

PJ-CAC 742

492-0294

DS. 135.14

(for TAB A
see p.p. i-ix)

PHILIPPINES NONCONVENTIONAL ENERGY
DEVELOPMENT PROJECT:

AN EVALUATION

DECEMBER 1981

PREPARED FOR:

USAID/MANILA AND THE PHILIPPINES MINISTRY OF ENERGY,
The Center for Nonconventional Energy Development

BY:

Development Sciences Inc.
P.O. Box 444
Sagamore, Massachusetts 02561

EXECUTIVE SUMMARY

The five year project agreement for the Philippines Nonconventional Energy Development Project was officially signed in May of 1978 and is now slightly over three years old. By any conventional set of standards, the AID/GOP Nonconventional Energy Development Project is severely behind schedule. Only three of the nine individual subprojects are now underway, and these are between six months to one year behind schedule. To date, less than 14 percent of the AID loan funds has been committed to subprojects. About 42 percent of grant funds, however, has been committed. Taken together, a total of approximately 20 percent of the \$8.65 million in AID funds has been committed. As to GOP counterpart funds earmarked for subprojects, \$3,691,416P has been committed of the total \$23,595,000 Philippine portion. Neither the rural energy use survey nor the renewable energy resource survey has yet to be conducted. Even this in-depth project assessment is almost two years behind schedule.

So few of the original project activities have been started, that it is very difficult to quantitatively measure progress toward the project purpose as stated in the Project Paper. This project assessment of necessity has become a very different kind of exercise than traditional project evaluations. It entails a careful examination of the problems encountered in the implementation of this program and a more fundamental look at the original project objectives and measures of project success. It also deals with the prospects for program success given new conditions imposed by the GOP and USAID.

The disquieting issue is that if a country like the Philippines with an established institution to handle nonconventional energy, a high level of indigenous technical sophistication and a government with the will and commitment to make such a program work has been unable to meet program objectives, how does

that bode for other less developed countries? The questions that we have addressed in the project assessment are:

- What were the problems with implementation which caused delays?
- What lessons can be learned for the future of this and other non-conventional energy projects?
- And, most importantly, what improvements are being made to project design, organization, management and implementation to assure future project success? What additional measures can be undertaken?

Problems

The project has been besieged by a number of critical exogenous and internal forces which can account for much of the delay in implementation. In order of importance or severity, they include:

1. The project expectations and recommended schedule in the Project Paper were based on and justified by the existence of an established entity in the Philippines to carry out the project. This entity did not, in fact, exist and much of the time between project initiation and now has been spent in institution and staff capability building. Unfortunately, the Project Paper does not include among its objectives, nor did it commit much funds to, institutional development.
2. The dendrothermal subproject, the centerpiece of the project accounting for \$3.6 million (50 percent of total AID loan funds), was "spunoff" to the National Electrification Authority (NEA). The small hydro projects were similarly redelegated to the NEA, accounting for another loss of \$1.28 million (18 percent of loans) of potential subprojects. The loss of these subprojects to an agency closer aligned to commercialization may be considered a testimony to good planning within The Center for Nonconventional Energy Development (CNED). However, these subprojects absorbed valuable time and manpower resources of CNED staff.

3. Fiscal management on the part of both AID and the GOP has been poor. Committed subprojects have been delayed by many months due to lack of timely funding. This was primarily the result of inexperience on the part of both AID and CNED in dealing with each other. CNED, a very young organization, was also inexperienced in dealing with its own Ministry of Finance.

4. Friction and misunderstanding between CNED staff and the original project coordinator resulted in an adversarial rather than cooperative relationship. This created a strained management style and ineffective program development.

5. The Ministry of Energy and BED were young organizations at the inception of the non-conventional energy project. CNED was created during the implementation of the project. Neither group has proven to have had the institutional maturity to accommodate this project. That maturity has grown over the last several years partly as a result of the AID project, and the remaining CNED staff now appear up to the task.

It has been difficult to develop acceptable project proposals as substitutes for those projects cancelled or lost to other agencies. The first package of replacement proposals was rejected within the Ministry of Energy almost one year ago (see Appendix E). New proposals are currently being prepared and have been reviewed by the DSI team (see pages IV-17 thru IV-20) and recommendations for improvement are shown in Chapter IV of this report. However, these proposals are two to six months away from acceptance and implementation. There has also been a limited number of subproject implementing organizations utilized by the Center. This course was purposely taken to improve the chances of funding successful subprojects.

These and a number of less significant problems have slowed project implementation and fund disbursement to a snail's pace. In order to meet the five year project schedule, fund commitments would have to increase by more than 1000 percent. While the prognosis is not encouraging, there are a few very important recent developments which improve this bleak picture.

First, the Center for Nonconventional Energy Development will, within the next month, be renamed and reorganized under the Philippine National Oil Company (PNOC), a semi-autonomous company within the Ministry of Energy. This is expected to improve the new Energy Research and Development Center (ERDC) fiscal capabilities to provide timely financing since PNOC has resources to make rapid cash disbursements to implementors. A more thorough description of this is found in Chapter III and Appendix B. Also, the pay scale of PNOC is higher than the government pay scale and, therefore, more high level staff may be attracted.

Second, the new project coordinator (in this position for eight months) is well regarded within the Center and at USAID. He has been vigorously promoting the development of new projects and tightening the control of existing projects.

Third, the Center is beginning to develop formal internal program priorities which are reflected in new project selections. It has also identified good outside implementing organizations and is encouraging appointment of the best program managers within those institutions.

Fourth, the newly approved Integrated Village Energy System (IVES) and Public Information and Promotion Proposals are very well thought out and comprehensive. They are of the quality which the DSI team feels is necessary for successful implementation.

Fifth, CNED has some technically suitable subproject proposals which fit within the Project Paper guidelines and which will be completed within the next two to six months. These subprojects involve a total commitment of approximately

\$3,200,000 (see list) and can be on line within six months if approved by the Ministry of Energy and USAID. These projects are listed below and evaluated in Chapter IV of this report.

<u>TITLE</u>	<u>APPROXIMATE USAID FUNDING \$US</u>	<u>POSSIBLE START DATE</u>
Adaptation of engines for fuel interchangeability	600,000	January 1982
Medium sized wind pumping syst-	325,000	January 1982
Sterling engines and Ormat energy systems	600,000	April 1982
Rural refrigeration systems	640,000	April 1982
PV water supply system	40,000	April 1982
Dispersal of cooking stoves	140,000	April 1982
Rural energy survey	250,000	January 1982
Research capability upgrading	200,000	April 1982

Despite these positive signs, the project is by no means rid of past problems or assured of success. There are serious questions and potential problems remaining.

1. The new subproject proposals are not yet adequately detailed nor acceptable for implementation. They must be brought up to an acceptable level.
2. Are the ERDC and project administration and management prepared to handle the steep climb in funding and administrative responsibility over the next two years?
3. While the move to PNOG will improve fiscal management, is it possible that the ERDC direction will emphasize conventional energy over non-conventional energy?
4. Can the new subprojects be completed by the chosen implementors within the current budget and time constraints?

5. Can the project coordinator provide all of the support necessary to assure success of the project and even if he can, will his expanded role be accepted by ERDC and the new PNOC management?

6. What support is necessary from AID to accomplish the project goals?

The preceding three years have brought about a multitude of changes and improvements to CNED and the next several months, with the realization of the organizational move of the Center to PNOC, should be a high point so far for the project. However, as can be seen from the above discussion, if the project goals and objectives are to be met and if the subprojects are to be successful (completed within time and funds), a number of other changes and improvements must be made.

Over 80 percent of the project funds must be spent within the next two years and some of the subprojects may not be completed within the time remaining. Because we believe that the subprojects now under consideration are good replacements for previous project elements and because they have a good chance of yielding most of the original project goals, we believe that a time extension may be warranted. If AID and the ERDC decide on other funding arrangements, or if they can meet the existing project time targets, a time extension may not be necessary. The next six months will be critical and no decision on time extensions should be made until this period of change and stabilization has been completed.

In order to assure that further unnecessary delays are eliminated, we recommend that a short term subproject development and approval schedule and deadlines be agreed upon by AID, ERDC and the subproject implementors. Within six months, from September 30, 1981, all new subproject proposals should be officially approved for implementation by AID-GOP. At this time, March 1, 1982, the project budget should be revised to include the sum of the approved subproject budgets plus an amount for contingencies and cost increases. The

fate of the remaining uncommitted funds from the original project budget and possible changes in project timing should be reviewed by AID.

A specific set of recommendations, procedures, and deadlines has been developed by the DSI team for the next six months of the project. These recommendations are summarized below:

- Of the currently proposed six subprojects for loan funding and two grant funded activities, three should be officially accepted by AID-GOP within two months. During the remaining four months, at least the other five and possibly new subprojects should also receive official AID-GOP approval or be rejected. Accomplishment of this will require the continued participation of both ERDC and AID and the involvement of a US consultant team.

- In order to assure that the resultant package of project funded activities is consistent with project goals and can be performed within the time and budget targets established, a team of US consultants should be hired using project funds to assist ERDC, the outside implementors and the project coordinator. The consulting team should participate actively over the next six months in proposal completion and detailed work plan definition. In the remaining project years, members of the team should participate with implementors, the project coordinator and key ERDC staff at scheduled subproject milestones. This concept adheres to the original project paper. However, rather than relying on unassociated individual consultants, we recommend a team approach to integrate and coordinate across subprojects. It is very important to have a team with a variety of skills who work on a continuing basis with implementors. The team must consider both specific subproject details as well as overall project and ERDC priorities.

- The six draft proposals, which replace those subprojects which have been terminated or removed, are still two to six months from implementation. They seriously need improved technical and economic justification, better methodologies and their budgets tied to a detailed workplan. In the best of all possible situations the sum of the subprojects would amount to a cohesive program leading to a specific and focused set of goals and objectives. The original project paper did not call for this and at this time we do not think it is productive or practical to require it. The subprojects should be consistent with the project paper and meet priorities of ERDC.

- ERDC should add a senior technical staff person to each subproject implemented by an entity outside ERDC. This senior person should work with the subproject management to assure that problems are prevented or immediately resolved and should be responsible to see that the ongoing subproject accomplishments are internalized and known to ERDC staff. This will offer an expanded opportunity for experience in implementation of subprojects and allow technical center personnel to become more familiar with project management.

- The ongoing subprojects have some critical problems now under study. The project coordinator and ERDC staff should work with the implementors to resolve the problems, establish new schedules and deadlines, and immediately reinstate subproject work. This should also be accomplished within the next four months.

The highest priority should be given to initiation and completing the grant funded energy survey and the wind and solar mapping activities and to assure that the IVES subproject is properly started. The project coordinator should be particularly involved in seeing that problems are solved and that the ongoing subprojects are put back and stay on schedule. For this he will need technical backup and management advice.

- The center and implementors should pay much more attention to institutional, cultural, social, economic analysis throughout each subproject proposal. This is especially true for the six pending loan funded subprojects. The US consulting team should be called on to help address these issues. Each new subproject work plan should also contain a set of milestones where implementor, ERDC staff, the project coordinator and outside US team consultant meet to discuss progress and agree on the adjustments necessary to keep the subproject on time and on target.

- The most important accomplishments during the next six months will be the preparations of thorough and well thought out proposals and work plans for the new package of subprojects. If this cannot be accomplished within six months to the satisfaction of the chief energy advisor of the AID mission, it is the teams feeling that the prospects for accomplishing the project goals are not good. Therefore, the ultimate decision on the fate of the project must be made at the mission. The project coordinator must become the day to day manager of the next six months program.

Current project status suggest that even in light of the recent progress, the accomplishments and the ongoing subproject planning the task of completing the project in the time remaining is very difficult. However, with the continuing presence of a US consulting team, the elimination of past organizational and financial difficulties and continued and focused attention by the AID Mission, the project has a good chance of accomplishing most of its original goals. It is likely that at the end of six months, some money will not be committed, but the money to be spent will be well targeted and most appropriate for meeting the project goals.

An enthusiastic committment to the project by GOP and AID along with implementation of specific recommendations of this assessment will provide the mix of skill and dedication necessary to achieve success. Without this the DSI assessment team feels strongly that while the project performance will improve, budget and substantive targets will not be met. If this happens, the project funds

will not have been well spent and the remaining period of project life will result in only a small improvement over the first three disappointing project years.

Nonconventional Energy Resources Development Program (NERDP)

EVALUATION OF PROJECT PROPOSAL

(Revised 6.28.78)

Project Data

Title: SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES

Proponent/Principal Investigator: PAGASA/Mr. Manuel C. Bonjoc

Date Received: December 11, 1978 Project Duration: One (1) year

NERDP Project Area: Direct Solar - supportive project

FINANCIAL EVALUATION

Are listed personnel (type and number) within guidelines? Yes. No.

Is it possible to reduce personnel without affecting project outputs?

Yes. No.

If so, how? (comments below)

Are contractual salaries/honoraria rates within guidelines? Yes. No.

Are all budget items relevant to project? Yes. No.

Is it possible to trim budgetary items? Yes. No.

If so, how? (see comments)

Are budget items reasonably itemized? Yes. No.

Are consulting fees appearing in costing? Yes. No.

If so, are these within guidelines? Yes. No.

Please rate proposal's overall value:

High Priority.

Second Priority.

Needs revision of some items (see comments)

Comments:

Funding will come from a USAID grant.

Noted by: Manuel L. Angua
MANUEL L. ANGUA

RENATO G. CAYETANO
Evaluator

Nonconventional Energy Resources Development Program (NERDP)

EVALUATION OF PROJECT PROPOSAL
(Revised 6.28.78)

Project Data

Title: SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES

Proponent/Principal Investigator: PAGASA/Mr. Manuel C. Bonjoc

Date Received: December 11, 1978 Project Duration: One (1) year

Requested BED Funding: P54,975.00

NERDP Project Area: Direct Solar - supportive project

TECHNICAL EVALUATION

Is project in line with current program priorities? Yes. No.

Does proponent have backing of an institution? Yes. No.

Does institution have required expertise and technical facilities?

Yes. No.

Is technical basis sound, i.e., will proposed device/system/process

work? Yes. No.

Is system scale acceptable (not too small to be a mere laboratory model

and not too big to require large investment)? Yes. No.

Is work program (phasing, duration) reasonable? Yes. No.

Will the project be essentially a duplication of an on-going or

completed work? Yes. No.

Is intended site acceptable? Yes. No.

Will project outputs (product device and data gathered) be useful?

Yes. No.

What are Specific Outputs at completion (briefly)?

Outputs are Solar Radiation/Wind profiles of different areas of the

Philippines and its seasonal variation and distribution.

Key outputs realizable within 6 months. one year.

NCRD EVALUATION OF
PROJECT PROPOSAL

/ p. 2

Please rate proposal's overall value:

- High Priority,
- Second Priority,
- Needs revision of some items (see comments)
- Rejected on technical grounds (see comments)

Comments, if any:

Radiation data is needed to study and evaluate solar-dependent and
wind-dependent installations. Acquiring accurate data is the first
step in attempting to harness wind or solar energy.

RENATO G. CAYETANO
Evaluator

ENT:cvr
6.28.78

Noted by:

1. E. N. TEJRADO [Signature]

2. R. B. BOMASANG [Signature]

3. A. C. SAWIOS [Signature]

PROPOSAL

FOR

SOLAR ENERGY/WIND MAPPING
OF THE PHILIPPINES

Submitted to

THE BUREAU OF ENERGY DEVELOPMENT

THE PHILIPPINE MINISTRY OF MINING, GEOPHYSICAL AND
ASTRONOMICAL SERVICES ADMINISTRATION
(DAGASA)

8 December 1978
Metro Manila

ROMAN L. KINTANAR
Director-General

MANUEL C. BONGOC

MAPADO

RESEARCH PROJECT PROPOSAL

- I. PROJECT TITLE : SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES
- II. PROPONENT : PHILIPPINE ATMOSPHERIC GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)
- III. COOPERATING AGENCIES : UNITED STATES AGENCY FOR INSTRUMENT DEVELOPMENT (USAID)

BUREAU OF ENERGY DEVELOPMENT (BED)

- IV. PROJECT COST : TOTAL ₱ 2,378,511.00
- (a) USAID FUNDING ₱ 1,152,336.00 (FX)
- (b) BED FUNDING ₱ 54,975.00
- (c) PAGASA FUNDING ₱ 1,171,200.00

V. PROJECT DURATION : ONE (1) YEAR

VI. INTRODUCTION :

Under P.D. No. 78 as amended by P.D. 1149 the Philippine Weather Bureau was abolished and created in its place was the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). It was given the " . . . provide environmental protection and utilize scientific knowledge as an effective instrument to ensure safety, well being and economic security of the people, and for the promotion of national progress . "

To fulfill such tasks five major organizational units were created. One of these units, the National Atmospheric Geophysical Atmospheric Data Office, has been mandated to undertake activities concerning the observation, acquisition, collection, quality control, processing and archiving of atmospheric and allied data, to include among others, meteorological, seismic, oceanographic and astronomical data and observations and making same available in usable form for the benefit of agriculture, industry and commerce. This Office under the same decrees

was also directed to conduct continuing studies of Philippine Climatology, Agrometeorology, Solar radiation, Wind Effects or Gustiness and other such technological studies vital to national progress.

To accomplish its mission the former Weather Bureau and now PAGASA has established all over the country a network of observing stations all over 500 in number of all categories. Some stations monitor only temperature and rainfall while others measure all meteorological parameters. In four stations solar radiation is monitored. Although wind is measured in 65 stations only very few of these are equipped with self-recording instruments. The present distribution and the instrumentation of the solar radiation stations do not meet the standard requirements of the network.

Solar radiation and wind data are weather parameters that need to be gathered, processed and put into usable forms so as to provide baseline data and information for the government programs in harnessing solar and wind energy.

Solar energy plays an important role in crop production. Rice crops planted during dry season when solar energy is maximum, produces higher yields as compared to the rice crop planted during wet season when solar radiation is low.

The principal use of solar energy at present, among others are in solar drying, water heating, salt making, and energy generating.

Wind as a source of energy has been recognized even during the older days. Some utilization has designed and constructed various types of windmill to draw or move water and they have been successful in varying degrees. But for the purpose of transforming fully wind energy into usable forms there is a need to know more detail of the wind regime in the country. Studies must be made of the speed-duration curve at strategic points throughout the country. At present this cannot be adequately done because

of the lack of data from continuous self-recording wind equipment. This project will consist of the following main activities:

- A. Expansion and upgrading of the existing solar/wind station network in the Philippines.
- B. Collection and processing of solar radiation/wind data.
- C. Analysis and evaluation of solar/wind data.
- D. Preparation of reports.

VII. SPECIFIC OBJECTIVES:

- A. To provide data and information on solar radiation and wind velocity in the Philippines to various researchers who are involved in the utilization of solar and wind energy resources and other related fields of studies.
- B. To determine the seasonal and monthly variation and distribution of solar radiation and wind velocity for the whole country.
- C. To determine the relationship of solar radiation versus duration of bright sunshine in the Philippines.
- D. To expand and upgrade the present solar/wind stations network in the Philippines.

VIII. METHODOLOGY:

- A. Rationale for choosing the proposed sites, description of instruments and the kind of the data to be collected by each site.

Considering the characteristics of the climate of the Philippines situated in a maritime tropical setting with very irregular topography it is felt necessary that an adequate network of solar/wind observing stations should be established. This can be done by expanding the present network of such stations. At the same time, the stations should be fairly well distributed such that the parameters measured at each station should represent fairly the condition in the surrounding areas. The resulting proposed network based on the above considera-

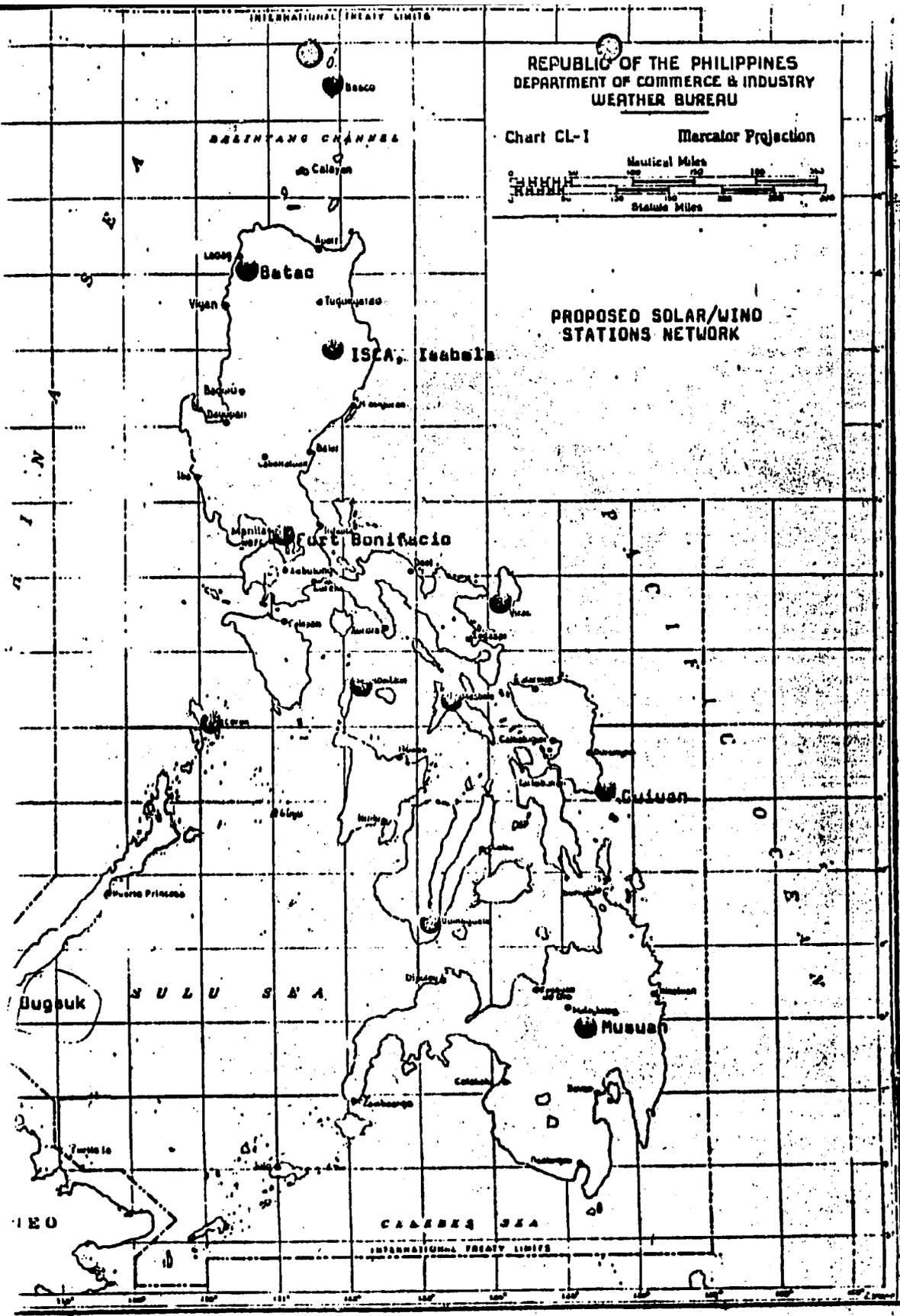
INTERNATIONAL TREATY LIMITS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF COMMERCE & INDUSTRY
WEATHER BUREAU

Chart CL-1 Mercator Projection



PROPOSED SOLAR/WIND
STATIONS NETWORK



tion is shown in Chart. *CL/10*

The energy received from the sun reaches the earth's surface after passing through space and the atmosphere. The amount of this energy as measured on the earth's surface varies from place to place and from time to time. It is influenced by the distance of the sun from the earth, the solar output of radiation, inclination of the sun's rays to the horizontal surface and the transmission and absorption characteristics of the atmosphere above the given place.

The data to be collected including the existing weather elements observed at each site are the following:

Sunshine Duration:

This data show the total time that the sun is not obstructed by the clouds and is measured with the use of the Campbell Stokes Sunshine recorder. Sunshine duration data can be utilized to derive the total global radiation if the relation is established. This data is normally expressed in minutes or hour per day or month of bright sunshine. It may also be expressed as a percentage of possible bright sunshine.

Total global solar radiation:

The total direct and diffuse radiation from the sun and sky (global solar radiation) as received on a horizontal surface is measured by a pyranometer. This energy is measured in langley's.

Diffuse or Sky Radiation:

This data is measured by a pyranometer with a shadow band. The diffuse solar radiation as received on a horizontal surface. This energy is measured in langley's.

Direct solar radiation:

This data could be obtained by subtracting the diffuse solar radiation from the global solar radiation.

Wind Data:

The wind direction and wind speed are measured by a combined wind vane and anemometer instrument. Most of the regular synoptic station record only wind direction and wind speed at 3-hourly interval due to lack of self-recording equipment. These stations do not have continuous record of wind direction and wind speed.

B. Description of Proposed Equipment Requirement

The proposed required equipment is based on the existing instrumentation of the solar radiation stations. The data to be gathered are the data which are not gathered by the present set-up of the network. The present stations do not observe continuously the wind direction and speed and diffuse or sky radiation.

1. Epply Pyranometer (B & W) Model 8848

- It has a thermopile sensor
- It measures global (total sun and sky) radiation
- It could be used also in continuous recording and spot measurements of the solar scattered radiation and the reflected solar radiation (albedo) which is usually used in field of Agrometeorology, and Forest Science
- Proven also in strictly meteorological network

2. Wind Indicator

- It is attached to the wind sensor so as to display simultaneously wind direction and speed in a separate dial.

3. Electrical Recorder For Wind Indicator W 1760 Main Drive

Project Case

- It is used with the wind indicator and sensor
- It displays and records wind direction and speed on a continuous chart

C. Description of existing equipment

The existing station equipment does not measure and record continuously wind direction and wind speed and diffuse solar or sky radiation. The existing instruments are as follows:

1. Pyranometer, B & W, Eppley, Model 8-48 (3)

- It has a thermopile sensor
- It measures global (total sun and sky) radiation
- It could be used also in continuous recording and spot measurements of the solar and scattered radiation and the reflected solar radiation (albedo) which is usually used in field of ~~the~~ meteorology, and Forest Science.
- Proven also in strictly meteorological network.

2. Normal Incidence Pyrheliometer Model NIP, Eppley (3)

- For measurement of the direct solar component (only) received on a surface perpendicular to the beam
- Provided with the manually notable filter folder accommodating up to those filters.

3. Straight Chart Recorder, 2 Pen, Multi-span speed, Hp 7128A Module 17501A (3)

- It is used with the meter sensor
- It records total radiation and sunshine duration in the graph.

4. Campbell Stokes Sunshine Recorder (20)

- Burning glass Sunshine recorder
- It records the duration of bright sunshine
- It is used to obtain the total time that the sunshine is not obstructed by the clouds.

D. System for Data Collection

After having calibrated all the equipment, they will be installed in synoptic or primary climatological stations operated by the PAGASA. The recorded data in the form of charts are compiled for each month in each of the stations and sent to the National Weather Data Office for processing and analysis. These are then published in usable form. The PAGASA's existing 1130 IBM and Nova Computer system will be used in the processing.

IX. TIMETABLE OF ACTIVITIES

	1	2	3	4	5	6	7	8	9	10	11	12
A. Expansion & upgrading of existing solar/wind station network in the Philippines												
1. Procurement of equipment												
2. Installation and calibration of new equipments												
B. Collection & Processing of solar/wind data												
1. Observation and collection												
2. Processing												
C. Analysis & Evaluation of Solar/Wind Data												
1. Programming												
2. Computerization												
3. Mapping & Analysis												
4. Evaluation												
D. Preparation of Report												

23

X. SUMMARY OF BUDGETARY REQUIREMENTS

	<u>PACASA</u>	<u>BED</u>	<u>USAID</u>	<u>_____</u>
1. PERSONNEL SERVICES	₱49,200		-	₱ 49,200
2. MAINTENANCE AND OTHER OPERATING EXPENSES	170,000	15,000	-	185,000
3. EQUIPMENT & FURNITURE	807,000		1,152,336(PX)	1,959,336
4. CAPITAL OUTLAY	120,000	-	-	120,000
5. SPECIAL PURPOSES	<u>25,000</u>	<u>39,975</u>	<u>-</u>	<u>64,975</u>
TOTAL	₱1,171,200	₱54,975	₱1,152,336	₱2,378,511

XI. PERSONNEL REQUIREMENT

	<u>Honorarium/ Incentive Pay Per month</u>
1. Project Director (1)	₱ 750.00
2. Senior Research (2)*	1,300.00
3. Research Assistants (2)*	600.00
4. Science Aides (2)*	<u>600.00</u>
	₱3,250.00
	vvvvvvvv

* 25% part time each

ANNEX I LINE-ITEM BUDGET

PROJECT TITLE: SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES

I. PERSONNEL SERVICES	<u>BED FUNDING</u>	<u>USAID FUNDING</u>	<u>PAGASA</u>	<u>TOTAL</u>
1. Salaries				
a) Two (2) full time research assistants #600/personnel/mo.			P14,400	P14,400
b) PT technical assistants			25,200	25,200
2. Wages				
a) two (2) laborers for the installation of equipment			9,600	9,600
				49,200
II. MAINTENANCE AND OPERATING EXPENSES				
1. Travel			100,000	100,000
2. Supplies and Materials			35,000	35,000
3. Sundries			20,000	20,000
4. Contingencies	15,000		15,000	30,000
				P185,000
III. EQUIPMENT AND FURNITURE COST				
1. Equipment Cost		1,152,336 (FK)	800,000	1,952,336
2. Furniture			7,000	7,000
				P1,996,336
IV. CAPITAL OUTLAY			120,000	120,000
V. SPECIAL PURPOSES				
1. Honoraria	39,975			39,975
2. EDB Usage and Facilities			25,000	25,000
	<u>P54,978</u>	<u>P1,152,336</u>	<u>P1,171,200</u>	<u>P2,378,511</u>

XII. EQUIPMENT REQUIREMENT
 (For the installation of wind/solar stations at the following 12 places:
 Fort Bonifacio, Basco, Batac, Isabela, Guluang, Coron, Virac,
 Dumaguete, Masbate, Romblon, Musuan and Bugsok)

No.	Qty.	ITEM	Cost (U.S. \$)	
			Unit	Total
1	2 units	Eppley Pyranometer (B&W) Model 8848	600	1,200 ✓
2	1 unit	Eppley Shadow Band Stand model SBS	700	700 ✓
3	2 sets	Eppley Integrator/Printer Model 411-6140	1800	3,600 ✓
4	1 unit	Campbell Stokes Sunshine Recorder	400	400 ✓
5	1 unit	Planimeter Casella W 6014 *	125	125
6	5 boxes	Printing paper	55	275
7	2 rolls	Ribbon	49	98
8	1 unit	Combined Wind Direction & Speed Indicator W 1404, KPH mains drive 220 V/60Hz	2000	2,000 ✓
9	1 unit	Electrical Recorder for Wind Indicator W 1760 Mains Drive Projecting case	2000	2,000 ✓ 1500
10	1 set	Metal Cabinets for two Indicator W 1406	216	216
11	4 units	Power Supply Batteries	67.5	270
12	30 meters	5-core cable	2	60
13	30 meters	2-core cable	0.8	24
14	1 unit	Investor	260	260
15	1 unit	Wind Mast	680	680
16	5 sets	Roll Chart for Recorder W 1784	53	265
17		Other supplies: bottles of ink filler W 1790, Spare pen nozzle W 1792, cleaning out pump		85

For one Station U.S.\$ 12,258.00

*For Main Office only

Total Cost for 12 Stations with the planimeter only for the Main Office: $(12,258 - 125) \times 12 + 125$ \$145,721.00

Total Cost for freight and handling including insurance 10,000.00

Grand Total \$155,721.00
 or at an exchange rate of 7.4 pesos per one dollar ₱1,152,335.40

ANNEX "B"

DISBURSEMENT SCHEDULE

Title of Project : SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES

Proponent/Principal Investigator : PAGASA/Mr. Manuel C. Bonjoc

Duration of Project : One (1) year; project will commence upon arrival of equipment

Disbursement Schedule:

First Release:

At the start of the 1st month of the Project, after complying with the initial requirements, stipulated in the Memo of Agreement, subject to availability of funds.

USAID Funding: ₱ 1,152,336.00 (full)

- For equipment acquisition in accordance with normal AID procedures

BED Funding: ₱ 27,000

Second Release: ₱ 13,500 (BED)

At the start of the 7th month of the Project after completing the requirements for the first six-month period as stipulated in the Memo of Agreement, subject to availability of funds.

Third Release: ₱ 10,738 (BED)

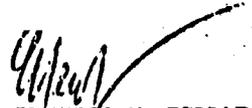
At the start of the 10th month of the Project, after completing the requirements for the first nine-month period as stipulated in the Memo of Agreement, subject to availability of funds.

Fourth Release: ₱ 3,737 (BED)

At the end of the project, after completing all final requirements as stipulated in the Memo of Agreement, subject to availability of funds.

	<u>1st Release</u>	<u>2nd Release</u>	<u>3rd Release</u>	<u>4th Release</u>
-Maintenance and other operating expenses	₱ 7,500	₱ 3,750	₱ 3,750	
-Special Purposes	<u>₱ 19,500</u>	<u>₱ 9,750</u>	<u>₱ 6,988</u>	<u>₱ 3,737</u>
	₱ 27,000	₱ 13,500	₱ 10,738	₱ 3,737

Noted by:


DR. ERNESTO N. TERRADO
Manager for Nonconventional
Resources Division

- b. To determine the seasonal and monthly variation and distribution of solar radiation and wind velocity for the whole country.
- c. To expand and upgrade the present solar/wind stations network in the Philippines by providing suitable equipment to existing PAGASA stations at strategic sites.

3. Obligations of the BED:

1) The BED shall provide financial assistance in the form of an outright grant to the project in the amount of One Million Two Hundred Seven Thousand and Three Hundred Eleven Pesos (P 1,207,311). One Million One Hundred Fifty Two Thousand and Three Hundred Thirty Six Pesos (P 1,152,336) shall be chargeable against the grant component of the USAID-GOP Project on Nonconventional Energy Development for which BED is the overall coordinator for the Philippines. The balance of Fifty Four Thousand Nine Hundred Seventy Five Pesos (P 54,975) shall be chargeable against BED's 1979 budget for grants-in-aid. All of the above funds shall be referred to henceforth in this Agreement as "BED funds". The funds shall be disbursed by BED to PAGASA in accordance with the Disbursement Schedule hereto attached as Annex B. Releases will be subject to the proper bonding of the Project Director, compliance with government accounting and auditing rules and regulations, other pertinent policies of the BED and submission of the Projects reports stated in Article 4 of this Agreement.

2) The BED shall provide at no cost to the PROPONENT:

- a. Technical assistance relevant to the pursuit of the project from personnel within the BED with the necessary expertise, as available;
- b. Consultations with foreign experts brought to the country by BED in connection with the present Project or other projects within the Program, as available;
- c. The use of BED's technical and library facilities for specific work items certified by BED to be directly relevant to the conduct of the Project;
- d. Assistance in coordinating with other government agencies in matters requiring their attention or cooperation insofar as these are directly relevant to the Project and as are with the capability of BED.

4. Obligations of the PROPONENT:

- 1) The PROPONENT shall provide a counterpart fund, in terms of relevant personnel services, equipment, supplies, etc., as stipulated in the Project Proposal, hereto attached as Annex "A".

2) The PROPONENT, through the Project Director, shall:

- a. Exert all efforts to attain the general and specific objectives of the Project as stated in this Agreement and in the Project Proposal within the stipulated time period of twelve (12) months.
- b. Keep a complete and factual amount of the daily activity, operation and progress of the project, including data actually taken, in a logbook or other appropriate form, which shall be open for inspection by representatives of the BED, provided that for monitoring observation and inspection purposes, the BED representatives shall also be allowed free access to the project site;
- c. Submit to the BED quarterly reports on:
 - 1) Technical progress of the project
 - 2) State of usability of apparatus, equipment and other facilities forming part of BED assistance to the Project.
 - 3) Expenditures of BED funds, duly supported by receipts and/or certification by the accounting officer and verified correct by COA representative for the Proponent agency, if any. The financial reports shall include an accounting of expenditures made out of the Proponents counterpart fund for the Project.
- d. Submit to the BED monthly summary reports on the progress of the Project, containing relevant technical findings and expenditures of BED funds;
- e. Ensure the Project's continuity by securing BED's approval before allowing senior Project personnel, including the Project Director, from leaving his station for abroad or for another assignment involving a period of more than ten (10) consecutive days;
- f. Return or remit to the BED the unexpended balance of the grants and whatever income that may be derived by the Proponent from the project;
- g. Submit to the BED within sixty (60) days from the completion of the Project a detailed written account in prescribed Final Report form in thirty (30) copies, including a technical Report in publishable form on the whole undertaking in thirty (30) copies which shall indicate among others, technical findings and problems encountered in the Project;

3) The PROPONENT shall, in all of its official brochures, media advertisement, press releases and signboards at the project site duly acknowledge the assistance of the Ministry of Energy through its Bureau of Energy Development.

5. Project Personnel: The project personnel shall be hired by the Project Director on contractual basis consistent with the provisions of this Agreement, Personnel Cost as reflected in the Line Item Budget of the Project Proposal, made an integral part hereof; provided, however, the Project Director shall submit to Bureau a copy of such contacts together with the job descriptions and qualifications for the positions involved. It is understood that the services of all Project Personnel shall be discontinued upon termination of the Project.

6. Ownership of Properties: All non-expendable materials and properties out of funds granted by the BED for the Project shall exclusively belong to the BED. They shall be inventoried and a copy of such inventory furnished the BED within thirty (30) days from the date of purchase. Provided, that all non-expendable materials and properties purchased by the Project out of funds granted by the BED in connection with the aforementioned project shall be marked as such. Nevertheless, the completed project and all its associated equipment shall be jointly owned by Ministry of Energy and Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

7. Rights to Discoveries and Inventions: Rights to discoveries and inventions arising directly out of the conduct of the present project shall be governed by the provisions contained in Annex "C" which is made an integral part hereof.

8. Compliance with Laws: The Proponent shall comply with all laws, local or national, city and municipal ordinances, building and construction codes, and all government regulations, insofar as they are binding upon or affect the parties hereto, the work, or those engaged thereon and shall obtain required licenses and be responsible for all damages to persons or properties which may occur in connection with the prosecution of the Project.

9. Claims of Personnel: The PROPONENT shall hold BED safe and free from any and all liability, suits, action demands, damage, cost of fees, on account of death, injuries to its personnel or properties or any loss resulting from or caused by PROPONENT incident to or in connection with the Project under this Agreement.

10. Fidelity Bond: The Project Director or his designated Special Disbursing Officer agrees and bind itself to put up in favor of the BED immediately upon the execution of this Agreement, a fidelity bond from a bonding company acceptable to the BED in the amount equal to the amount to be granted by BED for the faithful performance of this undertakings in this Agreement. BED agrees and binds itself to release and cancel said bond thirty (30) days upon completion of the Project and upon submission of all required reports.

11. Warranty Clause: The PROPONENT hereby warrants that it or any of its officials or representative has/have not given or promised to give any money or gift to any employee/official of the BED to influence the decision regarding the awarding of this Agreement, nor the PROPONENT has or its officials or representatives have exerted or utilized any unlawful influence to solicit or secure this Agreement through an agreement to pay a commission, percentage, brokerage, or contingent fee. The PROPONENT agrees hereby that breach of this warranty shall be sufficient ground for the BED either, at the BED's discretion, to terminate or cancel this Agreement, or to deduct such commission, percentage, brokerage or contingent fees from the contract price without prejudice to the PROPONENT's or any other person's civil or criminal liability under the Anti-graft law and other applicable laws.

IN WITNESS WHEREOF, the parties hereunder set their hand on the date and first above written.

MINISTRY OF ENERGY

PHILIPPINE ATMOSPHERIC, GEOPHYSICAL & ASTRONOMICAL SERVICES ADMINISTRATION

By:

By:

GERONIMO Z. VELASCO
Minister

ROMAN L. KINTANAR
Director-General

SIGNED IN THE PRESENCE OF:

REPUBLIC OF THE PHILIPPINES)
MAKATI, METRO MANILA) S. S.

A C K N O W L E D G E M E N T

BEFORE ME, a Notary Public in and for Makati, Metro Manila, this _____ day of _____, personally appeared the following:

<u>NAME</u>	<u>Res. Cert. No.</u>	<u>Date & Place of Issue</u>
GERONIMO Z. VELASCO	A&B -	
ROMAN L. KINTANAR	A&B -	

known to me to be the same persons who executed the foregoing Agreement consisting 6 pages including this page wherein the acknowledgement is written and acknowledged to me that the same is of their free act and deed and the free act and deed of the organization which they represents.

WITNESS MY HAND and Notarial Seal on the date and at the place first herein above written.

ANNEX "C"

SOLAR RADIATION/WIND MAPPING OF THE PHILIPPINES

RIGHTS TO DISCOVERIES & INVENTIONS

Discoveries and inventions arising directly out of the conduct of projects financially assisted by the BED shall be owned (1) by the government of the Republic of the Philippines through the BED and the PROPONENT in case the PROPONENT is a government institution; or (2) by the PROPONENT in case the PROPONENT is a private entity, which shall have a free industrial and commercial disposition thereof, provided, however, that the PROPONENT turns over to the BED a royalty in an amount not exceeding fifty percent (50%) to be determined by the BED of the benefits of all nature which the exploitation of the said discoveries and inventions will bring about in whatever country in any form be it sale of patents, concessions of license, direct exploitation, shares of stocks in a corporation, etc.; provided, further, that the PROPONENT pledges and binds himself or itself (1) to submit to the BED all contracts concerning the sales of his or its patents or concessions of licenses and not to enter into any contract without obtaining the written consent of the BED, (2) in case of shares of stocks in any corporation to transfer to the BED not exceeding fifty percent (50%) of the rights of all nature which will be conferred to him or it as remuneration for his or its shares of stocks, and (3) to make mention of the provisions of these agreements in any contract he or it may enter into, be it sale of patents or concessions of license of all nature and to stipulate that the buyers and concessionaires shall pay directly to the BED the aforesaid royalty which does not exceed fifty percent (50%).

In executing the present Memorandum of Agreement, the PROPONENT agrees to represent that each of his or its staff member has entered into a contract of employment wherein the PROPONENT and each staff member shall:

1. Bind himself and his heirs, successors and assigns that any and all discoveries and inventions which he solely or jointly with others, has conceived or made, or thereafter may conceive or make, during the period of his employment by the BED and/or proponent pertaining to or resulting from or suggested by (a) any work which he has done, or thereafter may do, in connection with his employment by the BED and/or Proponent or (b) any of matters which, during the period of his employment, has been or hereafter shall be the subject of experimentation or investigation shall be the property of the BED and/or Proponent pursuant to Article 8 of these agreement; and to that end, assign or agree to assign to the BED and/or PROPONENT all such inventions and discoveries and to agree from time to time, at the request of the BED and/or PROPONENT to sign any and all instruments of assignment or transfer which may be reasonably requested of him in order that the intent hereof may be fully carried into effect;

2. Promptly disclose and deliver to the duly designated representative or representatives of the BED and/or PROPONENT all information and data at any time in his possession necessary to impart a full understanding of said discovered and inventions; and not to disclose or deliver any such information or data to any other person or persons unless authorized in writing by the BED and/or PROPONENT;
3. Assist the BED and/or PROPONENT in every way in obtaining and enforcing patents for the benefit of the BED and/or PROPONENT covering the said discovery or inventions in any and all countries, and to that end, execute and deliver to the BED, PROPONENT and/or Sponsor any and all instruments or documents which may be requested of him; and to continue this obligation as well as any services needed in connection with the prosecution of any application for patents, and any interferences and/or litigation involving the same or any patent or patents issued there from even beyond the termination of his employment with the BED and/or PROPONENT;
4. Agree that these obligations shall be binding on his executors, administrators, and legal representatives and shall inure to the benefit of not only the BED and/or PROPONENT but also of the successors and assigns of the same.

NOTED BY:

LEGAL DIVISION