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APPROPRIATE TECHNOLOGY INTERNATIONAL:
ACCOUNTABILITY FOR REPLICATING
ITS SUCCESSES MUST BE DEFINED

AUDIT REPORT NO. 85-12

March 26, 1985

March 26, 1985

Office of the
Assistant Inspector General
for Audit

MEMORANDUM FOR SAA/S&T, Nyle G. Brady

FROM: AIG/A, James B. Durnil

SUBJECT: Audit Report No. 85-12, "Appropriate Technology
International: Accountability for Replicating
Its Successes Must be Defined"

This report discusses Appropriate Technology International's (ATI's) efforts to expand the use of appropriate technology in developing countries. The audit consisted of analyses of ATI activities under the Cooperative Agreement and the AID grant.

Improvements have been made in ATI's operations since the issuance of our last report. However, our audit disclosed that accountability and responsibility for replicating successful ATI projects should be clearly established. We recommend that this be accomplished by amending the cooperative agreement and expediting the completion, approval and implementation of a replication strategy. We also recommend periodic evaluations of progress in achieving the widespread replication of ATI's successful technologies. These steps will better ensure that the goals and objectives of ATI's \$16.5 million cooperative agreement program are achieved.

Written comments from the Bureau for Science and Technology and ATI were generally favorable to the overall thrust of the report and its recommendations. These comments, included as Attachments 1 and 2 to the report, were carefully considered and, where appropriate, revisions were made in the final report. Where there were differences, we presented in the body of the report management's comments followed by Inspector General comments.

Please advise me within 30 days of the action taken or planned to clear recommendations. Thank you for the courtesies extended my staff during the audit.

EXECUTIVE SUMMARY

Improvements have been made in Appropriate Technology International's (ATI's) program since the issuance of our April 1983 report. In sharp contrast to its prior program, ATI has focused on the commercial viability of specific technologies, improved its reporting to AID's Bureau for Science and Technology and strengthened the management of its projects.

Of particular significance, the Bureau and ATI are currently focusing on replication. Under this concept, successful ATI projects would be replicated at other locations throughout the world by private concerns, AID, other donors and host country government and non-government organizations.

After reviewing the limited success of the Bureau and ATI under the prior grant, we basically agree with this current focus. Through replication, (i) the Bureau and ATI can achieve their overall goal of significantly expanding the use of appropriate technology in developing countries and (ii) ATI can become a cost beneficial organization.

The Bureau and ATI did not significantly increase the use of appropriate technology under the prior \$23.7 million grant. Due primarily to the lack of emphasis on commercial viability, only a small number of technologies were successfully demonstrated. Further, since there was no formal requirement to do so, there was little success in achieving replication.

It is too early to determine how many projects under the current cooperative agreement will be commercially successful and replicated. The Bureau and ATI anticipate that demonstrating the commercial viability of appropriate technologies will result in an increase in replication.

Replication is essential to make ATI cost beneficial. The ATI demonstration projects are expected to be high risk and accordingly have a low success rate, i.e., few projects will turn out to be commercially viable. Benefits from replicating successful projects would make up for the costs associated with non-commercially viable projects, ATI's project management, policy and information activities, and administrative functions.

There may be developmental benefits associated with all ATI demonstration projects--even those that do not prove to be commercially viable. However, it is questionable whether these benefits justify a separate organization outside of AID; ATI will incur \$8.3 million management and administrative costs over the three-year life of the cooperative agreement. In our view, replication of successful ATI technologies by private concerns, AID, other donors and host country government and non-government organizations could provide such a justification.

We believe the Bureau and ATI are moving in the right direction concerning replication. However, there are no institutional requirements for them to pursue this course. Although dissemination was discussed, replication was not specifically addressed by the authorizing legislation or the current cooperative agreement.

More than a year ago, the Bureau urged ATI to develop a long-term strategy that would address the widespread use of successful demonstration projects. ATI prepared a strategy which incorporated the new replication focus, but it is still in draft form and not sufficiently comprehensive to ensure that replication will be achieved.

The draft strategy lacks a description of the Bureau for Science and Technology's specific role in the actual accomplishment of replication. The Bureau could work with the Bureau for Private Enterprise in attracting private financing for successful demonstration projects. The Bureau could also interface with other bureaus and missions in identifying appropriate locations for replication projects. Alternatively, the Bureau could facilitate such initiatives by ATI. Other areas regarding replication which should be expanded in the strategy are: (i) needed organizational changes, (ii) selection of projects with replication potential, (iii) project development, (iv) marketing and financing alternatives, and (v) evaluation of the replicability of completed demonstration projects.

Firmly establishing accountability for replication is essential to keep the program on track and to measure progress in achieving the overall goal of expanding the use of appropriate technology. While the Bureau should be ultimately accountable for achieving replication of successful ATI projects, there are staffing constraints that must be addressed. Assignment of specific responsibilities to ATI may be necessary.

In any event, the Bureau's and ATI's progress in developing and implementing a strategy that results in the replication by others of successfully demonstrated projects could be the basis for deciding the benefits of continued AID funding for ATI. Accordingly, we believe a synopsis of the finalized strategy should be included in the annual Congressional Notification for the ATI project.

We are therefore recommending that the Senior Assistant Administrator, Bureau for Science and Technology clearly establish accountability for achieving replication by (i) amending the cooperative agreement to provide specific and measurable objectives and performance criteria, (ii) expediting the completion of a joint Bureau/ATI replication strategy, and (iii) requiring periodic evaluations of progress in achieving the widespread replication of ATI's successful technologies.

The Bureau and ATI agreed with the overall thrust of the report that the replication element of the ATI program should be strengthened. Other than specific word changes, which we made, the Bureau also agreed with our recommendations.

Written comments received from the Bureau and ATI are included as appendices 1 and 2. Where appropriate, we made changes in the report. Included in the report body is a discussion of the salient Bureau and ATI comments and our responses where we did not revise the report.

Office of the Inspector General
Office of the Inspector General

APPROPRIATE TECHNOLOGY INTERNATIONAL:
ACCOUNTABILITY FOR REPLICATING
ITS SUCCESSES MUST BE DEFINED

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PART I - INTRODUCTION

A. BACKGROUND

The Congress authorized AID in 1975 to expand and coordinate private efforts in the development and dissemination of appropriate technologies for developing countries. The legislation referred to appropriate technology as smaller scale, cost-saving, labor-using technologies that are generally more appropriate for the small farms, small businesses, and small incomes of the poor. Based on AID's recommendation, Appropriate Technology International (ATI) was authorized under Section 107 of the Foreign Assistance Act and incorporated in Washington, D.C. on December 10, 1976 as an independent, private, nonprofit organization governed by an independent board of trustees.

AID committed a total of \$41 million to ATI which consisted of \$16.5 million under a three-year cooperative agreement ending in September 1986; \$23.7 million under a grant covering the period September 1978 to September 1983; and a \$.8 million start up grant. ATI funded 271 projects, as of December 31, 1984, including 240 grant projects and 31 cooperative agreement projects. Exhibit I lists the cooperative agreement projects over \$10,000.

The Inspector General issued two previous audit reports ^{a/} on ATI's performance. These reports cited vague ATI goals and objectives, inadequate AID monitoring of ATI activities, and inadequate ATI project management. Based on these reports and general AID and Congressional dissatisfaction with ATI's operations, various corrective actions were taken including changing the ATI authorization and funding document from a grant to a cooperative agreement. This permitted more control by the Bureau for Science and Technology's Directorate

^{a/} Report No. 83-58, April 7, 1983, "A.T. International Grants Need: Better Management by AID and Implementation by the Grantee"; Report No. 81-67, April 28, 1981, "Review of Appropriate Technology International."

for Human Resources which has responsibility for monitoring and overseeing the ATI program.

B. AUDIT OBJECTIVE AND SCOPE

The purpose of our audit was to determine whether ATI's programs have significantly expanded the use of appropriate technology in developing countries. We performed our review from June to December, 1984, and covered ATI activities under the cooperative agreement and AID grants. We analyzed program objectives, planning strategies, project records, previous audits and evaluations. We interviewed officials at ATI's office in Washington, D.C. and at AID's Bureau for Science and Technology. We visited ATI projects located in Botswana, Cameroon and Thailand. We also visited USAID Missions in these countries as well as in Nepal, Honduras, and India.

Our audit was made in accordance with generally accepted government auditing standards and included such tests of records and internal controls as were considered necessary in the circumstances. Our audit examined the economy, efficiency and program results of ATI's operations.

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PART II - RESULTS OF AUDIT

A. FINDINGS AND RECOMMENDATIONS

1. ACCOUNTABILITY FOR REPLICATION SHOULD BE ESTABLISHED

Finding

Responsibility and accountability for replication should be formalized. S&T established ATI to expand the use of appropriate technology in developing countries. Although ATI received \$23.7 million under its prior grant, significant progress was not achieved. S&T and ATI have addressed the cause of their prior limited progress under their current cooperative agreement. This was accomplished by substantially improved monitoring and management practices and focus on commercial viability and replication. However, accountability for replication needs to be clearly established in the cooperative agreement and in a joint S&T/ATI replication strategy.

Recommendations

Recommendation No. 1

We recommend that the Senior Assistant Administrator, Bureau for Science and Technology:

- a. Amend the cooperative agreement to provide (i) a definition of replication, (ii) specific and measurable objectives and performance criteria for replication, and (iii) a statement of the Bureau's and Appropriate Technology International's roles for achieving replication by others.
- b. Expedite the completion, approval and implementation of a joint Bureau/Appropriate Technology International replication strategy. This strategy should include such issues as (i) AID bureau and mission involvement, (ii) needed staff and organizational changes, (iii) selection

of projects with replication potential, (iv) project development, (v) marketing and financing techniques, and (vi) evaluation of the replicability of completed projects. The strategy should also identify the Bureau's and Appropriate Technology International's accountabilities and responsibilities for achieving the replication of commercially viable projects. A synopsis of the joint strategy should be included in the annual Congressional Notification.

- c. Require periodic evaluations of progress in achieving the widespread replication of Appropriate Technology International's successful technologies.

Discussion

Section 107 of the Foreign Assistance Act requires AID to emphasize private efforts in the development and dissemination of appropriate technology in developing countries. This overall goal of expanding the use of appropriate technology was included in S&T's grant and cooperative agreement with ATI.

To achieve this goal, we believe that replications of successful ATI demonstration projects by private concerns, AID, other donors and host country government and non-government organizations are essential. Most ATI projects by their nature are high risk in terms of their chances for commercial viability. In order for ATI's high risk operation to be cost beneficial, other private and government organizations must be successfully influenced to replicate commercially viable technologies in other locations of the host country as well as in other parts of the world.

The Use of Appropriate Technology Under the Prior Grant

ATI's \$23.7 million grant program did not significantly increase the use of appropriate technology in developing countries. According to an AID evaluation, about 40 percent of the grant projects did not involve technology development and/or diffusion. Many projects were geared toward strengthening host country institutions' abilities to contribute to development. For example, several projects involved improving accounting and

bookkeeping systems, helping to generate future sources of financing and improving management of host country institutions.

Technologies demonstrated under the grant that were conducive to replication, such as water pumps and solar dryers, were generally not replicated. ATI undertook these projects on the presumption that other private or government organizations would replicate the successful technologies. Such replications generally were not forthcoming.

S&T and ATI officials acknowledged that private concerns, AID, other donors and host country government and non-government organizations have not replicated a significant number of technologies demonstrated under the grant program. Of those technologies that purportedly were replicated by other organizations, we found no documentation in S&T and ATI files which described these experiences.

ATI also informed us that they had replicated certain projects themselves. For example, ATI duplicated a building construction technology project funded under the prior grant. Also, ATI has duplicated two other projects under the prior grant. While additional demonstrations of these projects may have been needed, we do not consider these to be replications since ATI's efforts were not replicated by others.

S&T can have a far greater impact on the expanded use of appropriate technology if others replicate successfully demonstrated ATI projects. This will allow ATI to continue to undertake high risk projects and thereby identify technologies suitable for replication.

The Current Focus on Commercial Viability and Replication Are Positive Steps

Recognizing the limited impact on the expansion of appropriate technology under the prior grant, ATI's current program was redirected by S&T and ATI's board of directors. This redirection was intended to demonstrate the commercial viability of appropriate technologies under the theory that commercially viable projects would be replicated by others. While this theory appears to have great potential, it is too early to determine whether the projects will actually be replicated.

Although sufficient time had not elapsed for us to assess final results under the cooperative agreement, we found that ATI's planning process has improved considerably. Project papers contained specific and quantifiable objectives, performance standards, and feasibility studies to assess the potential for commercial viability. For example:

- A \$108,000 project in rural Botswana was approved to test the commercial viability of animal driven pumps for agricultural and domestic use. A project objective was to demonstrate the economic advantages to farmers using animal driven pumps over diesel powered models. Thirty-six pumps were to be tested over a five year period and result in a profit to the manufacturer and a cost advantage to farmers.
- The plan for a \$137,700 project in Thailand to test the technical and commercial viability of rhizobium (a bacterium that substitutes for chemical fertilizer) contained estimates of potential demand, assessments of alternative production and distribution methods, estimates of commercial and economic viability of a production plant, and projections of economic and social benefits to farmers using the product.

From these and other projects currently being developed, we concluded ATI was making efforts to select those projects with some potential for replication.

ATI's Program Will Not Be Cost Beneficial Without Replication

We basically agree with S&T's and ATI's current focus on replication. However, if other organizations do not replicate demonstrated technologies, the cooperative agreement with ATI will not be cost beneficial. In essence, the long-term value of ATI's program must be a function of replication.

ATI expects to fund and provide technical support to 50 experimental projects at an average cost of \$165,000. According to targets of the cooperative agreement, a minimum of 10 percent, or 5, of these projects will be "achieving objectives sufficiently so that ATI is assisting or has assisted the subproject implementing organization or individual in locating financial support

for innovation dissemination activities."a/ Such a low minimum success rate underscores the importance of replication.

As shown in the following diagram, a minimum of five successful projects at \$165,000 each only account for \$825,000 of ATI's \$16.5 million cooperative agreement. The remainder will be taken up by other demonstration projects, policy development, information dissemination activities, ATI management costs, and administrative expenses. In effect, each of the five successful projects will cost \$3.3 million (\$16.5 million divided by 5 projects) should the remaining projects prove to be commercially unsuccessful. Thus without replication, the high cost per successful project may not be justified.

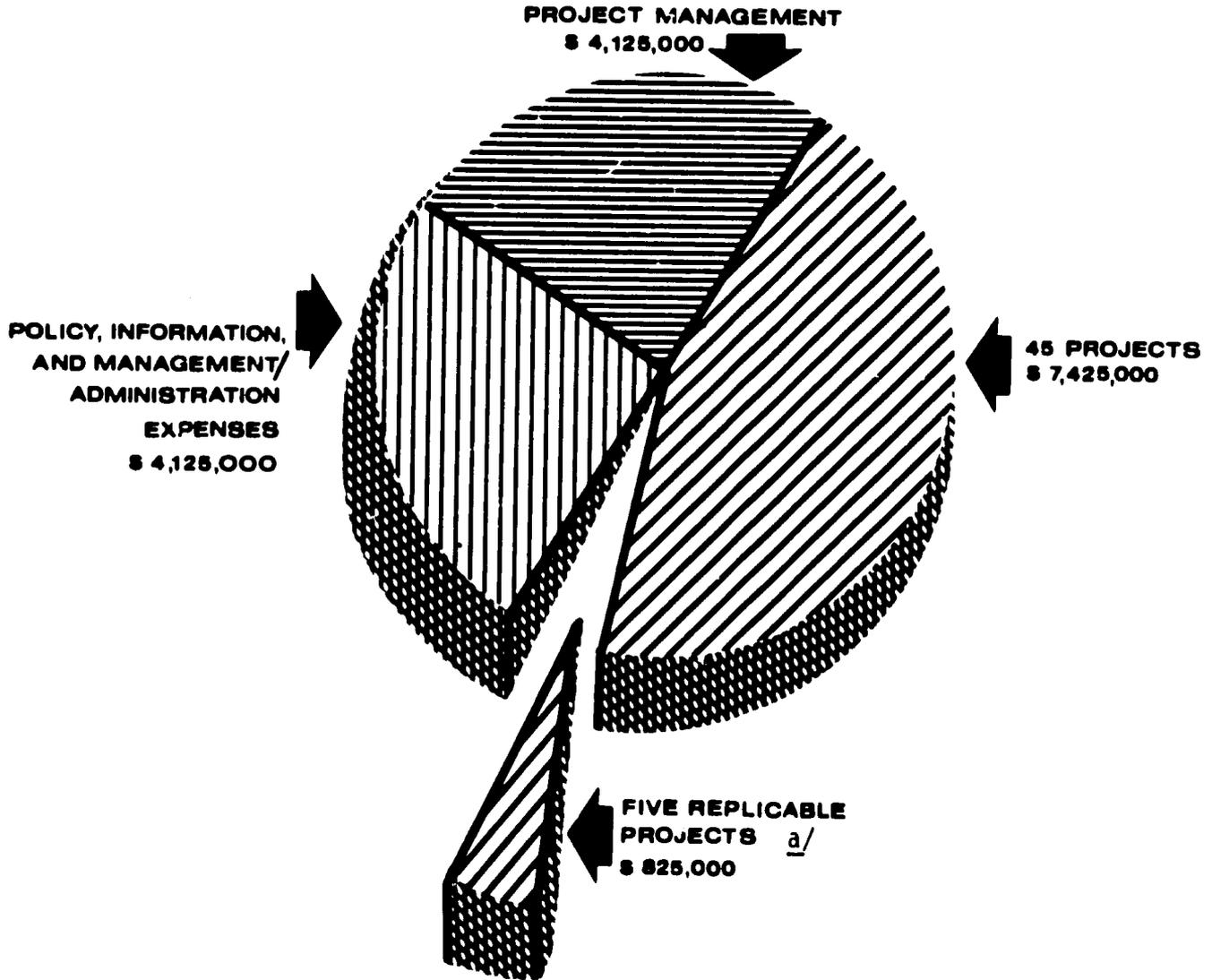
There may be developmental benefits associated with all ATI demonstration projects--even the unreplicable ones. However, these benefits alone may not justify a separate organization outside of AID with its \$8.3 million management, policy development, information dissemination and administrative costs (50 percent of the total three-year budget provided for in the cooperative agreement). In our view, replication of successful ATI technologies by private concerns, AID, other donors and host country government and non-government organizations could provide such a justification.

Accountability for Replication Needs To Be Defined

The objectives and performance criteria of the authorizing legislation and the cooperative agreement did not specifically call for replication. As noted earlier, Section 107 of the Foreign Assistance Act requires AID to emphasize private efforts to develop and disseminate appropriate technologies in developing countries. Although S&T officials consider replication to be included in the term dissemination, the legislation does not define dissemination or suggest methods for achieving it.

a/ According to S&T and ATI officials, the term dissemination as used in this context means replication of the technology in other parts of the country or world.

PROJECTED ATI REPLICATION ACTIVITIES UNDER THE
COOPERATIVE AGREEMENT



a/ ATI estimates it will participate directly in the replication of at least 1 out of 10 projects by assisting subproject implementing organizations in securing financial support for replication.

In June 1983, the Inspector General described the proposed cooperative agreement language as process and procedure oriented and unusually vague in defining goals and objectives. A series of performance targets for commercial viability were then added to the proposed agreement but they did not adequately define S&T's or ATI's accountability for achieving replication. For example:

- The term "replication" is not used in the cooperative agreement.
- The term "dissemination," although used frequently in the cooperative agreement, is not defined; thus, it does not provide an adequate basis for planning, implementation and evaluation.
- The objective of the cooperative agreement, according to S&T, is typical for cooperative agreements in that it focuses on the strengthening of ATI as an institution rather than on program results. The stated purpose is to "strengthen ATI's capacity to facilitate the choice, development, transfer, adaptation, commercialization/dissemination and assessment of appropriate technologies." S&T's role in accomplishing this is not discussed.
- The cooperative agreement performance targets are qualified and thus do not hold either S&T or ATI accountable for achieving the replication of successful demonstration projects. ATI is expected to make every effort to (1) assist grantees in locating financial support for dissemination activities, and (2) seek to transfer information, technical assessments, prototypes and/or technical services. Again, S&T's role in accomplishing these objectives is not discussed.

While projects under the cooperative agreement strive to demonstrate the commercial viability of appropriate technologies, objectives and performance criteria of individual projects did not focus on replication. None of the 17 project plans we reviewed contained replication objectives or performance criteria. Thus, accountability for replication also does not exist on a project level.

S&T and ATI Need a Comprehensive Replication Strategy

Shortly after signing the cooperative agreement in September 1983, ATI started drafting, at S&T's direction, a long-range strategy that would address the widespread use of successful demonstration projects. However, as of February 1985, the strategy which incorporates S&T's and ATI's new replication focus was not finalized and not sufficiently comprehensive to ensure that replication will be achieved.

The draft strategy lacks a description of S&T's specific role in the actual accomplishment of replication. S&T could work with the Bureau for Private Enterprise in attracting private financing for successful demonstration projects. S&T could also interface with other bureaus and missions in identifying appropriate locations for replication projects. Alternatively, S&T could facilitate such initiatives on the part of ATI.

Some other areas that should be expanded in the joint S&T/ATI replication strategy include:

- the potential need for specialized staff and/or a separate group whose main responsibility would be the promotion and achievement of replication.
- procedures and guidelines for selecting projects with the greatest replication potential.
- the number, general location, and mix of projects required to implement the strategy. (The number of projects currently authorized by the cooperative agreement was not based on the proposed strategy.)
- a detailed approach for marketing successful demonstration projects and for obtaining replication financing. The 17 cooperative agreement projects we reviewed generally did not analyze and plan for such replication issues as financing alternatives, marketing methods to make ATI successes known to potential users and financiers, locations for potential replication projects, and replication costs.
- procedures and guidelines for evaluating the replicability of completed demonstration projects.

Although ATI operated under a draft strategy during 1984, the strategy has not been finalized. S&T and ATI are now in the second year of the three year cooperative

agreement. Given ATI's rate of initiating new demonstration projects (about 20 per year), much of the \$16.5 million will be committed without the benefit of a finalized and comprehensive replication strategy. Completion of the strategy should be expedited.

Conclusion

An assertive role must be taken to assure replication of ATI's projects by private concerns, AID, other donors and host country government and non-government organizations. The overall goal of expanding the use of appropriate technology through replication is needed to make ATI's program cost beneficial.

S&T and ATI believe they will achieve replication under the cooperative agreement by emphasizing commercial viability of selected technologies. However, the program still lacks accountability for replication.

Without replication of ATI projects by others, it is questionable whether a level of developmental benefits can be achieved to justify a separate organization.

The Bureau should bear the ultimate accountability for achieving replication of successful ATI projects. Due to staffing constraints, the Bureau may choose to negotiate the assignment of specific responsibilities to ATI which are necessary to achieve replication.

To establish proper accountability, we believe that replication objectives and performance criteria should be included in the cooperative agreement. We also believe that the draft strategy paper outlining how ATI will pursue projects that have the potential for replication should be expanded and finalized. It should address how other organizations will be influenced to replicate commercially viable technologies. To further emphasize the issue of accountability for replication, a synopsis of the joint S&T/ATI replication strategy should be included in the annual Congressional Notification. Finally, periodic evaluations should be performed of the progress in developing and implementing a strategy that results in widespread replication of technologies that are successfully demonstrated by ATI.

Management and Inspector General Comments

S&T and ATI agreed with the overall thrust of the report that the replication element of the ATI program should

be strengthened. With minor word changes, which we made, S&T also agreed with our recommendations.

S&T and ATI comments are included as Appendices 1 and 2. Where appropriate, we made changes in the report. The following is a discussion of the salient S&T and ATI comments and our responses where we did not revise the report.

Management Comments

Both S&T and ATI were concerned about establishing accountability for replication with S&T. S&T stated that they signed the cooperative agreement for the purpose of ATI carrying out all of the cooperative agreement objectives including those relating to replication. ATI stated that ATI's Board of Trustees bears accountability and responsibility for all ATI activities.

Inspector General Comments

Section 107 of the Foreign Assistance Act directs the President, through AID, to pursue private efforts to expand the use of appropriate technology. Within AID, S&T has entered into a cooperative agreement with ATI as one method for achieving the legislative mandate. As caretaker of public funds, ultimate accountability for achieving this mandate rests with AID. This accountability is not altered by the S&T/ATI cooperative agreement relationship.

Management Comments

S&T and ATI have defined replication as the dissemination of innovative elements of appropriate technology projects beyond the objectives and implementation plan of the original project. Such replications can be sponsored and funded by ATI as well as government and non-government organizations.

Inspector General Comments

We disagree with the S&T/ATI definition. According to this definition, projects which result in dissemination of innovative approaches to such "soft" technologies as unique accounting systems, strengthening institutions

and influencing policies would be considered successful replications. While we recognize that these may be desirable results, we believe they can be achieved more directly through other, perhaps less costly, means than ATI funded projects.

We believe ATI's unique contribution justifying the \$3.3 million cost per successful project is in achieving replication of innovative "hard" technologies by others. Such technologies include, for example, ATI's animal driven pump project in Botswana.

We also believe that ATI sponsored projects should not be considered replications. Once ATI has demonstrated the technical feasibility and commercial viability of a technology, S&T and ATI should take an active role in encouraging others to replicate the projects in other parts of the country as well as in other developing countries. Further demonstration of a technology by ATI may be required, but the multiplier or spread effect will not be realized until replication of projects by others is achieved.

Management Comments

S&T and ATI objected to our interpretation of the cooperative agreement's performance criteria as presented in the pie chart. They said that the 10 percent criterion refers only to projects which will require ATI assistance in locating replication financing. S&T pointed out that 20 percent of the projects initiated under the cooperative agreement will be successful enough so that information on the project will be disseminated to interested organizations and individuals. ATI stated that under "perfect conditions", there can be replication without ATI assistance. S&T also said that the performance targets as presented in the cooperative agreement are very conservative and therefore much lower than what will probably be realized. S&T further said that achievement of time-defined objectives and an adequate return on investment are not appropriate standards for research activities.

Inspector General Comments

We acknowledge that the performance criteria in the cooperative agreement are vague and should be clarified along the lines of our recommendation. However, we

interpret the existing criteria to say that only 10 percent of the cooperative agreement projects are expected to be candidates for replication. Merely disseminating information, as provided in the 20 percent criteria, will not likely lead to replication without direct involvement by S&T and ATI. We therefore conclude that ATI is currently accountable for demonstrating that only 10 percent of its projects will be successful enough to realistically expect replication. Even this would be a marked improvement over the prior grant program.

With regard to S&T's comment on conservative performance targets, we believe the performance criteria in the cooperative agreement should realistically reflect the degree of replication ATI is expected to achieve. If ATI can reasonably be expected to achieve a higher target, the Bureau should amend the cooperative agreement accordingly.

We disagree with the Bureau's assertion that time constraints and adequate return on investments are inappropriate measures for research. A decision must be made at some point in time concerning the continued investment of resources in any research endeavor. In the case of ATI, 8 years have passed and \$41 million has been committed to the research program with no significant impact on expanding the use of appropriate technology. We believe that at some point in the near future a decision must be made concerning the continued funding of ATI's research program. Such a decision should be based on a comparison of costs to benefits derived from the program. Implementation of our recommendations should provide the basis for that decision.

Management Comments

S&T stated that the report does not properly take into account the time required to implement and replicate successful demonstration projects.

Inspector General Comments

We realize that implementation and replication of successful projects takes time. We believe that time constraints and performance targets should be established so that progress toward program goals and objectives can be measured and results evaluated.

Management Comments

S&T said that the report does not adequately describe its leadership role in helping ATI focus its program on replication. S&T stated that they saw the need to increase program emphasis on replication long before the IG began its audit. As a result, ATI's focus on replication has increased substantially.

Inspector General Comments

Our report shows that ATI is placing more emphasis on commercial viability of its projects which should increase the level of replication. Our report also recognizes S&T's role in assisting ATI to focus its program on replication. The report points out that ATI, at the direction of S&T, began work on a replication strategy shortly after the cooperative agreement was signed in September 1983. However, more than one year has passed since work began on the strategy yet it has not been finalized and implemented. Also, the draft strategy does not address several important replication issues including S&T's role in replication, marketing and financing alternatives and guidelines for evaluating replication potential of completed ATI projects. Implementing our recommendations will establish accountability for replication and ensure continued progress toward the goal of expanding the use of appropriate technology.

Management Comments

ATI asserted they were not informed of our focus on replication in sufficient time to develop documentation on successfully replicated projects. Both ATI and S&T questioned our statements in the report concerning the lack of replication achieved under the ATI grant program.

Inspector General Comments

We disagree with ATI's assertion that they were not allowed adequate time to develop documentation on successfully replicated projects. We informed ATI management in November 1984 at the start of the review phase of our work that replication of successful projects was our focus. This point was re-emphasized during subsequent meetings with ATI management and staff. In January 1985, ATI prepared, at our request, a

list of projects they claimed were replicated. Most of these same projects were included in the list of 12 projects (out of 240 grant projects) attached to S&T's March 1985 comments.

Six of these projects were sponsored or are planned to be sponsored by ATI and, as discussed above, would not fall within our definition of replication. Our review of ATI files and our requests for further documentation from S&T and ATI on the remaining six grant projects revealed no evidence to support replication. Further, our analysis of the attachment to S&T's comments showed that five of the remaining six projects involved "soft" technologies such as training programs, construction of an appropriate technology center, and financial support to a women's bank for microentrepreneurs. Only one project involved a "hard" technology dealing with the manufacture of cooking stoves. For this project, we were unable to obtain from ATI or S&T files any documentation to support the information presented. We could not verify this information because we were told it was verbally obtained subsequent to issuance of our draft report.

Accordingly, we believe our statements concerning the lack of significant impact of ATI's 240 grant projects are accurate. This conclusion was concurred in by S&T and ATI officials during several discussions throughout the audit.

B. COMPLIANCE AND INTERNAL CONTROL

Compliance

Overall there was an adequate level of compliance with the ATI Cooperative Agreement. Also, with one exception, audit tests showed a satisfactory level of compliance with applicable laws and regulations. Other than the condition cited, nothing came to our attention that would indicate that untested items were not in compliance with applicable laws and regulations.

The exception was the funding of two projects in violation of the Brooke Amendment to the Foreign Assistance Appropriations Act. This amendment prohibits assistance to countries in default on United States loans. AID did not inform ATI that Tanzania was in violation as of February 9, 1983. In June 1984, ATI made two grants totaling \$209,788 to an organization in Tanzania. In a November 1984 opinion prepared at our request, the AID Office of General Counsel recommended that AID (1) add Tanzania and any other countries that were in violation of the Brooke Amendment to ATI's list of prohibited countries and (2) either negotiate orderly terminations of the Tanzanian projects or invoke the termination provisions of the grant.

In response, the Bureau for Science and Technology informed ATI that no further projects should be funded in Tanzania. No other actions had been taken as of January 1985. We will monitor the Bureau's actions to assure compliance with the remainder of the Office of General Counsel's recommendations.

Internal Control

With the exception of control weaknesses associated with the following incident, internal controls were found to be appropriate and were operating in a satisfactory manner. The exception involves an embezzlement of \$8,000 in ATI funds detected by ATI officials in June 1984. This incident was referred to local authorities and ATI made appropriate adjustments.

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PART III - EXHIBITS AND APPENDICES

EXHIBIT I

Cooperative Agreement Projects
Over \$10,000
As of December 31, 1984

<u>Project Description</u>	<u>Country</u>	<u>Project Amount</u>
Animal Driven Pumps	Botswana	\$108,000
Brick Production	Botswana	90,000
Lime Production	Botswana	95,000
Palm Oil Extraction Units	Cameroon	304,000
Lime Production-2 projects	Costa Rica	145,000
Swine Feed	Dominican Republic	161,000
Flour Production Plant	Haiti	87,000
Venture Capital Company	Indonesia	307,000
Regional Wheelchair Production	Latin America	201,000
Linares Pump	Latin America	18,000
Biogas Refrigeration	Mali	12,000
Turbine Driven Agro-processing	Nepal	30,000
Wool Spinning	Nepal	165,000
Venture Capital Company	Philippines	367,000
Rhizobium Inoculant	Thailand	138,000
Protein Enriched Cassava	Thailand	235,000
Rural Small-Scale Industries	Thailand	350,000
Oil Press Production	Tanzania	112,000
Village Oil Processing	Tanzania	143,000
Rural Potteries	Tanzania	98,000
Improved Bricks	Tanzania	156,000
Small Scale Agro-Industries	Zimbabwe	224,000
Successful A.T. Case Studies	-	80,000
TOTAL		<u>\$3,626,000</u>

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UNITED STATES INTERNATIONAL DEVELOPMENT
ADMINISTRATIONOFFICE OF THE
SENIOR ASSISTANT ADMINISTRATOR

MAR 20 1985

MEMORANDUM

TO: IG/RIG/A/W (Acting) Reginald Howard

FROM: S&T, N.C. Brady *MB*

SUBJECT: Draft Audit Report "Appropriate Technology International: Accountability for Replicating Its Successes Must Be Defined" dated February 1985

A. Introduction

We agree with the general thrust of the Report that the replication element of the ATI program should be strengthened. In fact, we saw the importance of replication and were discussing with ATI the need to increase program emphasis on replication long before the IG began its audit in July 1984. As a result, ATI's focus on replication has increased substantially. Even before we received the Report, we planned to amend our Cooperative Agreement (CA) with ATI to better define ATI's replication activities.

B. General Comments

The Audit Report is unclear about the S&T Bureau relationship to and accountability for the replication objectives of the ATI Program. The definition of replication used in the Report is not workable and needs to be modified. The emphasis of the Report on the achievement of time-defined objectives and on adequate return for the replication element of ATI's Program ignores the basic research nature of ATI's efforts to determine the mechanisms involved in the replication of successful appropriate technology innovations. The Report does not properly take into account the time required to implement and replicate successful demonstration projects. The major changes which have taken place in the ATI Program as a result of negotiation and implementation of the CA were not adequately reflected in the Report. It does not adequately portray the leadership role the S&T Bureau has played in helping ATI to focus on the place of replication in its Program and the considerable emphasis of the CA on replication issues. The statement in the Report that the replication of technologies demonstrated under ATI's old grant is not significant is inaccurate.

1. S&T Bureau Relationship to and Accountability for Objectives of ATI Program

The Audit Report is unclear about the S&T Bureau relationship to and accountability for the objectives of

the ATI program. On page iv the Report states: "... the Bureau should be ultimately accountable for achieving replication of successful ATI projects." The Report talks about the Bureau "influencing others to replicate successfully demonstrated ATI projects" at one point (see page 8), and facilitating ATI initiatives at another (see page 15). On pages iv and 17 the Report indicates that the Bureau may delegate specific replication responsibilities to ATI.

The Audit Report thus evidences a lack of clarity about the function and operation of the CA. The S&T Bureau signed the CA for the expressed purpose of having ATI carry out all of the CA objectives including those relating to replication. The basic Bureau responsibilities for the CA are oversight, cooperation and evaluation. The CA makes ATI responsible for achieving the CA objectives. If the Bureau could have carried out one or more of the CA objectives itself, it would not have needed to fund ATI to do so.

We are currently taking a number of actions to facilitate the replication of the innovative elements of successful ATI demonstration projects. Therefore, we concur in the recommendation that the joint Bureau/ATI Replication Strategy include a description of the actions the S&T Bureau will take to facilitate replication. However, we believe that any suggestions that the S&T Bureau is accountable for replication are inappropriate.

The delegation of authority from the S&T Bureau to ATI discussed in the Report assumes a direct line of authority between the Bureau and ATI. The Bureau's arrangement with ATI is contractual and, therefore, does not involve direct line authority. As indicated by the name of the contractual agreement between the Bureau and ATI, the Bureau and ATI are cooperators.

2 Definition of Replication

The Audit Report's definition of replication excludes replication carried out by ATI (see pages i and 8) and indicates that individual demonstration projects should contain replication objectives and performance criteria (see pages 14 and 16). These elements of the Audit Report's definition make it unworkable without modification.

A workable definition of replication must support development and evaluation of specific objectives and performance targets. We believe that the best definition is the following: "Replication is the dissemination or diffusion of the innovative elements of successful

appropriate technology demonstration projects beyond the objectives and implementation plan of the original project. The innovative elements of a project can be related to product, process or the institutional support system. The process of replication can be spontaneous or result from information dissemination or active marketing efforts. The agent of replication can be a private enterprise, a non-governmental organization, another donor including A.I.D. units, a host country government organization or ATI."

If an ATI demonstration project has been completed and evaluated and replication of its innovative elements is within its financial capability, ATI would be the preferred agent of replication because of the knowledge and experience it had obtained through the demonstration project. Consequently, exclusion of ATI from the list of replication agents would reduce the impact of the S&T Bureau's investment in the ATI Program.

As defined above, replication is a program-level, rather than a project-level activity. Potential replicability is an important selection criterion for demonstration projects and an assessment of replicability should be included in the evaluation of completed projects of this type. However, once a demonstration project has been selected, inclusion of project-specific replication objectives and performance targets in the project design is not appropriate, as replication has been defined as the spread of innovative elements beyond the boundaries of the original project.

3. Investigation of Replication Mechanism Is Research Activity

The Audit Report treats the ATI Program as a productive activity which needs to show an adequate return to be justified. This approach is particularly apparent in the ATI expenditure "pie diagram" and related discussion in the Audit Report (see pages 10 to 12).

The ATI expenditure pie diagram is seriously misleading. It is designed to leave the impression in the mind of the casual reader that only 5% of the \$16.5 million amount of the CA will be productively spent. The CA performance targets are based on 10% of ATI demonstration projects being successful enough so that replication financing is being sought and 20% being successful enough so that information on the project is being disseminated to interested organizations and individuals (see CA, Attachment A, page 5, items i and j). The 5% figure on the pie diagram corresponds to the 10% replication performance

target and ignores the 20% replication performance target altogether.

As the CA indicates, ATI "will act as catalyst in the appropriate technology process providing limited amounts of resources to carry out innovative activities which, although inherently risky, have a high payoff potential in terms of becoming self-sustaining and providing a model for other similar activities" (see CA, Attachment A, page 4). The conservative bias of the CA replication performance targets reflected this planned higher risk growing out of the greater innovativeness of ATI projects. However, experience during the first 18 months of ATI operations under the CA indicates that ATI should be able to achieve approximately double the percentages implied by the CA replication performance targets without much difficulty.

The pie diagram neglects several other important points. The replication performance targets contained in the CA represent minimums rather than most probable outcomes. All ATI demonstration projects are potentially replicable or ATI would not undertake them.

The pie diagram analysis also neglects the benefits which ATI demonstration projects which do not appear to be replicable provide to their intended beneficiaries. ATI does not undertake demonstration projects unless analysis shows that the benefits received by the intended beneficiaries will be commensurate with the costs of the project.

In addition, the third quarter of the diagram, project management, represents project identification, design, monitoring, technical assistance and evaluation activities which are directly beneficial to individual projects. Policy and information dissemination activities included in the fourth quarter of the diagram also provide important benefits and support the replication of the innovative elements of successful demonstration projects.

ATI's provisional indirect cost rate, which has been accepted by A.I.D. effective January 1, 1985, is 21%. This is in the lower part of the range for non-profit organizations working with A.I.D.

An important element of the ATI program is research into the mechanisms involved in the replication of successful appropriate technology innovations. This research will include replication of product, process and institutional support system innovations. It will cover spontaneous replication and replication through information dissemination as well as replication through active marketing efforts. Replication agents examined as part of

the research will include private enterprises, non-governmental organizations, other donors including A.I.D. units and host country organizations as well as ATI itself.

ATI's planned research into replication mechanisms is basic and central. Work in the area is sparse and incomplete. Since ready-made models and hypotheses are not available from the academic literature, ATI will have to develop its own. No other appropriate technology organization worldwide is as far along in its thinking about and planning for replication as ATI. ATI will be working on the frontier of knowledge.

Since this research is basic research, documentation of failures is as important as documentation of successes. The normal performance standards for a basic research activity are adequate progress towards research objectives and cost effectiveness. Achievement of time-defined objectives and an adequate return are not appropriate standards for this type of activity.

4. Replication Takes Time

The Audit Report does not properly take into account the time required to implement and replicate successful demonstration projects. ATI did not begin to operate under the CA until the beginning of FY 1984. When work on the audit began in July 1984, ATI had been operating under the CA for 9 months and had approved 13 demonstration projects. Since the average elapsed time from the approval of these projects was less than three and one-half months, none of them had progressed beyond the early organization and procurement stage. By December 31, 1984 ATI had approved 19 demonstration projects and 2 projects which seek to replicate old grant technologies. Therefore, the Audit took place before there was any real indication of what replication experience might be under the CA.

Since ATI's average project length is three to four years, ATI will not have enough successful completed demonstration projects to carry out basic research into the replication mechanism until FYs 1987 and 1988. Completion of this research activity will probably not occur until FY 1990.

If spontaneous replication is, as we expect, relatively rare, it may take two years or more after the completion of a successful demonstration project to determine whether it is going to be replicated. Therefore, the percentage of demonstration projects approved during any time period which are successfully completed and

replicated will continue to increase for at least 5 to 8 years after the end of the period.

Under these circumstances some of the Audit Report's findings and conclusions seem somewhat premature. However, we agree that ATI should establish a selection criterion for demonstration projects based on replicability and criteria for evaluating the replicability of completed demonstration projects at this time. Development of a replication strategy including a plan for carrying out basic research into the mechanisms involved in the replication of successful appropriate technology innovations will position ATI to take advantage of a larger supply of successfully completed CA demonstration projects available for replication in FYs 1987 and beyond.

5. Transition from Grant to CA

The Report does not adequately reflect the major changes in the ATI Program brought about through negotiation and implementation of the CA. The CA increased ATI's focus on:

- a. Field-oriented activities
- b. Priority technical areas.
- c. Balance between the technical and institutional aspects of the appropriate technology process.
- d. Subprojects involving a specific technology or technologies rather than more generalized efforts to promote appropriate technology.
- e. Private sector implementing organizations.
- f. Dissemination of successful innovations.

The CA also established more effective reporting, monitoring and evaluation systems for ATI projects and a more cooperative relationship between ATI and A.I.D.

As a result of the negotiation and implementation of the CA, ATI has dramatically turned around from the low point it reached in early FY 83 to become a viable and effective organization which is committed to carrying out the program Congress and A.I.D. have asked it to carry out. The composition of the Board of Trustees has radically changed and now represents a good balance between development professionals and private sector representatives. The Board is now both responsible and responsive to A.I.D. ATI management is capable, effective, pragmatic and field-oriented and includes several individuals with substantial private sector experience. ATI's structure has been extensively reorganized to carry out the Cooperative Agreement.

ATI has developed a good long-term strategy for achieving its objectives which focuses on:

- a. Needs of rural and semi-urban poor.
- b. Three priority technical areas.
- c. Integration of core "hard" technology with required "software" support package.
- d. Commercial viability and economic sustainability of technologies.
- e. Promotion of small-scale profit-making enterprise.
- f. Replication of innovative elements of successful projects.

Technical areas and countries of operation have been limited and average project size has been increased. Linkages to markets and the private sector have been enhanced through:

- a. Use of small enterprises, organizations of small enterprises and organizations working with small enterprises as implementing organizations in almost all cases.
- b. Project focus on commercial viability of technologies.
- c. Project focus on the promotion of small-scale profit-making enterprises.
- d. Development of rural small-scale industry (RSSI) projects involving venture capital companies. RSSI projects have been approved in Indonesia, Thailand and the Philippines and are being developed in Sri Lanka and Bangladesh.
- e. Establishment of full commercialization by the private sector as a major replication method.

The quality of ATI projects has shown marked improvement due to greater emphasis on careful design, detailed analysis, complete reporting and systematic evaluation. Currently project quality varies from good to excellent and is improving over time.

The Audit Report should discuss these changes and the results in greater detail to provide a more balanced picture (see page 2 of Report). As a result of the changes made, experience under the old grant is not relevant to the current situation and should be deleted or included in an annex (see pages 7 and 8 of Report).

6. Development of Concept of Replication

Although the Audit Report acknowledges that the ATI Program is currently focusing on replication (see pages 1 and 4), it does not adequately portray the leadership role the S&T Bureau has played in helping ATI to focus on the

place of replication in its Program and the considerable emphasis of the CA on replication issues. The importance of dissemination of appropriate technologies was first highlighted in a workshop on "The Role of Appropriate Applications of Technology to Problems of Developing Countries" which was held on October 29 and 30, 1982 and sponsored by the S&T Bureau. A good representation of the leading academic and non-academic practitioners of appropriate technology attended the workshop. During discussions of the Congressional Notification covering the first tranche of funding for the ATI Cooperative Agreement with interested Congressional Committees during the Spring and Summer of 1983, Congressman Clarence Long, who was then Chairman of the House Appropriations Committee Subcommittee on Foreign Operations, expressed disappointment in efforts to replicate successful innovations in appropriate technology.

The Audit Report indicates that the CA is relying on the demonstration of commercial viability for replication (see pages ii, 8 and 17). This seriously understates and misinterprets the level of focus on replication in the CA, which was signed on September 30, 1983.

The CA uses the term "dissemination" which includes "replication" in its meaning. A subgoal of the CA is "wide dissemination of successful innovations relating to appropriate technology" (see CA, Attachment A, page 3). The General Guidelines of the CA require ATI to "make an effort to ensure that successful innovations resulting from its activities achieve the widest possible dissemination and provide an illustrative list of three dissemination promotion activities (see CA, Attachment A, page 4). Two of the CA performance targets seek to measure the success of the ATI Program in terms of innovation dissemination promotion activities (see CA, Attachment A, page 5, items i and j). Four specific items included in the CA scope of work require ATI to promote the dissemination of its innovations (see CA, Attachment A, page 7, item b.1)d); page 8, item b.2)h) and page 13, items d.6) and d.7)). Dissemination of successfully demonstrated innovations through A.I.D. units other than the S&T Bureau is specifically discussed in the CA (see CA, Attachment A, page 14, paragraph f.1)c)).

On December 6, 1983 at a meeting of the ATI Board of Directors, the S&T Bureau's Agency Director for Human Resources posed to the Board a number of questions about the objectives and vision of the ATI Program. Several of these questions related to the breadth of impact of ATI projects and their replication. S&T Bureau review of ATI's Annual Work Plan for the period from October 1, 1983 to December 31, 1984 in January 1984 stressed the importance

of replication of the innovative elements of successful ATI projects. Replication was an important focus in the development of ATI's Long-Term Strategy starting with the initial S&T Bureau/ATI discussions of the subject in the Spring of 1984.

Even before we received the Audit Report, we had made strides in discussions about the replication area with ATI and planned to amend ATI's CA to better define ATI's replication activities. The planned CA amendment would have contained a clearer statement of ATI's replication objectives and a more refined version of performance targets relating to replication. In other words, the replication element of the ATI Program would have been strengthened over time with or without the Audit Report.

7. Replication Not Accomplished

The Audit Report indicates that the replication of technologies demonstrated under ATI's old grant is not significant (see pages 7 and 8). This statement is inaccurate. At least 12 technologies demonstrated under the old grant have been replicated by private enterprises, non-governmental organizations, other donors, host country government organizations, and ATI. A short description of each of these technologies and its replication is included in Appendix A to this Audit Response.

C. Comments on Recommendations

Our comments on the recommendations of the Audit Report are mainly procedural. However, they are important in that they suggest ways that the recommendations can be revised to make them workable rather than impractical.

1. Recommendation No. 1a

The Audit Report recommends that the CA be amended to include the Bureau's role and responsibility for achieving replication by others. Even if the S&T Bureau agreed that it is responsible for replication (see Section B.6. above), the CA would not be an appropriate place to set out this responsibility.

The CA is a legal document which establishes the relationship between ATI and A.I.D. It has a standardized format. Discussion of the S&T Bureau's responsibility for one of the CA objectives in the CA would undercut ATI's responsibility for achieving this objective. In any future contractual dispute with ATI, a statement of the Bureau's responsibility in the CA could undercut the Bureau's case in any ensuing legal proceedings.

In any event, under existing regulations a PIO/T including an amendment to the CA which established the S&T Bureau as the party responsible for achieving one of the CA objectives would not be acceptable. In order to make Recommendation No. 1a workable, the words "and responsibilities" in part iii should be deleted so that it only refers to the Bureau's role in replication.

2. Recommendation No. 1b

Recommendation No. 1b requires that the Joint S&T Bureau/ATI Replication Strategy accompany the annual Congressional Notification (CN). Congressional Notifications are the subject of an agreement between the Congressional Committees interested in matters involving A.I.D. and the A.I.D. Legislative Office. They use a standard two-page format with no provision for attachments.

The A.I.D. Legislative Office would not accept a CN with the Joint S&T Bureau/ATI Replication Strategy attached. In order to make Recommendation No. 1b workable, the requirement should be changed from including the Joint Replication Strategy with the CN to providing a short summary of the Strategy in the CN.

One other point should be mentioned. In the last sentence of this Recommendation "achieve" should be changed to "facilitate." Reference is made to the discussion of the S&T Bureau's responsibility for replication in Section B.6. above.

3. Recommendation No. 1c

We have no comment on this recommendation.

D. Conclusion

We appreciate the opportunity to comment on this draft Audit Report. As our comments make clear, the S&T Bureau has played a leadership role in recognizing the importance of replication and helping ATI to focus on the place of replication in its Program. Even without the benefit of the Audit Report, we planned to amend the CA to better define ATI's replication activities. Therefore, the chief impact of the Audit Report is to encourage us to do what was already planned.

We assume that the full text of this Audit Response including Appendix A will be printed in the Final Audit Report.

Clearances:

ST/RD/EED:M. Farbman	_____	date	_____
ST/HR:R. Zagorin	<u>RCZ</u>	date	<u>3.19.85</u>
ST/PO:V. Anderson	(info)	date	_____
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Drafted by:ST/RD/EED, EKSMITH:x58964:etj:W20570

Response to Draft Audit Report
"Appropriate Technology International: Accountability
For Replicating Its Successes Must be Defined"
dated February 1985

Appendix A

Replication of Technologies Demonstrated Under ATI's Old Grant

1. Improved Jiko Stove

This stove is an improved version of a charcoal stove or "jiko" which is widely used throughout Africa and Asia. The Kenyan Ministry of Energy and a local organization, KENGO, developed an improved jiko stove which consists of a ceramic lining combined with the traditional bucket stove. This results in fifty percent fuel savings when compared to the traditional bucket stove. ATI originally financed a project with ATAC, a Kenyan non-governmental organization, to enable ATAC to establish a production unit which would test and manufacture one hundred of the improved jikos per week.

Today ATAC independently, without ATI or other donor support, manufactures 150-200 improved jikos every week. The commercial success of the production unit originally established with ATI support has resulted in the spontaneous replication of similar jiko production units by private enterprises in Tanzania, Somalia, and urban areas of Kenya. ATI plans to support a followup project which will assist 20 established manufacturers of traditional charcoal stoves in rural and semi-urban areas of Kenya to manufacture the improved stoves and train local potters to produce the ceramic stove liners, in order to establish commercially viable private enterprises to meet the rapidly increasing demand for the improved jiko stove. Widespread replication appears likely given the initial success with spontaneous replication by private enterprises in East Africa.

2. Rural Appropriate Technology Centers

In Thailand ATI has supported the establishment of two village appropriate technology centers which use existing village health and family planning networks and volunteers to disseminate appropriate technologies. Specific technologies developed by these AT centers include bamboo reinforced concrete water catchment tanks, sanitary shallow wells, pit latrines, improved cottage industries and small livestock raising.

The implementing organization for this ATI project was the Population and Community Development Association (PDA) which has a widespread network which covers 16,000 Thai villages. CBADTS, the community development division of PDA, was originally established largely with ATI assistance and has successfully demonstrated that AT centers and an existing village-level network can be effectively used to promote the use of appropriate technologies. In the case of the bamboo-reinforced concrete water tanks for example, CBADTS developed a methodology that combines the use of village self help construction teams with CBADTS technical assistance, loan financing, and follow-up evaluation.

Several international donors have participated in the expansion and replication of this program after initial ATI assistance ended. Other donors include the Ford Foundation, IDRC, CUSO, and Agro Action of Germany. Total donor support for CBADTS activities exceeds \$8 million. This support has been used to establish another AT center and install more than 7000 bamboo-reinforced concrete water catchment tanks, in addition to 1500 pit latrines, numerous shallow wells and other village-level appropriate technologies.

3. Cooperatively Owned Women's Bank for Microentrepreneurs

An ATI project has supported the establishment of a cooperatively owned women's credit society in southern India. The credit society, created by the Working Women's Forum of Madras (WWF), provides small loans to women microentrepreneurs to enable them to expand their commercial operations. The WWF also provides technical assistance in planning and marketing to its clients. The credit society, which now has 9000 members in Madras alone, is administered cooperatively by the women themselves. During the initial ATI financed project the credit society provided 720 loans.

It has since expanded its operations to many villages in southern India. In 1983 the credit society provided 6000 loans funded by reflows from its original loans and concessionary financing from local banks. Recently the credit society received official approval to operate as a bank.

Various international donors have expressed interest in this cooperatively owned women's bank. The concept of cooperative ownership and small or micro loans combined with technical advice has been replicated in a similar credit mechanism used by the Self Employed Women's Association (SEWA) elsewhere in India.

4. Small Scale Irrigation Using Water Percolation Tanks

ATI has supported the development and implementation of an innovative village water management scheme in Maharashtra State in Southwest India that uses percolation tanks to provide water for small scale irrigation. Water percolates from reservoirs and other water sources through semi-pervious material to mud tanks and pools. Electric pumps are used to pump the water from the mud tanks and pools and sometimes the reservoirs themselves into the canals of small irrigation schemes. The success of the technology depends largely on the village water user groups or pani panchayats established to operate the water schemes. The initial ATI project supported the training of water resource technicians and helped GGP, an Indian non-profit trust, to expand its pilot project and establish twenty village water management schemes.

This small scale irrigation technology and the pani panchayat concept has generated a good deal of interest within India, both from the Government of India and several international donors. The Ford Foundation provided funds to complete the construction of the training center. The Government of India has included the pani panchayat concept of dry land irrigation in its 20 point development program and has provided some funds for the replication of the water management scheme. GGP is now replicating an average of 2-3 water management schemes a year without further ATI assistance. A total of thirty-three schemes are currently in operation, benefiting approximately 25,000 people. There is also a strong likelihood of other donor assistance with similar schemes elsewhere in India.

5. Franchising as an Appropriate Technology Mechanism

ATI has provided support to enable a non-profit organization in India, Foundation of Occupational Development (FOOD), to develop and implement a program of small-scale franchises. In the project supported by ATI, FOOD worked with urban snack food vendors to increase their profits and sales through training and bulk purchase of raw materials. FOOD entered into contracts with farmers to ensure a reliable, lower cost supply of raw materials. The organization also provided training for the snack food vendors who were educated but unemployed youth. The young trainees then purchased their own snack food "franchises". Another innovation introduced by FOOD is the use of solar energy to further decrease costs of operation by an average of 2-3 percent. The program has expanded from one hundred franchise members to more than three hundred.

FOOD has replicated the franchise concept with low cost building materials. The organization supports the establishment of small-scale construction companies that use low cost building materials. FOOD provides design assistance, raw materials and training for the owners of the small companies similar to the franchise arrangement for the snack food vendors. This project is financed by loans from local banks and credit institutions.

6. Third World ATI/Hotchkiss Wheelchair

ATI has financed the development of a durable wheelchair that is well adapted to uneven road surfaces and other conditions in developing countries, can be produced in small workshops with locally available materials, and is easily maintained and repaired. Initial ATI support financed the design and testing of this wheelchair, which is now known as the ATI/Hotchkiss wheelchair, as well as the training of thirty-three Latin Americans in wheelchair production techniques in a series of three seminars in Jamaica, Peru and Costa Rica.

Replication of this technology has occurred spontaneously in Paraguay and Peru without further ATI assistance. Several individuals who completed the ATI-financed training course have started a wheelchair production workshop in Paraguay that now produces 120 wheelchairs a year without further assistance. Another small enterprise in Peru is currently producing 12 wheelchairs a month and is expanding production.

ATI has recently begun a followup project which will provide loans to support the establishment of eleven wheelchair production enterprises in Columbia, Peru, Honduras, Guatemala and the Dominican Republic. ATI will finance the purchase of tooling and equipment to standardize production of the ATI/Hotchkiss wheelchair. ATI anticipates that eight small scale wheelchair production enterprises will be operating by the end of 1985. Another eight enterprises are expected to be in production by the end of 1986, including three that will receive financial assistance from ATI and five that will receive only technical assistance.

The ATI/Hotchkiss wheelchair has generated a good deal of interest in Africa and Asia as well as in Latin America. Goodwill Industries plans to include ATI's wheelchair in one of their projects in Panama, and has expressed interest in adapting and incorporating this technology into its program in Africa. ATI will publish a production manual and is financing the production of a standard tool kit that will further assist with the replication of the ATI/Hotchkiss wheelchair in other locations.

7. Fabric Block Printing

The Bangladesh Rural Advancement Committee (BRAC) with ATI support has developed an improved block printing technique for fabric. The ATI project assisted BRAC in improving their dyes, increasing colorfastness and improving cloth weaving techniques, and encouraged the block printing enterprise to select local designs and motifs for the printed fabric.

During the initial ATI-financed project in Bangladesh, the Women's Skills Development Program of the Nepali Women's Association became interested in the improved fabric printing techniques developed there. ATI subsequently financed a project with the Women's Skills Development Program that successfully replicated the fabric printing techniques in Nepal. Although small, the Nepali block printing enterprise has become a commercial success. Building on the small enterprise experience of the Women's Skills Development Program, now renamed the Association for Craft Producers, ATI is currently financing a wool spinning project developed by this organization.

8. Mobile Factory System for the Production of Prefabricated Construction Materials

An ATI project in Columbia helped to develop a mobile factory system capable of casting and manufacturing cement panels used in modular prefabricated low cost housing construction. The production technique was adapted to mobile factories that used trucks to reach rural areas and small communities not easily served by centrally-located factories in urban areas. Under the initial ATI project implemented by SERVIVIENDA, a non-profit organization in Columbia that provides financial and technical assistance for low cost housing construction, three mobile factories were established. These three factories produce cement panels for approximately three hundred houses a year.

A second ATI project replicated this mobile factory system in Guatemala, and adapted the prefabricated construction technology to the seismic conditions of Guatemala. The Guatemala factory expects to produce sufficient building materials for 500 housing units during the next two and a half years. Other development organizations operating in Latin America are interested in replicating the mobile factory system for manufacturing prefabricated construction materials.

9. Linares Pump

This technology which is also known as the Ubaque Water Wheel, is a stream-powered water pumping device used both for small scale irrigation and domestic water supply. This pump consists of a paddlewheel device installed in the river or stream, which powers a two-piston reciprocating pump. Under the initial ATI-financed project implemented by the Save the Children Foundation, a prototype pump was developed and tested. Twenty-five pumps were manufactured and three were installed in Colombia.

Encouraged by the initial results of the field tests, ATI is supporting a follow-up project which will test and install the remaining twenty-two Linares pumps in Ecuador, Dominican Republic, Guatemala, Mexico and Colombia. Six pumps have already been installed in Columbia, and are operational and two pumps are now being tested in each of the other four countries.

10. Brick Press

An ATI project in Mali supported the development of a stabilized adobe production technology. The project trained masons in the production technology and in the use of the brick press, and resulted in the construction of fifteen houses.

This production process developed under the ATI-financed project was used in the World Bank-supported construction of twenty-four health centers. The Malian organization ADUA which implemented the project has successfully manufactured the press using local materials. Encouraged by the success of the Belgian-manufactured brick press in the initial project, ATI has used the press in several recent brick projects in Botswana and Tanzania. This represents the first introduction of this particular technology outside of West Africa. The bricks produced by the press are stronger and more durable than bricks produced by the traditional slop molding process.

11. Small Scale Cement Production

An early ATI project in India has supported the development, testing and small scale commercial manufacture of high quality portland cement. The technology developed under this project uses two low quality raw materials, one low in calcium carbonate and one high in calcium carbonate, which are widely available throughout India, to produce a portland cement that meets the Indian Standards Institute specifications for this material. The implementing organization, ATDA, an Indian

non-governmental appropriate technology association, has established a small cement plant with a production capacity of twenty tons per day. The cement plant is now producing cement on a commercial basis using the technology developed with ATI support.

The small scale cement plant technology has generated a good deal of interest throughout India. Several private enterprises, including one in Bangalore, India, plan to set up similar cement plants and it appears likely that the technology developed by ATDA will be replicated on a commercial basis.

12. Sisal Fiber Spinning and Weaving Technology

The development of this technology has been financed by an ATI project in Columbia. It is a labor-intensive process for spinning and weaving sisal for use in the production of coffee and cacao bags. Twenty members of the SINTRA PROFISAN cooperative are currently using the improved spinning and weaving machinery. However, it is estimated that a minimum of 8000 sisal growers and 7000 weaving artisans in Columbia can benefit from this improved technology.

ATI plans to finance the transfer of this technology tested and developed in Columbia to Haiti under a new ATI project.

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ATI

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March 15, 1985

Mr. Reginald Howard
Acting Regional Inspector General
for Audit, Washington
Agency for International Development
Washington, D. C. 20523

Dear Mr. Howard:

In response to the draft audit report on Appropriate Technology International, enclosed are our comments.

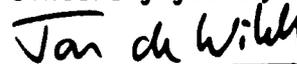
Francis Keppel, Chair of the ATI Board of Trustees, and I would like to thank you for accommodating our time needs in arranging the earlier discussions we had with you and your staff on the Audit Report.

In general, we agree with the overall thrust of the Report. Therefore, we have limited our comments to a few areas with which we are concerned.

In this letter, I would like to highlight one of our comments. In your efforts to establish accountability for ATI's activities, the role of ATI's Board of Trustees appears to have been overlooked. In finalizing the report, you might want to consider that under D.C. law, ATI's Board of Trustees bears the ultimate responsibility for all ATI activities.

My staff and I will be available to meet with you and/or your staff to discuss our comments. Please call me if you have any questions.

Sincerely yours,



Ton de Wilde
Executive Director

TdW/ar
Enclosure

1985 M/R 15 F11 2:04

Comments of Appropriate Technology International

AUDIT REPORT NO. 85-

Feb., 1985

**"APPROPRIATE TECHNOLOGY INTERNATIONAL:
ACCOUNTABILITY FOR REPLICATING
ITS SUCCESSES MUST BE DEFINED"**

The Audit Report, of the Office of the Inspector General, Agency for International Development, finds that:

- ATI is in compliance with the terms of its Cooperative Agreement with AID; that
 - ATI's performance under the Cooperative Agreement is in accord with the provisions and intent of its governing legislation; and that
 - the focus of ATI is, quite properly, upon replication of productive technologies.
1. The Report concludes that prior deficiencies in ATI's performance, cited in earlier audit reports, have been corrected by substantially improved monitoring and management practices and focus on commercial viability and replication of productive technologies. Several parties contributed to this change: among them are the Inspector General's Office which pointed out several deficiencies in its 1983 report; AID's Bureau of Science and Technology and ATI's Board of Trustees and new management, who worked in a cooperative, but disciplined manner to effect a constructive and successful organization.
 2. While the Audit Report commends ATI for its turnaround from earlier inefficiencies, the Report recommends that in order "to keep the program on track," some specific accountability for replication be written into the Cooperative Agreement.

ATI cannot help but be pleased with the essentially positive thrust of the Audit Report. It is complimentary both to ATI as well as to the AID officials who have assisted ATI in the transition to become the kind of productive development instrument originally intended by the Congress. Still, ATI is concerned that the Report's narrow interpretation of "replication," and the inapposite procedures suggested to maintain the program's replication features, may be more disruptive than helpful.

The Audit Report never undertakes a definition of "replication." On the one hand, the Report treats replication as a given:

"Replication is essential to make ATI cost beneficial."

"Replications of successful ATI demonstration projects... are essential."

"The current focus on commercial viability and replication are positive steps."

"We basically agree with S&T's and ATI's current focus on replication."

On the other hand, the Report (in Recommendation No. 1) asserts that there is a need for definition--even legislatively--of replication; yet the Report itself never ventures an explicit opinion as to what that definition might be. The Inspector General's definition must be inferred, and that is a cause for concern.

ATI and the Bureau of Science and Technology are proceeding with a mutual understanding of replication as the dissemination of innovative elements of appropriate technology projects beyond the objectives and implementation plan of the original project. This replication can be achieved in a number of ways, including spontaneously, resulting from information dissemination, or the result of active marketing efforts. The ultimate repository of the replication can be in specific projects, general acceptance in the market place, and/or embodiment in local, national, regional, and perhaps even global policies.

3. ATI's particular concern is that the Report implies one very narrow definition of "replication," and then suggests that this constitutes the sole determinant of "success." This is found in the dramatically misleading pie chart on page 12. Here, the Report takes but one of several indicators of accomplishment in the Cooperative Agreement--that a certain number, estimated at 10%, of ATI projects will have achieved objectives sufficiently so as to warrant specific ATI intervention to help secure funding for replication--and uses that as the boundaries for "replication." Thus, the Report says that "such a low minimum success rate underscores the importance of replication" (p.10), and suggests (p.11) that the other projects might be deemed "unreplicable." Upon such analysis rests the Report's' later recommendations of forceful means of guaranteeing replication, including grafting of an ATI replication strategy onto

the Congressional Notification documents.

Of course, replication as a result of ATI's fundraising efforts is only one way in which projects may be replicated. Under perfect conditions--i.e., when an ATI demonstration project has proven beyond question the commercial viability of a productive technology--there can be replication without further ATI assistance.

4. The report does not distinguish clearly between activities and projects conducted under a previously audited earlier grant and activities undertaken under the current Cooperative Agreement. The frequent shift in focus tends to obscure the current status of ATI's activities as well as the efficacy of the Cooperative Agreement arrangements.
5. The Report has neglected to take into account the fact that ATI is a private organization, governed by a private Board. For example, long before the negotiations which culminated in the Cooperative Agreement, ATI's Board had instructed management to direct 50% of its financial resources as direct assistance to projects overseas.

The cumbersome procedures, proposed in the Report, such as unorthodox Congressional Notification procedures, will require an inordinate amount of administrative work. It would be more in line with the private sector character of ATI to discuss the implementation and accountability of the proposed modifications with ATI's Board, which under the current law is ultimately responsible for the work ATI carries out.

6. The observation on page 8 that no documentation was found in ATI's files which described successful replication of projects is questionable. After 6 months of investigation, the auditors informed ATI they were interested in seeing documentation on successfully replicated projects--but allowed ATI only two days to collect this material. Most of the information that was furnished was described as not falling fully within the definition of replication as understood by the auditors. As indicated earlier, this implied definition of replication has not yet been communicated to ATI.

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