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PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-447

1. PROJECT TITLE  GUINEA APPROPRIATE TECHNOLOGY  (VITA OPG)		2. PROJECT NUMBER 675-0208	3. MISSION/AID/W OFFICE AID AFFAIRS OFF.
		4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY)	
		<input type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY 83	B. Final Obligation Expected FY 83	C. Final Input Delivery FY 86	A. Total \$ 650,000 B. U.S. \$ 500,000	From (month/yr.) 11/83 To (month/yr.) 6/85 Date of Evaluation Review 6/22-28/85

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

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Internal administrative organizational agreement between VITA and the Centre National de Perfectionnement (CNP).  a six	VITA Rep + GOG Rep	8/15/85
2. Proposal for/month project extension in order to pursue Cinva Ram program.	VITA + USAID Projr Officer	8/15/85
3. Contingent on the availability of funding, process Project Grant Amendment to add \$150,000 in AID FY 86 funding. This includes CN submission.  Distribution: AFR/PD/CCWAP AFR/CCWA/GTEG-B AFR/TR/ARD REDSO/WCA - Papworth USAID/GUINEA - 1 REDSO/WCA-Defts GOG VITA FVA/PPE FVA/PVC	USAID Proj. Officer, REDSO RLA WAAC + AID/W	11/30/85

8. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT
<input checked="" type="checkbox"/> Project Paper	<input checked="" type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____	A. <input type="checkbox"/> Continue Project Without Change
<input checked="" type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify) _____	B. <input type="checkbox"/> Change Project Design and/or
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<input type="checkbox"/> Other (Specify) _____	<input checked="" type="checkbox"/> Change Implementation Plan
<input checked="" type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P		C. <input type="checkbox"/> Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles) Larry Williams (VITA), S. Conolly (VITA) G. Branson (USAID Contract Project Asst.) H. Papworth (REDSO Eng. /Energy Advisor) R. Hellyer (USAID ADO)- Project Officer Aliou Condé (GOG) Director General Centre National de Perfectionnement. Project Director	12. Mission/AID/W Office Director Approval Signature <i>Mark G. Wentling</i> Typed Name Mark G. Wentling Date September 5, 1985
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GUINEA APPROPRIATE TECHNOLOGY  
(675-0208)

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## NARRATIVE SUMMARY

The Guinea Appropriate Technology Project grew out of a rural energy survey performed by VITA in 1980 at the invitation of the GOG. The original proposal for a Renewable Energy Project was submitted to the USAID mission in mid-1982. The original proposal contained a bio-gas component, as well as the three other components (Cinva Ram, stoves, and documentation center). Per results of proposal review in REDSO/WCA, the bio-gas component was dropped and the title changed to Guinea Appropriate Technology.

The OPG Agreement between AID and VITA for \$500,000 was signed in August, 1983 and field level activities began a few months later. The project purpose is to develop and test two selected technologies: Cinva Ram machine fabrication in order to produce pressed bricks; and improved stoves for wood and charcoal. The project was also to strengthen the National Productivity Center through development of a documentation center. The name of the center was changed during the project to the Centre National de Perfectionnement, which translates roughly as the National Center for Supplementary Training.

The Appropriate Technology Project was the first activity performed by Private Voluntary Organisation in Guinea for many years; and the establishment of VITA in Guinea was seen as symbolic of the opening up of Guinea after many years of isolation. Bureaucratically the project represented a horse of a different color, in that the independence of the PVO/OPG arrangement did not conform with the usual tight control over project implementation exercised by the host country implementing agency. Therefore, on the administrative level, as opposed to the field level where things have gone very well, there has been some friction. With the advent of the new Government on April 3, 1984, and given the Government's commitment to the development of the private sector and the reduction in the role of the state, the atmosphere has improved notably.

Despite all the usual project implementation difficulties (lack of infrastructure, difficulty in finding parts, low GOG salary scale, bureaucratic maze for counterpart funds, etc.) that one finds in Guinea, field level activities have been successful. The improved stove program has been an unqualified success, and is now well established in the private sector. The Cinva Ram program has experienced some difficulties, delays in start-up and loss of approximately one-third of steel in shipment, but is now producing significant results (see Eng. report). The establishment of the documentation center will be completed before end of project.

The twenty-four month activity schedule called for in the OPG Agreement will be completed in November-December of 85. The PACD is in June of 86, but funding will run out with the activity schedule. At the termination of project funding (Dec., 85), it is anticipated that approx. 150 of the planned 500 will have been constructed and distributed.

## RECOMMENDATIONS

1. That the project be extended until June 30, 1986 through addition of approximately \$150,000 in FY 86 funds. The purpose of the extension is to permit fabrication and distribution of approx. 330 Cinva Ram machines. It is the opinion of the evaluation team that this valuable component of the project should be continued until full utilization of project funded raw materials is achieved.
2. As a precondition for the above proposed extension, VITA and the CNP must reach a written agreement on project administration. The agreement must decentralize project management and present a local currency budget for the extension period.
3. Every effort should be made to maximize private sector involvement in the manufacture and distribution of the machines. An effort should be made to use private merchants in distribution.

## GUINEA APPROPRIATE TECHNOLOGY

### AFRICA EVALUATION GUIDELINES

I. What constraint did this project attempt to relieve?

This project attempts to relieve the constraint resulting from the lack of appropriate technologies to address both the fuel wood and low cost construction problems.

II. What technology did the project promote to relieve this constraint?

This project promotes the use of fuel efficient improved cooking stoves; stabilized earth construction is encouraged by introducing CINVA-RAM brick press manufacture. In addition, a documentation center is being established to provide access to information dealing with other appropriate technologies.

III. What technology did the project attempt to replace?

The intended beneficiaries now use a variety of inefficient cooking stoves. The project attempts to replace these with fuel efficient models.

The project also attempts to replace the use of fired earth block and expensive cement block.

IV. Why did project planners believe that intended beneficiaries would adopt the proposed technology?

The project planners believed that the savings resulting from reduced fuel-wood consumption and the substitution of inexpensive stabilized earth block for cement block would provide incentive to adopt the two technologies. Household wood-fuel expenditures of 3000 sylis per month are common in Mamcu. Use of improved stoves can reduce this to 1500 sylis. Cement block currently cost 70 sylis apiece; fired earth block, in Conakry, cost 50 sylis apiece. A stabilized earth block can be produced for 15 sylis.

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- V. What characteristics did the intended beneficiaries exhibit that had relevance to their adopting the proposed technology?

Acquiring the daily requirement of wood-fuel involves frequent and relatively costly trips to the market or walking great distances to areas where wood can be gathered at no cost. These hardships are greatly alleviated by using improved stoves.

Commonly used cement blocks are very expensive due to inadequate supplies of sand and cement. In addition, these blocks are oftentimes of inferior quality due to the low dosage and low quality of locally available cement.

- VI. What adoption rate has this project achieved in transferring the proposed technology?

Prior to the project there was little awareness of the benefits of improved stoves, primarily reducing household expenses and combatting deforestation by reducing consumption of wood. Considerable interest has been generated by developing, testing, and disseminating stoves in Mamou, radio and television coverage of demonstrations in Conakry, and project participation in a national seminar on the use of wood-fuel during which improved stoves were presented to representatives of each prefecture in the country.

Dissemination of CINVA-RAM presses has only recently begun. Nonetheless, judging by the level of interest generated by public demonstrations and television coverage and the number of requests for presses resulting from this publicity the prospects for wide spread adoption are excellent.

- VII. Has the project set forces into motion that will induce further exploration of the constraint and improvements to the technical package proposed to overcome it?

The project has provided an important means of reducing consumption of fuel-wood during a period when the Guinean government and informed population became much more concerned with deforestation and the resultant fuel-wood shortage in upper Guinea. Ready availability of fuel conserving wood and charcoal stoves is encouraging the government to support dissemination efforts, particularly in building demand via newspapers, radio and in Conakry, television.

CNP personnel have been trained in both the techniques of improved stoves manufacture and in the standard methodology for testing stoves. As a result of this training they will be able to introduce further

modifications to improve efficiency and lower the cost of fabrication and verify any impact on efficiency due to these modifications.

Stabilized Earth Block - with only modest effort to build demand for the CINVA-RAM press during the course of setting up a production process, the number of buyers seeking to buy the first lot of presses far exceeds the quantity available. The introduction of CINVA-RAM presses coincides with what appears to be the beginning of a building boom. The press is meeting with enthusiasm among builders aware of its existence as it permits savings of 40-50%, depending on the labor, transport, percentage of cement used, etc.

- VIII. Do private input suppliers have an incentive to examine the constraint addressed by the project to come up with solutions?

Stabilized Earth Block - the private sector has been banned over the past 25 years in many areas of activity and little encouragement of small artisans has been offered by the government. With the new regime's launching of efforts to encourage the private sector and builders sensing substantial profits in the face of a pent up demand for new and renovated buildings, there appears to be ample incentive for private builders serving the low cost building market to try stabilized earth block technology. The high cost and frequent shortages of cement for traditional cement block construction and the banning of fired clay bricks by the Guinean government should make stabilized earth blocks of enduring interest to private builders beyond the project's end date.

Cook Stoves - initial efforts to interest private metal workers in producing cook stoves in the Mamou area have been positive. As the profits of the first sales of stoves register it is expected they will have considerable inducement to continue fabrication well beyond the end of the project.

- IX. What delivery system did the project employ to transfer technology to intended beneficiaries?

In both technologies in question the primary means of transferring them will be to demonstrate to private sector producers that there are profitable markets to be exploited.

With regard to stoves, interested artisans were trained in techniques of improved stoves manufacture. Templates were provided to ensure adherence to critical dimensions. Ini-

tially, stoves were commissioned to eliminate any financial risk on the part of the artisans. As the profit potential became clear, the artisans began producing stoves independently. The project team continues to provide quality control by spot checks.

Stabilized earth technology is being imparted by a combination of demonstrations, arranging television coverage, and meetings with private and public sector builders. A new series of workshops is planned to attract interested builders to explain the technology and to demonstrate it by producing blocks and constructing a building of CINVA-RAM block. The initial batches of presses fabricated by the Centre Pilote d'Industrie have been priced at 13,500 sylis for rural purchasers and 16,500 sylis for Conakry purchasers. These price levels are low enough to encourage many builders to buy them and take the risk in trying out a new technology. As the technology becomes accepted and used widely, the price of the presses should be raised to reflect real costs and a reasonable profit margin, currently estimated to total approximately \$150..

- X. . What effect did the transferred technology have upon those impacted by it?

It is too early to ascertain the impact the stabilized earth technology has had on those few who have used it. First reports indicate blocks are being made at less than a quarter of the cost of cement blocks. Experience elsewhere by VITA and The World Bank indicates the cost of materials, transporting materials and labor to lay up one square meter of stabilized earth block ranges from 40-50% less than when using cement block.

The Mamou stoves designed and tested by the CNP stove team provided on the average a savings of 50% in fuel-wood and charcoal. This reduction in consumption of fuel-wood and charcoal represents monthly savings of 1500 and 2000 sylis per household.

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ORIGINAL EOPS	MAXIMUM POSSIBLE	SITUATION TO DATE	REVISED EOPS	REQUIREMENT TO ACHIEVE ORIGINAL EOPS OR MAXIMUM POSSIBLE
1. Approximately 500 CR presses produced and disseminated.	330 due to non-arrival of substantial quantities of steel.	35 CINVA-RAM's produced, 7 sold	150 presses will have been produced and disseminated	8 month extension, additional funding to achieve maximum possible production of 330 presses.
2. 25% of CR production acquired by private sector.	EOPS will be achieved	5 of 7 sold are to private sector	No Revision	
3. IPC will have strengthened capacity to produce CR presses.	EOPS will be achieved	Production has been underway for nearly 3 months.	No Revision	The Guinean private sector must acquire the means to produce CR's to make training worthwhile.
4. IPC, private sector personnel will be trained in production of CR presses.	The private sector in Guinea does not currently possess the means to produce CR's, training will therefor involve IPC personnel only	8 IPC workers trained	IPC personnel will have been trained in CR production	
5. An evaluation of the production and dissemination of CR's will have been carried out by VITA, AAO, REDSO.	EOPS will be achieved	Evaluation is underway	No Revision	
6. Proceeds for sale of CR presses will be available to IPC for continued production.		The IPC requests payment for CR's in lots of 100	Proceeds will be put in an account for future production and dissemination	
7. VITA and CNP have monitored dissemination/utilization of CR final evaluation given	EOPS will be achieved	Dissemination has just begun	No Revision	

## REVIEW OF EOPS

ORIGINAL EOPS	MAXIMUM POSSIBLE	SITUATION TO DATE	REVISED EOPS	REQUIREMENT TO ACHIEVE ORIGINAL EOPS OR MAXIMUM POSSIBLE
8. Socio-economic data collected on wood-fuel consumption and cook-practices.	EOPS will be achieved	This data was gathered before prototype production	No Revision	
9. Several prototype stoves developed and tested.	EOPS will be achieved	Prototype development completed prior to selection of 3 models suited for dissemination	No Revision	
10. Field testing carried out; contribution by participants assessing effectiveness/acceptability of stoves.	EOPS will be achieved	Final models incorporate modifications resulting from field testing	No Revision	
11. Stoves for middle Guinea selected for production and sale.	EOPS will be achieved	Approximately 200 stoves thus far disseminated	No Revision	
12. Trained artisans in production of improved cooking stoves.	EOPS will be achieved	8 artisans have been trained	No Revision	
13. Detailed dissemination plan for improved stoves by CNP/VITA.	EOPS will be achieved	Program has proceeded according to plan. Current phase involves artisans continuing with production and sales independent of project involvement.	No Revision	

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ORIGINAL EOPS	MAXIMUM POSSIBLE	SITUATION TO DATE	REVISED EOPS	REQUIREMENT TO ACHIEVE ORIGINAL EOPS OR MAXIMUM POSSIBLE
14. Assessment/procurement/installation of documentation center equipment.	EOPS will be achieved	Equipment has been installed	No Revision	
15. Appropriate documents on various technologies selected by CNP will have been procured, cataloged and organized.	EOPS will be achieved	Documents have been received	No Revision	
16. Selected candidate attended three week seminar at VITA/Rosslyn in the organization and management of a doc. center.	EOPS was achieved	The CNP candidate who was trained at VITA/Rosslyn has been transferred	The new candidate may receive only locally available training	Additional funding would be required to train the new Documentation Center manager
17. VITA assistance provided to help make center operational.	EOPS will be achieved	Organization of documents will begin shortly	No Revision	

Stephen H. Connolly  
29 June 1985

## memorandum

DATE: 1 July 1985

REPLY TO  
ATTN OF: Hugh P. Papworth Engineering/Energy Advisor/WCA

SUBJECT: Engineering Field Service Report TDY Conakry, Guinea 22-28 June 1985

TO: Jim Stanford, Acting Director, REDSO/WCA  
Thru: Michael Kingery, Assist. Director, Chief Engineer, ECCS

I was called by the mission to participate in the evaluation of the Guinea Appropriate Technology project (No. 675-0208). This project involves a grant from USAID in the amount of \$500,000 to 'VITA' to administer and develop the project which consists of three parts, namely:

1. Set up and develop the means of manufacture, distribution, and popularization of the 'CINVA-RAM' soil-cement brick press. (500 units).
2. Develop a system of fabrication, distribution and popularization of an improved efficiency line of wood and charcoal burning stoves. No production goal was established for the stoves.
3. Establishment of an Appropriate Technology Document Center (Library and Reading Room) in Conakry.

The life of the project was stipulated to be 24 months which will bring the project to a close in November or December of this year. The details of my findings are contained in the attached report which concludes with a recommendation that the project be extended for a period of six months. Good progress has been made in a difficult and evolving political environment and the extension should allow a very worth while project to achieve even more than the original goals outlined.

OPTIONAL FORM NO. 10  
(REV. 1-80)  
GSA FPMR (41 CFR) 101-11.6  
5010-114

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## memorandum

DATE: June 28, 1985

REPLY TO  
ATTN OF: Hugh P. Papworth, Eng./Energy Advisor, REDSO/WCASUBJECT: Engineering and General Evaluation of the Guinea/VITA Appropriate  
Technology Project No. 674-0208George Branson - Evaluation Team Coordinator  
Mark Wentling - Aid Affairs Officer, ConakryINTRODUCTION

This Project was conceived and initiated under and within a considerably different economic and governmental "ambiance" than presently exists in Guinea. I am reasonably sure that some of the approaches taken would be different if the Project were starting out today. My experience in dealing with African (or any) government agencies, especially when imagination or "entrepreneurship" to create a marketable product at a competitive price is required, has been very negative to date.

The two product lines (stoves and brick presses) are well suited and "appropriate" for Guinea at this time. The personnel enlisted to develop the Project both within "VITA" and the Guineans that have been involved have done and are doing a good job. The inability to reach specific production goals is certainly not due to a lack of effort and application to the task. The primary goal of introducing the products and the necessary organization to produce and market them is well initiated and the remaining time left in the project should allow these major objectives to be realized. In the time remaining, a maximum effort should be made to "wean" as much of the decision making and fiscal control and constraints from government agencies and to involve the private sector in the project to the greatest possible extent.

In view of the stated government aim (per President Conté) of reducing the governmental role in the everyday affairs of the people, I would expect that anything that we can do to assist along these lines would be much appreciated by the new regime.

The present arrangement for decision making and production (of the brick press) is too cumbersome to have any long range viability. The stoves are being produced and marketed substantially free of government involvement and this aspect of the project should continue on its own with a minimum of additional outside help.

In the time remaining in the Project, we must sit down with the parties involved and outline a workable plan of action that will isolate the brick press segment under competent "private" leadership and responsibility in order to at least allow a possibility of profitability sometime in the future. This is very difficult to do but I think it is possible.

OPTIONAL FORM NO. 10  
(REV. 1-80)  
GSA FPMR (41 CFR) 101-11.6  
5010-114

It appears that we will be "locked in" to the IPC as the supplier of finished presses until such time as a private producer can be identified. This arrangement appears to be workable and can be made economically feasible (with the changes outlined above) but they should be used as product suppliers only. The government involvement should cease here, however, and an alternative source should be developed in the event that IPC becomes too expensive to use in the future.

All pricing, distribution and marketing decisions should rest within the small and dedicated group isolated for this activity led by the most capable person that can be identified. There is not much money to work with so the organization will have to be small, perhaps only three or four people.

VITA APPROPRIATE TECHNOLOGY PROJECT NO 675-0208 ENGINEERING EVALUATION

Contents

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3. Project Goals
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  - a. End Function
  - b. Manufacturability
  - c. Economic Concerns (Affordability)
5. Production Facility
  - a. Equipment
  - b. Manpower
  - c. Supervision
6. Marketing Considerations - Pricing
7. Problem Areas
  - a. Monetary and Fiscal Policies
  - b. Free Enterprise Development
8. Conclusions and recommendations.

1. Project Identification and Definition

Name of Project: Guinea Appropriate Technology Project No. 675-0208  
Funding: \$500,000 USAID grant to "VITA" for project administration and funding  
Initiation Date: 23 August 1983  
Duration: 24 months

2. Information Inputs and Sources
  - a. Project Paper
  - b. VITA quarterly reports (Stephen Connally)
  - c. VITA Status Reports (Stephen Connally)
  - d. Published Schedules and work plans
  - e. Brick Press & Stove Reports by short term VITA contract specialists (Andre Charette, Gautun Dutt, Alfred Eush)

- f. Consultations with Evaluation Team Members, and management personnel of CNP and the Industrial Pilot Center
- g. Product Demonstrations and End User Visits

### 3. PROJECT GOALS

There are three separate areas of activity within the framework of this project which are:

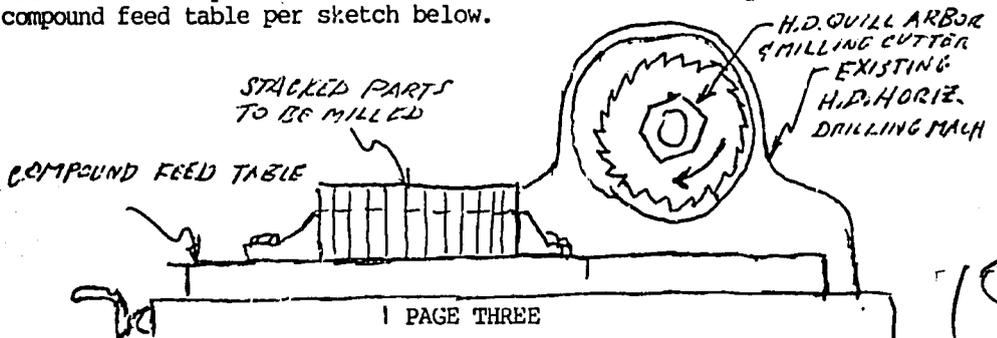
- a. To establish a viable manufacturing system for the CINVA-RAM brick press and set up marketing procedures for a self-sustaining enterprise for the distribution and popularizing (advertising) of the press. The production goal was 500 presses during the 24 month span of the project
- b. The establishment of the production and distribution for improved sheet metal cook stoves (wood and charcoal). No production targets were set for the stoves.
- c. The establishment of an appropriate technology Document Center in Conakry.

### 4. PRODUCT DESIGNS

- a. Function: Both the stoves and the press are replications of proven designs and represent sound approaches to the problems addressed.
- b. Manufacturability: The brick press employs some steel sections (the side and top and bottom brick forming plates) which are best cut out on medium heavy or heavy duty shearing equipment. Otherwise (with the exception of a large capacity drilling machine) the press could be efficiently produced by a small forgeron shop with welding and "cut-off" capability. The stoves are well within the capability of the sheet metal-smith skill levels found throughout Africa.
- c. Economic concerns: Neither the stoves nor the press utilize any unusual materials or manufacturing techniques and with reasonable attention to good shop practices are producible with little special training. The units that I saw were of an acceptable quality level. As with any had operated equipment, there will be wide variation in the force employed to operate the brick press and failures could result from thoughtless use.

### 5. PRODUCTION FACILITY

The production facility chosen is the Industrial Pilot Center in Conakry. This plant has a wide range of medium and heavy duty shearing and drilling equipment which can easily reproduce all of the components of the brick press. If there was a horizontal milling machine I missed it. A mill would cut the production cost of open radius cuts by 90% (stack mill contoured parts in one pass). In all probability the large horizontal drill could be adapted to this work with the use of a heavy duty arbor and a compound feed table per sketch below.



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MANPOWER.

The work force at CNP (Brick Press production) demonstrates full capability to perform the required work though there are undoubtedly specific areas where training would enhance their efficiency and capabilities. Since the stoves are being produced by small private enterprise and individuals, the capable ones will be the survivors.

Supervision

It appears to me that the direct lower echelon supervision is motivated and productive but as you go up the chain of command where "politics" begins to dominate the selection of people, the situation is less encouraging. Of course, this isn't at all unusual in a "statal" or "parastatal" situation.

6. Marketing - Pricing

I saw no developed plan for advertisement and distribution though this is not a major factor at current production levels. I have listened to various theories about the level of subsidy that is required with the introduction of a new product on the market etc. It is a fundamental error to price any product below the actual cost of production unless there are overriding considerations of "cash flow" or some other emergency situation which doesn't exist here. The cost should be the sum of all of the components of doing business.

i.e.

1. Material
2. Direct Labor
3. Indirect Labor
4. Burden
5. Overhead
6. Advertising
7. Distribution
8. Manufacturing Profit

The sum of these factors yields the distributors or, in this case, probably the retailers cost. The dealer should be allowed to tack on whatever the market will bear in his (or her) territory.

The basic pricing exercise in this case (for the press) might go as follows:

(All calculations in US Dollars)

Material (a) Steel

\$36,000/60,000 lbs. = \$.60/lb (can be reduced substantially by cutting "shrinkage")

Amount of steel per Press = 65 Kilos or 143 lbs

Cost of Raw Material (steel) including 10% scrap:

(143 +14.3) (.6) = \$94 + Weld Rod \$ 2 = \$96.....\$ 96

Labor Direct = 24 Hrs at .25/hr = \$6.....\$ 6

Labor Indirect = 50% of Direct Labor = \$3.....\$ 3

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Burden Computation (Plant Cost/useful Life Production Hrs.)	
Building (assigned space)	\$ 30,000
Radial Drill	\$ 65,000
Shear	\$ 45,000
Weld	\$ 2,000
Cut	\$ 3,000
	<u>\$ 145,000/40,000 hrs = \$3.60/hr</u>

Burden at 2 hours machine time per unit \$7.20.....\$ 7.20

Over head (utilities, office, expendable tools, machine repair, etc)  
 50% of assigned burden or \$3.60 3.60  
 Total Fabrication Cost \$116.00

\*Advertising (2% of Fab Cost) \$2.30

\*Distribution (5% of Fab Cost) \$5.75

Subtotal \$124.05

\*These items could be dealer responsibility  
 Profit (20%) 24.81  
 SUG. MANUFACTURERS SELLING PRICE \$148.86

As manufacturing efficiency improves this distributors price might be reduced by as much as 20% or 25%. If this dealer/distributor cost is increased by the dealer by another 15% for dealer profit the selling price comes to about \$171/unit.

Is this attainable in the market? Using an average brick selling price of 14 cents (at c300/\$ about c 42) and a production (with 3 men) of 250 bricks/day the dollar output per day is \$35. Assuming a labor cost of \$.25/man hr the total direct labor comes to (3x8x.25) \$6.00  
 Cement for 250 bricks = 2 1/2 bags (50kg/bag) at \$8.00/bag = \$20.00 (cement)

Total direct labor and material.....	<u>\$26.00</u>
Overhead at 10% L&M	<u>2.60</u>
TOTAL	<u>\$28.60</u>

At a selling price of \$.14/brick the Gross receipts/day are \$.14 x 250 = \$35 yielding a gross profit of \$6.40 or \$.025/brick. 6.40

If \$171 was cash price of machine it would pay for itself in about a month (assuming all 6640 bricks produced in one month could be sold during the month).

On borrowed startup capital. If we use a useful life for the press of 2 years (600 working days) (150,00 bricks) and assume all borrowed money at an interest rate of 15%/annum and a repair rate of 10%/annum (of purchase price) we come out with:

\$171.00
51.00 Interest
<u>34.00 Repairs</u>
<u>\$256.00 Total</u>

Amortization cost per block over 2 year life is only .17 cents or less than 1/5 cent per block or 42 cents per 250 brick day.

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Even if the final numbers indicated a two month machine pay out time the \$171 final selling price would be attractive. Of course, the biggest component of cost by far is the portland cement content of the product. (8 cents/brick). This may be on the high side as cement ranges from \$5.50 to \$9.00/bag throughout West Africa.

This is a very difficult time to assign any local currency value to a newly developed product line. For this reason, I have kept this "mini" analysis in US dollars. In any case, it is essential to maintain a very flexible pricing policy until the currency situation settles down after the "imminent" devaluation occurs.

#### PROBLEM AREAS

From an engineering viewpoint, the problems are relatively minor. Certainly there are areas where production processes and procedures could be improved. There are items such as the simplification of certain parts, addition of assembly welding jigs, improvement of welding work stations etc. some of which are covered at the end of this report. The major road block to success, however, is the involvement with "state controlled" means of production. This was the only option at the time this project was conceived and initiated. With the advent of the change of government and of stated government policy this is no longer true. Within the time and monetary constraints of this project at this juncture (5 months left in project) there is little chance of developing alternative free enterprise sources. There is a possibility, however, of simplifying the operation and hopefully of improving and reducing the burdensome and completely counterproductive chain of command and decision making on matters of fundamental inputs such as pricing, marketing and production decisions. This metamorphosis is fundamental to the success of this and any future activity of this type in this country and far overshadows the "nuts and bolts" aspects of this project in relative long term importance.

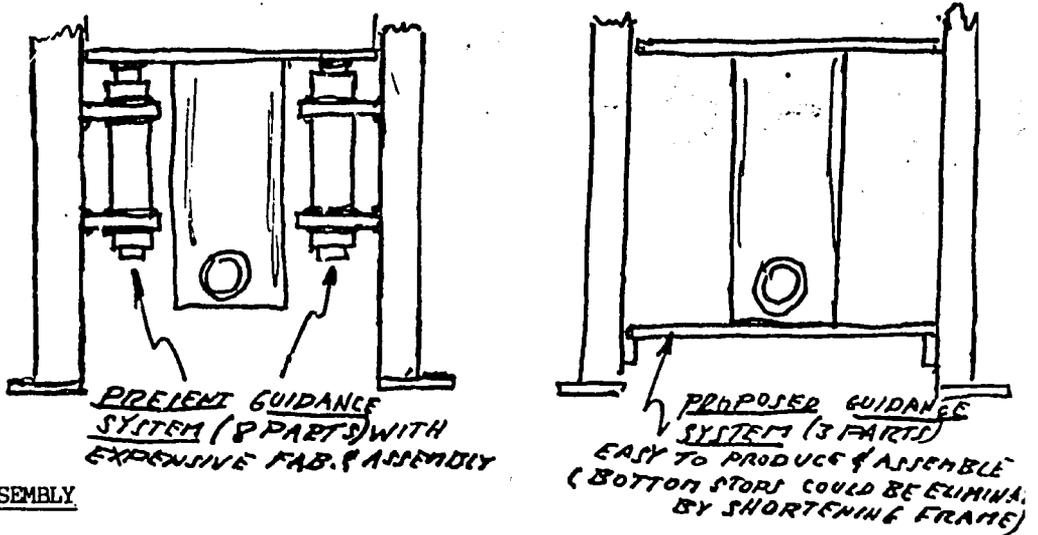
In one respect, the "shortfall" in planned production is really a positive factor insofar as it affords us some opportunity to develop a more workable "modus operandi" with the stock in hand in the brief time remaining in the project. I recommend that we use the remaining time towards this end. If it becomes apparent that traditional attitudes are so entrenched as to be unchangeable within a reasonable time frame, then we can let the project come to an orderly and peaceful conclusion. If real progress can be achieved, however, in the time remaining and there is a "glimmer of hope" that real movement can be made towards a more streamlined and a freer operation then I would recommend an extension of up to 6 months to more firmly establish the more workable approach. There really is no substitute for "free wheeling" competition in a true free enterprise environment but in order to at least "simulate" this situation the following steps should be initiated.

1. Isolate, insofar as it is possible, the stock, the manpower and the financial records and responsibility for the brick press operation.
2. Keep accurate and complete production and sales records.
3. Create an organization with all essential responsibilities assigned and manned with the fewest possible number of people.
4. Explore the possibility of producing "kits" for outside assembly (not an immediate priority).

5. Box or containerize all future raw material shipments to minimize "shrinkage" in port & transport.
6. Identify someone in the private sector who would act as "C.E.O." with the ultimate goal of taking over the whole operation.

### BRICK PRESS DESIGN

I believe that there can be a significant reduction in the number of component parts of the brick press and some of the elements could be simplified in design and manufacture without adversely affecting press performance. Indeed the ram guidance could be improved using 5 fewer parts (see sketch below) and possibly 7 fewer parts.



Since the primary mode of assembly is welding, attention must be concentrated on all of the aspects which affect welding output such as:

1. Appropriate rod selection as to material and diameter and flux
2. Proper rod handling and storage to achieve high quality spatter free welds (light bulb heated storage (75 w) will keep opened cans of rod in good shape in a reasonably tight box.)
3. Proper settings on welders for the rod employed (which is determined by the thickness of steel being welded).
4. Accurate and well made jigs and fixtures to insure accuracy of parts positioning and allow optimum "downhand" welding.
5. Well organized work locations with steel welding tables (1/2 " THK reinforced steel top) at the proper height to minimize worker fatigue.
6. Hand grinder to deburr and chamfer parts and to clean up table top from weld spatter.

Since there may be no practical alternative to using the "Pilot" operation for press production, I would cultivate and develop it as a parts supplier only. We might even be able to assist them in improving their operation. Especially in the stocking, milling and welding areas.

## SALES

I firmly believe that all sales should be made only through authorized and established dealers. A dealer organization takes time and skill to develop but once in place it becomes a tremendous asset to any enterprise. It not only gives the best coverage of the territory but it also helps in making smart marketing decisions and with information dissemination and advertising. Dealers should be provided with product at uniform cost at the manufacturing point and they should be given complete freedom to market the product in any way that produces profitable (hopefully) sales in their particular territory.

## PRICES AND COSTS

The price set by the manufacturing agency must reflect all identifiable costs including a 'living' wage for the workers and the cost of maintaining raw material stocks and operational overhead (and of course, some profit is desirable). Any other pricing policy is counter-productive and shortsighted. In fact, the product is doomed if it cannot consistently return its true cost of production. The rate of return "numbers" for the press owner indicate that the press should be salable at reasonable profit levels. If there are other economic conditions or situations (such as adequate available capital, etc.) these are separate issues and should be handled separately, and not be reflected as a "hidden" subsidy in the manufacturer's price. People buy \$8,000 diesel taxi cabs to go into business all over Africa (with a payback period of one year or more). They will buy a \$200 press if they can see that they will be "home free" with a fully amortized machine in 6 to 8 weeks.

All of these issues should be addressed in the remaining 6 months in the project. I think that this a great opportunity to realize much more out of this endeavor than was originally envisioned, primarily, because of the drastic improvement in the political situation in Guinea. If a little more time is required to mature to fruition these broader "free enterprise" goals I believe it would be very shortsighted not to extend the project for at least another 6 months. These people need all the help they can get to emerge from the dark ages they have been subjected to under the last regime. Identifying and enlisting enterprising capable and honest dealers will require hard work but it will pay off handsomely not only with the brick presses but in other "product line" that might evolve such as carts, stoves, implements, plows and "whatever".

## FINALLY

A lot of progress has been made in this project involving many fine people. A brick press is in production which is a definite improvement over the original prototype model and I am sure it can be improved upon even more. I believe the government of Guinea is receptive to any constructive and well thought out plan that can be evolved and presented to improve the efficiency and utilization of their existing production facilities even if it means "relinquishing" some fundamental controls and this should be a precondition to any further commitment or extension of this project activity or funding. The improved stove program should be able to stand on its own feet by the original project completion date. A Guinean should be identified and specifically trained as "General Manager" who has good fiscal and organizational skills. I would also like to see a chief of design and production designated from those displaying the most ingenuity responsibility and leadership traits. It would be wise to identify these key people with the contribution and assistance of all persons presently involved with the stove program.

The documentation center is well suited to the needs of the people in Conakry. In addition to "VITA" type information on "how to do" a collection of current brochures and catalogs on appropriate and available hardware and products from all over the free world would be a further low cost means to educate and stimulate the users of the facility.

Hugh P. Paworth, Engineering/Energy Advisor, REDSO/WCA

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