transportation, should collections be made in the Tumaco area.

Priority 4 - Venezuela. --FAO is currently conducting a survey under the United Nations Special Fund in the Guayana Highlands. The Forest Products Laboratory at Merida has completed mechanical testing of 100 trees from this region although, unfortunately, the herbarium material has generally been inadequate for accurate species identification.

We would recommend that AID emphasis be placed on the Amacuro Delta and extensive collections of Virola be made there. This area is not being exploited at present, but judging from the demand for this wood it will soon be ripe for development. Complete herbarium materials would be required and a comprehensive testing program carried through at Madison. Facilities at the Merida Laboratory are, as yet, not adequate nor are they sufficiently staffed to carry out a comprehensive testing program.

Priority 5 - Ecuador. --FAO is currently conducting a forest survey in the Esmeraldas Department under a United Nations Special Fund Project. They contemplate making complete herbarium collections and collecting wood specimens from these accurately identified trees for wood testing. They are following the program developed by Dr. Kukachka for FAO in Guatemala.

Whether the AID project could extend cooperative effort to this FAO project is not known. If collections of virola, sande, and sajo could not be made in the Tumaco area of Colombia, they could be made in Esmeraldas. Perhaps FAO could make the collections and testing could be done at FPL under AID sponsorship.

Notes on priority statements. --The first two priorities are quite evident. More difficulty is found in assigning additional priorities. Actually, it is our feeling that Colombia and Venezuela are much on a par. The decision to give Colombia the higher priority was based largely on the fact that imports to the

U.S. are much more important from Colombia than from Venezuela, although the Amacuro Delta has a high potential. Additionally, Venezuela already has some work under way.

Virola has been mentioned on a number of occasions as needing to be comprehensively tested. The reason for this is that the species supplying the U.S. market are specifically unknown (botanically), as well as mechanically and physically. It seems apparent that a number of species are involved and this perhaps accounts for the opinion of users in this country that virola from one given area is superior to that from another.

AID-FOREST SERVICE-COUNTRY AGREEMENT

General Features

As indicated in the report, general verbal agreement to cooperate was obtained during the trip, with some additonal detail in the case of Peru. With this agreement in principle, we do not anticipate serious difficulties in reaching formal agreement. Once AID-FS agreement as to nature and extent of the project is developed, country negotiations can be undertaken.

Mission Funding

At most country missions, we were told directly or by inference that their funds were fully committed and that they hoped that the project would not be established on research funds and later transferred to mission funding.

Preliminary Negotiation Through Missions

The missions seem agreeable to conducting preliminary negotiations with the appropriate government agency, generally the Ministry of Agriculture. We therefore suggest that copies of Appendix 5 be sent to the mission in each selected country for review by the Ministry or other groups. This should be accompanied by a request for certain items of information, such as proposed collection areas, estimated yearly costs, percentage of costs to be absorbed by the country, training requirements, and the like. A draft memorandum of understanding should be sent as a basis for negotiation. The Forest Service will be glad to work with AID in developing the necessary documents.

Final Negotiations

Questions may develop as to intent and procedures during the negotiations. If necessary, the Forest Service will be glad to furnish personnel to assist in final negotiations in the country.

APPENDIX I

EXPLANATORY AIRGRAM TO AID MISSIONS

AIRGRAM

DEPARTMENT OF STATE

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FROM - AID/W

SUBJECT - Survey trip to select project headquarters location (in one of five LA countries) for research to promote utilization of Latin American forest tree species by wood-using industries

REFERENCE - AIDTO Circular XA-919 (2/27/64 to Caracas, Lima, Rio de Janeiro, Santiago); Caracas TOAID A-573 of 3/31/64; Lima TOAID A-1104 of 3/31/64; Rio TOAID A-1356 of 3/11/64; Santiago TOAID A-953 of 4/8/64

1. AID/W is negotiating an agreement with the Forest Service, USDA, for a regional research project on Latin American forest products. The decision to go ahead with this research is based in part upon the findings of the earlier preliminary survey (see reference airgrams) which stressed the need for work on properties of tree species and on promoting their utilization, and review of LA institutions in forestry field in four countries (Venezuela, Brazil, Chile, Peru) (Ref Circular). The proposed project has been reviewed and approved by the AID Research Advisory Committee and would be funded from the interregional research allotment.

2. The initial action under the agreement is a survey trip to select the country where the research would take place, and to develop detailed plans and arrangements for starting the work. In selecting the research site, such factors will be weighed as the country's forestry institutions' desire for the project, opportunities for collaboration with local institutions in research and training, availability of laboratory and related facilities, opportunity for undertaking research broad enough in scope so that the results of the work in the selected country will be applicable to similar problems in other LA countries, etc. The USDA survey group will select the country after visiting all five of the countries (listed in par. 3) and consulting with the USAIDs concerned, and cable its recommendations to AID/W. Assuming AID/W concurrence, the survey group would work out detailed project arrangements with USAID in the selected country before returning to U.S. Field work would begin early FY 66.

PAGE 1 OF PAGES 6

DRAFTED BY	OFFICE	PHONE NO.	DATE	APPROVED BY:
SMBergen:cjc	TCR/ORA	8306	2/26/65	David Tilson, TCR/RA

AID AND OTHER CLEARANCES

THHiller, LA/ID
THazard, LA/ID
CKincaid, LA/TEX
[illegible], LA/CMR
SKoskoritz, LA/CV
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3. The countries to be visited for this purpose are Venezuela, Peru, Brazil, Ecuador and Colombia. The first three of these have already indicated interest in the proposed research project, in the replies made to Ref Circular. (Chile was among those queried, but USAID Santiago advised that proposed work would overlap there with a new FAO program). Ecuador and Colombia were not visited in the preliminary survey (par. 1 above) or queried in Ref Circular, but are considered possible locations for the proposed activity. USAIDs Quito and Bogota are requested to consider possibility of establishment of the project in their countries, which the USAIDs could discuss with USDA survey group during its proposed stops in Quito and Bogota.

4. The group also plans to stop in Mexico City, Guatemala City and San Juan, in order to visit (a) current forestry projects relevant to the proposed work and (b) established laboratories whose facilities might be used on a contract basis for the evaluation of properties of wood samples.

5. Project Objectives. The project has the following specific objectives:

(a) To determine the characteristics of various forest species and the products for which they can be used.

(b) To study and evaluate means of utilizing the research information developed under Item 1 and from other sources for the benefit of the forest products industries.

Very briefly, under Item 1, the project will collect herbarium material (flowers, fruit, leaves, and bark) to permit exact botanical identification of species and samples of the wood, on which small-scale screening evaluations will be performed to obtain an indication of properties and thus of potential uses. Large-scale evaluations will be made for the more promising species. In connection with Item 2, the project will survey the principal wood-using industries in one or more selected Latin American countries with respect to their more important needs for technical information and will study means for interpreting research information in terms of industry needs and of imparting it to industry.

6. Survey Team. In addition to selecting the country for conducting the research, the USDA group will develop a detailed plan of operations and investigate laboratory facilities in several countries in case species evaluations would need to be made outside the headquarters country.

It is anticipated that the USDA survey group will consist of Alan D. Freas, Assistant to the Director, Forest Products Laboratory, Forest Service, USDA (in charge of group), Dr. B. F. Kukachka, in charge, Wood Structure and Identification Research, Forest Products Laboratory, and Eugene F. Landt, Principal Wood Technologist, Division of Forest Products and Engineering Research, U. S. Forest Service, Washington, D. C.

Tentative plans call for them to leave the United States sometime during the latter part of March. A very tentative itinerary is attached, with departure date of March 15. This date could be postponed to March 22 or March 29.

Their first stop will be at each USAID to discuss the proposed project and arrangements for contacts within the country. Regarding the latter, group would explore the project with appropriate government agencies to gage the needs for and interest in the project and the degree of cooperation which may be expected. Since some laboratory work will be required, they will want to visit university and other laboratories to evaluate their equipment and capabilities. In addition it would be desirable for them to visit a few typical wood-processing plants such as sawmills, veneer and plywood plants, preservation plants, furniture factories, and the like.

7. Cable reply is requested with USAID comments on the itinerary attached. It is requested that the USAIDs concerned make some advance arrangements so that the group can see appropriate persons and installations. This tentative itinerary lists a number of proposed contacts the group feels should be made. Additional suggestions as to such contacts by USAID would be appreciated, along with any comments on timing of group's visit in relation to USAID's convenience, time required for the proposed visit in the country and for travel, and the like.

The USAID is requested to supply transportation (or to facilitate its procurement) for the group's visit, and, similarly, to help the group procure the services of an interpreter as needed. The group will have funds with which to pay for these services, in cases where funding by the Mission is not possible.

NOTE: The proposed survey of Latin American woods is consistent with the research objectives as identified by the National Academy of Sciences Task Force, which investigated the potential location for ecologically based agricultural research-training institutes within the American tropics. Any recommended location and research program arising out of the Forest Service survey would necessarily, therefore, be fully coordinated within the broad program outlined by the Task Force in its recent proposal to A.I.D. for the creation of a Tropical Research Foundation.

TENTATIVE ITINERARY
USDA SURVEY GROUP

March 15	Travel Madison-Mexico City
16, 17	Visit Instituto Nacional de Investigaciones Forestales, Progreso S. Roberto Villasenor, Director
18	Travel Mexico City-Guatemala City
19, 20	Visit
	Centro de Investigaciones de Ingeniera, Universidad de San Carlos Emilio Beltranena Mathen, Coordinator General
	UN Forest Survey of El Peten Department, R. C. Wilson, Co-director
21	Travel Guatemala City-Caracas
22	Visit AID Office, Caracas
23	Travel Caracas-Merida
24, 25	Visit
	Laboratorio Nacional de Productos Forestales Pausolino Martinez, E., Director
	Instituto Forestal Latino-Americano Rafael E. Viloria Diaz, President
26	Travel Merida-Caracas
27	Travel Caracas-Bogota
29, 30	Visit
	AID Office
	Instituto Investigaciones Tecnologicas Calle 13, #15-61, 5° Piso Contact, Hernan Caceres Rojas
March 31	

April 1	Travel Bogota-Medellin
April 1	Visit
	Facultad de Agronomia National University of Colombia Dr. Carlos Garces
	Return Medullin-Bogota
2	Travel Bogota-Quito
	Visit AID office
	FAO Forest Survey
4	Travel Quito-Lima
5, 8	Visit AID office
	Peruvian Forest Service, Flavio Dazan, Chief
	Instituto Investigaciones Forestales Universidad Agraria y la Molina Luis F. Galvan, Director
	FAO Forestry School Project John Yaworsky, Director
9, 12	Travel Lima-Iquitos
	Visit Forest Service Ranger School and Industry
	Travel Iquitos-Lima
13, 14	Conferences AID and others
15	Travel Lima-Rio de Janeiro
16	Visit AID office
19	Visit Jardim Botanico
20	Travel Rio-Sao Paulo, visit AID office
21 ,23	Visit
	Instituto do Pesquisas Tecnologicas Dr. Francisco Maffei, Director and Dr. Edgard Ghilardi, Chief of Wood Technology Division
	Instituto Botanico Dr. Alcides R. Teixeira, Director

April 24, 26	Travel Sao Paulo-Rio and further discussions with AID
27	Travel Rio-Manaus
28	Visit Instituto do Pesquisas Florestais, Dr. Djalma Batista, Director
29	Travel Manaus-Belem
April 30, May 3	Visit Instituto Agronomico do Norte and Goeldi Museum, perhaps industry
4	Travel Belem-Trinidad, San Juan, Puerto Rico
5, 6	Visit Institute of Tropical Forestry Dr. Frank Wadsworth, Director
7	Travel San Juan-Madison

RUSK

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GUATEMALA CITY
CARACAS
QUITO
BOGOTA
LIMA
RIO DE JANEIRO

APPENDIX 2

ITINERARY OF FOREST SERVICE TEAM

April 8, 1965	Madison, Wis. - Washington, D.C. (Kukachka, Freas)
April 10	Washington, D.C. - Mexico City, Mexico (Kukachka, Freas, Landt)
April 13	Mexico City, Mexico - Guatemala City, Guatemala
April 15	Guatemala City, Guatemala - Caracas, Venezuela
April 21	Caracas, Venezuela - Bogotá, Colombia
April 23	Bogotá, Colombia - Medellin, Colombia and return
April 25	Bogotá, Colombia - Quito, Ecuador
April 27	Quito, Ecuador - Lima, Peru
April 29	Lima, Peru - Iquitos, Peru
May 1	Iquitos, Peru - Lima, Peru
May 6	Lima, Peru - Rio de Janeiro, Brazil
May 9	Rio de Janeiro, Brazil - São Paulo, Brazil
May 10	São Paulo, Brazil - Rio de Janeiro, Brazil
May 11	Rio de Janeiro, Brazil - Manaus, Brazil
May 12	Manaus, Brazil - Belem, Brazil
May 15	Belem, Brazil - Caracas, Venezuela
May 16	Caracas, Venezeula - Merida, Venezuela
May 18	Merida, Venezuela - Caracas, Venezuela
May 19	Caracas, Venezuela - Washington, D.C. (Landt) and Madison, Wis. (Kukachka and Freas)

APPENDIX 3

APPENDIX 3

SUMMARY OF INTERVIEWS

Given in the following sections are summaries of information obtained at the various locations. A complete list of institutions and individual contacts is given in Appendix 4.

Mexico

A short stop was made in Mexico City to see whether, as part of the proposed program, arrangements could be made for evaluation of wood samples from various countries by Mexican laboratories on a contract basis.

In addition to the AID Mission, we visited two Mexican institutions. The first, Instituto Nacional de Productos Forestales (National Forest Products Institute) is under the Subsecretary of Forestry and Wildlife Resources which in turn is under the Secretary of Agriculture and Livestock. Only about 20 percent of its funds, however, come directly from the Mexican Government. The balance comes from contract work with industry. They currently have UN Special Fund financing to expand their forest survey work and are presently negotiating a Special Fund project for experts, fellowships, and equipment. In addition, they have several bilateral agreements (all with European countries) under which experts are assigned to assist them.

Their professional staff numbers approximately 45. Their interest in improving the competence of this staff is indicated by the fact that they generally have from 11 to 13 people overseas for advanced training.

The Institute is divided into four departments--Wood Technology, Photogrammetry and Forest Inventory, Economic Social Studies, and Biosilviculture. The one of greatest interest to us, of course, was that on wood technology, which includes 5 sections--Anatomy and Identification, Physical and Mechanical Testing, Chemistry, Drying, and Preservation.

We were extremely interested to learn that all samples brought to the Institute for evaluation were accompanied by herbarium material so as to permit botanical identification of all test material. Unfortunately, they do not always collect full herbarium material, so that exact identification is not always possible. However, they recognize the need for a knowledge of the material they are evaluating. This, of course, is directly in line with the projected AID program.

Testing equipment, dry kilns, conditioning chambers, and the like appeared to be adequate for evaluations contemplated in the proposed AID program except that they are unable to undertake studies in the field of pulp and paper. Evaluation of mechanical properties is currently done under the continental European (Monnin) system, but they are in the process of changing over to the United States (ASTM) system.

The Director-General, Roberto Villasenor, expressed willingness to cooperate by making evaluations of wood properties under contract. He agreed to use the ASTM system for mechanical properties if such a contract should develop.

The second institute, Instituto Mexicano de Investigaciones Tecnologicas (Mexican Technical Research Institute) is a private organization. It was set up in 1950 by several banks concerned with development in Mexico. About two-thirds of its budget comes from contract work, the balance from the sponsoring institutions.

The only interest of the Institute relating to wood was in the field of pulp and paper. They seemed to have a rather complete pilot plant for pulping and for bleaching but, having no paper machine, could make only handsheets. They do, however, have facilities for making the usual physical tests on paper, including an air-conditioned room in which to make the tests.

They indicated an interest in doing contract pulping research.

Guatemala

A stop was made here to learn more about a current forest inventory project. This is a UN Special Fund project, located in Guatemala City, charged with a forest inventory of the El Peten district of the country. Coincident with the forest survey, complete herbarium material from a number of trees in El Peten will be collected, along with wood samples from the same trees. Evaluation of a limited range of properties of the wood will be made at San Carlos University in Guatemala City. Thus, a project is being instituted which is similar to that which the Forest Service team is considering for other Latin American countries. This project, developed for them by Dr. Kukachka, will be on a relatively small scale because of limited personnel.

The Engineering Studies Center of San Carlos University appears to have adequate equipment for making small-scale evaluations, such as density,

strength properties, and the like. Unfortunately, they have no conditioning facilities so that evaluations must be limited to the green condition. They do use the American (ASTM) system of testing.

Caracas, Venezuela

The most important contact in Caracas was with Sixto J. Perrichi, Chief of the Venezuelan Forest Service in the Ministry of Agriculture. After an explanation of the proposed project, Mr. Perrichi expressed great interest in the value of the work and agreed to furnish qualified personnel to make the collections. He indicated that the work would be under the direction of Dr. Lasser, Director of the Botanic Garden, which is under Perrichi's direction. In a later interview, Dr. Lasser reaffirmed their ability to do the work, but indicated that he would need financial assistance to hire certain types of personnel, such as laborers, to do the job on an adequate scale.

Bogotá Colombia

Mr. Kopf, of the AID Mission, had arranged a large-scale meeting at which we were able to explain the project to a group representing the Ministry of Agriculture, various universities, development groups, and the like. The nature and volume of questions after the formal presentation indicated a real interest in and appreciation for the value of the proposed research. Toward the close of the meeting, a representative of the Ministry of Agriculture indicated that the Ministry would take responsibility for undertaking the collections.

A visit to the Institute of Natural Sciences at the National University showed a well-maintained herbarium and skilled and enthusiastic botanists. Undoubtedly, this would be one group which would be concerned with collection work.

We visited the District University where there is a Forestry and Wood Research Institute. It is currently being operated by a German mission, but will be turned over to Colombians after a few years. The laboratory is fairly well set up for small-scale evaluation, but with completely German equipment designed for the small-size specimens used in continental Europe. In general, results would not be comparable to those obtained using US procedures.

The Technical Research Institute (Instituto de Investigaciones Tecnologicas) is a private organization sponsored by several Colombian organizations. In general, it works on a contract basis. Their work on wood is quite limited, although they are concerned with wood as one of the natural resources. They have done some work on drying and have published kiln schedules for several species. Their equipment, basically a small compartment in which temperature, relative humidity, and air speed can be controlled, does not appear adequate for really effective drying research. They have under way some soil block tests and, from their reports, have done some research on preservative treatment, although we did not see their equipment. Evaluation of mechanical properties is done for them by the Forestry Institute at the District University, mentioned earlier.

Medellin, Colombia

Our first visit was with the Secretary of Agriculture for the State of Antioquia, in which Medellin is located. The secretary is a young, obviously energetic man who has developed a very complete forestry organization staffed with professionals. They have developed extensive statistics on their resource and have ambitious plans to develop it. The secretary was quick to grasp the importance and value of the proposed work and expressed great interest.

We also visited the Agronomy School of the National University and the Forestry Institute located there. Both the Dean and the Director of the Institute offered assistance in the collection project.

Quito, Ecuador

Perhaps the most important visit here was with the Director General of the Forestry Department. He expressed great interest in the collection project and offered the services of his twelve district forest offices in making the collections.

There is a UN Special Fund project here concerned with an inventory of forest resources in northwest Ecuador. With the inventory, as in Guatemala, they plan herbarium and wood collections and evaluation of properties. They had not yet selected an institution to make the evaluations, but are considering the Forest Products Laboratory in Merida, Venezuela and the Forest Products Laboratory in Madison, Wisconsin. We did not learn the planned scale of their collections, but any AID effort in Ecuador should be coordinated with that of the UN project.

Lima, Peru

This was an extremely important visit in view of the herbarium and wood collections now going on with PL-480 funds. This work has been going on since 1961 and will terminate in April 1966. In the case of Peru, we have a "running start" on the proposed AID project since valuable work is already under way and skilled crews are available at strategic points in the country.

We took the opportunity to visit one of the district forest service offices (in Iquitos) and to see in the jungle some of the trees marked for collection. The problems of getting flowers and fruit from large-diameter, very tall trees and of getting large wood samples to the river along jungle trails appear formidable. The Forest Service, however, has developed equipment and techniques and appears to take the problems in stride. If special training is needed by personnel from other countries, it could be quickly gained by a period with one of the Peruvian collection crews.

Ing. Adolfo Salazar, Assistant Chief of the Peruvian Forest Service, and acting chief during the absence of the Chief in the United States, assured us that the Forest Service would cooperate fully in our proposed project and would maintain the skilled collection crews already working. They had planned to continue the work on their own funds at the termination of PL-480 support, but would have had to do so on a more limited scale.

While Salazar was completely in agreement with the proposed project, as is his chief, and could give us verbal assurance of support and cooperation, any formal agreement would have to be signed by the Minister of Agriculture. This is a long-drawn-out procedure requiring concurrence at several levels and would take some weeks.

Mr. Salazar was unable to furnish us with exact total costs, but did furnish us with a record of charges against the PL-480 project as follows:

May 1961 - September 1961 -- 222,222 soles ($8,400 approximately)
October 1961 - September 1962 -- 455,400 soles ($17,200 approximately)
October 1962 - September 1963 -- 394,500 soles ($14,900 approximately)
October 1963 - September 1964 -- 331,100 soles ($12,500 approximately)

Approximately half of the expenditures in the first 5 months was for equipment--a jeep, a boat, and an outboard motor.

Mr. Salazar indicated that Peruvian Forest Service had absorbed an increasing percentage of the cost which would appear to be reflected in the decreasing amount charged against the PL-480 project. While we did not question him on the point, it would appear that the Forest Service has absorbed the cost of most of the major equipment. More equipment than is mentioned above was seen at Iquitos, only one of their collection stations.

Mr. Salazar indicated that Peruvian Forest Service was currently absorbing on the order of 30 to 40 percent of the cost of the project. He indicated further that they would be willing to continue at about that percentage. He indicated that a suggested budget would depend upon the degree of acceleration desired but that they could use effectively as much as 1 million soles per year, or about $37,900. He would not propose to establish new collection stations, but vould range farther afield at each current station, thus marking and collecting from additional trees. Some of the additional amount suggested over current expenditures results from the fact that collection of herbarium and wood samples is going on at an increasing rate, and transportation costs for shipping the material to the United States for evaluation will correspondingly increase.

We had previously discussed with the executive officer of US AID/Lima the problems incident to headquartering a utilization specialist in Lima. One serious problem was that of furnishing office space, since neither the Mission nor the Embassy has space. This was mentioned to Mr. Salazar and he offered space, without cost, at the Forestry Institute at La Molina on the outskirts of Lima. He also offered the services of a bilingual secretary, as needed, if we would contribute some portion of salary. This amounts to about 4,000 soles ($150 approximately) and he was amenable to a contribution of half-salary, or about $75 per month.

As indicated, neither the Mission nor the Embassy could provide office space. The executive officer did, however, say that the Mission would provide all possible assistance in establishing a man in Lima. This would include furniture and household equipment furnished by the Mission without cost to the project. When the man is chosen, his name should be sent immediately to the Mission so that he can be accredited to the Peruvian government and receive the usual courtesies such as free entry of personal effects, annual free import privileges, etc. Commissary privileges will be accorded him and he can use the pouch system subject to the usual rules. There is no APO system in Peru. Other points were discussed, such as payment of salary, payment for in-country travel, etc., but there was sufficient uncertainty about financial arrangements to preclude final settlement. Housing was indicated to be scarce and expensive, but the Mission will assist in locating housing.

A UN Special Fund Project is located at the Agrarian University at La Molina, just outside Lima, with the objective of establishing a forestry curriculum. They are closely allied to the Forestry Institute. As part of the physical plant, they expect to establish a small laboratory. The Director of the Project, Dr. John Yavorsky, expressed considerable interest in working on the evaluation of wood properties, but he has no equipment as yet. When they start, they expect to use ASTM procedures.

Rio de Janeiro, Brazil

Botanic Garden. --A brief visit was made to the Botanic Garden of the City of Rio de Janeiro. The visit was primarily to become acquainted with the facilities, since we considered them too remote from the Amazon area to be effective in work on herbarium and wood specimens from that area. They have a substantial herbarium of 115,000 sheets, which might prove useful in preliminary identification of collected material.

Apparently, the scientists of the Botanic Garden have complete freedom in their choice of projects and, as a consequence, rather basic research is under way. Dr. Machado has excellent facilities for electron microscopy and, apparently, ample assistance. A number of microscopists from other countries have come to work with him for extended periods--an indication of the scope of his facilities and of his capabilities.

National Institute of Technology. --The wood technology section of this Institute is small, ill-equipped, and apparently staffed by one man. We would not encourage consideration of the Institute for participation in the proposed program.

Brazilian Forest Service. --A rather brief visit was made to the Ministry of Agriculture. An explanation of our objective elicited some mild expressions of interest but no real enthusiasm nor offers of assistance. The attitude reinforces rumors that the Forest Service is rather weak.

São Paulo, Brazil

State Forest Service. --A courtesy visit was paid to the Director of the Forest Service of the State of São Paulo. This is an energetic organization, with ambitious plans and an action program for reforestation and improvement of the State's forest land. They are importing seed from several areas, including the southern United States, to improve their forests. Introduction of conifers is intended to improve the prospects for pulp and paper. An American pulp and paper company is considering establishing a mill. If this organization were not confined to a single state, we would consider it a good source of cooperation in the project.

Technological Research Institute. --The wood division of the Institute is one of five divisions and covers such aspects of wood utilization as wood anatomy, pulp and paper, pathology, preservation, seasoning, and physical and mechanical properties. The division chief, Mr. Ghilardi, is attempting to

build a strong, well-staffed division. He has increased his staff from 6 to 11 in 3 years and has two people studying in other countries. He feels, however, that overseas training is inefficient in that he loses the services of his people for the time they are gone. He would much prefer to have specialists come to São Paulo to work with and train his people. He feels that, in this way, he would get his work done while gaining training for his people. In his physical and mechanical testing work he uses the European system. He indicated that he would prefer to change to ASTM procedures but could move only slowly on this.

Mr. Ghilardi would be most anxious to work on the evaluation aspects of the proposed program. He indicated that financial assistance was not needed, but that some training would be necessary.

The Director of the Institute was very cordial, but indicated some disappointment that training of personnel discussed with him as a possibility 3 years ago had never developed. He seemed to feel that promises had been made and not fulfilled. We pointed out the problems involved in developing such a program and, hopefully, made it clear that the program was still under development.

If evaluation aspects of the proposed program are developed within participating countries, we would suggest consideration of this Institute. However, some problems would be involved in converting them to ASTM procedures, from the standpoint of training and otherwise.

Botanic Institute. --This Institute is undergoing a considerable expansion in both staff and facilities. It has an ambitious building program and a large group training overseas, mostly in the United States. It has a substantial herbarium and has made collections outside the state of São Paulo. It is, however, a state institution, and its primary concern is with state problems. Because of this and because of its great distance from the Amazon area, we do not feel that it could be considered for participation in the proposed program.

Manaus, Brazil

Here we visited only the National Research Institute of Amazonia. The Institute is under the National Research Council (Conselho Nacional de Pesquisas) which, in turn, reports directly to the President of Brazil.

Dr. Batista, the Director of the Institute, was fully in favor of the proposed program. He said that, so far as he was concerned, he would be agreeable to working on the collection of herbarium and wood samples, but that he was

not empowered to make a commitment. Any commitments would have to be made by the chairman of the National Research Council. Inquiries should therefore be addressed to:

Prof. Antonio Moreira Couceiro, President
Conselho Nacional de Pesquisas
Av. Marechal Camara, 350 -6°
Rio de Janeiro, Brazil

Copies of correspondence should go also to Dr. Batista.

Dr. Batista's principal concern was his limited technical manpower and the effect participation in the program would have on his regular work. Nevertheless, he felt the value of the work was such that he wanted to cooperate.

Belem, Brazil

In Belem we visited only the Northern Agriculture-Livestock Research and Experiment Institute. Dr. Condurú the director, promised cooperation and, further, indicated that he was in a position to commit the Institute to cooperation. Apparently, although he is under the Ministry of Agriculture, he does not need to refer such matters.

Merida, Venezuela

The Easter weekend and Venezuelan Independence Day (the Monday after Easter) prevented us from visiting Merida earlier.

The Forest Products Laboratory is in the process of moving into new buildings and this prevented us from getting more than a partial view of facilities. However, our impression was good.

We spent considerable time with the Director of the Laboratory and with the Dean of Forestry of the University of the Andes. We explained in detail our proposals and had considerable discussion of the various aspects. The Dean talked at some length of the necessity for additional information on properties of various species and reinforced our conviction of the soundness of the collection-evaluation part of the project. Both he and the Director mentioned several times their desire to cooperate in all possible ways.

They pointed out, however, that their programs for 1966 had to be submitted soon. If any work were contemplated for them during that year they would need detailed information soon in order to provide for it in their program.

One point kept recurring, although the full import did not become fully clear until after several repetitions in different forms. Finally, however, the Director pointed out that, if the evaluation work were done in Madison, as we indicated would be our suggestion, they would get only a report. Although he did not deprecate the value of such a report, he did point out that the project would have left them with no skills to carry on similar work.

This is a point that had bothered us and was the reason we had considered proposing duplicate evaluations in countries where facilities and personnel were available. Unfortunately, as has been noted earlier, we saw little real opportunity for evaluation work in the countries themselves in the immediate future.

Finally, the Director made the suggestion that suitable personnel from his laboratory should be assigned to Madison to actually make the evaluations, thus providing not only results but training which these personnel could take back to Merida and impart to others. This struck us as an excellent suggestion and one which might well be considered for all countries involved.

A short conference was held with the Rector of the University of the Andes. Mr. Martínez summarized for him the proposals we had discussed and the points raised during our detailed discussions. The Rector assured us of his interest in the proposed program and of the maximum cooperation from the University.

Miscellaneous Observations

Visits to Wood-Processing Plants

A limited number of industrial visits were made. It became quickly apparent that the character of the industry was so highly variable that little could be gained by such visits except general impressions. We saw two plants with rather modern equipment--one a particle board plant, the other a plywood plant. In both, however, a great deal of hand work was evident. This is probably understandable, since manpower costs are very low. For example, we were told in the plywood plant that wages for 2 days were about equivalent to those for 1 hour in the United States. The prospects for mechanization or automation thus appear to be rather low.

We were struck by the predominance of European equipment. The plywood plant mentioned earlier had all German equipment. We do not know the reason for this, but Latin America might be a fertile field for US equipment salesmen.

Utility Poles and Fence Posts

Throughout the countries visited, utility poles of reinforced concrete were the rule rather than the exception, and concrete fence posts were not uncommon. This was commented on several times by both AID and local people since, at least in some countries, cement and steel must be imported, so that concrete posts and poles are very expensive.

We could not discover the reason for this usage except that many timber species were readily attacked by decay fungi and by termites,and treating facilities are not common.

This would appear to be a field in which productive effort could well be made to create additional markets for wood. This would probably involve demonstration of the efficacy of preservative treatment and, perhaps, the overcoming of some tradition in the use of poles and posts of other materials.

Housing

We did not make any specific effort to inspect housing. However, it was obvious that by far the highest percentage of housing was of masonry construction. It is probable that this is in large part based on tradition which might be a difficult barrier to overcome in any attempts to invade the housing market with wood.

Probably the problem would be greatest in established cities. Most countries, however, are pushing colonization projects, and the introduction of wood houses might be easiest in connection with such projects. Some study of the possibility of developing the use of wood in housing appears worthwhile.

Tree Size for Collection

In several locations we were queried as to why we had chosen a minimum diameter of 45 cm. for the trees from which collections were to be made. It was pointed out that smaller trees were numerous and that they might well find a market as utility poles or fence posts. We recognize the validity of the question and recognize that these are markets to which some effort might be applied.

However, we feel that the greatest overall potential lies in the export field. In general, this would require larger trees. Since this is an

extremely large field in itself, we feel that the job here is big enough and the effort would be badly diluted if we attempted property evaluation on trees of all sizes.

Therefore, we continue to recommend a minimum tree size for collection. We would, of course, urge the countries to investigate smaller trees if they feel it desirable.

APPENDIX 4

CONTACTS DURING TRIP

Mexico City, Mexico

Instituto Nacional de Productos Forestales,
- Roberto Villasenor A., Director General
- Victor Díaz Gómez, Chief, Wood Technology Department

Instituto Mexicano de Investigaciones Tecnologicas
- Salvador Cruz Castelán, Program Coordinator

AID Mission
- Lyall E. Peterson, Rural Development Officer

U.S. Agricultural Attaché
- Henry Hopp

Guatemala City, Guatemala

AID Mission
- Milton W. Lau, Agronomy Advisor
- Raymond H. Luke, Industrial Officer
- Mack H McLendon, Livestock Advisor

AID Regional Technical Staff
- William H. Cowgill, Agricultural Advisor

UN Special Fund Project (Forest Survey)
- Richard E Wilson, Co-Director
- T. A. McClay, Silviculture and Management

Centro de Investigaciones de Ingenieria, Universidad de San Carlos
- Emilio Beltranena Matheu, Coordinator-General

Caracas, Venezuela

AID Mission
- Victor J. Pra Sisto, General Agriculturist

Ministerio de Agricultura
- Sixto J. Pericchi, Chief of Division of Renewable Natural Resources

Instituto Botanico
- Tobias Lasser, Director

U.S. Agricultural Attaché
- Marion A. Eggleston, Assistant Agricultural Attaché

Bogotá, Colombia

AID Mission
- Kenneth Kopf, Agronomy Advisor
- Agapito Olea, Agronomist

Instituto de Investigaciones Tecnologicas
- Norton Young López, Director
- Hernán Cáceres Rojas, Chief, Section of Applied Chemistry and New Product Development

Instituto de Ciencias Naturales de la Universidad Nacional
- Dr. Alvaro Fernandez-Perez, Head Curator
- Dr. Rafael Romero, Economic Botanist

Universidad Distrital
- Adolf Barghoorn, Director, Forestry and Wood Research Institute

Medellin, Colombia

Secretaria Agricultura, State of Antioquia
- Alfonso Barreneche Estrada, Secretary of Agriculture
- Xavier Jaillier, Chief, Division of Natural Resources

Universidad Nacional de Medellin
- Miguel Hernandez, Dean, Faculty of Agronomy
- Eduaro Ruiz Landa, Director, Forestry Institute

Quito, Ecuador

AID Mission
- Freeman P. Smith, Chief, Rural Development Division
- D. C. Myrick, Agricultural Economist
- Edward Castleman, Deputy Director
- Francisco López C., Agronomist

Ministerio de Fomento
- Fabian Jarrin V., Director General of Forestry Development
- Pablo Rosero G., Assistant Director General of Forestry Development

Centro de Desarrolo
- Galo H. Montaño, Executive Director
- Julio H. Ulloa (Also USAID)

UN Special Fund Project
- Elbert S. Reid, Director

U.S. Agricultural Attaché
- Carlos Ortega

Lima, Peru

AID Mission

Torkel Holsoe, Agricultural Advisor
Sidney Schmukler, Deputy Director
Rudolph Fascell, Executive Officer

Servicio Forestal y de Caza
Adolfo Salazar C., Assistant Director
Luis Fernando Galván, Director, Forestry Institute

UN Special Fund Project (La Molina)
John Yavorsky, Director

U.S. Agricultural Attaché
Fred W. Traeger

Iquitos, Peru

Servicio Forestal y de Caza
Abelardo Gutiérrez, Chief, Iquitos District

La Universidad Nacional de la Amazonia
Emilio Gordillo Angulo, Rector
Alfonso Chacon Díaz, Decano Facultad de Agronomia y Forestal

Ric de Janeiro, Brazil

AID Mission
R. R. Newberg, Food-agriculture Officer
A. W. Pollard, Soils Advisor
Paulo de Souza, Consultant

Jardim Botanico
Jose Correa Gomes, Curator
R. Machado, electron microscopist

Instituto Nacional de Tecnologia
Sylvio Froes Abeu, Director
Epaminondas Azevedo Botelho, wood technologist

Ministry of Agriculture
David de Azambuja, Executive Secretary and Counsel of Commissions CICATI and CNCA.

U.S. Agricultural Attaché
Rado J. Kinzhuber, Assistant Agricultural Attaché

São Paulo, Brazil

Servicio Florestal do Estado São Paulo
Roberto de Mello Alvarenga, Technical Director
Armando Ventura, Curator

Instituto de Pesquisas Tecnológicas
Francisco Maffei, Director
Edgard Ghilardi, Chief, Wood Division
Calvino Manieri, wood anatomist
Instituto Botanico do Estado São Paulo
A. Teixeira, Director

Manaus, Brazil

Instituto Nacional de Pesquisas da Amazonia
Dr. Djalma da Cunha Batista, Director of the Institute
Dr. Mario A. P. Moraes, Director of Biology Division
Arthur Loureiro, wood technologist
William Rodriguez, botanist, Director, Forest Research Center

Belem, Brazil

Instituto de Pesquisas e Experimentação Agropecuárias do Norte
José Maria Pinheiro Condurú, Director
Alfonso Wisniewski, Assistant Director
Paul Ledoux, Chief of Experimental Station at Mazagao (Federal Territory of Amapa)
United States Consulate
John R. Bartelt, Consul

Merida, Venezuela

Universidad de Los Andes
Pedro Rincon, Rector
Carlos Liscano, Dean of Forestry
Laboratorio de Productos Forestales
Pausolino Martínez E., Director
Ian Hunt, Wood Preservation
Harry Corothie, Wood Anatomy
Jose R. Rodríquez Sánchez, Pulp and Paper

APPENDIX 5

APPENDIX 5

PART 1 OF PROPOSED PROGRAM

Title: Collection, identification, and evaluation of Latin American timber species.

Objectives: Determine exact botanical identity and wood properties of Latin American timber species using collection of complete herbarium material and wood specimens from precisely identified trees.

Plan of Attack: The procedures for accomplishing the objectives are:

1. Determination of country agency which will undertake the project
2. Appointment of an overall country project leader or coordinator
3. Selection of areas in which collection will be made
4. Appointment of a principal collector for each of the collection areas
5. Collection and identification of herbarium specimens
6. Collection of wood specimens
7. Wood quality evaluation testing
8. Correlation and publication of findings in Spanish, Portuguese, and English

Details of Procedures

1. On the basis of the findings of the Forest Service Team, the Ministry of Agriculture within each country involved would be the principal agency concerned with this project. In each instance, the actual work involved would be delegated to the Forest Service of the country or the Botanical Institute or both, because commonly the latter institutions are subordinate to the Agriculture Ministry.

2. The appointment of an overall project leader or coordinator would be at the discretion of the Agriculture Ministry and undoubtedly would be an individual in the Botanical Institute or the Forest Service who would be in very close contact with the country project. He would be responsible for the coordination of the project within the country and be responsible for all collections and their transmission to the proper institutions for identification and testing. He would also bear responsibility for all progress reports and financial statements.

3. The area or areas of collection selected would be at the discretion of the country agencies since they would be best qualified and familiar with the various forest types, accessibility, and/or proximity to established experimental stations from which the collection would proceed. Consideration would also be given to areas not readily accessible at the present time, but which may become so in the near future with the construction of roads and railroads. Collection areas should include the various forest types containing timber of commercial size regardless of whether or not these timbers are currently being utilized.

4. A principal collector would be appointed for each collection area or zone, and he would be responsible for the selection of the test trees and their marking; the actual collection of herbarium species, their proper pressing, drying, treatment and storage in a manner that would prevent deterioration. He would also be responsible for the collection of wood specimens from the trees which have complete and adequate collection of leaves, flowers, and fruits; the cutting of the wood sections, their preservative treatment, and transmission to the country project headquarters. The principal collector is generally the head of the area experimental unit or the task may be delegated to the Forester-Botanist of the unit, as the case may be.

5. Collection and identification of herbarium specimens. Trees of commercial size and quality and apparently representative of their species will be selected in the region or regions of collection. These trees will be at least ~~40~~ 45 centimeters at breast height if free of any basal swellings or buttresses and at least this diameter above basal swellings or buttresses when these occur. They must be free of apparent defects, such as broken tops, evident decay, termite nests, and without excessive lean or eccentricities. A lean up to 10 percent from the vertical will be permitted. Trees with lean in excess of 10 percent will contain tension wood which makes the wood unusable for testing purposes. Where lianas occur on sample trees, they are to be removed in order to prevent the accidental collection of leaves from them instead of from the trees. A minimum diameter of 40 centimeters is recommended because it is felt that the greatest overall and current potential lies in the export field.

Choice of species for collection will initially depend to a considerable extent on local opinion regarding their abundance and perhaps their importance in local utilization. Trees intended for collection need not be restricted to little-known or unknown species, but should also include locally well-known species. Duplication of the same species is likely to occur if several areas are being collected. However, such duplication is welcomed because it will be useful in assessing species variability.

Selected trees will be consecutively numbered and conspicuously marked with a durable letter, number, or both, using yellow oil-based paint with figures at least 25 centimeters high and the lines at least 2.5 centimeters in width. Markings should be so placed that they are readily visible from trails, roads, or water courses.

Each marked tree will be visited as often as required to secure the necessary botanical specimens which will include leaves, flowers, and fruits which are necessary to establish the exact identity. In some areas, it may be desirable to enlist the aid of local people who are in a position to observe trees at more frequent intervals and who can inform the area collector with regard to the condition of the tree, with respect to flowering and fruiting.

Each time a collection is made from a marked tree, it will be assigned the individual collector's number, as well as the original tree number because in most cases, at least two collections will be made from the same tree. For example, the first collection from tree No. 3 may consist of leaves and flowers and might be designated Diaz No. 22 plus the date of his collection. Later when the fruits are collected, the fruit collection might be cited as Diaz No. 46, plus the date of this collection from tree No. 3. Even though the tree number remains the same, the collection number made will most likely be different because collections would most likely have been from other trees in the interim.

All herbarium specimens are to be properly pressed and dried in accordance with proven techniques and treated to prevent molding and insect attack. These procedures are well known to all the botanical personnel visited by the Forest Service Team. Large dry fruits, such as those of Ceiba, that are likely to dehisce or separate into a number of parts must be wired or tied to maintain their integrity. These fruits must be thoroughly dried, treated with insecticide, and stored in appropriate containers. Polyethylene bags are excellent for this purpose.

Special care must be taken to insure that every collection of leaves, flowers, fruits, and wood always be accompanied by the tree number from the time of collection through the drying or preservative treatment to transmission to an institution for identification and testing. Special vigilance must be exercised in all of these procedures.

The collectors will carry field collection record books in which will be recorded the required information. Some of these data may be obtained at the time the tree is marked for collection.

1. Tree designation (number of tree plus area code letter as, for example, tree No. 43 collected in the Pucallpa area may be designated at P-43).

2. Common name and botanical name if known or suspected (specific determination will generally not be possible in the field in the majority of instances).

3. Locality of collection (include Department, Province, District; distance from km post when collecting along highways; specific forest reserves; etc.).

4. Altitude.

5. Collector's name and his collection number with date(s) of collection.

Additional data which should be collected will include color of flowers and fruits, because they may change in the drying process; distinctive odor of freshly cut wood or bark; occurrence of latex or gum and its color; occurrence of basal swellings or buttresses and their height; forest type; diameter at breast height in normal trees and above buttress or swelling in trees with these features; merchantable length of bole to a top diameter of 20 centimeters or first large branches; and local uses if any.

Final field collection data will be typewritten to preclude any misunderstandings through illegibility of writing. Abbreviations will not be used since these may not be understood outside the country of collection.

Seven sets of herbarium vouchers of flowering materials and seven sets of fruiting specimens will be furnished to the U.S. Forest Products Laboratory, Madison, Wis. Where the fruits are of such a size that they must be removed from the twigs to permit pressing, at least 4 or 5 average-sized fruits should be supplied with each voucher. In the case of large fruits, such as those of Ceiba, two average-sized fruits per voucher will suffice.

Identification of herbarium specimens may be made in the country of collection where adequate herbaria and qualified taxonomic personnel are available. The vouchers supplied the Forest Products Laboratory will be further checked at the large U.S. Herbaria and also by specialists in the various plant families as may be necessary.

Herbarium specimens will be carefully packaged and sent to the Forest Products Laboratory, Madison, Wis., by air. Shipping expenses will be borne by the project of the country, except those which are variable and cannot be estimated at point of shipment. The latter fees will be paid from project funds at the Forest Products Laboratory.

Air shipments will be marked "Dried botanical specimens for scientific study--no commercial value" and directed to the U.S. Dispatch Agent (usually at Miami, Fla.) for reshipment to the Forest Products Laboratory. The U.S. Dispatch Agent will be notified in advance of such shipments and also supplied with a copy of the usual Phytosanitary Certificates. The latter are usually issued by the Ministry of Agriculture of the originating country. A copy of the correspondence will also be sent to the U.S. Forest Products Laboratory. Instructions for proper routing of material through the U.S. Dispatch Agent may be obtained from the local U.S. Embassy.

After complete identification, sets of herbarium vouchers will be distributed as follows:

University of Wisconsin, Madison, Wis.
Chicago Natural History Museum, Chicago, Ill.
U.S. National Herbarium, Washington, D.C.
Institute of Tropical Forestry, Rio Piedras, Puerto Rico
Kew Gardens, Kew, Surrey, England
New York Botanical Garden, New York, N.Y.
Jardin Botanique, Geneva, Switzerland

The number of sets of additional vouchers to be collected and retained within the country of origin is at the discretion of the originating country.

6(A). Collection of wood specimens (for evaluation survey of little-known or unknown species).

After complete and adequate herbarium material has been collected from a marked tree, it will be felled at a convenient time. Starting at a point three meters above the ground (normal trees) or above basal swellings or buttresses, three consecutive bolts (45 centimeters in length along the grain) will be cut from the bole. The transverse surfaces of these bolts will be cut carefully so that they are parallel with each other and at right angles to the grain of the bolt. One of these bolts will provide specimens for testing in the green or saturated condition; the second for testing at a moisture content of 12 percent; and the third will provide specimens for distribution to laboratories the world over.

On each of the bolts, a line is drawn through the average diameter and passing through the pith. Two additional lines are then drawn, one on each side of the average diameter line at a distance of 8 centimeters from and parallel to it. The bolts will then be sawn just outside these outer guide-lines to produce specimens which will be 16 centimeters in width, 45 centimeters in length along the grain, and the full average diameter of the bolt. To facilitate the handling of specimens from trees or large diameter, the sections may be sawn vertically through the pith and across the 16-centimeter width.

Each bolt or part of a bolt will be marked with a galvanized or aluminum metal tag bearing the designation of the tree, and this will be nailed to the bolt with galvanized or aluminum nails which are at least 2.5 centimeters in length.

The bark will be removed from two of the sections, but allowed to remain intact on the third section. All corners and edges will be slightly rounded with a wood rasp to minimize the possibility of puncturing the plastic container for the sections.

After the sections have been cut and labeled, and the corners and edges rounded, the sections will be sprayed or painted immediately and very thoroughly to the point where they are dripping with the following solution: 1 gallon of pentachlorophenol (1 to 10 concentrate) is mixed into 20 gallons of No. 2 fuel oil or kerosene and to this is added 6.4 pounds emulsifiable concentrate containing benzene hexachloride with 11 percent gamma isomer. It must be stressed that the solution be liberally applied to all surfaces and that application must be made in the forest immediately after cutting the bolts from the tree.

CAUTION: Personnel handling treated specimens must wear rubber gloves. This applies equally well to those in the field, as well as those in the laboratory preparing the specimens for testing. Some individuals are particularly sensitive to certain of the compounds found in the preservative solution and if care is not exercised, handlers may experience a severe case of dermatitis. Handlers should also be cautioned against touching their faces or eyes with their gloves.

Immediately after preservative treatment, the sections are to be placed in heavy gage polyethylene bags (4 mils or thicker if available) and an additional quantity of preservative added prior to tightly securing the bag. Approximately 1 liter of preservative should be added to each bag.

After a sufficient number of bolts have been collected, they will be carefully secured in wooden crates and shipped to the U.S. Forest Products Laboratory, Madison, Wis., for evaluation testing. Shipment will be by surface carrier. As was indicated for the herbarium material, shipments will be directed to the U.S. Dispatch Agent for reshipment to the Forest Products Laboratory. Each crate will be marked "Wood specimens for scientific study and preserved in pentachlorophenol and benzene hexachloride." Shipping charges are to be borne by the project of the originating country.

6(B). Collection of wood specimens (for comprehensive testing of timbers currently utilized abroad and for which there is very little, if any technical data).

For this type of testing, larger quantities of wood are required, and the selection of the trees and bolts will be in accordance with the procedure described in American Society for Testing and Materials (ASTM) Designation D 143-52.

Briefly summarized, the procedure is as follows: Five trees of a given species are marked and complete herbarium collections obtained prior to felling. From one of these trees several bolts 3 meters in length will be obtained, beginning at ground level or above buttresses if present (the number depending upon the merchantable length of the bole). From the remaining four trees, one 3-meter bolt will be taken from each tree at a height of 3 meters above the ground or buttress if present.

Water storage of logs should be resorted to whenever possible. In this instance, the above-water portion of the log should be thoroughly sprayed with the preservative solution previously described. It may be necessary to repeat the spraying if the logs are exposed to heavy rain and remain in the water for several weeks. When the logs are removed from water storage, they should be allowed to dry for several hours and then be thoroughly wetted with preservative, paying particular attention to the end surfaces and to any debarked areas. The ends of the logs will then be end coated to prevent or retard end checking. For the end coating, a heavy asphalt preparation known to the trade as a "cutback" has proved highly suitable. Asphalt cutbacks are readily available since they are extensively used in commercial roof construction and for moisture-excluding coatings on cement and metal surfaces. The product should be viscous enough so that it does not sag excessively and leave a thin coating. As a general rule, the coating should be thick enough when dry to hide small irregularities on the end surfaces made by the saw. To accomplish this, it may be necessary to use material with

a consistency suitable for light troweling rather than brushing. It is important that the coating extend to the edge of the bark and also be applied to any area from which the bark has been removed in handling.

If water storage is not available, the logs with bark intact must be treated very thoroughly (dripping wet condition) with the above-mentioned preservative solution after which the ends are coated as previously described. Logs must be stored under roof cover or given some form of protection from the rain and direct sunlight.

Because it is not desirable to store logs for prolonged periods under tropical conditions, some consideration should be given to time interval between felling and sailing or shipping schedules. In other words, the shortest possible time should elapse between felling and placement on shipboard.

Shipping procedure and instructions are as for the small sections for evaluation testing.

The ends of the logs should be inspected at frequent intervals for checking and splitting. When this occurs, the log ends should be treated with preservative preferably using a pressure sprayer.

7. Wood quality evaluation.

The great majority of the species collected will be subjected to a limited evaluation testing program, the results of which will be helpful in estimating the potential uses and also permit comparison with well known or otherwise established species in the world lumber market.

Outlined below are a number of easily accomplished tests and procedures to which the smaller specimens will be subjected.

(A) Specific gravity: Determination of this value permits estimates of strength, weight, nail-holding power, and ease of working with machine tools. It is also an index of resistance to wear and serves as a basis for estimating yield of pulp per cord of wood.

(B) Shrinkage: Radial and tangential shrinkage measurements indicate how much a given species is likely to change in dimension when subjected to different conditions of relative humidity. Values obtained would dictate end use and aid materially in the development of seasoning schedules. The following values would be obtained:

(a) From green to equilibrium at 80° F. and 80 percent relative humidity

(b) From 80-80 to 80-65

(c) From 80-65 to 80-30

(d) From 80-30 to ovendry

(C) Hardness: Represents the resistance of wood to wear and marring. Value is of importance when timber is used for such purposes as flooring, furniture, etc.

(D) Static Bending: The various values obtained are useful in comparing the bending strengths of different species; for computing the deflections of joists, beams, and stringers; for comparing the ability of different species to withstand a combination of high load and high deflection without appreciable injury; and also a measure of the combined strength and toughness of a material under bending stresses. The alternate ASTM Standard will be used.

(E) Silica: The presence of silica in wood plays an important part in machinability, as well as in chipping of wood for pulping or particle board. It is also believed to have some degree of importance in assessing the value of a timber for marine borer resistance. It is microscopically detectable when present in excess of 0.05 percent of the dry weight of the wood. When present, will be quantitatively determined.

(F) Fiber Length: Is of value for pulping and papermaking characteristics and can be determined concurrently with Item E. Fiber length, when coupled with specific gravity, gives a good estimate of the Runkel Ratio, which rates the suitability of a wood for pulping and papermaking.

(G) Heartwood Color: Determines esthetic value and also is related to pulp bleaching requirements.

(H) Heartwood-Sapwood Ratio or Volume: Indicates volume or amount of durable heartwood in the case of durable species or the amount of treatable sapwood.

(I) Decay Resistance: The soil block test employing two or three different fungi will be used. This is a relatively rapid and simple method for assessing the relative durability of timber. Species which are obviously nondurable (as indicated by the presence of starch near the center of the tree) will not be tested.

(J) Grain Characteristics: Direction of grain, whether straight or interlocked, is an indicator of machining properties. Grain direction also indicates how the wood will react during seasoning and also the potential esthetic value.

(K) Texture: Pore diameters dictate finishing requirements and certain end uses.

To insure uniformity of testing procedure, the testing will be accomplished at the Forest Products Laboratory, Madison, Wis. Similar testing may be done in the country of origin if facilities are available, and this may serve as training for their personnel and also as a check on their results. It is suggested, however, that training be accomplished by having suitable personnel participate in the evaluations at Madison.

Comprehensive testing of a small number of commercially important species will also be done at the Forest Products Laboratory in Madison. This will include full-scale mechanical and physical properties, machinability, seasoning, durability, and veneering as may be required for projected uses. The species under consideration occur in considerable volume in certain areas and are thus of appreciable value from the export point of view. These species, furthermore, are currently being utilized in the United States in increasing volume, but their utilization could be increased considerably after their properties are fully known. Testing procedure would be in accordance with ASTM Designation D 143-52.

It is recommended that the following species be comprehensively investigated as soon as possible: Swietenia, Juglans, Amburana, Ceiba, and Virola from Amazonian Peru; Dialyanthera, Brosimum, and Campnosperma from northwestern Ecuador or southwestern Colombia; and Virola from the Belem area of Brazil and from the Amacuro Delta of Venezuela.

8. During the course of this project, all available properties data for Latin American species would be collected and correlated with the data from the evaluation testing program at the Forest Products Laboratory. Comparison tables would be prepared incorporating the above data together with those for American species and also the West African and Asiatic timbers commonly found in the U.S. lumber market. This publication would be essentially a ready source book of information for all potential users of Latin American timber species. Publication would be in English, Spanish, and Portuguese.

Anticipated Duration: 5 years.

Headquarters: Caracas, Venezuela; Bogota, Colombia; Quito, Ecuador; Lima, Peru; Manaus and Belem, Brazil.

Technical Supervision: Forest Products Laboratory, Madison, Wis.

APPENDIX 6

APPENDIX 6

PART 2 OF PROPOSED PROGRAM

Title: Inventory of forest products utilization practices and potentials in selected Latin American countries.

Objectives: The broad objective of this part of the program is to develop a catalog of utilization practices and potentials in selected Latin American countries in order to:

(a) Discover and outline specialized problem areas requiring additional research;

(b) Discover and outline areas which justify assistance projects; and

(c) Isolate applications in which wood is not now used, but in which it might be used, and to outline the problems, if any, which may be encountered in extending wood use to these potential applications.

Plan of Attack: In reaching these objectives, such areas as the following will be studied:

(a) Species currently used, reasons for preference, what motivation would be required to obtain acceptance of additional species. In this connection, one of the early missions would be to collect samples of species used in various enterprises, giving the name by which they are known, and the use to which they are put. Such samples would be sent to FPL, Madison, for identification.

(b) Techniques currently used in producing basic material (lumber, for example), deficiencies if any of the product as a material for further processing, and the changes in techniques which would be required to improve acceptability. This would include such things as uniformity of lumber dimensions, proper moisture content, proper grading, and treatment against fungus and insect attack if needed.

(c) Techniques currently used in producing finished products, such as furniture, deficiencies, if any, which lead to lack of consumer acceptance, and changes in techniques required to improve acceptability. This would include such things as choice of raw materials, machining and finishing practices.

(d) Current practices as related to degree of processing. That is, whether logs, flitches, or other relatively unprocessed forms are shipped out of a region or a country and, if so, what the potential is for further local processing to increase the economic base.

(e) What potential additional uses are not being exploited, and what motivation is needed for wider acceptance of wood. For example, wood sees relatively little use in dwellings. With the rapidly expanding population in Latin America and with considerable effort to colonize neglected areas, wood housing could offer a fruitful field if prejudices and other factors could be overcome. Housing is cited only as an example and it is not intended that the effort be limited to this.

(f) What hindrances exist in the form of laws or regulations relative to taxation, import restrictions, export restrictions, and the like to more efficient and economically beneficial utilization of wood. It is anticipated that this would be strictly an inventory which could form the basis for a research project which could seek corrective measures.

The utilization specialist assigned, using the objectives and the tentative study subjects outlined above will, in the first 3 to 6 months of his assignment, develop a detailed working plan and determine personnel requirements for completing this part of the project within a reasonable period. Assignment of additional personnel, if required, will be arranged on receipt of this information. It is anticipated that short-term consultants will be used to study special subject areas as required.

Anticipated Duration: 2 years.

Headquarters: Part 2 of the project will be headquartered initially in Lima, Peru. After development of the detailed working plan, headquarters for additional personnel will be considered.

APPENDIX 7

Appendix 7

Proposed Budget for a 5-Year Program of
Forest Products Research in Five Latin American Countries
(Peru, Brazil, Venezuela, Colombia, Ecuador)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
PART 1--COLLECTION, IDENTIFICATION, EVALUATION						
Collection, Identification:						
In-country AID costs	$103,000	$120,000	$137,000	$173,000	$173,000	1/ $706,000
Country contribution (30%)	44,000	51,000	59,000	75,000	75,000	2/ 304,000
Cost of training in collection by U.S. FPL	10,000	5,000	5,000	5,000	5,000	3/ 30,000
Subtotal	157,000	176,000	201,000	253,000	253,000	1,040,000
Evaluation:						
Basic property evaluation U.S. FPL	30,000	50,000	50,000	50,000	50,000	4/ 230,000
Full scale evaluation, U.S. FPL	30,000	50,000	50,000	50,000	50,000	5/ 230,000
Training of country people at U.S. FPL						
AID costs	5,000	20,000	20,000	20,000	20,000	6/ 85,000
Country contribution (50%)	5,000	20,000	20,000	20,000	20,000	7/ 85,000
Subtotal	70,000	140,000	140,000	140,000	140,000	630,000
Total, Part 1	227,000	316,000	341,000	393,000	383,000	1,670,000
PART 2--INVENTORY OF UTILIZATION PRACTICES AND POTENTIALS						
In-country work, AID costs	35,000	105,000	70,000	--	--	8/ 210,000
TOTAL PROGRAM						
AID costs						
Direct, parts 1 and 2	213,000	350,000	332,000	298,000	298,000	1,491,000
Overhead (15%)	37,000	62,000	58,000	52,000	52,000	261,000
Total, AID	250,000	412,000	390,000	350,000	350,000	9/ 1,752,000
Country contributions	49,000	71,000	79,000	95,000	95,000	389,000
Total	299,000	483,000	469,000	445,000	445,000	2,141,000

1/ AID cost of collection and shipment of complete herbarium materials and wood samples to FPL from Peru, Brazil, Venezuela and Colombia. Includes $5,000 per year for Ecuador to cover cost of cutting and shipping logs of commercially important species for full scale evaluation tests at FPL. The FAO special fund project in Ecuador is currently engaged in a collection of herbarium and wood sample project. Therefore, Ecuador could cooperate with the FAO in getting trees marked and collected before cutting for full scale testing. AID contribution to Ecuador will cover the cost of getting test logs to FPL. Industry cooperation is expected in N.W. Ecuador to assist in cutting and logging. Costs in other countries are based on experience in Peru where a simular project is now underway under P.L. 480 funds. Costs will increase after the first year because of increase in amount of materials collected and shipped.

2/ Latin American country contribution is 30 percent of total cost which is the amount Peru currently is contributing.

3/ Expense of one man from FPL to visit L.A. countries to advise and inspect the collection project in five countries. Covers salary, transportation and travel expenses for trips to two countries the first year and at least one trip each year thereafter to supervise and inspect progress of the project.

4/ Cost of basic wood quality evaluation tests of unknown timbers at FPL. Covers one professional man-year for first year and 1-1/2 professional man-years plus supporting personnel thereafter.

5/ Cost of full scale wood evaluation tests at FPL of commercially important known timbers. Covers one professional man for the first year and 1-1/2 professional man-years plus supporting personnel thereafter.

6/ Transportation and living expenses in the U.S. for one technical man from Peru for training in wood quality evaluation for the first year at FPL and for four men per year thereafter from Venezuela, Peru, Brazil and Colombia $5,000 per year per man. Ecuador is excluded because no promising program of wood evaluation is underway in Ecuador. In each of the other countries there are wood testing facilities and programs of work that would benefit from the training.

7/ Latin American country contribution is for salary of their men while in the U.S. This amount is estimated to be 1/2 of the total cost.

8/ Salary, moving, allowances, etc., for one 1 U.S. Wood Utilization Specialist to be located for 2 years in Lima, Peru (first and second year), one man for 2 years in Belem, Brazil (second and third year), and one man for 2 years in Merida, Venezuela (second and third year to cover Venezuela, Colombia and Ecuador). $35,000 per year per man.

9/ AID cost per year per country averages approximately $70,000.

APPENDIX 8

Appendix 8

Proposed Budget for a 5-Year Program of
Forest Products Research in Three Latin American Countries
(Peru, Brazil, Venezuela)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
	PART 1--COLLECTION, IDENTIFICATION, EVALUATION					
Collection, Identification:						
In-country AID costs	$78,000	$90,000	$102,000	$126,000	$126,000	1/ $522,000
Country contribution (30%)	33,000	38,000	42,000	56,000	56,000	2/ 225,000
Cost of training in collection by U.S. FPL	10,000	5,000	5,000	5,000	5,000	3/ 30,000
Subtotal	121,000	133,000	149,000	187,000	187,000	777,000
Evaluation:						
Basic property evaluation, U.S. FPL	30,000	50,000	50,000	50,000	50,000	4/ 230,000
Full scale evaluation, U.S. FPL	30,000	50,000	50,000	50,000	50,000	5/ 230,000
Training of country people at U.S. FPL						
AID costs	5,000	15,000	15,000	15,000	15,000	6/ 65,000
Country contribution (50%)	5,000	15,000	15,000	15,000	15,000	7/ 65,000
Subtotal	70,000	130,000	130,000	130,000	130,000	590,000
Total, Part 1	191,000	263,000	279,000	317,000	317,000	1,367,000
	PART 2--INVENTORY OF UTILIZATION PRACTICES AND POTENTIALS					
In-country work, AID costs (Peru, Brazil only)	35,000	70,000	35,000	--	--	8/ 140,000
	TOTAL PROGRAM					
AID costs:						
Direct, parts 1 and 2	188,000	280,000	257,000	246,000	246,000	1,217,000
Overhead (15%)	33,000	50,000	45,000	44,000	44,000	216,000
Total, AID	221,000	330,000	302,000	290,000	290,000	9/ 1,433,000
Country contributions	38,000	53,000	57,000	71,000	71,000	290,000
Total	259,000	383,000	359,000	361,000	361,000	1,723,000

1/ AID cost of collection and shipment of complete herbarium materials and wood samples to FPL for Peru, Brazil, and Venezuela. Does not include shipment of logs from Ecuador. Costs will increase after first year because of increase in amount of materials collected and shipped.

2/ Latin American country contribution 30 percent of total cost.

3/ Expense of one man from FPL to visit L.A. Countries to advise and inspect project. Covers salary, transportation, and travel for trips to two countries the first year and at least one trip each year thereafter. (Same as for five countries because project is 5 years in duration.)

4/ Cost for basic wood quality evaluation tests of unknown timbers is same as for five countries because the cost for five countries was based on the large number of specimens coming from Peru during the first and second year, whereas very few specimens would be coming in from the countries first getting started on the collection part of the project.

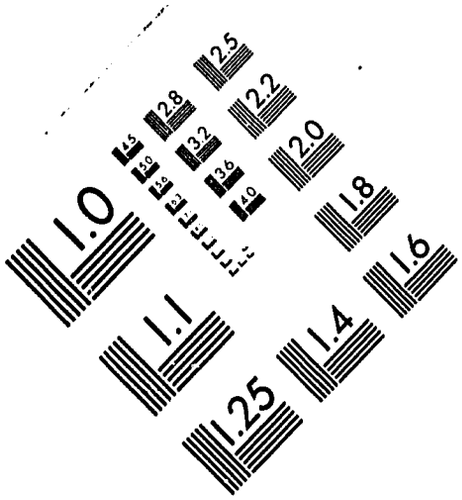
5/ Cost would be same as for five countries due to same reason listed in footnote 4.

6/ Transportation and living expenses in the U.S. for one technical man from Peru for training in wood quality evaluation for first year at FPL and for three men per year thereafter from Venezuela, Peru, and Brazil.

7/ Latin American country contribution is for salary of their men while in the U.S.--estimated to be 50 percent.

8/ Salary, moving allowances, etc., for one U.S. Wood Utilization Specialist to be located for 2 years in Lima, Peru (first and second year) and one man for 2 years in Belem, Brazil (second and third year).

9/ AID cost per year per country averages approximately $95,000.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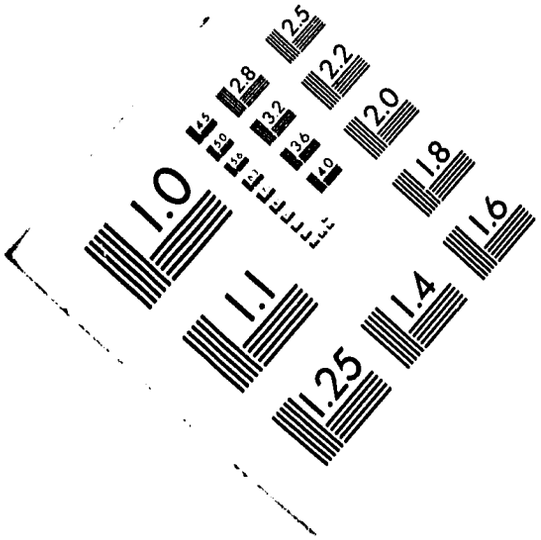
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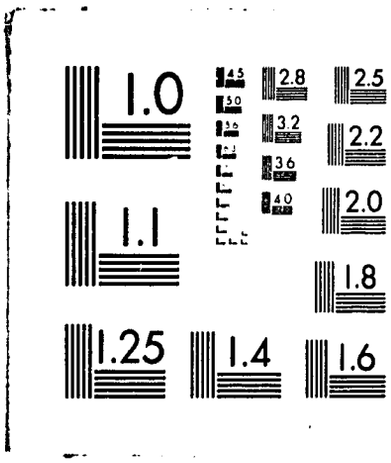
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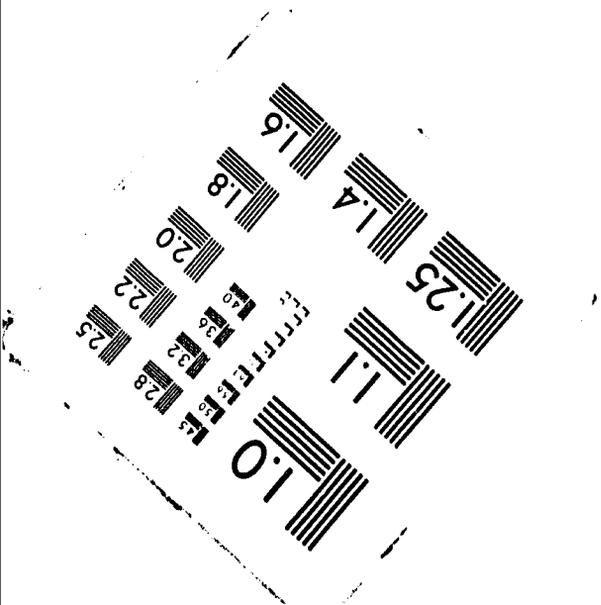
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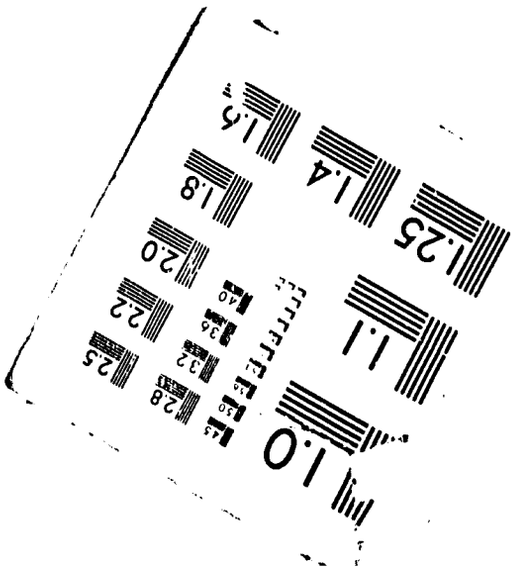
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