

BENIN RURAL WATER SUPPLY PROJECT

~~680-0201~~ 680-0201

PROJECT PAPER AMENDMENT

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Le Bénin en Afrique.



U.S.A.I.D.
Lomé Togo
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Benin Rural Water Supply Project, 680-0201
Project Paper Amendment

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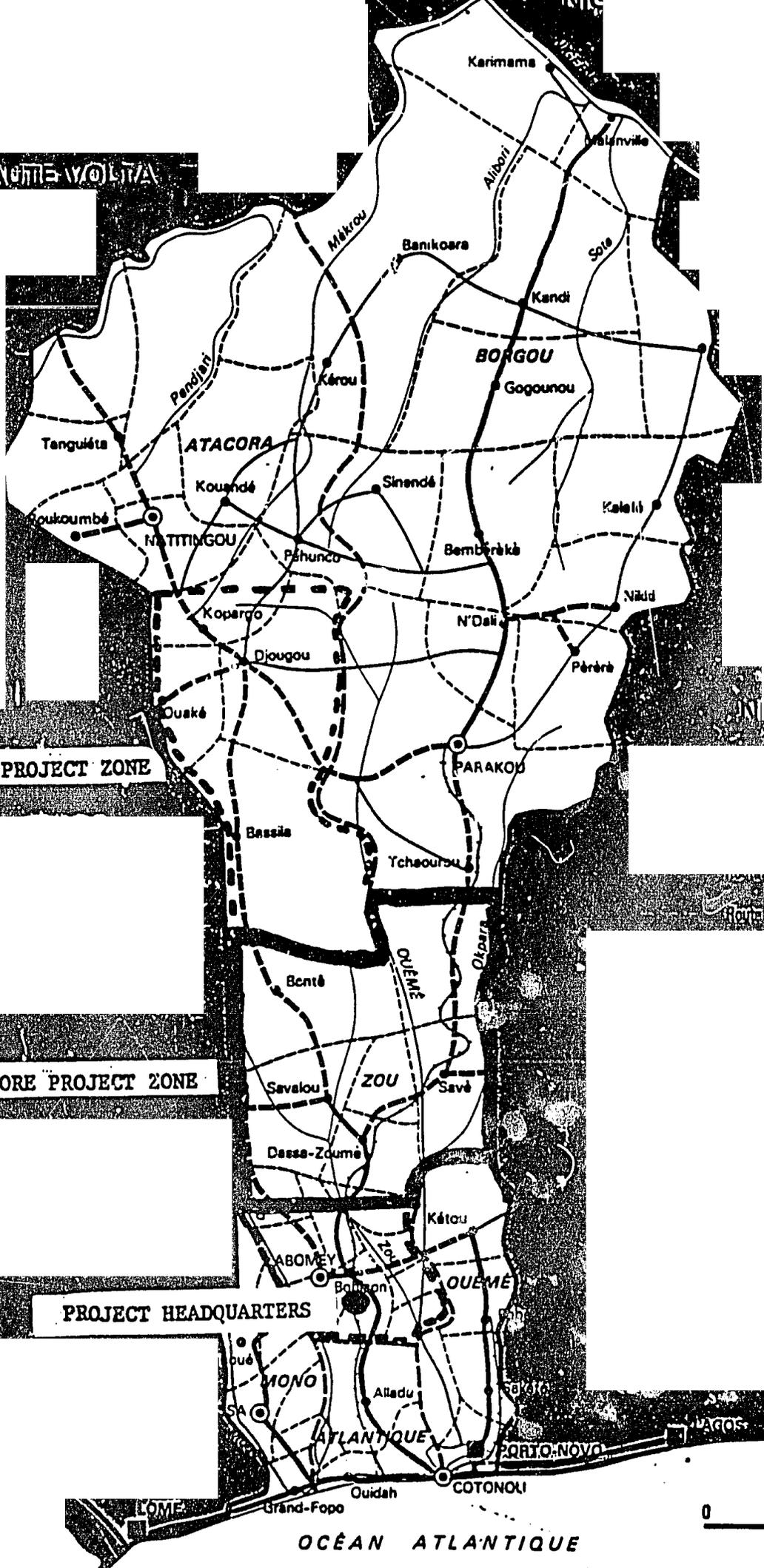
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HAUTE VOLTA



ANNEX PROJECT ZONE

CORE PROJECT ZONE

PROJECT HEADQUARTERS

0 60 km

OCEAN ATLANTIQUE

6

I. SUMMARY AND RECOMMENDATIONS

A. FUNDING, GRANTEE, SUMMARY BACKGROUND

Authorization of this Project Paper Amendment by the A.I.D. Assistant Administrator for Africa will reactivate the Benin Rural Water Supply Project, 680-0201. This project was authorized in February, 1980, for a five year life of project grant funding of \$6,707,000 to the Government of the People's Republic of Benin (GPRB) pursuant to the Population and Health Program established under Section 104 of the Foreign Assistance Act of 1961, as amended. The Project Agreement for partial funding was signed in August, 1980. Full funding was obligated by a December, 1980 Project Agreement Amendment. However, project activities continued only until December, 1981, when this project was suspended due to strained U.S.-Benin relations. The sum of \$457,906.78 was disbursed to fund 1980-1981 activities. In October, 1984, suspension was lifted and, after careful analysis, plans were made to recommence the project with the remaining \$6,249,093.22. This amount will fund all activities described in this Amendment which, with the exception of some logistic and administrative modifications explained herein, are the same as those envisaged by the 1980 Project Paper. Further background details are provided in the Background subsection "History and Progress to Date of the Existing Project".

B. PROJECT ASSISTANCE COMPLETION DATE

In addition to reactivating project implementation, authorization of this Amendment will extend the Project Assistance Completion Date from September 30, 1985 to September 30, 1988.

C. PROJECT PURPOSE

The purpose of the Amendment is:

to assist the GPRB to improve the health practices of and the adequacy and quality of water supply and sanitation facilities available to the rural poor in selected districts of central Benin.

This purpose is functionally the same as that of the 1980 Project Paper, namely, improving village hygiene through water resource development and health education. The Amendment purpose language has been modified for two reasons. First, it makes the purpose more concrete and progress toward its achievement more observable than would be the case were the purpose phrased, "improved village hygiene".

Second, it clarifies and emphasizes what always has been the fundamental principle of this project, namely, that the provision of potable water and of sanitation facilities is not an end in itself but rather a support action to a broader program of bringing about long term improvement in village health by first bringing about a galaxy of improved rural health practices. There is abundant experience showing that a positive health impact accrues only from an improvement in health practices, and that proper health practices are adopted by villagers only after their careful introduction by trained village level workers and after continual demonstration and monitoring to assure that the new behavior has been reinforced to the point of becoming habitual. This same experience clearly shows that no or very limited positive health impact accrues from provision of water and sanitation infrastructure without the concomitant permanent adoption of improved health practices. As will be discussed more fully throughout this Amendment, the operational consequence of this fundamental principle is that infrastructure facilities will be provided to villages only if there is reasonable expectation to believe that the facilities will be used and maintained so as to have a positive impact on the users' health. Therefore extensive health education and organization of villagers for assured pump maintenance and repair will precede installation of facilities such as wells with pumps and latrines. Indeed, the degree of success of these educational and organizational interventions in specific villages will be (along with the anticipation of adequate ground water for a positive well drilling) one of the most important factors in determining well siting.

D. SUMMARY PROJECT AMENDMENT DESCRIPTION

This Amendment funds a broad array of assistance, services, commodities and training to achieve the purpose. This Amendment's activities will be carried out in central Benin and are divided into three broad components. First, the Rural Health Interventions Component includes: village level community mobilization activities and the training of agents to catalyze these activities; all rural health education and training; and all rural pump maintenance and repair training. Second, the Water Supply Component is divided into two subcomponents, the most important of which is well drilling and subsequent pump installation. An "alternate water source" subcomponent complements and supplements the well drilling and consists primarily of installation of rainwater catchment systems using tin roofs and gutters for rainwater collection and cement lined and covered cisterns for storage. Third, the Sanitation Component consists of two subcomponents: water quality control support, and training and assistance in latrine siting, construction, and maintenance.

Each component is supported by technical assistance, commodities, and training. Other technical, financial, and management expertise will be provided on a short term basis. Concerning long term technical assistance, A.I.D. will finance a Senior Advisor/Project Manager to assist the Beninese Project Coordinator in supervising and facilitating all project activities, a Public Health Education Advisor to oversee the Rural Health Interventions Component, and a civil engineer with a strong background in sanitation to assist activities of both other components and to oversee remodeling and construction of a project headquarters at Bohicon. An important A.I.D. contribution will be the funding of a Cooperative Agreement with UNICEF, which has extensive well drilling and pump installation experience in the project zone. Pursuant to this agreement UNICEF will provide a four person team to manage the drilling and pump installation component and to train Beninese drilling crews, and to conduct pump maintenance and repair activities. The team will be comprised of a hydrologist, geophysicist, master driller, master mechanic, and senior project officer. The engineering analysis performed during the design of this Amendment indicates that UNICEF is knowledgeable and well qualified in this field and that UNICEF's cost estimates are based on broad experience, are reasonably sound, and support a positive 611(a) finding. The Cooperative Agreement also will fund services of a UNICEF environmental sanitarian. In addition, it is anticipated that the Peace Corps will contribute about \$475,000 worth of volunteer services to all components over the life of the project.

Concerning commodities, A.I.D. will finance directly all new drilling equipment, pumps, spare parts, heavy vehicles and trucks, passenger vehicles for its directly funded technical assistance personnel and for the Beninese Project Coordinator, construction materials for an office, warehouse, and repair shop, concrete and other materials for construction of rainwater catchment systems and latrines, water quality testing equipment, and training materials for health education. Through the Cooperative Agreement with UNICEF, A.I.D. will fund expendible drilling supplies, operational drilling costs, and pump maintenance materials.. Other operational costs will be financed directly by A.I.D.

Extensive training related to all three components will be financed by this Amendment. A definitive and binding Training Plan should only be drawn up after the long term technical assistance personnel have had sufficient opportunity to identify the most acute and urgent training needs. An A.I.D. recruited Training Coordinator will assist in drafting this plan for about four months early in the project. Certain aspects of the training are predictable, however. The Health Interventions component will require substantial, intermittant, but repeated short term sessions for large numbers of

participants, especially given the "training of trainers" orientation for rural level training . The Water Supply Component may require long term technical training in the United States for one or two individuals. In addition to this U.S. training, which may be denominated as "participant", there will be extensive, continuous, on-the-job training. In this category, the training received by the Beninese counterparts of the drilling and pump installation teams is especially significant. Short term training in Europe or Africa related to all components is contemplated for up to five persons.

The GPRB will contribute personnel, office space, land for office, warehouse and repair shop construction, use of a training facility, and some operational costs, and will assign a Project Coordinator who will have primary responsibility for project implementation and some support staff.

This summary description is intentionally skeletal. A more complete discussion is contained in the Detailed Project Description. Readers are referred especially to the Introduction and Project Amendment Rationale subsection of this description for a comprehensive overview of the project and how it is expected to proceed.

E. IMPLEMENTING AGENCY

A Beninese Project Coordinator will have primary responsibility for implementing this amended project. The full time assignment of this person to the project, and A.I.D.'s and UNICEF's written concurrence in the selection of the particular individual nominated, will be a condition precedent to any disbursement of funds. This Coordinator will work to elicit the interministerial, multi-disciplined cooperation required to produce the envisioned project outputs on schedule. The variety of skills and technical disciplines involved in implementation make assignment of a supervisory coordinator preferable to identifying one governmental body as the responsible "implementing agency". This project management decision is discussed more fully in the "Detailed Issues" subsection of this section.

Four Beninese governmental entities are especially significant for this amended project: the Directorate of Health Education and the Directorate of Sanitary Engineering of the Ministry of Public Health; the Directorate of Social Affairs of the Ministry of Labor and Social Affairs; and, the Directorate of Hydraulics of the Ministry of Equipment and Transportation. Health Education and Social Affairs personnel will be crucial to the implementation of the Health Interventions Component. It is they who will be trained and in turn train others in the areas of organizing villagers into

Village Health Committees, the links between contaminated water and disease and between sound hygiene practices and health, and the establishment of village pump maintenance programs. The Directorate of Hydraulics will assign teams to work with UNICEF drilling and pump installation technicians and will contribute land in Bohicon on which office, warehouse, and repair shop, remodeling and construction can take place. The Directorate of Sanitary Engineering personnel will focus on latrine construction.

F. SUMMARY FINANCIAL PLAN

Technical Assistance	\$2,516,239
Local Personnel, A.I.D. Supported	16,380
Training	351,800
Commodities	1,436,670
Vehicles	331,150
Operating Expenses	718,245
Construction/Remodeling	175,000
Evaluation	30,000
Contingency (10.76 percent)	<u>672,516</u>
Life of Project	\$6,250,000

More detailed financial information is set forth in the Financial Analysis and in the Budget Worksheets Annex F.

G. AUTHORIZED GEOGRAPHIC CODE

The Second Project Agreement Amendment between USAID/Benin and the GPRB Ministry of Foreign Affairs will specify that, except as A.I.D. may otherwise agree in writing:

- 1) Goods and services financed by A.I.D. under this Project Amendment shall have their source and origin in the Cooperating Country (GPRB) and in countries included in A.I.D. Geographic Code 941.
- 2) Ocean shipping financed by A.I.D. under this Project Amendment shall be financed only on flag vessels of the United States or the Cooperating Country.

H. WAIVERS REQUIRED

The following waivers and special approvals are included in Annex C for authorization by the Assistant Administrator for Africa as part of this Project Paper Amendment:

1. Waiver of FAA Section 110(a) requirement of a 25 percent host country contribution.
2. Action Memorandum requesting authorization to negotiate and execute on a noncompetitive basis a Cooperative Agreement with UNICEF for drilling, pump installation, and other specified services.
3. A source/origin waiver from A.I.D. geographic Code 000 to Code 935 to permit the procurement of about \$333,150 worth of vehicles and rolling stock.

The waivers and special approvals supersedes those contained in the 1980 Project Paper, which hereby are declared void.

I. CONDITIONS PRECEDENT AND COVENANTS

A limited number of conditions precedent will be included in the Project Agreement Amendment to assure that preliminary activities which are functional prerequisites to reasoned project implementation in fact are completed satisfactorily before the activities which they further are allowed to go forward. Summarily, conditions precedent to initial disbursement require:

- a written legal opinion that the Project Agreement Amendment has been duly ratified and constitutes a binding obligation of the Host Country;
- written concurrence by A.I.D. and UNICEF in the nomination of the individual selected by the GPRB to serve as Project Coordinator; and,
- a GPRB written identification by name and title of GPRB officials authorized by the GPRB to act as its representative or representatives together with a specimen signature of each identified official certified as to its authenticity.

The Project Agreement Amendment will include several covenants to formalize GPRB accord to undertake specified essential actions to further project implementation and to take appropriate steps, commensurate with its fiscal constraints, to maintain project benefits after A.I.D. project assistance terminates. The GPRB will covenant to:

- provide sufficient numbers of adequately qualified personnel and of skilled and unskilled workers to assure successful implementation of the project and achievement of the project purpose:

- assign all A.I.D.-financed (whether directly or through a Cooperative Agreement) materials, commodities, equipment, and vehicles to the project zone for project use for the life of the project;
- within the first six weeks after the A.I.D.-funded long term technical assistance personnel arrive in Benin (including the UNICEF team), submit for the joint written approval of the highest-ranking A.I.D., GPRB, and UNICEF official acting for each entity in the project a Commodity, Equipment, and Vehicle Procurement Plan drafted by representatives of the three organizations which, at a minimum, will take into account commodities already ordered for and available to the project, identify and cost new items to be procured, and set forth procurement arrangements, schedules, warehousing facilities, and detailed equipment specifications;
- before the end of the first project year, prepare a Pump Maintenance Plan, in form and substance satisfactory to A.I.D. and UNICEF, including at a minimum identification of organizational entities responsible for pump maintenance, and operational and financial plans for allocating adequate, trained personnel and financial resources to the pump maintenance program;
- before the end of the first project year, prepare a Pump Logistics Plan, in form and substance satisfactory to A.I.D. and UNICEF, for pump storage and for phased ordering of pumps and spare parts, and for pump spare parts distribution to rural areas for village purchase;
- request Peace Corps Volunteers to assist in project implementation;
- assure that women participate in all training programs and partake of the professional advancement opportunities under all project components; and,
- through the Project Coordinator, transmit to the A.I.D. Representative during the first month of the final implementation year, a written plan for maintaining project benefits, including but not limited to the envisaged means of meeting any recurrent costs reasonably foreseeable as a result of the project.

An expanded presentation of the text of these conditions precedent and covenants is presented in the "Conditions, Covenants, and Negotiating Status" section below.

J. SUMMARY FINDINGS

This amended project is ready for implementation and is considered financially, economically, socially, and environmentally sound, and technically feasible.

K. STATUTORY CHECKLISTS AND A.I.D. REPRESENTATIVE'S CERTIFICATIONS

1. This amended project meets all applicable statutory criteria. Annex V of the 1980 Project Paper includes the appropriate checklists, the validity of which applies equally to this Amendment.
2. Three certifications of the A.I.D. Representative are included in Annex B to this Amendment:
 - a) a FAA 611 (a) (1) certification attesting to the accuracy and adequacy of the cost estimates for engineering activities;
 - b) a FAA 611(b) certification related to the technical analysis of the water systems; and,
 - c) a FAA 611 (e) certification attesting to the GPRB' capability to implement, maintain, and use facilities provided by the project.

L. PROJECT AMENDMENT ISSUES

The following issues have arisen during preparations to reactivate the project.

1. Given the multidisciplinary technical requirements of the amended project, and taking into consideration a long-standing lack of harmonious cooperation among some of the principal GPRB entities involved in implementation, what is the best way to elicit contribution from and participation by all relevant GPRB agencies and to assure impartial, evenhanded coordination of all concerned parties for effective project implementation?

There is every reason to expect that an individual chosen either by a neutral ministry, such as Plan or Foreign Affairs, or by representatives of the four most closely participating directorates (Hydraulics, Sanitary Engineering, Health Education and Social Affairs) — perhaps in combination with personnel from other ministries — would be, by the very selection and assignment process, neutralized and removed from affiliation with any one directorate, and thereby given the institutional liberty to be a constructive, cohesive managing force. This Amendment envisages that the senior

Beninese project official, or Project Coordinator, will be just such an individual, duly nominated by the GPRB and approved by A.I.D. and UNICEF after review of the GPRB nomination process and of the person's management capabilities, technical background, and general reputation for professionalism.

The 1980 Project Paper assigned exclusive "implementing agency" responsibility to the Directorate of Hydraulics. Assessment of interdirectorate relations in the intervening years indicates that assignment of overall implementation responsibility to any functional directorate could result in a generally counterproductive implementation situation. Activities under the aegis of the chosen implementing agency well could be favored while those sponsored by other directorates given short shrift. This predictable imbalance would jeopardize the cooperation that is essential to the success of integrating health interventions with water supply development and sanitation. This observation has hypothetical logic, and in the instant case the validity is heightened by a history of strained relations between certain hydraulics and health personnel.

The effectiveness and professional reputation of any Project Coordinator assigned to the project will be measured by an ability to overcome struggles and to combine the efforts of all directorates to produce a general benefit rather than a narrow technical or sectoral product. A well chosen Coordinator will avoid even the appearance of favoring one component or technical speciality because uneven, asymmetrical implementation success of the components will be deemed a failure, a failure for which the Coordinator will be held primarily responsible. If the fixing of responsibility is done in this way, even a Project Coordinator who formally worked for and continued to be paid by one of the participating directorates predictably would be balanced and effective. A contributing factor to this prediction is that the directorates can be expected to engage in at least modest mutual scrutiny and, as a result, to keep each other honest.

2. What is the best way to procure technical assistance personnel for the well drilling and pump installation subcomponent?

Three approaches to procuring the drilling team for the subcomponent have been suggested. The first involves engaging a private firm to provide the standard team of a hydrologist, geophysicist, master driller, and master mechanic. The second involves engaging only an expatriate master driller and an expatriate mechanic, and relying on locally available hydrogeological services, supplemented by short-term technical assistance. The third involves entering into an agreement with UNICEF, which already is established in Benin, to provide the standard team.

The first option has two important disadvantages. It is much more expensive than the other options and would bring in technicians new to the project area requiring high mobilization costs and also lowering the drilling success rate for at least nine months while the new team developed an instinct for what probably would work. The second option also has the disadvantage of bringing in technicians new to the project zone and adds the serious impediments of foreseeable difficult coordination and possible sporadic unavailability of local hydrogeological personnel due to other commitments.

The third option clearly is the most advantageous, both financially and administratively. Because UNICEF is a non-profit organization, this option is the cheapest. Most important, UNICEF has five years' experience working in areas adjacent to the project zone, and by now has developed an instinctive sense which only comes with familiarization with the territory of what is likely to be successful. UNICEF has the additional advantage of being fully familiar with UNDP-procured equipment placed at its disposal, much of which will be reconditioned for this project. Also UNICEF has demonstrated commitment to integration of rural health interventions with the provision of water supply facilities, and to training Beninese counterpart drilling crews to be eventually self-sufficient. Both these aspects are high priorities for GPRB officials but are unlikely to be adequately appreciated by personnel engaged under the first two options. In light of this analysis, this Amendment contemplates funding a Cooperative Agreement with UNICEF to enable it to undertake all activities related to the well drilling and pump installation subcomponent.

3. Will the shift from the 1980 Project Paper plan from working in the northern provinces of Borgou (drilling) and Atacora (spring captation) to the Amendment plan of focusing exclusively on water supply in Central Benin be accepted by the GPRB?

Discussions with GPRB officials explaining the reasons for the change (as set forth in detail in the Background section on Design Adjustments of this Amendment) indicate that they understand the reasons, acknowledge their validity, and see no insurmountable political problem attendant upon the change. At the same time, A.I.D. is amenable to undertaking limited drilling in the southern part of Atacora province which is adjacent to the core project zone in the Zou province, depending on availability of funds, resources, and time. Whereas no promises have been nor can be made by A.I.D. to this effect at the present time, the consolidation of resources effected by focusing on a core area well may make possible some movement into the Atacora province during the later months of the project. For an expanded discussion of the relocation of the core project zone, see the Background subsection entitled, "Design Adjustments Effected by this Amendment."

M. CONSIDERATION OF SMALL, DISADVANTAGED AND WOMEN-OWNED FIRMS

Three long term technical assistance personnel (Senior Advisor/Project Manager, Public Health Education Advisor and Civil Engineer) will be needed for project implementation. Along with other options, the Mission is considering the use of small, disadvantaged, and women-owned firms but believes it premature to commit itself to a "set aside" at this time.

N. PROJECT AMENDMENT TEAM MEMBERS

- Myron Golden, A.I.D. Representative, USAID/Lome
- Paul D. Guild, Project Officer, USAID/Lome
- Sarah K. Fry, PSC Consultant in Public Health and Health Education
- Pierre Leger, PSC Consultant in Civil/Sanitary Engineering
- William H. Ellis, WASH Consultant in Water Resources/Civil Engineering
- Jeffrey W. Goodson, Regional Environmental Officer, REDSO/WCA
- Julie Defler, Project Development Officer, REDSO/WCA

II. BACKGROUND

A. COUNTRY SETTING

1. Recent Political History

In 1960 when Benin became independent from France it was known as Dahomey. Regional and other political rivalries produced numerous changes in government and general instability during the next twelve years. In 1972, a revolution brought to power the then-military government of Lieutenant-Colonel Mathieu Kerekou. This government has focused on national unification, development of an independent economic and social identity, and increased popular participation in political life. In 1975, the country's single party was created (Party of the People's Revolution) and the country name changed from Dahomey to the People's Republic of Benin. The Party and its Central Committee reserve policy making authority, with the Council of Ministers acting only as the governing administrative group. The present government is a military/civilian mix. It adopted a new constitution in 1977, held elections in 1979, and reconfirmed Kerekou as President in 1980.

2. Physical Characteristics

The People's Republic of Benin forms a long south-to-north corridor of 670 kilometers and is bordered by Nigeria on the east, Niger and Burkina Faso on the north, Togo on the west, and the Atlantic Ocean (with a 120 kilometer seashore) on the south. The total land area is about 112,622 square kilometers, characterized by generally poor soil and by a relatively flat relief with the exception of some hills in the northwest (Atakora) which reach elevations of 750 meters. The country is divided into six administrative provinces: Mono, Atlantique, Oueme (all southern), Zou (central), and Borgou and Atakora (both northern).

3. Human Resources

Benin's population is estimated at 3.7 million (1983) with a 2.7 percent growth rate. About 85 percent is rural. The population density in the project region is estimated at 30 persons per square kilometer, but density figures vary from 12 persons per square kilometer in the far north to 164 persons per square kilometer in the south. The low life expectancy of 47 years at birth produces a young population distribution, with 49 percent below age fifteen and 25 percent below age six. The most important ethnic groups, each of which has its own language, are the Fon (55 percent), Yoruba (13 percent), and Bariba (12 percent). Only about a quarter of the adult population is literate, with the largest part of this group concentrated in the southern provinces.

4. Economic Situation

At present Benin ranks among the world's poorest countries, with an average per capita annual income of \$310. Agriculture is the most important economic sector, employing 74 percent of the active population, 45 percent of the GDP, and between 36-55 percent of foreign exchange earnings. A small industrial sector consisting of a few import substitution and agricultural processing activities contributed about 11 percent to the GNP in 1982. The tertiary sector consists mainly of trade and transit enterprises which economically link Benin to neighboring countries.

Food crop production, primarily by individual farmers, dominates the agricultural sector, constituting 90 percent of total value of agricultural output and occupying over 80 percent of cultivated land. The most important of these crops are maize, sorghum, yams, cassava, beans, and small quantities of rice. An estimated 20 percent surplus of total production of these crops traditionally has been exported unofficially to Nigeria and Niger, offsetting Benin's foodgrain/cereal imports, which have been increasing. However, yields during the three year period ending 1983/84 (especially of cereals, cassava and yams), have been decreasing, due primarily to drought and a shortage of modern technology. Indeed, rainfall in some areas recently has been half that of normal years, resulting in acute food shortages in the central and northern regions and a declared state of emergency in early 1984 pursuant to which the international community donated food aid.

Cash crops and, as a consequence, the economy, also have been hurt by the drought. The most important are cotton, palm oil products, and groundnuts. Of lesser importance are sheanuts, cashews, coffee, and tobacco.

In addition to drought, Benin's economy has been adversely affected by a 15 percent inflation rate (1983), by devaluation of the French Franc and strengthening of the U.S. dollar (on which Benin's exterior debt is calculated), by the coming due of a significant number of Benin's loans, which the government is even more hard pressed to repay now than when they were incurred, and by the closing of the Nigerian border and consequent curtailment of profitable trade and transit activities. At present, Benin's economic situation is so dire that the 1984 national budget was decreased, and the stern measure taken of an 8 percent reduction in the amount budgeted for government personnel from the amount reportedly expended for this item in 1983.

Until recently development planning in Benin focused on the industrial sector, the objective being to increase its relative share of the GDP from 11 percent to 17 percent between 1978-1980. The development plan for these years allocated almost 75 percent of total programmed investment in large capital intensive and other industrial projects, in transport, and in public utilities. By contrast, rural development projects, including food crops and livestock, were allocated only 11 percent. The proposed 1983-87 Development Plan shifts the emphasis to rural development. Although it has not yet been approved formally nor made officially available to the donor community and general public, it nevertheless seems to be the operational guiding development document. Rural development accounts for the largest share of total investment, 23 percent, more than double its allocation in the first plan. Industry, construction, and public works, on the other hand, are slated to receive 54 percent, of which 21 percent is reserved for infrastructure and transit development activities. The assignment of highest priority to rural development stresses greater self sufficiency in domestic food supply through an increase in and diversification of food crop production, and indicates that the central and, to some extent, the northern regions, have acquired a new importance which will continue to grow.

5. Health Profile

The life expectancy figure of 47 years at birth indicates that health conditions in Benin are poor, particularly in rural areas. Other indicators (as of 1982) are an infant mortality rate of 123 per thousand and a juvenile mortality rate of 243 per thousand. National health statistics from the same year show that infectious and parasitic diseases account for 32.95 percent of morbidity, with malaria at 16.35 percent, gastro-intestinal infections at 10.19 percent, and measles at 1.68 percent. Diseases having a high incidence in the rural population are onchocerciasis (river blindness), schistosomiasis, filariasis, tetanus, tuberculosis, and Guinea worm (dracunculosis - especially prevalent in the core project zone). Most of these diseases are caused or exacerbated by poor water quality, inadequate water quantity, lack of sanitation facilities, and poor hygiene practices.

Guinea worm is among the most debilitating and needless of the water related diseases because it can be eliminated not only by provision of safe water but also by filtering contaminated water through a cloth. Experience has shown that most villagers realize that the disease is related to water but do not understand the infection cycle, which begins when they swallow a very small but

visible vector cyclops in unfiltered, contaminated water. The human thereafter becomes host to a long worm, the presence of which produces shallow, ulcering wounds. These reduce the body's general health and resistance to other diseases, and impede farming and other productive activity.

According to a 1981 GPRB report, only 21 percent of the population has access to safe water. A 1985 UNICEF document reports that only an estimated 8 percent of the rural population has access to safe water. Also, of the total population, a reported 15 percent has access to sanitation facilities, and of the rural population, only one percent.

Health care in Benin is inadequate, and primarily curative and urban due to four main factors: lack of resources for in-service training of rural health personnel in health education, preventive health, and primary health care; poor distribution of limited health staff; inadequate logistical support for rural outreach by health personnel; and, lack of rural health infrastructure. The ever present unequal distribution of resources between urban and rural areas also plays a role.

The economic decline and budget tightening just described makes it unlikely that the situation will improve, at least without substantial help from the donor community. The annual growth rate of the health budget was 9 percent in 1978, only one percent in 1981, and now is 8.5 percent. About 75 percent of health expenditures are for personnel, followed by medical supplies and fuel for hospitals. The amount for rural health infrastructure and programs is negligible.

6. Water Supply

Annual precipitation in Benin is substantially less than in other coastal West African nations, and fluctuates widely. The predominantly agricultural economy is dependent on this sparse, irregular rainfall. There are two agroclimatic zones: (a) the southern equatorial with average rainfall of 1,200 mm per year in two rainy seasons; and (b) the central/northern Sudano-Guinean with 800 mm per year in a single season.

As we have seen, few Beninese have access to clean water. Furthermore, the above reported figures of 21 percent of the total and 8 percent of the rural populations having access to clean water probably are overestimated as a result of the unusually severe drought during the last three years. The surface water normally supplying the traditional rural water sources of rivers and marigots (shallow water holes, often hand dug) has dried up.

The underground water table has fallen, causing the shallow, large diameter wells to become dry. Under these conditions women and children can spend the better part of a day searching for water, at times walking long distances for several hours each way to a point of reported underground seepage. There they dig shallow holes, wait as the water slowly seeps in to accumulate a quantity worth retrieving, fill a small vessel and empty it into a large pan, and continue to wait until they are able to fill their pan by this method. The 1984 State of Emergency Declaration, in addition to requesting food aid, also asked for water resource development assistance. This request has elicited a number of water supply projects which will be discussed more fully in the "Other Donors" section of this document. For present purposes it is sufficient to observe that, even with pledged donor assistance, the bulk of the rural population now has access to at most 5 liters of contaminated water per person per day, when the generally acknowledged (WHO) established minimum is 20 liters of clean water per person per day, and a satisfactory amount is estimated at 30 liters.

7. Policy Setting Concerning Water Supply Development

The policy environment in Benin today is even more receptive to the integrated rural water supply and health intervention activities of this project than it was in 1978-1980 when the project was conceived and approved. Shortly after the promulgation of the International Water Supply and Sanitation Decade Program (1981-1990), Benin drafted its own National Water Supply and Sanitation Program for these years modeled on the international plan. The Benin program is characterized by certain emphases which are exactly congruent with the fundamental principles underlying this project, as discussed in the "Purposes" subsection of the summary. Of greatest importance is the Benin program's insistence on integration of health education (reinforced by explicit decree in 1983) and of sanitation components into all water supply development projects, and its insistence on village mobilization and participation in all components of integrated projects. The project will be among the first (and, certainly the first of its size) to give more than lip service to the Beninese high priority of preceeding installation of water supply and sanitation facilities with extensive, multi-disciplinary health interventions. As such it can serve as a propitiously timed model, introduced when the GPRB is making vigorous efforts to carry out its National Water Supply and Sanitation Program.

In terms of targets of tangible facilities installed, the Benin program aims to provide a minimum of 10 liters of potable water per person per day before 1985 by developing 2,400 water

resources, and to provide a minimum of 20 liters per person per day to 80 percent of the rural population before 1990 by having developed a total of 10,500 water resources by that date. These targets focus on provision of a safe drinking water supply, recognizing that neither the country nor its villagers presently can afford installation and maintenance of the facilities to provide the internationally accepted WHO daily all-purpose minimum of 30 liters per person. Accordingly, it is acknowledged that in most cases washing will continue to be done with contaminated water. It is expected that the mandated health interventions (discussed below) to a large extent will offset the effect of falling short of the 30 liters/person/day target, and that virtually all the health benefits accruing from use of potable water will be realized. The target for sanitation facilities is to provide 40 percent of the rural population with pit latrines by 1990. To facilitate meeting this target, donors of rural water supply projects are being requested to provide latrine slabs for at least 40 percent of the population of the villages receiving water supply systems.

The water supply situation became so critical in 1983 that the three year Emergency Plan of the National Water Supply and Sanitation Program was developed. This plan identified seven urgently needed actions, among which are one labeled "BEN/03" concerning the construction of drilled wells in the Zou province to control Guinea worm (dracuncerlosis), another labeled "BEN/02" concerning initiation of a latrine construction program in the same province, and another labeled "BEN/06" concerning mandatory integration of health education into the national education system. This project always has been responsive to the National Program, and, as amended, will be specifically responsive to three of the seven problems designated by the Emergency Plan as having special urgency. The adjustments made to the 1980 project were made independently of the Plan, but it is a happy coincidence that many adjustments are responsive to the problems and areas separately identified by the GPRB as being most important. This coincidence confirms the perceptiveness of the independent judgement of the assessment and project amendment teams.

8. Provincial Setting of the Zou Province and Core Project Zone

The Zou province occupies about 18,700 square kilometers of Central Benin. Of its 610,000 population, 85 percent live in scattered rural villages. There is a relatively large concentration of population around the sizeable towns of Bohicon and Abomey. Outside this area, only a few towns reach the size of 15,000. Financial and logistic constraints have resulted in very limited distribution of rural health services in the province. In

fifteen districts, there are only eight district health centers, and only one of these meets minimum standards. Even more illustrative of the poor distribution is the fact that for 834 villages, there are only 44 village health units (facility operated by first aid workers and midwives), all of which are in the southern part of the province.

The traditionally great need for water supply and sanitation facilities in the Zou has been rendered especially acute by the fact that during the 1981-1984 drought, the Zou suffered an annual rain shortfall of 30-40 percent. At present, the GPRB estimates that, UNICEF efforts in southern Zou notwithstanding, only 19 percent of the population has been supplied with the 1985 minimum clean water target amount of ten liters of clean water per person per day. According to a UNDP-Directorate of Hydraulics needs assessment, only 325 of the estimated 1,725 wells needed to reach this minimum target have been supplied, two-thirds of them by UNICEF/UNCDF. Concerning sanitation needs, the GPRB estimates that 1,500 demonstration latrines and 28,000 latrine slabs to assist families in constructing their own latrines are needed.

The so-called "core" project zone consists of six districts in the northern part of this province (Bante, Ouesse, Save, Sgualou, Glazoue, and Dassa), with a total population of about 282,000. There are about 398 villages in this zone, 287 of which have a population under 1,000 -- the maximum preferred size for a village to participate in this project.

B. INSTITUTIONAL SETTING

An integrated rural water supply project by nature is multi-disciplinary and requires a wide variety of institutions working together at each governmental level for successful implementation. The project's organizational structure anticipates the managerial and coordination challenge presented by this multiplicity of entities by providing for a strong, neutral Beninese Project Coordinator supported by an A.I.D.-financed Senior Advisor/Project Manager. An overview of the involved GPRB entities follows:

1. National Level

The national level GPRB entities participating in this project's implementation are:

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- 1) the Directorate of Health Education of the Ministry of Public Health;
- 2) the Directorate for Sanitary Engineering of the Ministry of Public Health;
- (3) the Directorate of Social Affairs of the Ministry of Labor and Social Affairs;
- (4) the Directorate of Hydraulics of the Ministry of Equipment and Transportation.

Health Education and Social Affairs personnel will be active in the Rural Health Interventions component. Hydraulics personnel will work on water supply activities. Sanitary Engineering staff will work on latrine installation. A specialized directorate, the Directorate of Food and Applied Nutrition of the Ministry of Rural Development, will carry out water quality testing and control.

2. Provincial Level

Benin is divided into six provinces. This project will focus on six districts of the central province of Zou. Possibly some work might be done in the southern part of the northern province of Atakora. Provincial directors of the four participating Directorates and personnel from each will be involved in the Provincial Coordinating Committee and in the Provincial Supervisory Operational and Technical Unit. Further information is provided in the Institutional Analysis.

3. District Level

The district level is the fulcrum of this project in that it is the administrative center for many of the programs to instruct trainers of other lower level educators. It also is a convenient unit for channeling grassroots sentiment to national personnel and for directing resources and health interventions from higher levels to villages. Details of personnel involved in project implementation at this level and their affiliation to higher level GPRB entities are set forth in the Institutional Analysis. As stated above, the initial core project zone consists of six districts in the Zou province.

4. Village Level

Villages vary a great deal as to size and ethnic composition. This project will work primarily in villages of less than one thousand people and, preferably, with at most two ethnic groups. It is estimated, that about 70 percent, or 287 of the 398 villages in the core project zone meet this requirement.

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C. OTHER DONOR ASSISTANCE

1. Health Sector

During the 1980-1984 period FED has been the largest donor to the health sector in Benin. It has contributed to hospital rehabilitation and extension at Porto-Novo, Abomey, and Cotonou, remodeling and extension of a maternity in Cotonou, and to development of medical and hygiene services. Other significant donor-funded health sector activities include: German and UNCDF cooperation in the construction and equipping of five district and sixty communal health centers; pledged Swiss contribution to district level medical and hygiene services in the Oueme and Tchaorou districts; North Korean contribution for construction of a hospital in Come; Belgian contribution for construction and equipping of a modular hospital at Natitingou; Lybian contribution for the construction and equipping of a modern hospital at Porto-Novo; pledged cooperation of Japan, FAC, and FED in the remodeling and extension of the National University Hospital at Cotonou; pledged Norwegian contribution relating to foodstuffs; a pledged FAC sector grant relating to major diseases and tuberculosis treatment; Italian contribution to a pilot center for applied human biology; and, pledged German, UNICEF, UNCDF, French, Swiss, Dutch, Norwegian, WHO, and OPEC contribution to a quartet of programs concerning malaria and diarrhea prevention, enlarged vaccination campaigns, and a hygiene and sanitation campaign. This aid is conspicuously devoid of any meaningful attention to rural health and to health education, rural and otherwise. The beneficiaries also are located primarily in the southern province.

2. Water Supply Development

FED, the UN family, and the Entente Fund lead the donor list for water supply development. Other contributors are Switzerland, the West African Development Bank (BOAD), and the Arab Bank for African Economic Development. Borgou province has benefitted most from these water supply development programs (about 570 constructed wells or commitments for wells) followed at a fair distance by Zou and Atakora (about 360 each), which are followed by Oueme (about 300). The relatively greater present benefit of Borgou from already commenced or committed water supply programs is the primary reason the location of contemplated drilling activities has been shifted from Borgou to Zou, as is discussed in the Design Adjustments subsection of the "Background" section. With the exception of some meaningful health education activities in UNICEF water supply projects, health interventions in the above activities have been almost non-existent.

3. UNICEF

Because this project contemplates coordination with UNICEF to implement the drilling and pump installation activities of the Water Supply Component, information on UNICEF's well drilling activities in Benin is useful. UNICEF-UNCDF activities began with a December, 1978, agreement with the GPRB for the execution of 138 wells with handpumps in southern Zou. This work was carried out between January, 1980, and December, 1982, and was financed by a credit from the IDA to the GPRB (CFA 190 million), a grant from UNICEF (CFA 215 million), and a contribution from the GPRB (CFA 33 million). Between March, 1983, and May, 1984, UNICEF provided 132 new wells in northern Zou and southern Borgou provinces, with OPEC as the financing donor in the amount of about \$1 million, with additional support from UNCDF and UNICEF's own program funds which, combined, totaled about another \$1 million. An experimental mini-project of drilling 50 wells in two districts of west central Zou province has been carried out subsequently. UNICEF's participation with A.I.D. in this project will represent the third full phase of its drilling activities in Benin.

Health interventions have increased steadily during the history of UNICEF's drilling programs. At first, during the 1980-1982 drilling, each well was managed by a village committee, which constructed a well enclosure, maintained the pump, and kept the well area clean. Evaluation of this endeavor revealed a need to reinforce the work of village committees by appropriate entities at the national and provincial levels joined together to further an integrated approach to rural water supply which would incorporate environmental sanitation and health education with well drilling. The focus of the experimental mini-project undertaken after May, 1984, was to tighten the integration of these three elements of an integrated water supply program. Each village selected for well drilling received three pre-drilling sessions in health education and sanitation and established committees, the members of which participated in post-drilling workshops for village health and sanitation agents and in workshops on pump maintenance and repair. During the mini-project, a provincial health educator, a Directorate of Hydraulics representative, and two Peace Corps Volunteers joined the UNICEF water supply program's managing implementation team. A "Handpump Installation Brigade" also was formed.

This recitation of UNICEF's recent drilling activities in Benin, (and its extensive experience elsewhere in West Africa) indicates that it is an eminently appropriate partner for A.I.D. in this project. Not only will its extensive geophysical and hydrological experience facilitate very respectable initial

drilling success rates, but also its commitment to and experience with integrating health interventions will enhance the activities of the Rural Health Interventions Component. A.I.D. can be assured of UNICEF's continued commitment to health interventions because they are essential to executing UNICEF's mandate of improving and lengthening the lives of children.

D. TECHNICAL BACKGROUND ON RURAL WATER SUPPLY SYSTEMS AND SANITATION

The prototype image conjured up by this kind of project is that of providing tangible "things" - water supply facilities (usually wells) and sanitation facilities (usually pit latrines). Although, as has been and will be repeatedly stressed in this Amendment, this view widely misses the health benefit point of providing the facilities in the first place, nevertheless it is true that substantial resources are being expended to provide tangible facilities. Therefore a rudimentary technical overview is necessary to understanding the rationale for the technical options chosen. This subsection sets forth some basic information required to proceed with an informed perspective.

1. Traditional Water Gathering Practices

Traditional village water sources are nearby rivers, streams, and waterholes. When a river or a stream does not pass by a village, or, if the habitually used source has dried up, as often happens at the end of the dry season, villagers without access to other water resources (most villagers) obtain water from shallow pools (marigots) created by digging holes into sandbeds of intermittent streams and waiting for water to seep in. After a sufficient quantity has collected, the water is scooped out of the pool with a small vessel and poured into a basin of about 25 liters. This seeping, scraping, and pouring procedure continues until the basin is full. At the end of the dry season when seepage is slow, the process is very time consuming, as may be the increasingly long trip to more distant streams when nearby streams dry up.

2. Nature of Water Supply

The water supply in the project zone is unreliable and contaminated as a general rule. Rainfall is seasonal and traditional water sources dry up during the dry season. Even during the wet season when water is relatively plentiful, the traditional village water sources (and the large diameter dug wells constructed in some villages) are invariably contaminated and not suitable for drinking. The only reliable, naturally occurring source of unpolluted water is groundwater found at at

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least forty meters below ground. It usually is exploited by wells but sometimes also rises from the ground as springs. This water has been filtered by passing through long distances of soil and rock before being brought to the surface. The only way groundwater can be contaminated is by contamination of the well or spring. Rainwater, although lacking reliability, is another potential source of uncontaminated water, and should be gathered and protected when groundwater is not found, or when a community's financial resources do not permit installation of sufficient wells to serve a village's total population. This project focuses on the development of groundwater and rainwater because, in combination, they are the water resources most likely to yield an adequate, reliable, potable water supply for the target beneficiaries. A discussion of the methods of developing these resources follows.

3. Groundwater Development: Wells and Springs

Because there are no springs in the project zone, the available groundwater must be tapped by drilled wells, often known as "boreholes" or "tubewells". These are deep, slender 150-200 mm holes drilled to reach underground aquifers. The holes are made by a large truck-mounted machine (drilling rig) that advances a rotating device designed to penetrate rock ("rock-bit" or "drill bit") through the overlying rock strata and some distance into the water-bearing zone ("aquifer"). In soft, sedimentary rock, the drill bit can be advanced very quickly, reaching a depth of 50 or more meters in a day. In hard, crystalline rock, the drilling proceeds more slowly, but with proper techniques, similar depths can be reached in two to three days.

Standard procedure at the end of drilling for a suspected positive well is an "air lift" water yield test. This test is conducted using the drilling equipment and air compressor to obtain an estimated water quantity yield and at the same time clean, or "develop", the well by blowing out small particles of residue remaining from the drilling process which later could clog the well. If the yield proves sufficient - i.e., approximately one cubic meter per hour (a technical judgement made by a hydrologist) - the well is "completed" by installing plastic PVC casing, filling the space around the casing with gravel, a rubber seal, and concrete, pouring a sanitary concrete seal and apron around the top of the well, and conducting a time/yield water drawdown pump test to determine the actual capacity of the well. Knowledge of actual well capacity can prove useful at a later time if community resources permit diesel or electric power to exploit a well's full capacity.

A positive well is brought into production by mounting a hand pump on top of steel well casing which was left protruding (but protectively covered) when the well was completed. The GPRB has requested that brands and models of pumps be limited and has standardized on the India Mark II in the project zone. This is a very reliable pump that already has been installed in significant numbers near the project zone and has performed well. It is a refinement of the farmyard pump used in the United States. The pump itself is suspended below the water in the well by its own discharge pipe. Its piston is operated inside the discharge pipe by a long rod connected to the pump handle. Both the discharge pipe and the operating rod are made of heavily galvanized steel. This pump is designed to operate at a maximal lift of 40 meters. Experience has shown that at lifts much beyond this, the weight of the column of water being lifted is too heavy for the average person and that pump parts tend to break. At deeper levels, it is necessary to use motive power (diesel or electric) to lift the water. Because this option is beyond the villagers' capacity to maintain, they have been rejected for this project.

The main advantages of the drilled wells described above are:

- when properly installed and maintained, they are totally sanitary;
- they are the only certain and safe way of reaching water at depths beyond 25-30 meters, the depths where the only reliable sources usually are found;
- they can be installed quickly (about 100 per year are estimated as possible for this project);
- well life is at least 20 years; pump life about 10 years with routine replacement of wearing parts;
- the pump is a very simple, smoothly operating machine that easily can be operated by women and older children;
- if the aquifer permits, they can be installed right in the village center; and,
- their cost is reasonable, considering their durability, between \$10,000 and \$12,000 per productive well.

The basic disadvantage of this system is that, pumps, being mechanical devices, break, and until they are repaired, villagers resort to highly polluted surface water sources (assuming an insufficient alternate supply, such as rainwater catchment, to tide them over). Therefore, a readily available, qualified

maintenance and repair team is essential to the continued operation of drilled wells and the realization of the health benefits for which they were installed. The disadvantage of an occasional breakdown clearly is offset by the advantage of a reliable, safe water supply.

These wells can easily satisfy the daily per capita water supply target of 20 liters, with a minimum of 10 liters, if the projected service capacity of one pump is 250 people. The India Mark II pump with a 60 mm pump cylinder produces 1 cubic meter or, in liters, 1,000 liters of water an hour. There are 12 hours of daylight at the project zone latitude. Thus, the maximum daily output of one pump is 12,000 liters which, at 20 liters/person/day, could supply 600 people. There are practical constraints to pumping 12,000 liters per day, however, such as the putting down and picking up of basins and changing of places at the pump. More realistically, at the normal, easily sustained rate of 1,000 liters per hour, it takes one and a half minutes to fill a 25 liter basin, which is the standard rural water transporting vessel. Using this 25 liter basin, it takes eight trips to the pump each day to supply each member of a family of 10 with 20 liters per day. With 25 families of 10 using one pump, each family could have about half an hour each day to do 12 minutes of pumping, and still leave several of the reported 12 daylight hours unused. (8, 1 1/2 minute trips per family = 12 minutes actual daily pumping time per family, times 25 families = 300 minutes or 5 hours). Because this figure takes into consideration the practical realities of changing buckets and places at the pump, it would appear that up to 500 people could be served by a single pump without causing disincentive queuing delays, provided families arrange to stagger arrivals, something they sometimes already must do when using traditional water sources. Accordingly, it appears that one well per 250 persons is a very conservative target. It becomes even more so upon remembering that half an hour was allowed for 12 minutes of actual pumping, and upon remembering the Beninese focus on assuring only drinking water, especially in light of the estimated average daily drinking water requirement for the tropics of 3 liters per person.

One reason for adopting an estimate this seemingly conservative is the totally counterproductive disincentive of peak time queuing. If a que habitually tries the patience of villagers, and requires that they spend more time fetching clean well water than polluted traditional-source water, (thereby interfering with their proceeding with the day's activities), many, if not most, villagers will return to traditional sources. If this regression occurs, the intended health benefit of providing the well is not realized. The probability that people may return to traditional

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sources if well use becomes inconvenient is one reason health interventions always will precede well construction. Village Health Committees can be definitively instrumental in persuading people to change their habits and stagger pump use, and even to wait longer than they might care to in order to assure a clean water supply and its resulting benefits. With half an hour allowed to do 12 minutes of pumping and with about 7 unused daylight hours inherent in this 250 people per well estimate, there is plenty of slack time for people to space their trips to the well and accommodate each others' schedules.

At 250 people per well, a 1,000 person village needs 4 wells. This is an ideal target — each person over a 250 person increment requiring an additional well. This ideal allows for population expansion, an allowance any water resource planning is supposed to take into consideration. The very practical reality facing villages in the project zone is that presently most cannot afford to maintain more than one well. Therefore some compromises and accommodations are necessary: the daily water allocation per person could be less ambitious and coincide with the GPRB minimum target of 10 liters, and villagers could increase the efficiency of their use, deliberately speeding up the per family pump time allocation from 30 to 15 minutes (15 minutes to do 12 minutes of actual pumping — allowing 500 people to obtain 20 liters each per day, or 1,000 people 10 liters each per day). The idea of installing two pumps on the same well has been very carefully considered and, with regret, rejected as neither technically nor economically feasible. The 100-150 mm holes are too small to accommodate the rods and apparatus of two pumps. A 300 mm hole would be required, and a hole of this diameter cannot be dug with the equipment used by this project. Installing a second well of 100-150 mm is a more economical way to provide two pumps when a village needs and can maintain a second pumped water supply.

Another way of relieving the pressure on the wells, retaining the more desirable target of 20 liters/person/day, and moving toward the World Health Organization standard of 30 liters/person/day is to develop alternate water supply systems. Because of its technical appropriateness to and realistic chance of success in the project zone, rainwater catchment is the alternate supply this project will develop.

4. Rainwater Development: Catchment Systems

Rainwater has the advantage of being uncontaminated if properly collected and stored; it has the disadvantage of wide seasonal variation and unreliability even during the wet season. Yet, it is sufficiently abundant and reliable to warrant an investment to

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properly collect and protect. Experience in the Togo Rural Water Project has shown that in a village of about 750 people enough water can be stored to supply 3 liters/person/day for about 120 days.

The development of a rainwater catchment system involves the interception of rainwater runoff from tin roofs, and its collection and protection in a cistern. This interception is effected by installing gutters at the roof eaves, with discharge into pipes leading to a protected cistern. The cistern can be dug into the ground or built at ground level by the villagers themselves using a concrete block sealed with mortar. Water can be drawn using a handpump or with a pipe and valve. During a heavy rain, these devices are employed as described below. Because the first few minutes of rainfall from a tin roof are contaminated, the first runoff is diverted from the collection pipe(s) until the "first flush" has had a chance to wash away accumulated dust, leaves, bird droppings, and whatever from the roof surface. Thereafter the runoff is directed into the pipe connected to the cistern to collect the rain. To protect against contamination, the cistern is covered; to maintain water quality, the cistern water should be treated periodically with chlorox or similar product before use.

The amount of water collected is a function of rainfall and the number of houses with tin roofs. The average annual rainfall in the project region is about 1,000 mm, of which about 25% is lost to flushing, evaporation, etc. A family unit having a single dwelling with 20 square meters of tin roof could collect 15 cubic meters or 15,000 liters of water annually - enough to fill a cistern 2 1/2 meters in diameter and 3 meters high. A family unit of 25 using 5 liters per day would consume this water in 120 days. In villages in which few families have tin roofs, a large, pole-supported shed with a tin roof and several interconnecting cisterns could be constructed as a community project. If the structure were 10 by 20 meters, it would provide 5 liters of water per day per person to 250 people for 120 days. The costs involved are very modest and a supplemental water supply can be developed relatively cheaply.

5. Options Rejected

There are numerous other ways to develop water resources and many of them have been considered for use in this project. All of them have been rejected because they not only risk but practically assure contamination and unreliability.

a. Large Diameter Hand Dug Wells

Hand dug wells are in widespread use throughout the area. They are constructed by hand-excavating a hole 1 1/2 to 2 meters in diameter to the depth of the water table, but, because of practical constraints, no more than 30 meters down. They are difficult, slow, and dangerous to build because, among other things, there is a risk of collapse if they are not properly shored up. To prevent caving and to reduce the chance of pollution, dug wells should be (and often are) lined with concrete, which requires great expense and time.

These wells are brought into production by tossing a bucket into the well on a rope and withdrawing the bucket hand-over-hand. The rope usually falls on the ground as the bucket is hauled up and tossed again into the well, contaminating the well. As a rule, windlasses, which would keep the rope off the ground, are not used because they are much slower.

There are several important disadvantages to the type of well just described. Because their maximum depth is 30 meters, they can tap only shallow aquifers; i.e., those running a great risk of pollution from the surface and of running dry during the dry season. Indeed, a team visiting the project area at the end of the 1985 dry season noticed that most of these wells were dry. Dirty ropes and buckets, and lack of protective covering make contamination certain. They also take months to build, are dangerous to construct, last only 4-5 years, and, if concrete lined, cost an additional \$3,000 to \$5,000 per well, which brings the cost to that of a drilled well.

Measures can be taken to reduce substantially the contamination of these wells. Concrete lined wells can be covered with a concrete slab and a hand pump installed. This involves a skilled team constructing a form, placing reinforcing steel, and mixing and casting a concrete cover. This cover is hoisted into place when it is cured. The advantages of this system are that the risk of pollution, while not eliminated, is greatly reduced, and during periods of pump breakage, the cover can be removed and a windlass with bucket immediately installed so that villagers are not forced to return to contaminated water sources. The disadvantages of an improved large diameter well are all those of the unimproved model, plus the rather elaborate technology required to install the cover and the pump, and a high cost for a non-reliable water source. This approach, its recognized merits notwithstanding, has been rejected as providing a more costly, more time consuming, more probably contaminated, and almost certainly more unreliable water source when compared with rainwater catchment.

b. Small Impoundments for Storage of Surface Runoff

These devices involve the storage of small volumes of surface runoff behind embankment dams constructed to hold small watercourses. They are feasible under certain conditions: suitable size of catchment, and a convenient and non-permeable site for the pond. These conditions do not exist in the project zone, where their numerous disadvantages are immediately apparent: they wash out if not correctly constructed and maintained -- and they are relatively expensive to construct and maintain; there are large percolation and evaporation losses; the collected water often is polluted on arrival in the pond and always becomes more so with time; and, the stagnant water in the impoundments is a breeding ground for the vectors of many of the very diseases this project is designed to combat. For the above reasons, these devices have been rejected for this project.

6. Another Pump Option: the Abi-Vergnet

Mention should be made of the Abi-Vergnet pump, the hand operated version of which is used in some parts of Benin, and the foot operated version of which is used in Togo. In this pump a power cylinder at the ground surface is used to operate a bladder submerged in the well to lift the water. Its primary advantage is that the wearing parts and the pump piston are located at the ground surface, facilitating easy repair. (By contrast, the wearing parts in the India Mark II are at the bottom of the pump, necessitating pulling up and dismantling of all the interior rods with a trained crew to avoid dropping them down the hole and losing them.) There have been problems with the Abi-Vergnet bladder, which often has failed between three to nine months after installation in the Togo project. The manufacturer asserts that the problem has been corrected and is offering a three year guarantee. There has been insufficient time to support this assertion. Another drawback of the Abi-Vergnet is that the operating handle has a poor mechanical advantage and, due to friction in the drive cylinder, the pump handle must be pulled up as well as pushed down. The pull is tiring because one cannot put one's weight behind it. The Abi-Vergnet costs more than the India Mark II because it is more difficult to manufacture. However, assuming experience with the improved bladder is satisfactory, this project would consider use of the Abi-Vergnet were activities to expand to a region which had standardized on this model.

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7. Groundwater Development in the Project Area: Well Drilling in Northern Zou

The general principles of groundwater development have been explained above. Additional hydrogeological information pertaining to the project zone will be useful in understanding the drilling subcomponent of the Water Supply Component, which envisions drilling about 225 positive wells in the northern Zou province.

The western half of the northern Zou is underlain almost entirely by Pira migmatites. These are highly fractured metamorphic rocks that are slightly weathered in their upper horizons. Runoff in this zone appears to be very low; thus, recharge should be good. While not as easy to drill nor generally as productive as the sedimentary foundations to the south where the experienced UNICEF team has been obtaining a success rate of up to (but not always) 75%, drilling in this northwest zone possibly also will yield a success rate of up to 75%.

The eastern half of the northern Zou is underlain about equally by three formations: Pira migmatites; gneisses of the Djougou and Kandi groups; and, the granite basement complex. Drilling in the gneisses, which underlie the ancient river valley now occupied by the Oueme river, probably will result in about the same success ratio as in the Pira-underlain areas, i.e., possibly up to 75 percent.

Finding water in the basement complex-underlain third of the northeast will be substantially more difficult. This complex is composed of massive, very dense granite in which water occurs only in faults and fracture zones. The challenge consists of finding fissures extensive enough to yield useable amounts of water. Geophysical exploration in this area of dense material will be essential and of necessity more extensive than elsewhere, requiring the use of seismic equipment. Drilling in this area also will be slower and more difficult, with an anticipated success rate of somewhat less than 50 percent.

The consequence of this information is that about 458 holes will need to be dug to produce about 225 positive wells. This figure is arrived at by assuming that the drilling is divided 125:100 between the northwestern and northeastern halves of the zone, and that the average success ratio in the northwest is 60 percent and in the northeast is 40 percent. In the northwest 208 holes will be needed ($125 \text{ wells} \times 1/.60 = 208$) and in the northeast 250 holes ($100 \text{ wells} \times 1/.40 = 250$). The estimated success ratios of 40 and 60 percent are sufficiently conservative to ensure an outcome that equals or exceeds the target of about 225 positive wells.

8. Sanitation Component

a. Sanitary Excreta Disposal

The sanitary excreta disposal facilities used by this project will be limited to simple pit latrines. Anything more elaborate, such as pump out vault toilets is too expensive and complicated for villagers to maintain themselves. There is no need to do elaborate research on the kinds of latrines that might be suitable in the project area. There already is extensive literature on the many models which have been field tested and accepted in other parts of Africa. Two excellent, pertinent references are: "The Design of Ventilated Improved Pit Latrines", D.D. More, Technical Advisory Group, UNDP, TAG Technical Note 13, 1984, which is a complete practical handbook for low cost village latrines with many illustrations, describing many models used in Africa, including cost estimates; and, "Appropriate Technology for Water Supply and Sanitation: Technical and Economic Options", J.M. Kalbermatten, IBRD, December 1980 (2 vols.), similar to the first mentioned, already comprehensive reference, but even more detailed.

The key to a latrine program is villager acceptance. Informing villagers of the value of latrines will be a major task for the Health Interventions Component. To be successful from a technical viewpoint, the latrine model chosen must be affordable by villagers and able to be built by families using local materials as much as possible. There are numerous designs proven in Africa which use local materials for pit lining, floor supports, walls, and roof. The only outside materials commonly used are concrete for the floor slab and piping of about 4"-6" for the vent pipe. It is possible that some PVC well casing could be used for this. Another possibility involves bending cut sections of tin roofing in much the same way as roof gutters are made for rainwater catchment systems.

b. Water Quality Testing

It is important to check a new well's water quality soon after it has been brought into production and desirable to check it periodically thereafter to verify continued quality. If contamination is found, appropriate remedial measures can be taken to re-establish quality. Two standard tests are used to ascertain water quality: one to determine the number of total coliform bacteria, and another to determine the number of fecal coliform bacteria. Too many of either kind of bacteria

indicate an unacceptable level of contamination. Water sampling and handling, including storage and time in transit to the laboratory, must be done in a specified, fixed manner by trained technicians. However, the procedure is not difficult and has a demonstrated reliability, partly because coliform bacteria endure transport well and are easy to identify. The Millipore^R process is becoming the world standard for performing these tests and will be used in this project. It is simple, quick, and accurate, and can be performed at the FAO supported Food and Applied Nutrition (Direction d'Alimentation et Nutrition Applique, or "DANA") laboratory in Porto-Novo.

E. HISTORY AND PROGRESS TO DATE OF EXISTING PROJECT

The design of the Benin Rural Water Supply Project, 680-0201, began in 1978 and was directed at helping the GPRB with one of its highest priorities, carrying out the precursor plan to the above-discussed National Rural Water Supply and Sanitation Program. This precursor plan, the Rural Water Supply Program, set an initial target of providing each villager with ten litres per day of potable water, as opposed to the then existing dry season consumption figure of five litres per person per day of contaminated water. To accomplish this objective, an estimated six thousand drilled wells were needed; six hundred existed. The 1978 project included the drilling of 225 positive wells and equipping them with pumps, and spring captation, or the collection of spring water, its protection from contamination, and its uncontaminated conduct to village use centers. These water resource facilities were intended to supply each person in the immediate beneficiary region with twenty liters of potable water daily, thus accelerating achievement of the GPRB's target under the present national program in the project area. Public health and sanitation education and limited latrine construction also were planned. The project zone was to be selected districts of the two northern most provinces, Borgou (well drilling) and Atakora (spring captation).

The project was conceived as a multi-donor endeavor with A.I.D. providing the bulk of the technical assistance for water supply, sanitation, and health education, and also financing some equipment, commodities, operational and construction costs, and most participant training. The Capital Development Fund of the United Nations Development Program (UNDP-CDF) was to provide \$1.6 million of drilling equipment and UNDP \$300,000 for the services of a program and policy advisor to the Directorate of Hydraulics. The Peace Corps was to contribute 36 person years of volunteer services valued at \$540,000 for pump maintenance and repair and village health and sanitation activities. The GPRB had pledged personnel, office space, and some materials, and operation, construction, and vehicle maintenance costs (the preponderance of which were pledged for the final project year).

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The just summarized project was authorized in February, 1980, for a five year life of project grant funding of \$6,707,000. The original Project Agreement was signed in August, 1980, obligating \$1,965,000, and was amended in December, 1980, to obligate the full life of project funding. By March, 1981, all conditions precedent had been met except one applying specifically to disbursement for warehouse and office construction. Accordingly, other project implementation activities were able to go forward. Two technical assistance personnel had been engaged and were in place: a PSC project manager, and a PSC health advisor. A U.S.-based Procurement Services Agent had been retained and had been instrumental in procuring the first installment of pumps for the wells and some geological survey equipment. Two vehicles also had been procured. These goods and services cost \$457,906.78.

In December, 1981, this project was suspended due to a diplomatic incident. The two technical advisors were transferred to Togo, with their assigned vehicles, for service to projects in Togo. The pumps were transferred to a third country.

In October, 1984, a decision was made to lift the suspension and reactivate the project. To assure that the reactivated project would be appropriate to present conditions and responsive to current GPRB policy, a three person assessment team conducted a water resource and health sector survey in November-December, 1984. This survey discussed the most significant changes during the implementation hiatus, analyzed their consequences for future project activities, and identified possible modifications to the original design to be further explored by the project amendment design team.

F. DESIGN ADJUSTMENTS EFFECTED BY THIS AMENDMENT

Numerous inter-governmental discussions and independent investigations of the project amendment team have followed upon the November-December, 1984 assessment. As a result, several adjustments are being made to update the original design to make the project responsive to current needs of Benin. Some of these adjustments are for clarification only, some are responsive to altered conditions, and some are minor administrative accommodations to newly arisen objective realities.

The modification of the purpose statement explained in the Summary section falls within the first category of clarification. In emphasizing improvements of health practices rather than vaguely referring to improved village hygiene, the purpose becomes more tangible and near-term progress toward it assessable. At the same time, by going beyond the provision of a target number water supply and sanitation facilities, it avoids the risk of being a meaningless

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purpose, one which could be achieved, but to no beneficial end because the improvement in health practices required to reap the intended positive health impact of installing the facilities had not been instilled. The modified purpose statement also is more congruent with the GPRB current insistence on integrating health interventions into all rural water supply and sanitation programs.

The most important adjustment to altered conditions concerns a shift in project zone. As has been described, the 1980 Project Paper activities were to take place in the two northern most provinces, with drilling in Borgou and spring protection and exploitation in Atakora. On-site investigations and discussion with GPRB officials has disclosed that substantially greater benefits would be realized were project activities redirected to central Benin, i.e., initially to six northern districts of the Zou province and, possibly, some limited work in southern districts of Atakora if sufficient funds remain during the later months of the project. The reasons for this redirection are as follows. First, during the intervening period, Borgou has been the subject of a considerable amount of well drilling activity, and therefore has a substantially less desperate water supply situation relative to other provinces than it had in 1978-80. Conversely, the six northern districts of the Zou province have been comparatively neglected in terms of well drilling activity and now are in a decidedly disadvantaged water supply position relative to their Borgou neighbors. It is now these Zou provinces that are in most urgent need of help, and this Amendment accordingly shifts project drilling activities to this area of presently greater need.

The decision to direct resources which were planned for spring captation in Atakora to water supply development in central Benin, primarily the six core Zou districts, is an independent decision made after a review of pertinent official reports and after an April, 1985, site visit at the height of the dry season. This review and observation visit were undertaken to ascertain the continuing validity of the 1980 Project Paper assertion that seven springs in Atakora were sufficiently abundant to be exploitable. A 1981 Directorate of Hydraulics report stated that three of the seven springs had become dry or reduced to seeps as of February, 1981. This report was confirmed by the Regional Director of Hydraulics for the Atakora, who accompanied this Amendment's design team to the remaining four spring sites. All four springs were found to be emitting apparently clear water at estimated rates ranging from one to four cubic meters per hour. The current manner of using each spring follows a general pattern. The water rises from the ground some distance from the user village (distances ranged from 600 to 1,500 meters), and at a convenient outtake point, passes close to the village. Here, inhabitants dip the water out of the stream and carry it a few hundred meters to their houses. Generally, the water at the

outtake point was estimated to be of relatively good quality because there is no upstream use, and, accordingly, current users have a much better than average water supply (in terms of both quality and reliability) without any further development of the spring. In all but one case, the topography of the site and the substantial distance between the point where the water rises from the ground and that where it is retrieved by the villagers would require an exceedingly costly endeavor were it decided to protect the water at its source and pipe it to the user village. Estimates of cost range from \$50,000 to \$200,000. Populations of user villages range from 500 to 1,000, and in each instance only one village is sufficiently proximate to the spring and its resulting stream to use the water. Therefore, in these cases per capita costs of a captation program also are unreasonably high. Other factors also militate against spring captation. At the spring with an estimated \$200,000 development cost, captation of the spring source would dry up a picturesque falls area which draws tourists and provides an additional source of income to the user village. At another site where captation costs would be substantially augmented because the spring-fed stream also receives hillslope seepage, the user village inhabitants seemed less than enthusiastic about the prospect of captation; therefore, even without the technical complication, captation at this site would not be undertaken.

Also, even were the development cost-per-spring and per-capita within reasonable bounds, administrative considerations would make developing these four springs an ineffective use of project resources. The springs are widely separated from each other by rough rural roads and transport of captation teams and equipment would be very time consuming. The personnel charged with rural health interventions would need to travel numerous times for a full day from the core project zone in Zou to the northern Atakora over a very rough road which becomes impassible after the rains. In sum, the resources, time, and effort which spring captation in Atakora would require should be spent more prudently and effectively on drilling wells for villages in greater need of a reliable, clean water supply. For these reasons it is not deemed cost effective to protect the one spring which does not present unreasonable obstacles to capping. The diversion of project resources to benefit a population which already has a relatively good water supply cannot be justified. However, if, near the end of the life of the project, it is apparent that the drilling in Zou has proceeded at a faster than expected pace and that, as a result, time and resources still are available for limited drilling in southern Atakora, the project zone will be enlarged to include this area.

This amended project, although eliminating spring captation for the reasons just stated, is adding activities in alternate water resource development, primarily rainwater catchment. These activities will be especially appropriate in villages with too many inhabitants for one well but with too few financial resources to maintain two wells. A rainwater catchment program also will serve to dissipate some of the disappointment in villages where drilling is negative.

Another important adjustment to altered conditions involves the establishment of a Project Coordinator as the chief party responsible for implementing this project. As is more fully discussed in the Issues subsection of the Summary section, this arrangement represents a modification of the 1980 Project Paper which assigned implementing agency responsibility to the Directorate of Hydraulics. This adjustment is deemed necessary to effect a balanced administration of the project in which each participating directorate will be able to make its envisioned contribution, and will have that contribution coordinated with those of others to produce the intended project outputs.

A related administrative accommodation is the inclusion of the Directorate of Social Affairs in the Ministry of Labor and Social Affairs as a participating GPRB entity in lieu of the Ministries of Rural Development and Education. This substitution reflects a judgement that the currently available personnel in the Directorate of Social Affairs possess skills more congruent with the needs of this project than available personnel from the other two ministries.

An essential technical accommodation is being made in this amendment. The 1980 project envisioned procurement of Moyno pumps exclusively. The amended project will procure India Mark II pumps because this is one of the two brands on which the GPRB is standardizing, because it is the brand on which UNICEF has standardized, and because it is the standard brand of the project zone. The Mission is in accord with both the GPRB and UNICEF that maintenance and spare parts availability and distribution will be facilitated by standardization.

Finally, this amendment extends the Project Assistance Completion Date from September 31, 1985 to September 30, 1988.

III. DETAILED PROJECT AMENDMENT DESCRIPTION

A. INTRODUCTION AND PROJECT AMENDMENT RATIONALE

1. Rationale

From a development viewpoint, this project is even more worth doing now than when it was conceived in 1978-80. Severe drought in the intervening years has exasperated the already unsatisfactory water supply situation in the project zone, decreased the population's income, and reduced its health status. An integrated water supply project which provides health interventions and water and sanitation facilities to assure a positive health impact will remove a major obstacle to the health, productivity, and well being of rural poor in this zone. The GPRB is more in need of assistance to undertake this endeavor than it was in 1980. The drought has had a negative effect on the economy, as has closing of the Nigerian border, the debt situation, the devaluation of the French Franc, and inflation. However, if the GPRB is now in need of assistance economically, from a policy and organizational perspective it is better able to absorb the assistance and cooperate with a similarly-minded donor. As already discussed in the "Background" section, it has reorganized its priorities to favor rural development, has adopted a National Water Supply and Sanitation Program exactly congruent with the targets and methodology of this project, and has promulgated a 1983 decree initiating health interventions in water supply projects — a point on which this project always has been insistent. Accordingly, the project already has, and is likely to continue to receive, enthusiastic GPRB support, which, in turn, will facilitate project success. Furthermore, in addition to mirroring GPRB policy guidelines, the project is consistent with the AID mandate to assist the poor majority, the AID policy cornerstones of technology transfer and of human resources development and institution building, and with the Mission priority on improving health and water supply conditions in Benin.

This project, and GPRB policy, stress rural health interventions for very sound, logical reasons based on long experience. This experience clearly shows that most villages do not perceive the link between water and health, nor identify the causes of their health problems, without health education. Too many water supply projects ignore this logic and experience and, consequently, risk their intended health benefits going, so to speak, down the well tube. Health benefits do not occur automatically upon installation of water supply and sanitation facilities: they must be made to occur, and their continuation likewise is not an automatic spinoff but the result of persevering coordinated action and monitoring.

It is important to realize that rural populations heretofore without wells, rainwater catchment devices, and latrines have no reason to appreciate the relation between their proper use and maintenance, on the one hand, and human health, on the other. Nor have they reason to appreciate the importance of drinking clean water exclusively, to know what constitutes proper water collection, storage, and use procedures, to know what maintenance and repair measures are required, nor to realize the myriad unfortunate consequences of being forced back to old, polluted water sources when a broken pump is not promptly repaired. Indeed, the preponderance of beneficiary populations has not yet even developed the organizational skills prerequisite to absorbing information effectively on these matters, nor to transforming the information into individual and collective behavioral changes. Nor are project zone villages sufficiently organized and coordinated to define what for each of them constitutes the community's most threatening health problems and to bond together for concerted, remedial action. A great deal of guiding, teaching, mobilizing, and motivating of village communities is going to be necessary before a village population can be expected to benefit from installation of an improved water supply system.

Conceptual Framework: Components

From an operational point of view this project is an integrated rural water supply and sanitation improvement endeavor. As this statement and much of the foregoing text indicate, there are three components, which will be discussed individually at this point.

a. Rural Health Interventions Component

The Rural Health Interventions Component is the linchpin of this project in that it makes the other components worth doing by providing a reasonable expectation that their intended health benefits will be realized and sustained. The activities of this component operate at all project levels. They precede village infrastructure installation sponsored by the other components and they continue thereafter. At the village level, preliminary activities involve informing residents of candidate villages of the link between clean water and sanitation facilities and health, advising them of the numerous, essential behavioral changes needed to realize health benefits, and assuring that they have become sufficiently mobilized administratively and financially to assume (and to continue to assume) responsibility for maintenance and repair of water supply facilities and latrines. An important outcome of early health interventions will be the formation of Village Health Committees, the members of which are willing and able to serve (without promise of remuneration) as village coordinators during the informational campaigns sponsored by the component and also to serve

as catalysts in effecting the behavioral changes and community follow-through activities induced by these campaigns. Personnel assigned to this component also will assist this committee to institutionalize a means of regularly scheduling and paying for pump maintenance and repair.

A participation-oriented, collegial method is to be used in implementing the health interventions. This approach is based on the axiom that behavioral change occurs not primarily from access to information nor from attitudinal changes. Long lasting modification of entrenched behavior patterns accrues most successfully from repeated practice of the desired, modified behavior, combined with improvements in technical and organizational skills — which themselves are only acquired by doing.

The health interventions of this component go beyond being a series of isolated interventions, transfers of knowledge, or directives to take a prescribed course of action. To be of value for this project, the combined health interventions must constitute a continuous, cumulative participatory learning process. By engaging in this process, village members acquire the means to define and rank problems, to identify and choose among alternate methods of problem resolution, and to gain access to materials, knowledge, and skills to implement a chosen method without educators or others prescribing any particular method. The significant implementation consequence of this approach is that district educators and community organizers, members of Village Health Committees, and Village Health Workers merely assist in organizing village populations to identify and solve their own health problems. After having been guided several times in undertaking similar kinds of health improvement endeavors, villagers become motivated and able to undertake subsequent activities on their own — many of which activities require no inputs from this project (village clean up, draining mosquito breeding sites, nutritional monitoring, and vaccination). The last step in each discrete action of this learning process is evaluation of the action, during which participants compare actual accomplishments to their preestablished objectives, identify actions facilitating and impeding realization of objectives, and determine how planning and implementation of future endeavors can be improved. This participation-oriented, collegial approach is the optimal method for achieving this project's purpose, because improvement in health practices, and programs for facilities' maintenance require constant community and individual commitment and informed participation.

Extensive multi-disciplinary training at every project level is necessary for employing this component's implementation method successfully. Although national and provincial personnel will be trained, the largest numbers receiving training will be at the

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district, village, and other local levels. Training of trainers will be extremely important and key regional and local personnel -- especially representatives of the Directorate of Health Education, the Directorate of Social Affairs, and the Directorate of Sanitary Engineering -- will receive extensive in-country training at workshops and seminars, and also will require valuable on-the-job training, both from A.I.D. and Peace Corps-financed counterparts and from recently trained individuals from participating GPRB directorates. The subject matter of this training will concern the collegial, participation, and action-oriented implementation methodology just discussed, as well as the informational content of the health campaigns to be conducted in villages. Village Health Workers and members of Village Health Committees will receive similar instruction appropriate to their roles. The culmination, and the measure of success, of all this training is its ultimate effectiveness for the village citizen. A change in health practices which were the topics of this training should be discernable among villagers at the end of this project, as should an enhanced capacity of villagers to coordinate activities.

The community mobilization and participation and the multi-level training just discussed will provide a framework, methodology, and trained personnel for effective execution of various informational and village action campaigns. As already has been indicated, these campaigns will cover a wide variety of subject matters. Initially, villagers in villages tentatively selected for well-drilling will be advised what they can expect of the project and what the project expects of them, and asked if they wish to participate. Assuming a positive response, assistance will be provided in selecting a Village Health Committee and instituting a water supply facility maintenance program (usually a pump maintenance program) and a fund to support this program. Information will be disseminated concerning the importance of drinking exclusively clean water and, during short periods of pump breakdown, drinking only water that has been strained through cloth to remove Guinea Worm vectors. Informational campaigns also will concern the proper collection, storage, and use of clean water, proper hygiene practices, Guinea Worm prevention, and oral rehydration therapy. Assistance with latrine siting, construction, and maintenance will be provided. When pumps have been installed, training of village pump maintenance personnel will be undertaken. Villages desiring to reap maximum benefits from this component's activities will be able, through their enhanced organizational skills and ability to collect resources, to undertake concerted preventive actions to define and alleviate the village's most serious health problems. At this level there is a possibility of village anti-malaria and/or vaccination programs receiving at least publicity and administrative assistance from the project. Some villages also may wish to use the auspices of this project to nominate some of their members for training as village health workers -- first aid agents and midwives.

In addition to campaigns such as those just outlined, development of a methodology and appropriate survey instruments for baseline data collection, and development of a plan for long-term epidemiological surveillance will be important aspects of this component. Under the guidance of short-time technical assistance, district teams will conduct baseline surveys with the cooperation of Village Health Committees. These surveys will include: demographic data; prevalence and importance of the most common complaints; availability of local health resources such as personnel and facilities; existing water resources (distance from dwellings, quantity, reliability, purity); attitudes and practices concerning water use, sanitation, and disease and its prevention and cure; vector breeding sites; and, local leadership, communication, and decision making patterns. These surveys will be used by Village Health Committees to identify their most serious health problems, which health campaigns under this activity will encourage them to address through preventive action plans.

AID will finance a Public Health Education Advisor and the Peace Corps will contribute volunteers to implement this component. UNICEF has an environmental health specialist who will coordinate with these personnel. The Public Health Education Advisor will work most closely with the Provincial Chief of Health Education. These two people together with a representative of the Directorate of Sanitary Engineering and other appropriate GPRB personnel will comprise the provincial Supervisory Operational and Technical Unit. At the district level, a Peace Corps volunteer and GPRB state nurse will lead the district implementation team, also comprised of other district health center staff, social affairs agents (from the Directorate of Social Affairs), and rural sanitarians. Members of this district implementation team will work both directly with Village Health Committees and through appropriate extension agents, who then will work directly with the Village Health Committees and with villagers.

Training materials needed for the village health campaigns and for training workshops and seminars will be financed by AID, as will the improving of a training center adjacent to project headquarters in Bohicon for workshops and seminars. AID will also procure a vehicle for the Public Health Education Advisor.

b. Water Supply Component

(1) Drilling and pump installation subcomponent:

The Water Supply Component is divided into two subcomponents, drilling and pump installation being the dominant. The project envisions drilling about 458 holes in the Northern Zou province

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(about 208 in the Northwest and 250 in the Northeast), of which about 225 (about 125 in the Northwest and 100 in the Northeast) are estimated to be positive, warranting development as wells with installation of hand pumps. If the drilling proceeds more quickly than expected, and time and resources remain to add holes, the most probable locale for extension of drilling activities is the immediately adjacent southern Atacora region.

There are several ways to approach implementing a water supply activity in a development project. If no consideration at all is given to leaving behind a host country competence to continue the activity, or if the host country already has a fair to adequate competence but simply cannot drill fast enough to meet an established water supply goal within a designated time frame, then it is appropriate to bring in a profit making drilling company which will drill, estimate yield, and install wells and pumps on positive holes at as rapid a rate as possible. This method unquestionably results in the largest number of holes being dug in the shortest amount of time. If, however, the host country and the financing donor wish not only to improve water supplies for a specified population, but also wish either to establish or to enhance host country technical capability to plan and undertake water supply development programs on its own, an accommodation in the number of wells drilled must be made. Less wells can be installed because the expatriate personnel doing the drilling at the same time train their host country crew members to be self-sufficient teams, able to continue unassisted after the expatriate personnel depart. There is a trade off: for the long lasting benefit of in-country drilling competence, and the resulting almost certain opportunity for a larger total number of wells being drilled in the long run, there is an accompanying acceptance of a smaller number of wells being drilled in the short run -- the life of project period. If a host country has no technical drilling and pump installation/maintenance expertise, bargaining forward with a profit making firm to drill as many wells in as short a time as possible is analogous to disaster relief: needed and valuable, but really no more than a band-aid if the condition underlying the "disaster" is permanent rather than aberrant.

Because the water supply in rural Benin always has been qualitatively and quantitatively inadequate, and because the Directorate of Hydraulics presently has insufficient technical expertise to proceed on its own (even if it had enough equipment, which it does not), the project has set its target number of positive wells at an apparently modest 225 to permit time for training Beninese crews. If, during actual drilling, it becomes evident that this target is unrealistically high to assure

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comprehensive, thorough training, the training should not be slighted. Rather, the target should be reset downward and A.I.D.-Beninese accord on the modified target recorded in a Project Implementation Letter. In no case should drilling less than 225 wells because of attention paid to transferring technology be penalized in an evaluation. At the design stage (both of the 1980 Project Paper and of this Amendment) the necessity of a trade off was fully realized and an informed, deliberate decision made to further technology transfer within reasonable limits. A contributing factor to this decision is the belief that self-sufficient Beninese drilling crews can on their own make up any gap in wells not dug during the project very shortly after project termination.

Selection of villages for drilling activities will depend on a number of technical, epidemiological, and social factors. The selection team will narrow its preliminary investigations to those areas, and then to those villages which: have a high incidence of Guinea Worm; have no other nearby abundant water source, such as a river or stream; experience acute, seasonal water shortages each year; have populations no larger than 1000, preferably no larger than 500; have no more than two ethnic groups; and, are accesible to district health teams and extension workers carrying out the rural health interventions, and to drill rigs. All the above being equal, those villages which have demonstrated receptivity to the health interventions, and commitment to maintaining their pump and to using clean water as they have been counselled will be given preference. After these criteria have been satisfied and preferences taken into consideration, siting of drilling activities will depend on technical considerations, such as sufficiently positive hydrogeological (geologic and airphoto interpretation) and geophysical (reactivity/seismic traverse, grids and soundings) findings to warrant bringing a drill rig to a particular village. The drilling and pump installation themselves proceed as described in the Background subsection on "Technical Background on Rural Water Supply Systems and Sanitation." In some villages drilling may produce no water, but these villages will be urged to continue participating in the project, benefitting from the health interventions and from assistance available to install rainwater catchment devices. Because their initial selection as drilling sites in part depended on their demonstrated motivation and organizational ability, they are likely to continue participating in this modified way.

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A.I.D. and UNICEF will join forces to implement the drilling and pump installation subcomponent. Although A.I.D. will assume the primary financing role, UNICEF will be the lead agency during the process of implementation. UNICEF has undertaken drilling projects in the GPRB since 1980, providing a total of about 320 wells in the Zou and Borgou provinces as discussed in the "Other Donor" subsection of the Background Section. UNICEF wishes to continue its drilling activities in the region and there are substantial advantages to working together. First, a duplication of effort or at least a relative inefficiency will be avoided which might be possible were each agency to go forward with its own program. Second, the UNICEF drilling team will not need an acclimatization period before it can realize the projected drilling success rates in the range of 60 percent in the northwest and 40 percent in the northeast Zou; by this time it has developed a reliable gestalt for what is likely to be successful. Third, UNICEF has been in the forefront in Benin's efforts to introduce an integrated approach to water supply development, experimenting with various health interventions and community mobilization activities in its own endeavors. Therefore it will be supportive of the community health activities which A.I.D. will undertake as the lead agency for implementation of the Rural Health Interventions component -- relying on the A.I.D. Mission's extensive, current, more ambitious, and more intense interventions in a very similar Togo Water Supply project. Finally, UNICEF involvement in the project will minimize A.I.D. project management responsibilities and also minimize the number of directly A.I.D.-supported technical assistance personnel in Benin.

An A.I.D.-financed Cooperative Agreement between it and UNICEF will permit UNICEF's engaging a four person drilling team of a hydrologist, geophysicist, master driller, and master mechanic, and also a senior project officer to perform complementary management functions. The team will serve during the life of the project and will undertake the drilling and also the training of the Beninese drilling crews. Other elements A.I.D. will finance under the Cooperative Agreement are vehicles, expendable drilling supplies, drilling operating costs, and pump maintenance and repair activities. UNICEF's contributions to this Agreement will be its own overhead costs attributable to its activities under the Agreement, and passenger vehicles (for the drilling team) and their petrol, oil, lubricants, maintenance, and repair costs. The engineering analysis performed during the design of this Amendment indicates that UNICEF is knowledgeable and well qualified in the drilling field and that UNICEF's cost estimates are based on broad experience, are reasonably sound, and support a positive 611(a) finding. (As mentioned above, a UNICEF

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environmental health and sanitation specialist will work on the Rural Health Interventions component and also on the Sanitation component. A.I.D. will finance about half of this person's services under the Cooperative Agreement. UNICEF also will contribute part of this person's services.)

Some used drilling equipment will be donated by UNDP-CDF. This equipment was procured for the 1980 multi-donor project and has been used by UNICEF in its activities ever since. A.I.D. will finance the reconditioning of this equipment, and any new geophysical, hydrogeological, and drilling equipment needed to replace totally worn out UNDP-CDF-procured 1980 equipment or to bring the equipment group to full force. In addition, A.I.D. will fund spare parts, all heavy vehicles, trucks and other rolling stock, four passenger vehicles, all pumps and tubing, cement for completing and casing the wells, and all costs associated with construction of an office, a warehouse, and a repair shop at Bohicon.

(2) Rainwater catchment subcomponent

Rainwater catchment systems of the kind described in the Background subsection on "Technical Background on Rural Water Supply Systems and Sanitation" will be installed both to supplement pump water and to compensate for its absence in dry villages. Both family units and communal sheds or "hangars" will be encouraged, and maximum participation and contribution by villagers will be expected. A.I.D. will finance the life of project services of a civil engineer with a strong sanitary background to assist villages in catchment system construction, and the GPRB Ministry of Equipment and Transportation will contribute the services of engineers, masons, and carpenters as available. Peace Corps volunteers also will be working on this activity. In addition, A.I.D. will finance tin for gutters and for the roofs of communal sheds, cement for cisterns, and other construction materials. This subcomponent is closely linked with rural health intervention activities for assuring that villagers are fully informed as to the proper use and maintenance of these systems.

c. Sanitation Component

(1) Latrines

The Rural Health Interventions Component activities will inform villagers as to the importance of disposing of human excreta in a sanitary manner and will encourage them to build simple family pit latrines described in the Background subsection on "Technical Background on Rural Water Supply and Sanitation".

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The A.I.D.-financed life of project civil engineer working on rainwater catchment systems also will assist villagers with latrine construction, working with GPRB personnel from the Directorate of Sanitary Engineering, if available, and with Peace Corps volunteers. A.I.D. also will finance cement, re-bar, tin, plank wood, and other construction materials not found in the village (like sand). Villagers will be expected to supply their own labor.

(2) Water Quality Control Support

This project will provide quality testing for total and fecal coliformes using the Millipore^R process, as described in the Background subsection on "Technical Background on Rural Water Supply and Sanitation". Water samples will be collected in the villages and brought to the Food and Applied Nutrition (Directorate d'Alimentation et Nutrition Appliquee, or DANA) laboratory in Porto-Novo for analysis and test processing. Testing will be done soon after the wells are brought into production and as necessary thereafter. A.I.D. will finance expendible testing materials and equipment, and will fund the services, and the transportation and per diem costs of personnel from the DANA laboratory.

d. Component Coordination

The coordination of these components and achievement of the project purpose will be the responsibility of a Beninese Project Coordinator, assisted for the life of the project by an A.I.D.-financed Senior Advisor/Project Manager. As discussed in the Summary subsection on "Project Amendment Issues", the Beninese coordinator will be chosen either by a neutral ministry (Plan or Foreign Affairs), or by representatives of the four participating directorates (Hydraulics, Sanitary Engineering, Health Education, and Social Affairs) and will be approved in writing by A.I.D. and UNICEF as a precondition to initial disbursement. This Coordinator will be given explicit directions to assure that the Rural Health Interventions Component activities precede installation of facilities, and that selection of villages for well drilling is made objectively and fairly on the grounds set forth above in the subsection on the "Drilling and Pump Installation Subcomponent". The Coordinator will also assure that the four directorates cooperate with each other and with A.I.D., UNICEF, and the Peace Corps at all levels, that project activities at higher administrative levels support those at successively lower levels in a timely manner, that project personnel satisfy reporting requirements on schedule, and that these reporting requirements are structured to assure sufficient

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feedback from the village and district levels to permit effective project monitoring. The Coordinator, albeit with the help of technical assistance personnel, will be ultimately responsible for assuring that the project covenants are adhered to, for preparation and submission to A.I.D. of a Commodity, Equipment, and Vehicle Procurement Plan, of a Pump Maintenance Plan, of a Pump Logistics Plan, and of a detailed Training Plan.

The A.I.D.-financed senior advisor/team leader will be a professional project manager with extensive experience in developing countries, preferably, but not necessarily, with technical background in or acquaintance with water supply development, engineering, and/or financial management.

B. PROJECT GOAL

The overall goal to which this project contributes is the qualitative improvement of the health and living conditions of the Beninese rural population.

Progress toward goal achievement will be determined by assessing long-term reductions in: incidence of water-borne diseases; morbidity and mortality rates; urban migration; and water shortage-caused dispersal and urban migration of rural populations.

The major assumptions for goal achievement are: continued GPRB high priority on rural development, rural primary health care, and preventive medicine; increasing GPRB ability to shoulder recurrent costs; GPRB enforcement of its 1983 decree mandating integration of extensive rural health interventions in rural water supply development projects; continued donor support for rural development, rural health, and rural water supply exploitation; and, adoption by rural populations of the technological packages introduced to improve the quality of rural life.

C. PROJECT PURPOSE

The purpose of this project is to assist the Government of the People's Republic of Benin (GPRB) to improve the health practices of, and the adequacy and quality of water supply and sanitation facilities available to the rural poor in selected districts of central Benin.

End of project status conditions indicating that this purpose has been achieved include: the use of this project as a model for implementation of subsequent integrated rural water development projects in Benin; regular adoption by rural populations of improved health practices (such as: abandonment of traditional contaminated

water sources; exclusive use of potable water for drinking; collection, storage, and use of water so as to protect water quality; when necessary, filtering of water against Guinea Worm; access to and use of latrines by 10 percent of participating village populations; adoption of good hygiene practices, e.g., hand washing, proper garbage disposal, improved livestock logistics; adoption of preventive health measures; and, adoption of improved dietary practices as a regular part of village life); 30 percent decrease in incidence of Guinea Worm in participating villages; reliable, clean water source available to and used by participating villages year round; implementation of pump and of rainwater catchment system maintenance and repair programs, and systematized collection of funds to support these programs in participating villages; continuation of health education program focused on preventive health and sanitary excreta disposal by Village Health Committees and schools in participating villages; village level ability to recognize indications of contaminated water and to obtain water quality testing from the Directorate of Food and Applied Nutrition (DANA) or from other sources; institutionalized collaboration among concerned GPRB extension services, and between them and Village Health Committees, for improved village health; continued use of improved skills enhanced by training under this project by district and provincial GPRB personnel; capability of regional Directorate of Hydraulics personnel who received on-the-job training as drilling team members to undertake well siting and well drilling and pump installation on their own; increased time available to villagers for productive enterprise, and to mothers for socializing children; and, reduction in school absentee rate attributable to presence of a nearby, reliable water source.

Major assumptions for achieving the purpose of this project are: adequate responsiveness to health interventions of a sufficient number of villages in the project zone to warrant including between 200-275 of them as participants; sufficient groundwater and suitable hydrogeological conditions near villages selected for project participation to warrant drilling of enough holes to yield about 225 positive wells; GPRB commitment to assuring productive coordination of all national, provincial, and local entities charged with the development and exploitation of water resources, with the integration of health interventions into rural water supply development projects, and with the implementation of these projects; GPRB continued commitment to the guiding principles of the National Water Supply and Sanitation Program, and to its 1983 decree on mandatory health interventions; continuing Village Health Committee commitment and vitality after installation of wells and pumps, and their continuing effectiveness for assuring pump maintenance and repair; availability of sufficiently qualified and industrious village personnel for service as pump maintenance personnel; appropriateness for and

acceptability to target beneficiaries of technologies and improved practices introduced by the project (e.g. social acceptability of pumps, and of pit latrines); return of overseas trained Beninese participants to work in their respective disciplines; sufficient United States Government funding to support project activities at all levels indicated for the life of the project; Cooperative Agreement signed by UNICEF and A.I.D. for the envisioned coordination of services and assistance; and, UNDP-CDF donation of its used equipment.

D. PROJECT OUTPUTS

This project is expected to produce the following outputs which together should achieve the Project purpose:

- a functioning, replicable system for coordinating integration of health interventions into all water supply and sanitation projects;
- provincial and district Social Affairs, Health Education, and Sanitary Engineering agents, and other village level workers, trained in village mobilization and in the conduct of village health campaigns;
- functioning Village Health Committees in each participating village;
- active relations between Village Health Committees and rural extension services for integration of all project components;
- active collaboration among concerned GPRB rural extension services for village health improvements;
- pre-, concurrent, and post- water supply installation health education and pump maintenance repair campaigns;
- reliable, clean village water supplies developed and improved;
- pump installation, and maintenance/repair program in each participating village;
- master pump maintenance and logistics plan;
- upgraded technical competence of Hydraulics personnel assigned to drilling/pump installation teams;
- warehouse and repair shop for equipment and vehicles, and provincial project office and training center;
- adequate village based capacity to construct and maintain rainwater catchment systems, resources permitting;

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- sanitary excreta disposal facilities constructed and maintained;
- adequate village-based capacity to construct and maintain sanitary excreta disposal facilities;
- upgraded skills of rural sanitairians;
- water quality testing of each new well, subsequent testing as appropriate;
- upgraded skills of all personnel receiving long and short term participant training;
- Training Plan of training needs, recommended training facilities, with schedule;
- Commodity, Equipment and Vehicle Procurement Plan;
- A.I.D.-UNICEF Cooperative Agreement; and,
- Evaluations.

E. PROJECT INPUTS

The following inputs will be provided to realize the above set forth outputs:

.. A.I.D.

1) Technical Assistance

- 1) long term Senior Advisor/Project Manager
- 2) long term Public Health Education Advisor
- 3) long term Civil Engineer with strong sanitation background
- 4) long term Hydrologist (expatriate, funded under UNICEF Cooperative Agreement)
- 5) long term Geophysicist (expatriate, funded under UNICEF Cooperative Agreement)
- 6) long term Master Driller (expatriate, funded under UNICEF Cooperative Agreement)
- 7) long term Master Mechanic (expatriate, funded under UNICEF Cooperative Agreement)
- 8) long term Senior Project Officer (expatriate, funded under UNICEF Cooperative Agreement)
- 9) long term environmental sanitarian (expatriate, partial funding under UNICEF Cooperative Agreement)
- 10) short term personnel in appropriate disciplines as required, especially in financial management, training, and epidemiology.

- b) Training (per Training Plan)
 - Long term and Short term
 - Overseas, third country, and in-country
 - c) Equipment, its maintenance, and insurance
 - d) Commodities (expendable and non-expendable)
 - e) Vehicles
 - f) Construction (warehouse, repair shop, office,)
 - g) Operating Costs
 - h) Teaching materials
 - i) Cooperative Agreement funding to UNICEF
2. UNDP-CDF
- a. Used drilling equipment
 - b. Insurance for used drilling equipment
3. Peace Corps
- Volunteer Services valued at \$475,000
4. GPRB
- Project Coordinator
 - Personnel
 - Office space of Cotonou premises
 - Training Center
 - Land for office space, warehouse, repair shop
 - Operational costs

For itemized budgetary information concerning these inputs see the Financial Analysis section herein. Necessary waivers for project inputs are set forth in Annex C.

Additional information on the relationship between the goal, purpose, outputs, and inputs of this project is provided in the Log Frame at Annex A.

Additional information on the implementation of this project is provided in the "Introduction and Project Rationale" subsection of this Detailed Project Description, and in the Implementation Plan and Implementation Schedule following this section.

IV. IMPLEMENTATION PLAN

A. IMPLEMENTATION SCHEDULE

Project activities are programmed to occur over a three year period from the signing of the Project Agreement. The Project Assistance Completion Date is September 30, 1988.

Numerous preparatory activities will precede signing of the Project Agreement. Discussions will be held with UNICEF to finalize the substance of the Cooperative Agreement. Also, the Mission will prepare PIO/Ts, a draft CBD notice, and a draft RFP for technical assistance, and PIO/Cs for equipment, commodities, and materials. These documents will be transmitted to the RCO and RPO at REDSO/WCA, Abidjan, to enable review and any necessary further processing as soon as the Project Agreement is signed.

As soon as possible after the Project Agreement has been signed, the Cooperative Agreement with UNICEF will be signed to permit it to recruit four drilling team personnel and a senior Project Official. The GPRB will nominate and seek A.I.D. and UNICEF approval of its Project Coordinator. The Mission, with REDSO/WCA assistance, will order the equipment, commodities, and materials, some of which, such as expendable drilling supplies, materials, and the first group of pumps, can be expected to arrive in Benin in about five to six months. Very heavy equipment may have a delivery time of up to one year. A.I.D. and UNICEF will also begin reconditioning all still useable drilling equipment procured by UNDP in 1980 and used by UNICEF since then, and will begin to locate housing for the three A.I.D. long term technical assistance personnel.

Recruitment of technical assistance also will be initiated soon after the Project Agreement is signed. The Mission has determined that the best interests of the project are served by A.I.D. undertaking all contracting for technical assistance because of limited GPRB staff and capability in this area. The Mission has decided to recruit its three long term technical assistance personnel through Personal Services Contracts. Using a series of the most conservative time estimates, it is foreseen that RCO processing of the Mission PIO/T and CBD notice draft, can be completed during the first 30 days so that the CBD notice can be published at the end of the first project month. If 45 days are allowed for responses, the Mission will have all its applications during the third project month. During the fourth month the Mission Technical Assistance Selection Committee will review and rank the candidates, and recommend that the RCO begin negotiate with the highest ranked candidates. Assuming no unforeseen difficulties, these negotiations will require about a month, and the formalities of finalizing the

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contract another two weeks, resulting in signed Personal Services Contracts in five and a half months. The recruited personnel will consist of: a Senior Advisor/Project Manager; a Civil Engineer with a strong background in sanitation; and a Public Health Education Advisor. They are scheduled to arrive about six weeks after the contract has been signed, or at the start of the eighth month, by which time the UNICEF drilling team also will be in-country. This timeframe is deliberately conservative. If recruitment proceeds without problems, some personnel could be in-country during the sixth project month.

The Mission plans to obtain short term technical assistance during this early period in management, financial control, accounting, procurement, and logistics. This expertise is to be obtained through an IQC with a CPA firm, and the personnel are scheduled to arrive no later than six and a half months after the Project Agreement has been signed. A short term training advisor also will be recruited to arrive about this time and will remain four months. The short term advisor will work with the long term personnel and GPRB officials to produce the following documents about eight and a half months into the project: a management/reporting plan and schedule; a project accounting plan; a standard procurement and logistics procedure; an equipment, commodity and vehicle procurement plan; a pump maintenance plan; a pump logistics plan; and, a plan for assignment and scheduling of Peace Corps Volunteers. A training plan will be completed during the eleventh month. The responsibility for drafting these plans will rest with the IQC team and Training Advisor, so that long term personnel can become involved in their primary project activities. The person ultimately responsible for their finalization and timely submission to A.I.D. and UNICEF is the Beninese Project Coordinator.

Epidemiological and sociological expertise also will be obtained through three months of short term technical assistance. These assistance personnel will collect information on village attitudes, practices, and beliefs to identify attitudinal constraints to project success and to facilitate acceptability of project activities and methodologies. They also will do the preliminary epidemiological survey work outlined in the detailed discussions on rural health interventions.

During the eighth project month, construction of a project office headquarters, a warehouse, a repair shop, and a training center will be begun on land donated by the GPRB. These structures should be completed during the tenth or eleventh month.

Although new heavy drilling equipment ordered by A.I.D. will not arrive until about the thirteenth project month, enough reconditioned equipment, commodities, and personnel will be in place by the

beginning of the ninth month to get project activities underway in rural areas, starting with the northwest Zou where drilling predictably will be easiest. These activities will begin with health interventions by district and extension personnel in villages of under 1000 inhabitants having at most two ethnic groups. Preference for well citing will be given to villages indicating a commitment to maintaining the facilities provided by the project, to protecting the quality of their clean water, and to adopting improved health procedures. Drilling and pump installation will begin about a month later (the tenth project month). A repeating two to three month scenario of initial health interventions, village selection, well siting and drilling, well developing and testing, pump installation and water quality testing, broadening health interventions, initiation of pump maintenance and repair programs, and introduction of rainwater catchment systems and latrine installation will be followed sequentially in clusters of villages as activities spread throughout the project zone. By the end of the twenty-first month, 100 positive wells will have been drilled, by the end of the thirty-third month, 200 wells will have been completed, and, at the end of the thirty-sixth month, the target of about 225 positive wells will have been provided. The full complement of project activities also will have been undertaken in each participating village. Maintaining this schedule will be facilitated by arrival of the new heavy drilling equipment (among which there is to be a heavy duty rig on a four wheel drive base) around the thirteenth month.

In order to assure continued scrutiny of the management, financial controls, accounting, procurement, and logistics systems, personnel from the CPA/IQC firm are scheduled to return for short periods during the fifteenth month and the twenty-fourth month. This scheduling of management review coincides with two of the three project evaluations.

The A.I.D. Public Health Education Advisor will depart 24 months after arrival. The Senior Advisor and Civil Engineer will depart about 30 months after their arrival. The post-project schedule of UNICEF-recruited personnel will depend on the arrangements each has made with UNICEF.

B. ADMINISTRATIVE AND MONITORING ARRANGEMENTS

1. A.I.D. Responsibilities

A.I.D. is the lead agency for health education and all activities except those under the drilling and pump installation subcomponent. It will contract directly for three long term technical assistance personnel and will enter into a Cooperative Agreement with UNICEF for, among other things, a four person

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drilling team. Before arrival of the long term assistants, A.I.D. will: order equipment, commodities, and vehicles; have used UNDP equipment reconditioned; arrange for technician housing; recruit management, financial, and procurement/logistics specialists through an IQC with a management and accounting firm; and, recruit short term personnel in training and epidemiology. Once the long term assistance personnel are in place, A.I.D. will continue its role as primary monitor and financier of project activities.

2. GPRB Responsibilities

This project requires bringing together GPRB entities representing a wide array of disciplines at every administrative level for an effective integration of health, water supply, and sanitation activities to assure realization of health benefits. The GPRB has acknowledged the overriding significance of inter-disciplinary cooperation and will appoint a highly qualified Project Coordinator as the chief supervisory official responsible for implementation. This Coordinator will be responsible for: assuring qualified counterparts are in place for all the technical assistance personnel; assuring that sufficient support personnel and labor are made available as needed; assuring that qualified participants are selected for training; assuring that qualified personnel are made available for the extensive in-country training envisioned; assuring that technically qualified individuals with managerial potential are selected for on-the-job training and daily collaborative work with the UNICEF drilling team; assuring that adequate land sites are made available on a timely basis for construction of a project headquarters office, a warehouse, a repair shop, and improving of a training center; assuring the cooperation of all relevant GPRB officials in the drafting of and compliance with plans for management/reporting, financial control/accounting, procurement/logistics, equipment/commodities/materials procurement, pump maintenance, pump logistics, and training; assuring support for Village Health Committee organization and activities; and, assuring participation by all relevant GPRB officials in project evaluations and management reviews. The budgetary and staffing levels of the GPRB and its implementing units are considered adequate to handle its administrative and monitoring responsibilities under the project. The specific functions, responsibilities, and capabilities of both the national and supporting GPRB authorities involved in this project's implementation are described in the Institutional Analysis section.

B. UNICEF Responsibilities

Pursuant to the Cooperative Agreement to be signed between A.I.D. and UNICEF, UNICEF will be the lead agency of the drilling and pump installation subcomponent, and, as such, will receive A.I.D. financing sufficient to permit its fielding and supporting a four person drilling team with complementary management assistance, providing expendible drilling supplies, paying for drilling operating costs, and conducting a pump maintenance and repair program. A.I.D. financing also will partially pay the cost of an environmental sanitarian. UNICEF will contribute vehicles (and their maintenance) for the personnel it recruits, and will absorb any overhead costs of its Cotonou office attributable to this project. UNICEF also will contribute part of the environmental sanitarian's costs.

C. PROCUREMENT PLAN

1. Technical Assistance

A.I.D. will directly finance a total of 84 person months of long term technical assistance for this project. Through financing of a Cooperative Agreement with UNICEF life of project services of five other specialists are being obtained, as is the part time assistance of an environmental sanitarian. Authorization of AA/AFR for entering into this Cooperative Agreement without competitive solicitation is requested in Annex C-3 of this Project Paper. The individuals to be procured directly by A.I.D. will be recruited through Personal Services Contracts. The three individuals, and the respective lengths of their service, are:

Senior Advisor/Project Manager	30 PM
Civil Engineer with strong sanitation background	30 PM
Public Health Education Advisor	24 PM
Total A.I.D. long term TA:	<u>84 PM</u>

The Cooperative Agreement with UNICEF will finance UNICEF's recruitment for the life of the project of an hydrologist, a geophysicist, a master driller, a master mechanic, and a senior project officer. This Cooperative Agreement also will fund the part-time services of an environmental sanitation specialist working for UNICEF.

The identification of specialities of most of the short term technical assistance will be made after the long term personnel have had sufficient opportunity to determine gaps in GPRB

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expertise and ascertain the best kind of assistance to ameliorate them. Short term assistance in management, financial control, accounting, procurement, and logistics will be required very early in the project and periodically thereafter. This expertise will be obtained through an IQC with a management/accounting firm, and will total about eight person months. In addition, a Training Advisor (4 PM) and an epidemiologist, and sociologist (3 PM combined) are scheduled early in this project. Short term assistance also has been planned for the mid-term and final evaluations.

2. Commodities

This project involves direct contributions of A.I.D. and UNDP, which is making available used drilling equipment and paying its insurance, and also contributions of UNICEF through its Cooperative Agreement. Because of UNDP's direct contribution, A.I.D. is not the sole contributor to the project. Accordingly, A.I.D. Handbook 1 B, Chapter 16 C 3 a (2)(b) applies to A.I.D.-funded procurement by UNICEF under its Cooperative Agreement. This section provides that " when A.I.D. is not the sole contributor... A.I.D. relies on the international organization's auditing and procurement policies and procedures....", except that, pursuant to the following section, 3a (2)(c), A.I.D. may negotiate application of selected A.I.D. procurement and audit policies to protect U.S. interests if A.I.D. is the major contributor. Although A.I.D. is the major contributor in this instance, no protection of U.S. interests is deemed necessary in cooperating with a respected and established organization such as UNICEF. To the contrary, such protective measures on A.I.D.'s part foreseeably would impair UNICEF's ability to execute effectively its responsibilities. Accordingly, UNICEF will follow its own procurement and audit procedures.

For direct A.I.D. procurement partially to facilitate coordination with UNICEF's procurement, but even more importantly to respond realistically to the exigencies of project implementation in Benin, the authorized Geographic Codes are the Host Country and countries included in Geographic Code 941. A source/origin waiver to permit procurement of about \$333,150 worth of vehicles and rolling stock from countries included in Geographic Code 935 is set forth in Annex C-2.

A.I.D. will provide commodities and vehicles under each component. Health Interventions and Sanitation activities will require teaching materials, and small motorcycles. Construction materials for a training center and materials for building simple pit latrines also will be needed. Millinore water testing

equipment will be required for water quality control. For well drilling and pump installation, a wide variety of equipment, commodities, materials, and vehicles will be procured, and this is itemized in appropriate budget tables. Additional commodities, especially tin and cement, will be required for rainwater catchment system construction. The procurement, storage, and distribution of these commodities will be organized and systematized around the ninth project month by short term technical assistance in management, procurement, and logistics.

D. TRAINING PLAN

Training is inherent in most of the activities envisioned by this project. Much of it is in-service, on-the-job, or -- in the case of villagers building rainwater catchment systems or latrines -- learning through participation. There also will be limited overseas degree training, third-country training of various durations, and numerous in-country workshops and seminars, especially for village mobilization, health interventions, and some sanitation activities. Most of the in-country training will take place at the training center adjacent to the regional Hydraulics office in Bohicon.

A specialized background is needed to identify the diverse training needs of this project and to organize and coordinate the multi-disciplinary instruction which needs to be developed. Accordingly, A.I.D. is financing four months of service of a Training Advisor who will address these matters, establish systematized training packages for health and sanitation campaigns, and develop a "training of trainers" program. This person will work closely with all the long term technical assistance personnel to ascertain the disciplines in which training is most needed, identify suitable, qualified candidates, and locate appropriate institutions and courses of instruction.

E. EVALUATION PLAN

Three evaluations have been scheduled. The first is to take place about the fifteenth project month using project staff and personnel from the U.S. Embassy, Cotonou, USAID/Togo-Benin in Lome and REDSO/WCA in Abidjan. It will focus on the effectiveness with which inputs have been provided and will review project activities to date to ascertain the necessity of any course corrections. Of special interest will be the village health campaigns and pump maintenance programs at the local level, management and coordination at all levels, the effectiveness of the Project Coordinator, the appropriateness of the specialties of long term technical assistance personnel, and the individual performances of these individuals. The technological appropriateness of equipment, materials, and

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methodologies also will be reviewed. The second evaluation during the twenty-fourth month will be the most important. It will focus on progress toward realizing outputs and determining current and potential impact on Benin's development. This evaluation will recommend whether the project should be continued after three years of implementation. The final evaluation will occur during the final four weeks of the project and will focus on realization of end of project indicators. For these last two evaluations, a total of three person month of technical assistance has been scheduled to assist project staff and personnel from USAID/Togo-Benin and REDSO/WCA. The technical specialities will depend on which areas of expertise are needed to supplement those available from REDSO/WCA and AID/W.

Of equal, if not greater, importance than these formal scheduled evaluations will be the continuous evaluation process inherent in the implementation methodology of this project. On-going evaluations will be built into project activities on the rationale that many new concepts and technologies are being introduced, and review and feedback are necessary to assure that modifications are made as required.

V. INSTITUTIONAL ANALYSIS

A. GPRB

The reactivation of this project comes at a time when the GPRB is revitalizing its National Water Supply and Sanitation Program, strengthening its insistence on integration of health education into this program, and decentralizing what heretofore has been a highly centralized governmental structure. Because the project is multi-sectoral and inter-disciplinary, it requires the involvement, support, and collaboration of a large number of diverse GPRB entities, and, most important, commitment and active participation of local communities. Because all disciplines are equally important and none dominates project activities nor has a preponderant capability, the most promising way to assure the multi-level, inter-ministerial, inter-directorate collaboration which is a sine qua non for this project's success is the GPRB appointment (with A.I.D. and UNICEF approval) of a Project Coordinator. As has been discussed in the Summary subsection on Issues, this individual will serve as a liaison both among disciplines and among administrative levels, and will be ultimately responsible for well-managed and successful project implementation.

With the exception of fundamental policy formulation, project implementation will be decentralized, with the provincial officials of the Zou playing an important operational policy role in determining project emphases and assuring harmonious interaction at the district level of inputs from various GPRB entities. District officials will be charged with administrative and management direction, integration of project components and with outreach to villages. After extension workers and members of Village Health Committees have been trained, the most vital aspects of project implementation will occur at the village level.

1. National Level

The Project Coordinator will bring together five directorates working under four ministries. The Rural Health Interventions component will require contributions of the Directorate of Health Education of the Ministry of Public Health and the Directorate of Social Affairs of the Ministry of Labor and Social Affairs. The well drilling and pump installation subcomponent will be the primary responsibility of the Directorate of Hydraulics of the Ministry of Transport and Equipment. This directorate will identify and assign individuals to work with the UNICEF-recruited drilling team and to continue well construction at the end of this project. These personnel also will be expected to train their colleagues. Latrine siting and installation activities

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will involve the Directorate of Sanitary Engineering of the Ministry of Public Health, and water quality testing will be done by the Directorate of Food and Applied Nutrition of the Ministry of Rural Development. The Project Coordinator will be assisted by the A.I.D.-financed Senior Advisor/Project Manager.

2. Provincial Level

With the exception of fundamental policy formulation, project implementation will be decentralized, with the provincial level playing an important supervisory role, determining policy emphases and assuring harmonious and timely interaction of inputs from participating GPRB entities. The senior provincial officials representing each of the four above-named directorates will comprise a policy and coordinating committee which will guide the actions of the Supervisory Operational and Technical Unit. This Unit will be the principal supervisory project entity and will be comprised of the Provincial Chief of Health Education, a senior GPRB sanitary technician, a senior GPRB hydrologist, and a limited number of other senior GPRB personnel. A.I.D.-funded members of this Supervisory Unit will be the Public Health Education Advisor, Civil Engineer, the Senior Project Officer of the UNICEF drilling team, and the part time UNICEF environmental sanitarian.

3. District Level

The district level is, so to speak, "where the action is". Resources are allocated to district personnel from higher levels and are channeled to their appropriate end users at lower levels. Significant health intervention activities take place at this level: training of trainers, designing and scheduling of health campaigns, conduct of workshops and seminars, and frequent evaluation of village activities. District level inputs also will be critical to selection of villages for participation in project activities. The significant entity at this level will be the District Health Interventions Unit, which will be co-supervised by a GPRB senior nurse and a Peace Corps Volunteer. Other GPRB personnel will be Social Affairs Agents, Rural Sanitarians, and Health Center Staff, all of whom will engage in village outreach activities and who will enlist the participation of relevant members of the provincial Supervisory Unit when appropriate, especially when introducing new concepts and technologies such as rainwater catchment systems and latrines.

The Water Supply Development Team, the four person drilling and pump installation group recruited by UNICEF, supplemented by the A.I.D. Civil Engineer, Peace Corps Volunteers, and GPRB

Directorate of Hydraulics personnel, will be based in the provincial center but will do its actual work in participating villages. Accordingly, its coordination with workers of the District Unit will be essential, especially in the areas of well siting and pump installation.

4. Village Level

All participating villages must have functioning Village Health Committees to be eligible to receive project benefits. The members of these committees will serve without remuneration and will be charged with popularizing and reinforcing the messages transmitted during health education campaigns, assuring financial support and execution of a pump maintenance and repair program, and initiating village health activities which will enhance the benefits of pumped clean water, such as latrine construction, rainwater catchment system installation, and disease prevention campaigns.

All five participating directorates have adequate staff to assign to project activities. Admittedly, they have not had much experience working together synergistically to realize objectives that are greater than the sum of their combined inputs. The GPRB, A.I.D., and UNICEF recognize this constraint and expect that the combined managerial guidance of the Project Coordinator and the Senior Advisor/Project Manager will establish productive working patterns which will survive the project. It also is acknowledged that, while most GPRB personnel are trained to some extent, additional and sometimes extensive instruction must be provided to enable them to use the appropriate but, for them, new methods and technologies introduced by the project, and to provide them with a full complement of accurate health and disease related information. On the basis of existing GPRB personnel and organizations, by the institutional and human resources development activities described throughout this Amendment, the project is deemed administratively feasible.

B. A.I.D.

A.I.D. affairs in Benin are primarily managed by the A.I.D. Representative and one of his direct hire project officers. A full-time Assistant Program Officer under contract working out of the U.S. Embassy in Cotonou is responsible for day-to-day backstopping of A.I.D.-financed activities. This officer will be the individual primarily responsible for the liaison activities with the GPRB required by this project until the arrival of the Senior Advisor/Project Manager, after which the Assistant Program Officer will serve in a primarily supportive capacity. The administrative

preparatory activities described in the implementation schedule will be the responsibility of the A.I.D. Representative and the U.S.A.I.D. direct hire staff at USAID/Togo in Lome, supported with specialists from REDSO/WCA in Abidjan. The most important of these specialists are the Regional Contracting Officer (RCO), the Regional Procurement Officer (RPO), the Regional Legal Advisor (RLA), and engineers, health specialists, and human resources experts. This contribution of A.I.D. personnel is considered adequate to handle A.I.D.'s administrative and monitoring responsibilities under the project, which include acting as overall lead donor (i.e. financing) agency and as lead implementation agency for all activities except those under the drilling and pump installation subcomponent.

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VI. FINANCIAL ANALYSIS

A. FINANCIAL STATUS OF EXISTING PROJECT

This project was authorized and fully funded in 1980 with a five year life of project funding of \$6,707,000. When the project was suspended in December, 1981, \$457,906.78 had been disbursed, leaving a balance of \$6,249,093.22. This balance, rounded to \$6,250,000 for planning and discussion purposes, is to constitute the total A.I.D. life of project funding for the activities which have been described herein.

B. PROJECT AMENDMENT

1. A.I.D.

For this amended project A.I.D. will provide \$6,250,000 (exactly \$6,249,093.22) in FAA Section 104 Population and Health Program grant funds to the GPRB for technical assistance, training, commodities, vehicles, operating expenses, construction and remodeling costs, and evaluation over a three year period to assist the GPRB to improve the health practices of and the adequacy and quality of water supply and sanitation facilities available to the rural poor in selected districts of central Benin. The A.I.D. grant constitutes about 73.91 percent of the total cost of Amendment activities. The full funding had been obligated in 1980 and the entire obligation will be reactivated in FY 1985.

2. GPRB

The GPRB will provide in-kind and personnel contributions valued at \$1,330,880 over a three year period to cover personnel, commodities, land, facilities, and operating expenses. This Host Government contribution constitutes about 15.74 percent of the total LOP funding of all donors (\$8,455,880) and about 21.29 percent of A.I.D. LOP funding (\$6,250,000). A waiver of the FAA Section 110(a) requirement of a 25 percent host country contribution is included at Annex C-1, based on the ground that Benin is officially classified as a relatively least developed country.

3. Peace Corps

The Peace Corps is expected to provide volunteer services valued at \$475,000 over the life of the project.

4. UNDP

The UNDP is expected to make available in-use equipment purchased for the 1980 project presently valued at about a quarter of its \$1.6 million original costs, or \$400,000.

An illustrative budget is set forth below, the worksheets for which are attached as Annex F. Most one-time expenditures are expected to be made in calendar year 1986, and 1985 costs have been inflated by 15 percent to arrive at 1986 costs. Recurrent costs have been computed by inflating costs for each successive year by 15 percent, with the exception of salaries, which have been compounded at 5 percent. Personnel costs have been based on a family of four. This illustrative budget shows that the proposed funding is adequate to accomplish the project purpose in a timely manner.

C. ILLUSTRATIVE BUDGET

BENIN RURAL WATER SUPPLY PROJECT, 680-0201

(U.S.\$)

<u>EXPENSE CATEGORY</u>	<u>A.I.D.</u>	<u>Peace Corps</u>	<u>UNDP</u>	<u>GPRB</u>	<u>All Donors</u>
<u>TECHNICAL ASSISTANCE</u>					
<u>Long Term</u>					
A.I.D. Direct Contract 84 PM	1,101,439				
UNICEF Cooperative Agreement, 198 PM	1,264,800				
Total Long Term	2,366,239	475,000			
<u>Short Term</u>	150,000				
TOTAL TECHNICAL ASSISTANCE	2,516,239	475,000			2,991,239
LOCAL PERSONNEL	16,380			1,129,230	1,145,610
<u>TRAINING</u>					
Rural Health in-country US Degree, 2 people, w.English strengthening	141,800				
Europe/Africa, short term, 5 people	50,000				
TOTAL TRAINING	351,800				351,800
<u>COMMODITIES</u>					
UNICEF Cooperative Agreement, drilling Drilling equipment, pumps (direct A.I.D.)	495,120				
Abomey-Bohicon complex, equipping	80,000				
Latrine construction materials	225,000				
Rainwater catchment system construction materials	100,000				
Water quality Control Testing equipment	8,000				
TOTAL COMMODITIES	1,436,670		400,000	50,000	1,886,670
VEHICLES, SPARES	333,150				333,150

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	<u>A. I. D.</u>	<u>Peace Corps</u>	<u>UNDP</u>	<u>GPRB</u>	<u>All Donors</u>
OPERATING EXPENSES					
POL, vehicle insurance	168,200			72,000	
UNICEF Cooperative Agreement, drilling	330,080				
Direct A. I. D.-financed; drilling	107,200				
Monitoring	4,640				
Abomey-Bohicon	90,000				
Water Quality Control testing	18,125				
Cotonou office				20,000	
TOTAL OPERATING EXPENSES	718,245			92,000	810,245
LAND				25,000	25,000
CONSTRUCTION/REMODELING, Abomey/Bohicon	175,000				175,000
FACILITIES USE (Constructive rent)				34,650	34,650
EVALUATION	30,000				30,000
CONTINGENCY, 10.75 percent	672,516				672,516
LIFE OF PROJECT	6,250,000	475,000	400,000	1,330,880	8,455,880

This Project is financially viable. It uses personnel already in place and strengthens existing institutions; it does not create new cadres or institutions which would be a significant additional fiscal burden on the GPRB in the future. Aside from a slight augmentation in personnel costs accruing from more skilled government personnel — which costs should more than pay for themselves in increased and higher quality productivity — this project will not incur any significant recurrent costs.

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Assesment of the Methods of Implementation and Financing

Method of Implementation	Method of Financing	Approx. Amount (U.S.\$)
Technical Assistance	Direct Pay	2,516,239
Training	Direct Pay	351,800
Commodities and Vehicles	Direct Pay	1,769,820
Operating Expenses	Direct Pay	718,245
Construction	Direct Pay	175,000
Evaluation, other support, contingency	Direct Pay	718,896
		<u>\$6,250,000</u>

All payments made under this amended project will be made directly by USAID/Togo-Benin through its regional accounting center at Abidjan, Ivory Coast. This is the method of financing preferred by the Agency because it alleviates most cash management and overall accountability problems.

Title to Property: Title to vehicles, rolling stock, and drilling equipment purchased with A.I.D. funds under this grant shall be retained by A.I.D. during grant implementation. Direct and indirect costs associated with their operation will be covered by this project amendment grant. Upon termination of this amended project, final disposition of title of the above-mentioned items will 1) revert to the GPRB. 2) be jointly agreed upon by A.I.D. and the GPRB. 3) be decided by A.I.D.

I have reviewed the proposed methods of implementation and financing for this project, and find them to be appropriate. When necessary, adequate provisions have been made for detailed assessments of financial management capabilities. I therefore recommend that you approve this proposed project paper amendment.

J. C. Stanford
Regional Controller
REDSO/WCA

VII. ECONOMIC ANALYSIS

A. SOCIAL PROFITABILITY

The project already is socially profitable for Benin at this time for a variety of reasons to be discussed in this section. This social profitability can be shown even though the usual method of establishing profitability, an Internal Rate of Return analysis, is impracticable in this case because the benefits produced by the project are not amenable to exact quantification. The benefits are, nevertheless, unambiguous, substantial, and numerous. In short, their realization makes an immediate and essential difference in the lives of the target beneficiaries. Furthermore, several methods of calculation show that this basic difference is obtainable at a very reasonable cost. First, significant health benefits can be expected, such as a decrease in the incidence of debilitating and sometimes fatal water-borne and water-related diseases (Onchocerciasis or river blindness, dracunculosis or Guinea Worm, schistosomiasis, gastro-intestinal infections, various parasitic diseases, and malaria), and a decrease in high infant and juvenile mortality rates. Accruing from the decrease in disease and mortality rates will be other health related benefits, such as: an increased number of economically productive community members attendant on a decreased mortality rate; a positive return on the costs of rearing a child upon the child's becoming a productive adult as opposed to a waste of those expended resources if the child dies; lower fertility usually attendant upon lower infant mortality; lower absenteeism from work and school due to illness, disease, and need to fetch water; higher quality and quantity of work; increased concentration ability of students; decreased curative medical costs for treating water-borne diseases; and decreased costs of material losses due to enteric diseases that impair intestinal nutrients.

Second, there is a saving in the opportunity cost of obtaining water, that is, the value of what the labor used to fetch water could have produced. This saved opportunity cost increases as the dry season progresses, when villagers may be required to spend three to nine hours per day and expend many calories just to find water. The value of this opportunity cost depends not only on the amount of time saved, but also on the alternate uses to which the time would have been put. In 1978 Beninese women were asked what they would do with the time and their answers included: increased attention to domestic and childrearing activities; increased earnings by additional time spent in the field or in commercial activities; and, acquisition of artisanal skills and resultant augmentation of income. An attempt can be made to roughly estimate the value of the saved opportunity cost. A 1983 survey done in Togo ascertained that, on the average, women save two hours per day when there is a nearby, reliable water source — and the emphasis here is on nearby and reliable for

accessing opportunity cost -- not on clean water. Consistent with the discussion in the technical background of water supply and sanitation presented above, a well serving 250 people of 25 families of 10 directly benefits about 75 women if each family's 8 daily trips to the well to get 20 liters per person are shared by three women. (This estimate of the number of people gathering water by assigning the work only to women may be low because it excludes the substantial time and energy saved by the traditional watergathering efforts of children.) If each of the 75 women saves two hours per day, an estimated community time savings of 150 hours per day, or 12.50 12-hour work days can be attributed to the presence of a well. Over a period of a year, the savings in time is 4,562.5 days. To estimate monetary value saved, even assuming the alternate use carrying the lowest value, e.g., increased attention to domestic and childrearing activities, and assigning a modest estimated value of 50 cents per woman per day to this use, the estimated annual monetary savings to a community attributable to a well is \$2,281.25. Were the alternate use more measurably profitable, such as increased agricultural output and/or arts and crafts production, this annual community saving would be even more dramatic.

Third, a reliable water source can arrest two uneconomical population distributions often consequent upon unreliable water sources. The first of these is rural-to-urban migration. The movement of families from rural to urban areas is uneconomical from the district, provincial, and national standpoints, because it costs more to maintain a family in an urban than in a rural area, and because agricultural production decreases when the rural agricultural producing population decreases. This production loss is exacerbated by the fact that the relocated rural family is likely to be under- or even un-employed in an urban setting. The second of these uneconomic population distributions is population dispersal throughout rural areas. Too much population dispersal increases the costs of providing services to those in rural areas.

Other economic benefits also will be realized by this project. Income distribution will be more equitable because the beneficiaries are the rural poor in central Benin, an area traditionally disadvantaged vis-a-vis the urban and southern areas. Also village institutions will be improved by the community mobilization efforts of the Health Interventions Component. The improvement in these institutions and the promise for an improved standard of village life offered by this project may encourage village leaders to remain and help their villages rather than to move on in despair as they are prone to do when their communities appear to lack the organizational competence for handling their own problems.

Admittedly, it is exceedingly difficult to quantify these benefits, and this difficulty is all the more unfortunate because the most significant and substantial benefits and economic savings are the most elusive of estimation, namely those resulting from the proximity of reliable, clean water and from improved health practices. Efforts to quantify benefits risk being highly imaginative and contrived. However, one effort to estimate benefits for a 1978 tubewell project in Chad is persuasive and, on its face, deliberately conservative because it does not even try to measure most of the elusive health benefits. Indeed, it quantifies only four benefits accruing annually to a village of 300 upon installation of a tube well: (1) the cost of food for an infant (0-6 months) and for a child (0-5 years) and the extra food consumed by mothers during pregnancy and lactation, both of which expenditures are rendered nugatory if the infant or child dies (\$590.84 contributed toward the benefit of an adult rather than lost through death of a child or infant); (2) average number of workdays missed because of water-related diseases and the resulting loss of income (\$729.00); (3) average cost of treatment of water-related diseases in the village (\$776.00); and (4) gains of a woman who earns money during half the time she previously fetched water (\$1,676.00). The total annual gain is \$3,771.84. Discounting at a 10 percent discount rate yields a \$37,710 present value of benefits over an infinite life span of the project.

On the cost side for this Benin project, there is a positive well installation cost of \$10,000 and a per well annual depreciation and maintenance fee of \$100 which, discounted at 10 percent, gives a present value of \$1,000. Accordingly, the total present value cost is \$11,000. Using the conservative benefit figures from the Chad project gives a high benefit-cost ratio of about 3.43 (assuming conservatively a full disbursement of costs at the beginning of the project). It should be noted that the per well cost figure for Benin is inflated because it distributes the costs of equipment and training of drilling crews over only 225 wells when in fact these inputs will continue to serve the GPRB as it continues its rural well drilling program.

B. REASONABLE COST PER BENEFICIARY

For this project, some more concrete estimates can be made for cost per beneficiary, and, again, they are very reasonable and justify undertaking the project, assuming a \$10,000 per positive well cost and a \$1,000 present value per well depreciation and maintenance expense. To figure the number of beneficiaries, only the population of the smallest area which might be served is considered, i.e., the 282,000 of the six districts of the Zou province in the core project zone. If 85 percent of this population is estimated to live in

villages of 1000 or less (and thus be eligible for wells and health interventions), the target beneficiary population is 239,700. However, this number must be narrowed further if adherence to the extremely conservative 250 people per well standard is to be retained. With 225 wells the minimum actual number of primary beneficiaries who will participate in all project components is 56,250 people. If just the cost of the well installation and maintenance is considered (\$11,000 per positive well), the per beneficiary cost is a very low twenty cents per person. If the A.I.D. contribution to all project costs is considered, i.e. the \$6,250,000, life of project funding, the per beneficiary cost is a very modest \$111.11. If villagers learn to stagger their use so that up to 500 people can be served per well, then the number of primary beneficiaries becomes 112,500, the well cost per beneficiary ten cents, and the A.I.D. project cost per beneficiary \$55.56.

The cost per beneficiary of other facilities also is very reasonable, and the cost effectiveness of these facilities is one reason they were selected. Typical families range in size from 10-25. A family latrine requires about \$25 of A.I.D. resources and about a \$10 contribution from the family. Family rainwater catchment systems require about \$200 of A.I.D. resources.

Looking at the beneficiary picture more broadly and realistically, if almost all of the 239,700 rural residents of the core project zone can be expected to benefit from some project activities, such as near eradication of Guinea Worm, rainwater catchment systems, health campaigns, and latrines, then the A.I.D. project cost per beneficiary is \$26.07. For a family of ten, this would amount to \$260 per family. This figure is very close to the estimated \$256 cost per family of a Togo rural water supply project. This project recently received the highest ranking in a June, 1984 Rural Development Institute report partially on the ground of low per-family costs which facilitate replicability.

C. OPTIONS AND RELATIVE COST EFFECTIVENESS

As has been discussed in the subsection concerning Technical Background on Rural Water Supply, there is no acceptable alternative to small diameter drilled wells for providing a reliable, clean water supply in the project zone. Rainwater catchment devices are useful only as complements to pumped well water, not as primary water sources. Open, hand-dug wells are susceptible to pollution, even when concrete lined. The price of these lined wells often match that of drilled wells, and they become even more expensive if covered and supplied with a pump, while still being less sanitary and reliable than drilled wells. The previous discussions of infiltration galleries and small impoundments or storage of surface runoff has shown that these are expensive and unsatisfactory alternatives to drilled wells for the project zone.

Given the single cost-effective option of small diameter drilled wells for providing a reliable supply of clean water to the project zone, several ways to go about executing this option exist, as indicated in the Issues subsection of the Summary. A Cooperative Agreement with UNICEF which would facilitate its engaging the four person expatriate drilling team required to manage the drilling and pump installation subcomponent is easily the most cost-effective. It results in the lowest per well cost and provides the most appropriate organizational expertise among the alternatives. UNICEF will not encounter the same mobilization costs and require the same acclimatization time as would technicians totally new to the area. It has been established as a major well drilling institution in Benin since 1980, has broad drilling experience in areas adjacent to the project zone which will facilitate early realization of target success rates, has established good will and extensive contacts with relevant GPRB entities, and is familiar with the UNDP-CDF equipment bought for the 1980 A.I.D. multi-lateral project (most of which will be reconditioned for the project) which it has been using since 1980. These considerations, combined with the fact that UNICEF is a non-profit institution with a very respectable administrative track record will maintain the per positive well cost near \$10,000, as opposed to the up to \$15,000 per well figure which might be anticipated from other methods of procuring drilling technical assistance. Also, UNICEF is supportive of the technology transfer aspect of this subcomponent and already has demonstrated a commitment to training self-sufficient Beninese geophysical surveying, drilling, and pump installation crews. No other option for obtaining drilling technical assistance personnel will be able to provide the experienced expertise in training that UNICEF can offer.

The priority on training Beninese itself is seen as cost effective. In the medium and long terms more wells are going to be dug for the same amount of A.I.D. funding than would be the case without this priority. The most obvious alternative to UNICEF is engaging a private, profit-making company to provide the four person drilling crew, with the understanding that these individuals also would be responsible for teaching Beninese teams. Compared with UNICEF, this alternative is relatively disadvantageous on every point. It is more expensive (up to \$15,000 per well), requires a mobilization and acclimatization period, requires lead time to obtain the projected success rate, and could produce a predictable dissatisfaction and tension in technicians accustomed to drilling as many holes as possible each day when they are slowed down by the mandate to teach their Beninese counterparts. However, this second option may be favorable to combining an expatriate master driller and an expatriate master mechanic with local geophysical and hydrogeological services. The difficulty of coordination inherent in this third option would decrease production, as would the

profitability of periodic unavailability of local technicians due to other commitments. The necessity for substantial short term assistance offsets any apparent monetary advantage this alternative may seem to have. This alternative also holds the least promise for effectively training Beninese personnel.

D. COMPONENT MIX

Reference should be made here of the necessity of integrating health interventions and of offering assistance with latrine construction to realize optimal health benefits from this undertaking. As fully discussed in the Introduction and Rationale to the Detailed Project Description, the mix of water supply and sanitation facility installation with rural health interventions not only is the best way, but the only way, to realize enough health benefits from the cost of installing tangible facilities to make the installation economically worthwhile. The health interventions envisaged do raise the professional level of various local health-related personnel, but they use personnel already in place, establish no new cadres, and, for the most part, involve expatriate technicians only for the purpose of starting in motion a self-perpetrating "trainer of trainers" process. The nature of the upgraded skills is such that any added cost of maintaining better qualified personnel will more than pay for itself in increased quantity and quality of services performed.

VIII. TECHNICAL FEASIBILITY ANALYSIS

This project has been designed to provide the optimal combination of GPRB and A.I.D. resources for effective implementation. All GPRB entities are presently viable and functioning with previous experience in executing the responsibilities required of them under this project. No new Beninese cadres nor institutions will need to be, nor will be, created. The planned technical assistance mix is capable of assuring timely, effective project implementation. The combination of A.I.D.-funded long term assistance in health education, engineering, and management, UNICEF-recruited drilling personnel, and short term assistance in financial management, accounting, procurement, logistics, training, and epidemiology has been selected to provide management capability and adequate technical expertise in all disciplines of this integrated project. The technical feasibility of this combination also will assure interdisciplinary coordination and transfer of technology and capability to GPRB personnel.

Only established technologies and equipment with demonstrated success in West Africa are being employed in this project. The drilling equipment, the specific brand of hand pump, the type of rainwater catchment system, and the simple pit latrines discussed throughout this document all have been tried and proved. The same holds for methodology, which have been selected because of their appropriateness for this undertaking. Of special importance in this regard are the training of trainers orientation and the choice of village training materials which do not require literate audiences for the health interventions component, and the priority for on-the-job training of Beninese drilling crews so that they will be thoroughly familiar with the use and maintenance of the equipment which will be at their disposal at this project's end and able to continue on their own. An additional factor contributing to technical feasibility is the deliberate setting of conservative targets for drilling success rates ranging between 40-60 percent and for constructed of about 225 positive wells.

Not only are the technical assistance mix and implementation strategies adequate to provide the outputs required to achieve the project purpose, they also are -- individually and in combination -- the best among the available options. The envisioned assignment of a Beninese Project Coordinator is the best way to assure that inputs from the wide variety of disciplines required for this enterprise will be productively combined for project success. It is also the best way to avoid serious problems inherent in designating a sectoral GPRB entity as implementing agency. As has been discussed, the planned cooperation with UNICEF is both the most cost effective and the most technically effective means of executing the well

construction subcomponent. UNICEF involvement also will minimize A.I.D. project management responsibilities and the number of A.I.D. supported technical assistance personnel in Benin. Further, the division of lead agency responsibility between A.I.D. for health interventions and sanitation, and UNICEF for drilling and pump installation capitalizes on the relative expertise of each agency and constitutes the most effective means of procuring expatriate technical assistance. Most important, the integration of health interventions with water supply and sanitation activities has been discussed at length in this document (especially the Introduction and Rationale of the Detailed Project Description) as being not only the best, but the only way to achieve the health benefits for which the project is being undertaken.

IX. SOCIAL SOUNDNESS ANALYSIS

The project is socially sound in a variety of ways on several levels. The location of the core project zone has been deliberately chosen to equalize the benefits of water supply projects in rural Benin by setting this project in an area which has been relatively deprived of water supply development assistance. The project is expected to have a socially beneficial effect by reducing the incentive for water shortage-caused population dispersal and urban migration, thus facilitating an easier, more effective distribution of goods and services to the rural inhabitants of the project zone.

The direct beneficiaries of this project are widespread. At least 56,250 people (and probably considerably more) will benefit from well construction and clean drinking water. Women and children especially will benefit from a nearby, reliable source of water. The 239,700 estimated target population will benefit directly from myriad health interventions and campaigns, from assistance with rainwater catchment system construction, and from latrines. The Village Health Committee members, village and district pump maintenance technicians, District Health Intervention Unit members, and provincial Supervisory Operational and Technical Unit personnel will benefit from workshops and seminars under this project, and Beninese drilling crew members will benefit from the daily on-the-job training they receive from the UNICEF drilling team. The Project Coordinator similarly will benefit from enhancing professional skills during this project experience and from association with the Senior Advisor/Project Manager.

Indirect beneficiaries also are widespread. These include all who will take advantage of the higher skill level of GPRB personnel to undertake water supply, sanitation, and health intervention activities. This group will increase with time and as GPRB trained staff are able to pass on their training to their colleagues.

Finally, policies underlying this project are socially sound. The benefits yielded by each subcomponent's activities are clearly intertwined and build upon each other in such a way as to be cumulative and synergistic — the realization of several benefits making in combination a difference in the recipients' well being and increased standard of living greater than the literal sum of what might be expected from each benefit. The same principle operates over time: benefits yield benefits. These phenomena accrue in large part because the project does not reinforce institutionalized dependencies but assists the Beninese in helping themselves.

There are no social nor cultural constraints to implementing this project. Nor does the project foster social problems. It does not deprive some groups to benefit others, nor create new structures which would fit clumsily with present entities. To the contrary, present entities and their existing personnel are being strengthened for their mutual benefit and the benefit of Beninese society at large.

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X. ENVIRONMENTAL THRESHOLD DECISION

An Initial Environmental Examination Amendment has been written for this project amendment and is attached as Annex E. The results of that examination indicate that no significant adverse environmental impact is expected to result due to project activities. In concurrence with the findings of the IEE, this threshold decision formally determines that the proposed agency action is not a major action significantly affecting the environment.

XI. CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

A. CONDITIONS PRECEDENT TO INITIAL DISBURSEMENT UNDER THIS AGREEMENT

Except as A.I.D. may otherwise agree in writing, prior to any disbursement under this project, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee shall furnish or have furnished to A.I.D., in form and substance satisfactory to A.I.D. within sixty (60) days after the signing of the second Project Agreement Amendment:

- (1) An opinion of Counsel that the second Project Agreement Amendment has been duly authorized and/or ratified by, and executed on behalf of the Grantee and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms;
- (2) A statement setting forth the names and titles of persons holding or acting in the Office of the Grantee and representing that the named person or persons have the authority to act as the representative or representatives of the Grantee, together with a specimen signature of each such person certified as to its authority;
- (3) Nomination of a highly qualified individual for the full-time assignment to the position of Project Coordinator, with which both A.I.D. and UNICEF must give their respective written concurrence within the above-specified sixty (60) day time period.

B. COVENANTS

The Grantee shall covenant to:

- comply in a timely manner with all reporting requirements which shall be set forth by A.I.D. in Project Implementation Letters;
- provide sufficient numbers of adequately qualified personnel and of skilled and unskilled workers to assure successful implementation of the project and achievement of the project purpose;
- assign all A.I.D.-financed (whether directly or through a Cooperative Agreement) material, commodities, equipment, and vehicles to the project zone for project use for the life of the project.

- within the first six weeks after the A.I.D.-funded technical assistance personnel arrive in Benin (including the UNICEF team) submit for the joint approval of the highest-ranking A.I.D., GPRB, and UNICEF official acting for each entity in the project a Commodity, Equipment, and Vehicle Procurement Plan drafted by representatives of the three organizations which, at a minimum, will take into account commodities already ordered for and available to the project, identify and cost new items to be procured, and set forth procurement arrangement, schedules, warehouse facilities, and detailed equipment specifications;
- before the end of the first project year, prepare a Pump Maintenance Plan, in form and substance satisfactory to A.I.D. and UNICEF, including at a minimum identification of organizational entities responsible for pump maintenance, and operational and financial plans for allocating adequate, trained personnel and financial resource to the pump maintenance program;
- before the end of the first project year, prepare a Pump Logistics Plan, in form and substance satisfactory to A.I.D. and UNICEF, for pump storage and for phased ordering of pumps and spare parts, and for pump spare parts distribution to rural areas for village purchase;
- request Peace Corps volunteers to assist in project implementation;
- assure that women participate in all training programs and partake of the professional advancement opportunities under all project components; and
- through the Project Coordinator, transmit to the A.I.D. Representative during the first month of the final implementation year, a written plan for maintaining project benefits, including but not limited to the envisaged means of meeting any recurrent costs reasonably foreseeable as a result of the project.

C. NEGOTIATING STATUS

The above Conditions Precedent and Covenants have been discussed with and agreed to by the GPRB. During Project Agreement Amendment negotiations, USAID/Benin will incorporate into the Agreement Amendment appropriate language to cover these terms and conditions.

Project Title & Number: Benin Rural Water Supply, 680-0201

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

+3 years (Amendment)
 (Active) from 1980-1981, 1985-1988
 Total U.S. Funding: \$6,707,000
 Date Prepared: April 19, 1985

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Program or Sector Goal:</u></p> <p>The broader objective to which this project contributes:</p> <p>To assist the GPRB to qualitatively improve the health and living conditions of the rural population.</p> <p>A - 1</p>	<p><u>Measures of Goal Achievement:</u></p> <ol style="list-style-type: none"> 1. long term reduction in incidence of water-borne diseases, 2. long term reduction in morbidity and mortality rates, 3. long term reduction in urban migration, 4. long term reduction of water shortage-caused dispersal of rural population. <p>A - 2</p>	<p>- GPRB, A.I.D., and other donor statistics, reports, and documents</p> <p>- Site visits</p> <p>- Interviews at national, provincial, district, and village level</p> <p>A - 3</p>	<p><u>Assumptions for achieving goal targets:</u></p> <ul style="list-style-type: none"> - the GPRB will continue to place a high priority on rural development, on rural primary health care, and on preventive medicine, - the GPRB will be increasingly able to support recurrent costs, - the GPRB will enforce its 1983 decree mandating intervention of extensive rural health interventions in rural water supply development projects. <p>A - 4 (cont)</p>
<p><u>Project Purpose:</u></p> <p>To assist the GPRB to improve the health practices of, and the adequacy and quality of water supply and sanitation facilities available to the rural poor in selected districts of central Benin.</p> <p>B - 1</p>	<p><u>Conditions that will indicate purpose has been achieved: End of project status.</u></p> <ul style="list-style-type: none"> - This project used as model for implementation of subsequent integrated rural water development projects in Benin. - Improved health practices regularly followed: <ul style="list-style-type: none"> - abandonment of traditional contaminated water sources, - potable water is exclusive water used for drinking. <p>B - 2 (cont.)</p>	<p>- GPRB, A.I.D., and other donor statistics, reports, and documentation.</p> <p>- Site visits,</p> <p>- Interviews at national, provincial, district, and village level,</p> <p>- Village records re Guinea Worm, school attendance, economic productivity,</p> <p>- Participant training records and follow through,</p> <p>- Trip reports,</p> <p>B - 3 (cont)</p>	<p><u>Assumptions for achieving purpose:</u></p> <ul style="list-style-type: none"> - Adequate responsiveness of a sufficient number of villages in the project zone to warrant including between 200-275 of them in the project as participants, - Sufficient groundwater and suitable hydrogeological conditions near villages selected for project participation to warrant drilling of enough holes to yield about 225 wells. <p>B - 4 (cont)</p>
<p><u>Outputs:</u></p> <ul style="list-style-type: none"> - Functioning, replicable system for coordinating integration of health interventions into all water supply development and sanitation projects, - Provincial and district Social Affairs, Health Education, and Sanitary Engineering agent, and other village level workers trained in village mobilization and conduct of village health campaigns, - Functioning Village Health Committees in each participating village <p>C - 1 (cont)</p>	<p><u>Magnitude of Outputs:</u></p> <ul style="list-style-type: none"> - 1 - about 50 - 225 <p>C - 2 (cont.)</p>	<p>- Project initial and interim evaluation</p> <p>- Site visits, interviews</p> <p>- Quarterly reports required of project personnel at all levels</p> <p>- Post health-campaign reports</p> <p>- Participant training reports</p> <p>- Health education workshop observation and reports</p> <p>- UNICEF LTIA performance reports on members of drilling team</p> <p>- Peace Corps implementation reports</p> <p>- Consultant reports</p> <p>C - 3</p>	<p><u>Assumptions for achieving outputs:</u></p> <ul style="list-style-type: none"> - Appropriate technical assistance personnel and overseas/in-country/third-country training can be identified and provided to meet project needs. - Qualified GPRB personnel are made available for participant training and for on-the-job training. - Required commodities and equipment are available on a timely basis and from eligible sources. - Existing technology is appropriate and sufficient to attain outputs in project setting. <p>C - 4 (cont)</p>
<p><u>Inputs:</u></p> <p>1. A.I.D.</p> <p>a. Technical Assistance</p> <ol style="list-style-type: none"> 1) LT Senior Advisor/Project Manager 2) LT Public Health Education Advisor 3) LT Civil Engineer 4) LT Hydrologist (UNICEF Coop. Agreement.) 5) LT Geophysicist (UNICEF Coop. Agreement.) 6) LT Master Driller (UNICEF Coop. Agreement.) 7) LT Master Mechanic (UNICEF Coop. Agr.) 8) LT Senior Project Officer, drilling (UNICEF Coop. Agreement) <p>D - 1 (cont)</p>	<p><u>Implementation Target (Type and Quality):</u></p> <p>See financial analysis and implementation plan, and commodity and equipment lists of the Project Paper Amendment.</p> <p>D - 2</p>	<p>- A.I.D., UNICEF, and GPRB project records and vouchers</p> <p>- PIO/Cs, PIO/Ts, and PIO/Ps.</p> <p>D - 3</p>	<p><u>Assumptions for providing inputs:</u></p> <ul style="list-style-type: none"> - A.I.D. and GPRB proposed funding levels are approved by their respective governments and disbursements are made on a timely basis. - The GPRB meets all conditions precedent in a timely manner, and adheres to covenants. - Appropriate technical assistance personnel and overseas/in-country/third country training can be identified and provided to meet project needs. <p>D - 4 (cont)</p>

LOGICAL FRAMEWORK (cont.)

- 2 (cont)
 when necessary, water cloth. filtered against Guinea Worm
 10 percent of participating village populations have access to and use family latrines
 good hygiene practices (hand washing, proper garbage disposal, improved livestock logistics), preventive health measures, and improved dietary practices followed regularly as a part of village life.
 30% decrease in incidence of Guinea Worm
 Participating villages have reliable water source year round.
 Participating villages implement maintenance/repair programs for their pumps and rainwater catchment systems, and collect financial resources to support these
 Participating villages, through Village Health Committees and schools, continue health education programs focused on preventive health and sanitary excreta disposal.
 Participating village personnel know the indicators of contaminated water and know how to obtain water quality testing from DANA or other sources.
 Institutionalized collaboration among concerned GPRB extension services and between them and Village Health Committees, for improved village health.
 District and provincial GPRB personnel continuing to use their enhanced skills.
 Regional Hydraulics personnel trained on-the-job as drilling team members capable of undertaking well drilling/pump installation on their own.
 Additional time available to villagers for productive enterprise, and to mothers for socializing children.
 School absentee rate drops down as a function of a nearby, reliable water source.

- B - 3 (cont)
- Participant training records and follow through
 - Trip reports
 - Project final evaluation
 - Final report of Project Coordinator
 - Final report of Senior Advisor/Project Manager
 - Peace Corps final reports

- A - 4 (cont)
- Donor support for rural development, rural health, and rural water supply exploitation will continue.
 - Rural populations will adopt technological packages introduced to improve the quality of rural life.

- B - 4 (cont)
- GPRB commitment to assuring productive coordination of all GPRB entities at the national, provincial, and local levels charged with the development and exploitation of water resources, with the integration of health interventions into rural water supply development projects, and with the implementation of these projects.
 - GPRB continued commitment to the guiding principles of the National Water Supply and Sanitation Program, and to its 1983 decree on mandatory health interventions.
 - Village Health Committees will continue to be vital after wells and pumps are installed, and will be effective instruments for assuring pump maintenance and repair.
 - Sufficiently qualified and industrious village personnel are available and willing to serve as pump maintenance personnel.
 - Technologies and improved practices introduced by this project will be appropriate for and accepted by the target beneficiaries.
 - Pumps are socially acceptable by beneficiaries.
 - Pit latrines are socially acceptable to beneficiaries.
 - Overseas trained Beninese participants return to Benin to work in their respective disciplines.
 - The U.S. Government will provide sufficient funding to support project activities at the levels indicated for the life of the project.
 - UNICEF and A.I.D. sign a Cooperative Agreement for the envisioned coordination of services and assistance.
 - UNDP-CDF donates use of its used equipment.

8

LOGICAL FRAMEWORK (cont.)

- 1 (cont)

Active relations between Village Health Committees and rural extension services for integration of all project components. Active collaboration among concerned GPRB rural extension services for village health improvement.

Pre-, concurrent, and post-water supply installation health education and pump maintenance repair campaigns conducted.

Reliable, clean village water supplies developed and improved.

Pump installation and maintenance/repair program in each participating village.

Master pump maintenance plan.

Upgraded technical competence of Hydraulics personnel assigned to drilling/pump installation teams.

Warehouse and repair shop for equipment and vehicles, and project headquarters office.

Adequate village-based capacity to construct and maintain rainwater catchment systems, resources permitting.

Sanitary excreta disposal facilities constructed and maintained

Adequate village-based capacity to construct and maintain sanitary excreta disposal facilities.

Upgraded skills of rural sanitarians.

Water quality testing of each new well, subsequent testing as appropriate.

Upgraded skills of all personnel receiving long and short term participant training.

Training Plan of training needs, recommended training facilities, and schedule

Commodity and Equipment Procurement Plan
A.I.D.-UNICEF Cooperative Agreement
Evaluations

C - 2 (cont)

- 225 wells with pumps
- 100 rainwater catchment systems

- 20 (8 core personnel)

- 150 villages

- 100 single pit latrines

- 225 villages

- 6

- 1500 samples of water tested, 1-3 times per well

- 2 LT, 5 ST

- 3

C - 4 (cont)

- Sufficient numbers of villagers are willing and able to serve effectively on Village Health Committees without promise of compensation.
- At least 225 villages located for positive well drilling successfully respond to the preliminary health interventions to qualify as participating villages.

LOGICAL FRAMEWORK (cont)

D - 1 (cont)

Inputs:

- 9) ST TA in appropriate disciplines as required, especially in financial management, training, and epidemiology.
- 1) LT and ST, overseas, third country, and in-country training,
- 2) Equipment, its maintenance and insurance,
- 3) Commodities (expendable and non-expendable),
- 4) Vehicles,
- 5) Operational costs,
- 6) Teaching materials,
- 7) Cooperative Agreement funding to UNICEF.

2. UNDP-CDF

- 1) Well drilling equipment,
- 2) Insurance for well drilling equipment.

3. Peace Corps

Volunteer services valued at \$475,000

4. GPRB

- Project Coordinator
- Personnel
- Office space
- Land for office space and repair shop
- Operational costs.

D - 4 (cont)

- A highly qualified and effective individual is assigned by the GPRB as Project Coordinator.
- Sufficient and appropriate GPRB personnel are assigned to the project.

UNITED STATES GOVERNMENT
memorandum

DATE: 30 May, 1983

REPLY TO
ATTN OF: Dorothy M N McClellan REDSO Engineering Advisor *DM*

SUBJECT: BENIN RURAL PROJECT 693-0201 611(A) Findings; 611(E) Findings; 611 (B) Findings

TO: Myron Golden : USAID Togo/Benin

Concerning 611(A) Findings:

I have reviewed the Building Construction program of the Benin Rural Water Project 693-0201, examined the site of the proposed building construction, and prepared budget estimates for the improvements.

I find the program appropriate and that the budget established for this program is adequate.

Concerning 611(B) Findings:

Computations of benefits and costs set out in Section VII, Economic Analysis, satisfy the requirements of 611(B).

Date : 20 May, 1985
From : Dorothy M.N. McClellan, REDSO Engineering Advisor
Subject : Building Construction Program, Benin Rural Water
To : Myron Golden, USAID Togo/Benin

This will transmit information concerning the building construction program of the Benin Rural Water Project.

This information was developed as a result of a site visit 20 May, 1985; review of previously prepared sketches providing dimensions of existing structures and description of proposed improvements; meetings with Philippe Aboky, the Regional Director for the Hydraulic service of the Ministry of Equipment/Public Works. Appropriate Togo/Benin unit prices were used for cost estimation.

Improvements are assumed to be constructed of locally fabricated block, have minimum electrical services, and to be generally similar to the existing structures on the project site.

Attachment A. - Description of building construction program

Attachment B. - Summary of facilities, Building Construction Program

Attachment A

D. McClellan
20 May, 1985

DESCRIPTION OF BUILDING CONSTRUCTION PROGRAM, BENIN RURAL WATER

The building construction program consists of the renovation of two buildings, the completion of a partially constructed office building, and the construction of a covered garage. Cost of the building construction is estimated at \$55,000.

All building improvements will be constructed in the Regional Hydraulic Service area of the Ministry of Equipment/Public Works Regional Center at Bohicon located in the Zou province.

The site is easily accessible by paved road and is of adequate size to accommodate the proposed construction.

The site is drained by overland flow to the Southwest. The water table is sufficiently low so as not to conflict with the mechanic's pit in the proposed garage. Ponding is not a problem.

However, seasonal overland flow does create a hazard of water entry into existing buildings. Poured concrete thresholds have served to protect the existing buildings from water entry at times of high overland flows. New entries to renovated buildings will include thresholds of sufficient height to protect against water entry.

The foundation of the partially constructed office building allows a finished floor slab of approx. one meter above finished grade and is considered adequate to protect the building against water entry from high overland flows.

The proposed garage will be faced West/Southwest to minimize water entry from overland flows.

The existing Sanitaire will serve the proposed office building and will be augmented in the future, as needed, at minor costs.

The site is served with adequate water.

The GPRB Public Works department will prepare construction plans and build all improvements.

The REDSO engineers will review the final plans, make progress visits as needed, and make the final inspection/acceptance of the construction.

Attachment B

D. McClellan
20 May, 1985**SUMMARY OF FACILITIES, BUILDING CONSTRUCTION PROGRAM, BENIN RURAL WATER**Office Building

Complete the construction of an unfinished 138 m² (6m x 23m) office building; one story concrete block building to be built on existing foundation; building will provide 12 office areas.

Estimated cost \$25,000

Service/Storage Building

Renovation of the existing 81 m² (9m x 9m) masonry building; work includes roof replacement, enclosing 4m x 9m roofed area, installation of a new exterior door.

Estimated cost \$4,000

Parts/Storage Building

Renovation of the existing 60 m² (6m x 10m) masonry building; work includes roof replacement; adding a new 5m x 8m room, extending the overhand of the new roof 4m on the side and 2m in the rear; install interior shelving.

Estimated cost \$10,000

Covered Garage

New construction 200 m² (10m x 20m) masonry building; 4 bays @ 5m; full height rear wall with one window in each bay; partial height for the side walls, no front wall; reinforced concrete floor.

Estimated cost \$16,000

Recap

Office Building	\$25,000
Service/storage Building	4,000
Parts/storage Building	10,000
Covered Garage	16,000
	<u>\$55,000</u>

FAA SECTION 611(e) CERTIFICATION

I, Myron Golden, the principal officer of the Agency for International Development to the Government of the People's Republic of Benin, having taken into account, among other things, the maintenance and utilization of projects in the Government of the People's Republic of Benin previously financed or assisted by the United States, do hereby certify, pursuant to Section 611(e) of the Foreign Assistance Act of 1961, as amended, that, in my judgement, the Government of the People's Republic of Benin has both the financial capability and the human resources capability to effectively implement, utilize and maintain the proposed Benin Rural Water Supply Project, as amended.

This judgment is based upon the project analysis as detailed in the Benin Rural Water Supply Project Paper Amendment and is subject to the conditions imposed herein.

Myron Golden
A.I.D. Representative
Togo-Benin

Date

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

From : Myron Golden, AID Representative, Togo-Benin
 To : Mark Edelman, AA/AFR
 Subject : Benin -- Rural Water Supply Project (680-0201): Waiver of Section 110(a) of the FAA requirement of a Host Country contribution of at least 25 percent of total project costs.

A. Cooperating Country : Government of the People's Republic of Benin
 B. Project : Benin Rural Water Supply Project, 680-0201
 C. Nature of Funding : Grant

PROBLEM: Pursuant to Section 124(d) of the Foreign Assistance Act of 1961 (FAA), as amended, and the authority redelegated to you thereunder, your approval is requested to waive the requirement of Section 110(a) of the FAA for a Host Country contribution for at least 25 percent of total project costs.

BACKGROUND: Benin ranks among the world's poorest countries, with an average per capita income of \$310, and is included on the list of "relatively least developed countries" compiled by the United Nations Conference on Trade and Development (UNCTAD). During the 1981 - 85 period, Benin's economy has been adversely affected by several factors: severe drought, an inflation rate of at least 15 percent, devaluation of the French Franc and strengthening of the U.S. dollar (on which Benin's exterior debt is calculated), the coming due of principal payments on a number of Benin's loans, and the closing of the Nigerian border with consequent curtailment of profitable trade and transit actions. At present, Benin's economic situation is so serious that the 1984 national budget was decreased. The commitment to austerity is uncompromising, as shown by the fact that the budgeted reductions include an 8 percent decrease for government personnel. Accordingly, although the inhabitants of the country are in need of a wide variety of economic and rural development services, the government is unable to provide the services with its own resources.

One of the most acute needs of the Beninese population, especially of the 85 percent of which is rural, is potable water. It is estimated that only 21 percent of the total population and only 8 percent of the rural population have access to potable water. Accordingly, the incidence of debilitating and often fatal water-borne diseases is high and a major contribution to an infant mortality rate of 123 per thousand, a juvenile mortality rate of 243 per thousand, and an at-birth life expectancy of 47 years. These diseases also reduce the economic productivity of villagers.

The Government of the People's Republic of Benin (GPRB) realizes that lack of potable water is a serious constraint to rural development and has promulgated a National Water Supply and Sanitation Program which has set the targets of providing 10 liters of potable water per person per day by 1985 and 20 liters by 1990. These targets fall short of the internationally accepted WHO daily all purpose minimum of 30 liters per person and deliberately place the highest priority on providing everyone with clean drinking water before setting more ambitious water supply goals. Geophysical and hydrological research and experience in Benin have clearly established that the only way to provide reliable sources of potable water in rural areas is to drill small diameter wells and install pumps. The history of rural water supply activities further demonstrates that the only way to assure realization of the health benefits for which the wells and pumps were installed is to accompany provision of these facilities with extensive health and sanitation education. The GPRB National Program takes these considerations into account. It envisions well construction and pump installation in villages and mandates simultaneous undertaking of health and sanitation education activities. Because of insufficient financial resources, execution of the National Program must depend on donor assistance, and GPRB participation must be limited to personnel and in-kind contributions. Financial constraints make impossible even a 25 percent GPRB contribution to projects undertaken in response to the Program at present.

In 1980, A.I.D., the Peace Corps, and UNDP began implementing a multi-lateral rural water supply project to support the GPRB National Program. A.I.D. participation was suspended after a diplomatic incident in 1981. This suspension was lifted in October, 1984, and the project has been updated to accommodate conditions which have changed in the interim. The purpose, activities, and indicators of achievement of project purpose of the updated project remain essentially the same as those of the original project. About 225 positive wells are to be constructed in villages concurrently with extensive health and sanitation education activities. The expatriate drilling crews will train the GPRB drilling crews who, as a result, will continue rural drilling activities after the project is over. A health education methodology relying on training of trainers has been selected which will be self-generating and easily continued by Beninese. In short, the project assists the GPRB to execute an activity on which it has placed a high priority in such a way that Beninese personnel will be trained to continue project activities.

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DISCUSSION:

- A. Section 110(a) of the Foreign Assistance Act of 1961, as amended (FAA), provides that: "No assistance shall be furnished by the United States Government to a Country under Sections 103 through 106 of this Act until the country provides assurances to the President, and the President is satisfied, that such country will provide at least 25% of the costs of the entire program, project or activity with respect to which assistance is to be furnished, except that such costs borne by such country may be provided on an 'in kind' basis."
- B. FAA Section 124(d) authorizes a waiver, on a case-by-case basis, of the requirement of FAA Section 110(a) in the case of a project or activity in a country which AID determines is relatively least developed based on the United Nations Conference on Trade and Development (UNCTAD) list of "relatively least developed countries." Benin is on the UNCTAD list.
- C. A.I.D. regulations implementing FAA Sections 110(a) and 124(d) are set forth in A.I.D. Handbook 3, Chapter 2, Appendix 2G. With respect to the exercise of the waiver authority, Appendix 2G, Section E2b provides that it is reasonable to conclude that granting of a waiver is permissible whenever the initiation and execution of an otherwise desirable project is handicapped primarily by the 25% contribution requirement. It has been concluded that this project would be handicapped primarily by the 25% contribution requirement.
- D. Appendix 2G sets forth general considerations which should be taken into account in determining when a waiver of FAA Section 110(a) would be appropriate. Consideration relating to financial constraints, country commitment and the nature of the project are addressed below.

Financial Constraints: By its inclusion in the UNCTAD list of "relatively least developed countries", Benin is acknowledged to be among the poorest countries in the world and among the countries most deserving of assistance, especially in satisfying a need as rudimentary as that for potable water. As discussed above, recent events have had severe adverse effects in the Beninese economy, necessitating adoption of a strict austerity program. Accordingly, Benin's financial situation and the unavailability of other resources will not permit a contribution of 25 percent of total project costs.

Country Commitment: The GPRB has demonstrated a strong commitment to the project and its objective. This commitment is established by its promulgation of its National Water Supply and Sanitation Program, its making available substantial numbers of personnel from four government entities at all administrative levels, its assignment of a full time, high level government official to serve as the senior coordinator for the project, and its donation of land for construction and remodeling of office, warehouse, repair shop, and the use of training center facilities.

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Nature of the Project: The project assists the GPRB to satisfy the very basic need for potable water, to improve health practices of the rural poor and, thereby, improve the health and economic productivity of the rural population. The inputs selected to provide this support emphasize technical assistance and training, and project success is not dependent on a contribution by the GPRB.

RECOMMENDATION: That you approve a waiver of the FAA Section 110(a) requirement that the Government of the People's Republic of Benin contribute 25 percent or more of the project costs for the Benin Rural Water Supply Project.

Approved _____

Disapproved _____

Mark Edelman, AA/AFR

Date _____

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ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

From : Myron Golden, AID representative Togo/Benin
 To : Mark Edelman, AA/AFR
 Subject : Benin -- Rural Water Supply Project, 680-0201: Vehicle Source
 Origin Waiver

I. PROBLEM

A source/origin waiver from A.I.D. Geographic Code 000 (U.S. only) to A.I.D. Geographic Code 935 (Special Free World) is requested to permit the purchase of the below listed vehicles and spare parts under the Benin Rural Water Supply Project, 680-0201.

II. BACKGROUND

- A. Cooperating Country : Government of the People's Republic of Benin
- B. Geographic Code : 941 and Host Country
- C. Name of Commodity Importer: USAID/Togo-Benin or an organization contracted by USAID/Togo-Benin
- D. Description of Commodity Sought:
- (1) 4 WD long frame truck equipped with a crane, 2500 kg load (live weight) dumper back lorry, similar to a Mercedes 1313, of approximate cost \$47,500, plus \$4,750 spares.
 - (1) 4 WD short frame truck equipped with 8,000 liter capacity gas tank with hand meter for gas distribution, similar to Mercedes 1313, of approximate cost \$42,500, plus \$4,250 spares.
 - (1) 4 WD truck equipped with 8,000 liters capacity water tank comprised of one 3,000 liter front compartment with 2 inch left side exit and one 5,000 liters back compartment with 2 inch sluice-gate exit, interior painted with special feed paint, similar to Mercedes 1313, of approximate cost \$42,500, plus \$4,250 spares.
 - (2) Canvas covered pickup-type carryalls, similar to Peugeot 404 Bâche, approximate cost each \$8,750, plus \$875 spares.

- (2) Canvas covered pickup, similar to Peugeot 404, model U10, suitable for pump repair team and materials transport, of approximate cost \$10,000 each, plus \$1,000 each spares.
- (3) Low deck double cabin 2 ton diesel canvas covered pickup, lateral rack and back door, similar to Daihatsu V58-LW, approximate cost each between \$15,500 - 16,250, plus \$1,625 each spares.
- (1) Long wheel base 4 WD utility vehicle, similar to Landrover Series 3, approximate cost \$20,000, plus \$2,000 spares.
- (4) Nine passenger station wagons, similar to Peugeot 504, approximate cost each \$8,000, plus \$2,000 each spares.
- (50) 50cc-125cc mobyettes, approximate cost each \$1,000, plus \$100 each spares.
- (2) Heavy duty suspension, nine passenger station wagons, similar to Peugeot 504, (to be procured by UNICEF under AID-funded Cooperative Agreement), of approximate cost \$12,500 each, plus \$1,250 each spares.
- (2) Long wheel base double cabin, 4WD truck, similar to Toyota HILUX (to be procured by UNICEF under AID-funded Cooperative Agreement), of approximate cost \$10,000 each, plus \$2,000 each spares.

E. Manufacturers of Commodities Sought:

Most probably Mercedes, Peugeot, Toyota, Land Rover, and Daihatsu, because adequate spare parts and maintenance and repair capability exist in Benin for these manufacturers' vehicles.

F. Approximate Value of Commodities Sought:

Vehicles	: \$365,750
Spare parts:	\$ 43,375
Total	: \$409,125

G. Nature of Funding :

Section 104 Population and Health Program Grant

H. Procurement Source and Origin:

Germany, France Japan, England

I. Is the commodity sought from a sole source or from more than one source?

Bids will be solicited from multiple distributors.

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III. DISCUSSION

The Benin Rural Water Supply Project consists of three components, all of which require sturdy vehicles to go into remote rural areas. The project involves providing wells with pumps, latrines, and complementary health education to villages in central Benin, most of which are at least a day's drive away from a town over very rough terrain. Thus, most of the transport will be in rural areas where vehicles break down easily, but where only the most widely available spare parts can be obtained and where maintenance capability exists only for the most familiar kinds of vehicles. Accordingly, spare parts availability and maintenance and repair capability are essential to successful implementation: project activities cannot proceed according to schedule if vehicles are out of service for significant lengths of time. Adhering to the projected implementation schedule is especially important for a project such as this which has a relatively short three years in which to undertake a large number of activities. The component relying most heavily on reliable vehicles is the Water Supply Component. The drilling and pump installation and repair activities of this component require large four wheel drive trucks to transport drilling rigs, oil, water, bulky equipment, and materials into the most remote village areas being supplied with wells and pumps. These activities also require other sturdy trucks and utility vehicles to transport tools and personnel to remote drilling sites. As is indicated by the vehicle identification list above, most of these vehicles are to be purchased directly by A.I.D. However, four will be funded by A.I.D. under a Cooperative Agreement with UNICEF, which will be the lead implementation agency for these activities. The other two components, Rural Health Interventions and Sanitation, also require vehicles to transport personnel, teaching aids, latrine construction materials, and water quality testing equipment to participating villages in remote areas. The trucks and utility vehicles are being procured for the above needs. The station wagons are being procured for the three long-term A.I.D. financed technical assistance personnel, each of whom will need a vehicle suitable to transport in rural Benin, and for the senior Beninese official supervising this project to facilitate his effective project monitoring and for UNICEF geophysical and hydrological work. The molyettes are being procured for the Beninese district level and extension agents involved with community mobilization, health education, and pump maintenance and repair.

At present, no U.S. vehicle manufacturer is represented in Benin. As a consequence, there is no distribution network of spare parts for U.S.-made vehicles, nor is there a maintenance and repair capability for them because local mechanics are totally unfamiliar with U.S. brands. In contrast, the German, French, Japanese, and English vehicle manufacturers have established dealerships, and their spare parts distribution networks reaching even the remotest areas of Benin. Local mechanics are experienced in maintaining and repairing vehicles of these manufacturers.

Regarding small size mopylettes, there presently is no U.S. manufacturer of these items. However, there is a wide variety of suitable mopylettes manufactured in Japan, with spare parts availability and maintenance and repair capability even in the remotest areas.

IV. JUSTIFICATION

Section 636(i) of the Foreign Assistance Act of 1961, as amended, requires that all motor vehicles, to be eligible for A.I.D.-financed procurement, must be manufactured in the United States unless special circumstances permit a waiver. In accordance with Handbook 1, Supplement B, Section 4C2d(1)(a), special circumstances exist if there is an inability of a U.S. manufacturer to provide a particular type of vehicle, and, under Handbook 1, Supplement B, Section 4C2d(1)(b), special circumstances exist if there is a present or projected lack of adequate service facilities and supply of spare parts for U.S.-manufactured vehicles. Furthermore, in accordance with Handbook 1, Supplement B, Section 5B4b(2), a waiver may be granted if "the commodity is not available from countries included in the authorized Geographic Code". Handbook 1, Supplement B, Chapter 4C2d(3) and Delegation of Authority No. 40 authorize Assistant Administrators to waive source/origin requirements in this instance.

The information presented in the discussion section establishes that sturdy vehicles and mopylettes with spare-parts availability and maintenance and repair facilities in even remote areas of Benin are essential to successful implementation of this project, and further establishes that U.S. manufacturers are unable to provide the vehicles needed by this project, especially because, as a result of the absence of dealerships of U.S. manufacturers in Benin, there is a present and projected lack of service facilities and spare parts supply. The discussion also establishes that the commodity is not available from countries in the authorized Geographic Code.

V. RECOMMENDATION

For the reasons set forth above, it is recommended that you:

- (1) Conclude that special circumstances exist which merit a waiver of Section 636(i) of the Foreign Assistance Act of 1961, as amended;
- (2) Waive the source/origin requirements set forth in Handbook 1, Supplement B, to permit procurement of the above-identified vehicles in the quantities indicated from countries included in the A.I.D. Geographic Code 935; and,

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- (3) Certify that, pursuant to Section 5B4c of A.I.D. Handbook 1, Supplement B, exclusion of procurement of these project vehicles from Free World Countries other than the Cooperating Country and countries included in A.I.D. Geographic Code 941 would seriously impede the attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program.

Approved _____

Disapproved _____
Mark Edelman, AA/AFR

Date _____

ACTION MEMORANDM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

From : Myron Golden, AID Representative, Togo-Benin

To : Mark Edelman, AA/AFR

Subject : Benin -- Rural Water Supply Project (680-0201): Authorization to negotiate and execute on a non-competitive basis a Cooperative Agreement with UNICEF for drilling, pump installation, and other specified services

- A. Cooperating Country : Government of the People's Republic of Benin
(GPRB)
- B. Project : Benin -- Rural Water Supply Project (680-0201)
- C. Nature of Funding : Grant

PROBLEM: Pursuant to AID Handbook 13, Chapter 1 B 2C, your approval is required for USAID/Togo-Benin to negotiate and execute on a noncompetitive basis a Cooperative Agreement with UNICEF for drilling, pump installation, and other specified services under the Benin Rural Water Supply Project.

DISCUSSION:

Background: Lack of a reliable source of potable water is one of the main constraints to rural development in Benin. It is estimated that only 21 percent of the total population and only 8 percent of the rural population have access to potable water. Accordingly, the incidence of debilitating and often fatal water-borne diseases is high, and a major contribution to an infant mortality rate of 123 per thousand, a juvenile mortality rate of 243 per thousand, and an at-birth life expectancy of 47 years. Also economic productivity of villagers is severely reduced by water-borne diseases. Among the most prevalent and serious of these diseases are gastro-intestinal infections, onchocerciasis (river blindness), schistosomiasis, filariasis, dracunculosis (Guinea Worm), and malaria.

In furtherance of its mandate to improve conditions for child survival and development, UNICEF has been in the vanguard of conceptualizing and implementing rural water supply projects in Benin. Because the institutional mandate of UNICEF is health-oriented, its water supply projects have been distinguished by an approach integrating complementary disciplines in order to assure realization of health benefits. This approach deliberately goes beyond the provision of wells with pumps; it deliberately and conspicuously incorporates extensive health, sanitation, and pump maintenance activities. This integrated approach is deemed the only way to assure that villagers will collect and use the clean water provided by their wells in ways that protect it from

contamination, will adopt complementary health practices, and will maintain their pumps in working order. Abundant experience has indicated that provision of clean water without instruction in these areas results in little improvement in rural health indicators because villagers have no reason to realize the links between uncontaminated water, correct hygiene and sanitation practices, and their health.

UNICEF's involvement with rural water supply activities in Benin began as early as December, 1978, with a UNICEF-UNCDF agreement with the Government for the construction of 138 wells with handpumps in the southern part of the Zou province. This work was carried out between January, 1980 and December, 1982, and was financed by a credit from the IDA to the Government (CFA 190 million), a grant from UNICEF (CFA 21 million), and a contribution from the Government (CFA 33 million). At the conclusion of this first phase of its rural water supply activity UNICEF sponsored a national seminar to consolidate its experience in water, health, and sanitation, and apply the lessons learned to its undertaking of subsequent projects. The ensuing recommendations formed the basis of the Government's National Water Supply and Sanitation Program which stresses the integration of health education and sanitation interventions in rural water supply activities. These recommendations also served as guidelines for the second phase of UNICEF's activities carried out between March, 1983, and May, 1984. During this period UNICEF provided 132 new wells in northern Zou and southern Borgou province. OPEC was the financing donor in the amount of about \$1 million with additional support from UNCDF and UNICEF's own program funds, which in combination, amounted to about another \$1 million. Several subsequent UNICEF activities have continued to apply the integrated approach to rural water supply and to assure village mobilization and a committed national and provincial administrative structure to support local activities. Extensive on-the-job training of Beninese drilling crews, geophysical teams, and pump maintenance-repair brigades also has taken place. Between June, 1984, and May, 1985, 100 additional wells were constructed, and by the end of 1985 another 48 wells will have been provided to villages in the east-central Zou province. These activities have been financed by funds from OPEC, UNDR0, and UNICEF. This historical outline of UNICEF's rural water supply activities demonstrates its experience in undertaking such projects in Benin and also shows its leading role in policy guidance and in the formation of the Government's current National Water Supply and Sanitation Program. This experience and policy influence are unmatched by any donor, international organization, or private enterprise in Benin.

In 1980, A.I.D., Peace Corps, and UNDP began implementing a multilateral rural water supply project to support the GPRB National Program. This project followed the integrated approach directed by the National Program. A.I.D. participation was suspended after a diplomatic incident in 1981. The suspension was lifted in 1984 and the project has

been updated by a Project Paper Amendment to accommodate conditions which have been changed in the interim. The purpose, activities, and indicators of achievement of project purpose of the amended project remain essentially the same as those of the original project. About 225 positive wells are to be constructed in villages in central Benin concurrently with extensive health and sanitation activities. There also is strong emphasis in training Beninese personnel in all aspects of project activity so that at the end of the project the Beninese will be able to undertake integrated rural water supply projects on their own. In the drilling and pump installation area, the amended project includes precisely the kind of on-the-job hydrological and geophysical training which UNICEF recently has undertaken with success.

To implement this amended project, A.I.D. is financing technical assistance, commodities and materials, vehicles, training, operating expenses, and construction and remodeling costs.

The choice of means to implement the drilling and pump installation activity involves special consideration. First, because the period of this project is a short three years, it is important that the group performing the well siting and drilling achieve targeted success rates early in the work. Experience in and near the project zone is essential to developing an instinct for what is likely to be successful which facilitates achieving targeted success rates. No other organization or private company has this experience — much less the extensive experience that UNICEF has. Hypothetically, because of the time constraint, it would be worth paying a premium for this experience. In the case of UNICEF, the experienced service is available at a considerable discount from what would have to be paid to a private firm because UNICEF is a nonprofit organization. Accordingly, entering into a Cooperative Agreement with UNICEF to perform the drilling and pump-related services not only is the most technically effective but also the most cost effective way to undertake these activities. A second consideration in the procurement of drilling and pump installation services is identifying an entity which will be willing to accommodate and participate in the training of Beninese counterparts and in the multi-disciplinary kind of interaction required by the integrated approach to rural water supply development mandated by the Government and followed by this project. In general, private firms are accustomed to single-mindedly drilling as many wells as possible in as short a time as possible, and are not amendable to being slowed down to cooperate with health education and sanitation activities nor to train the local personnel working with them. Other donors until now also have not followed an integrated and training approach in their rural water supply activities. UNICEF, in contrast, has been a leader not only in integrating its own water supply projects and in including extensive training but also in helping the Government to build the integrated approach into its National Water Supply and Sanitation Program. Accordingly, UNICEF can be expected to be an

enthusiastic contributor to the health and sanitation interventions for which A.I.D. will be the lead implementing agency and also to make a genuine and effective effort to leave behind well trained Beninese personnel at the end of the project. The same cannot be expected of other potential sources of drilling and pump installation services because they have neither the inclination nor the experience. For purposes of this project, therefore, UNICEF is unique in processing an ideal mix of the highest technical expertise at lowest relative cost with the most extensive experience in the kind of interdisciplinary cooperation and counterpart training called for by this project. Its policy influence on the current Beninese rural water supply program and its knowledge of the Government entities active in rural water supply development also are unmatched. A further advantage, especially in light of the fact that A.I.D. does not have a Mission in Benin, is that UNICEF involvement will minimize A.I.D. project management responsibilities and also minimize the number of A.I.D. supported technical assistance personnel in Benin.

Justification: A.I.D. Handbook 13, Chapter 1 B 2 e. provides that: "The specific approval of the responsible Assistant Administrator ... is required where an invitation is restricted to a ... single entity" Handbook 13, Chapter 1 B 2 e (3) indicates that this restriction to a single entity can be permissible when, " ... the technical office deems [the entity] unique or most appropriate to undertake the effort which the office wants to support or stimulate." For the reasons set forth above, USAID/Togo-Benin deems UNICEF uniquely qualified and the most appropriate entity to undertake the drilling and pump installation, and related activities of the Benin Rural Water Supply Project.

RECOMMENDATION: That USAID/Togo-Benin be authorized to negotiate and execute on a non-competitive basis a Cooperative Agreement with UNICEF for drilling, pump installation, and other specified services under the Benin Rural Water Supply Project.

Approved _____

Disapproved _____

Mark Edelman, AA/AFR

Date _____

Clearance:

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ANNEX D

Ref: Benin Rural Water Supply,
680-0201

Dear

As you know, the United States Government plans to reactivate the Benin Rural Water Supply Project which was initiated in 1980. We have conducted an in-depth assessment of recent rural water supply developments in Benin and have revised the suspended project to respond to current needs in this sector. The project document upon which designated officials of the Agency for International Development (A.I.D.) will base the authorization to reactivate the updated project now is complete. The Agency's Washington headquarters office has determined that it would like to review and process this document for authorization by mid-June, 1985. Authorization at this time will facilitate our signing a Project Agreement Amendment as soon as possible.

This document, or Project Paper Amendment as it is called, defines a project with essentially the same purpose, activities, and end of project indicators as those of the 1980 project. The current project fully supports the integrated approach to rural water supply development called for in your National Water Supply and Sanitation Program. There has been a deliberate integration of extensive health education and sanitation interventions with rural water supply development for the purpose of assuring realization of the health benefits for which water supply development is undertaken. Conceptually, the project consists of three closely interrelated components, each of which now will be described to give you a comprehensive idea of our proposed amended project.

1. Water Resource Component

The dominant activity under the Water Resource Component is the drilling of up to 225 positive wells and installation of handpumps in villages in the northern Zou province. Pump maintenance and repair instruction will

accompany provision of these wells. Pilot efforts in exploiting another water resource, rainwater catchment systems, also will be undertaken in the same geographic area. For technical assistance in carrying out drilling and pump installation and maintenance, A.I.D. is planning to execute a Cooperative Agreement with UNICEF which already has substantial experience and demonstrated effectiveness drilling wells in areas similar to and adjacent to the project zone. Pursuant to this Cooperative Agreement, A.I.D. intends to finance UNICEF's recruitment of a four person drilling team and complementary management assistance to perform drilling and pump installation with Directorate of Hydraulics personnel, to train Beninese drilling crews in these activities and to execute a pump maintenance and repair program under which selected individuals in each village will be trained to keep the village pump in working order.

A.I.D., the Directorate of Hydraulics and UNICEF have had extensive discussions about this collaboration and all parties perceive substantial mutual benefit to be gained from participating in a joint endeavor which will enhance the effort of each agency beyond what either could produce separately. Ultimately this benefit accrues to the Government of the People's Republic of Benin (GPRB) and to the rural inhabitants of the project zone, and we anticipate your concurrence in our intended collaboration so that we may finalize the envisioned Cooperative Agreement.

Rainwater catchment activities will be supported by technical assistance and commodities funded directly by A.I.D., perhaps with the help of suitably qualified Peace Corps volunteers.

2. Sanitation Component

The Sanitation Component consists of two parts. The first part involves pilot activities in siting, construction, and maintenance of latrines in villages participating in the project. A.I.D. will finance directly the life of project services of an engineer with a strong sanitation background and, through the Cooperative Agreement with UNICEF, A.I.D. will provide funds for the services of an environmental sanitarian. The U.S. Peace Corps also is expected to provide volunteers to help with latrine construction and village sanitation efforts. A.I.D. also will finance latrine construction materials. The second part of the Sanitation Component involves water quality testing of each well at least once during the life of the project. Funds are being provided to finance laboratory equipment, processing costs, and personnel support for this testing, which is expected to be performed by the Directorate of Food and Applied Nutrition laboratory at Porto Novo.

3. Health Education Component

The activities of the Health Education Component have been designed to assure that the activities carried out under the two components yield a health benefit to residents of participating villages. These activities include: multi-disciplinary training of Beninese health education, sanitation, and other rural outreach agents so they will be trainers of trainers; village level community mobilization, extensive health education and hygiene instruction; village organization for and instruction in pump maintenance and repair; and basic epidemiological surveys and instruction. Special emphasis will be placed on eradicating Guinea Worm disease from participating villages in the project zone. To assist in implementing this component, A.I.D. will finance directly the long-term services of a Public Health Education Advisor and the short term services of a Training Coordinator and of epidemiological specialists. The UNICEF and U.S. Peace Corps volunteers also will assist with implementation. A.I.D. will fund teaching materials, village level training sessions, and district level workshops.

4. Component Support

All components will be supported by A.I.D.-financed participant training, contributions to operating expenses, and procurement of appropriate vehicles. A project headquarters is planned for a site in Bohicon used by the Directorate of Hydraulics. A.I.D. funds will be used to remodel or construct structures to serve as a project office, warehouse, and repair shop, and to improve a training center adjacent to the site.

5. Component Organization and Coordination

UNICEF, financed by the A.I.D. Cooperative Agreement, and working with the Directorate of Hydraulics, will be the lead agencies in the drilling and pump installation activities of the Water Resource Component. A.I.D. and the Ministry of Health will be the lead agencies in the Health Education and Sanitation Components and in the rainwater catchment pilot activities of the Water Resource Component. However, the details of procedure and daily operations for a project such as this can be defined fully only at the outset of actual implementation and must be continually refined as implementation progresses. To assist in drawing up detailed implementation plans and establishing operating procedures, A.I.D. is financing short term technical assistance at the beginning of the project in the fields of management, financial control, accounting, logistics, and procurement.

Also, to assure the effective coordination of these multi-disciplinary components, the amended project provides that the chief project supervisor will be a senior, highly qualified GPRB official nominated by the GPRB for full time assignment to the post of Project Coordinator. This Beninese Project Coordinator will be assisted by an A.I.D.-funded long term Senior Advisor/Project Manager. These officials will be responsible for assuring the cooperation of all government entities at every level, for assuring realization of outputs according to the projected implementation schedule.

6. Illustrative Budget

The foregoing narrative gives as precise a description as possible of the amended project at this pre-implementation stage. A summary illustrative budget follows to supplement this description. This budget is financed by the approximately \$6,250,000 undisbursed balance of grant funds remaining from the 1980 project. These funds will be disbursed over a three year period, that is to say, until September 30, 1988.

ILLUSTRATIVE BUDGET

BENIN RURAL WATER SUPPLY PROJECT 680-0201

<u>EXPENSE CATEGORY</u>	<u>AMOUNT</u>
<u>Technical Assistance</u>	
Long Term	
A.I.D. Direct Contract	\$1,101,439
UNICEF Cooperative Agreement	<u>1,264,800</u>
	2,366,239
Short Term Technical Assistance	150,000
Total Technical Assistance	<u>\$2,516,239</u>
<u>Support to Beninese Project Coordinator</u>	<u>16,380</u>
<u>Training</u>	
Rural Health: in-country	141,800
U.S. Degree, 2 people, with English strengthening	160,000
Europe/Africa, short term, 5 people	50,000
Total Training	<u>351,800</u>
<u>Commodities</u>	
UNICEF Cooperative Agreement, drilling operations	495,120
Drilling equipment, pumps	528,550
Abomey-Bohicon complex, equipping	80,000
Latrine construction materials	225,000
Rainwater catchment system construction materials	100,000
Water Quality Control Testing equipment	8,000
Total Commodities	<u>1,436,670</u>
<u>Vehicles, spares</u>	<u>333,150</u>
<u>Operating Expenses</u>	
POL, vehicle insurance	168,200
UNICEF Cooperative Agreement, drilling	330,080
Direct A.I.D. financed, drilling	107,200
Monitoring	4,640
Abomey-Bohicon headquarters	90,000
Water Quality Control testing	18,125
Total Operating Expenses	<u>718,245</u>
<u>Construction and Remodeling of Abomey-Bohicon headquarters</u>	<u>175,000</u>
<u>Evaluation</u>	<u>30,000</u>
<u>Contingency, 10.76 percent</u>	<u>672,516</u>
<u>Life of Project</u>	<u>\$6,250,000</u>

You may find it useful to have this same data in a different format:

Long term Technical Assistance (A.I.D. Direct contract)	\$1,101,439
UNICEF Cooperative Agreement: drilling, pump installation, pump maintenance	2,090,000
Short Term Technical Assistance (A.I.D. Direct contract)	180,000
Support to Beninese Project Coordinator	16,380
Vehicles, new rolling stock for drilling, spares, POL	501,350
Drilling rig and POL, pumps, drilling operating expenses	635,750
Rural Health Education and Monitoring	146,440
Abomey-Bohicon headquarters construction, remodeling, equipping, operations	345,000
Latrine construction materials	225,000
Rainwater Catchment System construction materials	100,000
Participant Training	210,000
Water Quality Testing	26,125
Contingency (10.76 percent)	672,516
Life of Project	<u>\$6,250,000</u>

As indicated at the outset of this letter, the A.I.D. approval process for this project will be conducted in Washington, D.C., and is expected to begin about June 8 and to end about June 20, 1985. To facilitate this approval process, and to satisfy an important requirement of this process, the United States Government requires a written request from the Government of the People's Republic of Benin formally requesting the project as outlined in this letter. We would appreciate receiving your request as soon as possible, but no later than June 8, 1985. For your convenience, we are enclosing a model of the kind of request letter which will satisfy our requirement. We look forward to receiving your formal request in the very near future. Please do not hesitate to contact us if you have any questions or require further explanation.

Since:

Myron Golden
A.I.D. Representative

Model Format Request for the Benin Rural Water Project, 680-0201, from the Government of the People's Republic of Benin to the United States Government

Dear _____,

We have reviewed the detailed description and summary illustrative budget for the Benin Rural Water Supply and Sanitation Project transmitted to us in your letter of _____, 1985. As we understand it, the project is an integrated rural water supply project consisting of three components: the Water Supply Component, involving drilling of about 225 positive wells and installation of handpumps in villages in the northern Zou province and also involving pilot efforts in the construction of rainwater catchment systems; the Rural Health Interventions Component involving the multi-disciplinary training of health education, sanitation, and other rural outreach agents to make them trainers of trainers, village level community mobilization, extensive health education and hygiene instruction, village organization for and instruction in pump maintenance and repair, and basic epidemiological work; and, the Sanitation Component involving pilot efforts in latrine siting, construction, and maintenance, and also water quality testing to be done by the Directorate of Food and Applied Nutrition laboratory at Porto Novo. Structures for a project headquarters including an office, warehouse, and repair shop will be either constructed or remodeled on Directorate of Hydraulics premises at Bohicon, and an adjacent training center will be rented or improved.

The Government of the People's Republic of Benin is in accord with the project as above set forth, and is in further accord with the proposed means of implementing the project. Most notably, we concur in the proposed Cooperative Agreement between the Agency for International Development (A.I.D.) and UNICEF for execution of well drilling and pump installation, for training of drilling crews composed of personnel recruited by our Government, and for carrying out a pump maintenance and repair program. We also concur in the continued UNICEF use of UNDP-financed equipment after termination of the OPEC-funded activities for implementation of which this equipment currently is at UNICEF's disposal. We agree in the selection of A.I.D.-financed technical assistance, namely, long term personnel in project management, public health education, and engineering, and short term personnel in management, financial control, accounting, procurement, logistics, training, and epidemiology, and we agree with the use of Peace Corps

volunteers in selected disciplines to be determined later. We agree to nominate and, assuming concurrence by A.I.D. and UNICEF, to make available on a full time basis a highly qualified individual to serve as the Project Coordinator, that is, the chief project supervisor, and, further, to nominate qualified individuals for overseas participant training. We pledge to make available Government personnel at every administrative level and in all relevant disciplines for successful implementation of this project. We acknowledge that there are numerous details to be finalized at later stages of project development, but concur with the basic project structure as defined in your letter and its enclosed budget.

The Government of the People's Republic of Benin welcomes the intended reactivation of the Benin Rural Water Supply Project, as amended, and hereby formally requests the project as summarized above.

Signed _____

Position _____

Date _____

**INITIAL ENVIRONMENTAL EXAMINATION
AMENDMENT
AMENDMENT**

Project Country: Benin

Project Titles: Benin Rural Water Supply Project (680-0201)

Funding:

EE Prepared by: Jeffrey W. Goodson, Regional Environmental Officer, REDSO/WCA

Environmental Action Recommended:

Categorical Exclusions for the following project components:

- 1) Local, participant and third country short and long term training (22 CFR 216.2(c)(2)(1);
- 2) Health and sanitation education program (22 CFR 216.2(c)(2)(viii)).

Negative Determination for all other project components, including:

- 1) Drilling and pump installation program;
- 2) Construction;
- 3) Latrine development program;
- 4) Alternative water source development program;
- 5) Water quality testing program; and
- 6) Commodity procurement

Concurrence: (Aiding Bureau Environmental Officer) APPROVED

SIGNATURE

DATE

CLEARANCE: (0 APR)

DATE

INITIAL ENVIRONMENTAL EXAMINATION AMENDMENT

Project Description

The Benin Rural Water Supply Project (680-0201) was designed in 1978, suspended in December 1981, and had suspension lifted in October 1984. Due to the three year lapse in the project, a joint State Department/AID decision was made to hire a consulting team to conduct a water resource and health sector survey and update background information for the redesign of the project. The redesign took place primarily during November 1984 - May 1985. As a substantive amendment of an ongoing project, program or activity is involved, an IEE amendment is required pursuant to 22 CFR 216.2(a).

The original project purpose of providing rural populations with adequate and safe sources of potable water and improved levels of hygiene has not changed in the interim, nor has the emphasis on well drilling and the village level health and sanitation education program. Principal changes include a shift in regional emphasis to the central portions of Benin; elimination of the spring captation program; and implementation of an alternative water source development program.

The project as designed includes six principal activities: 1) a well drilling program designed to achieve a target of 225 successful wells in the project region; 2) a health and sanitation program designed to complement provision of potable water through education of villages where wells or alternative water supply activities take place; 3) alternative water supply development, including cistern construction and roof/gutter catchment system establishment; 4) latrine construction; 5) water quality testing of successful wells and perhaps other utilized water sources as appropriate; and 6) local, participant, and third country training. Ancillary activities include: commodity acquisition; construction of minor building and warehouse facilities; and, provision of funds for salary, transportation and per diem costs.

Project Impacts

Project impact analysis was undertaken by the Regional Natural Resources/Environmental Officer, REDSO/WCA, between 27 March and 12 April 1985. Interviews were held with a number of senior and mid-level administrative and technical personnel, potential project regions and sites were visited and examined, and institutional capabilities and facilities were assessed for level of capability. A considerable bank of natural resources information was obtained, both in administrative centers and in the field. The impacts analysis contained herein is based upon the findings of that survey.

The well drilling and pump installation program is highly unlikely to result in any significant degree of adverse environmental impact. Drilling fluids used to date have been restricted almost entirely to water-based compounds, and principally include carboxyl methyl cellulose and bentonite. No oil-based or other fluids which could result in significant toxic impacts to exposed areas in the immediate vicinity of the drilling operation will be used in association with the project. Growth stimulation as a result of increased water quality is not likely to occur since all project sites are located in rural villages with stable or only slightly increasing population levels (due mainly to rural-urban migration). The distribution of target villages is also such that incentive to relocate near a well will be minimal, even if other factors inhibiting such a pattern were not operational.

As most of the project region is dissected by drainageways of variable size, some wells will invariably be subjected to occasional flooding; however, well depth is expected to be a minimum of 25-30 meters, and groundwater contamination through flooding with secondary uptake by pumping is considered to be highly unlikely. Well water quality will be tested after pump installation to assure that contamination does not exist. While contamination of wells in these formations at these depths is extremely uncommon, isolated cases have been noted in Togo and the water quality testing program has been incorporated into the project to assure that potential adverse impacts resulting from use of contaminated well water are minimized. Ponding of runoff water has the potential to result in establishment of breeding areas for malaria vectors; impacts resulting from this have and will continue to be minimized through proper channelization of runoff waters and secondary usage for watering gardens or other purposes. With respect to health impacts, it is critical to note that one of the principal criteria for village selection is the occurrence of Guinea Worm disease (dracunculiasis), and that the project is designed to sever the cycle of infection by providing uncontaminated water for drinking, cooking and washing.

The potential for aquifer drawdown below recharge capacity exists wherever well density and pumping might exceed the ability of the aquifer to recharge. This potential varies as a function of both pumping and recharge rates. While it is impossible to totally dismiss this as an adverse impact in the project region, it is not considered to be an impact of potential significance for several reasons. In the first place, no fossil water is likely to be tapped, i.e., recharge is expected to occur in all tapped formations seasonally as a function of precipitation and percolation. Second, experience in proximity to the project region indicates that recharge, while variable, is normally substantial enough to provide all of the target volumetric needs of the population. Where this does not occur, i.e., where production is very minimal, wells may be capped or augmented by alternative water source

development. Third, the distribution of wells in the project area is expected to be such that total volumetric production will be insufficient to result in drawdown below recharge capacity. This results from distances between villages, generally small village population size (e.g., 800-1200), and aquifer separation.

The health and sanitation program, designed as a critical component of the drive to eliminate dracunculiasis and improved rural health conditions, is expected to result in significant beneficial environmental impacts. No aspects of this project component are considered likely to result in adverse impacts of any degree.

The alternative water supply development program is expected to primarily involve harvesting of rainwater through a roof/gutter/cistern catchment system. Although principal emphasis will be given to those villages where successful wells are not possible or feasible, other villages are also likely to be affected. These include especially those where well production falls short of that required to meet a minimum drinking, cooking and washing needs of the village population. Several designs for these systems are under consideration, based primarily on performance in Benin, Togo and other proximal regions of West Africa. In all cases, designs incorporate an ability to eliminate or minimize the potential for production of mosquito-breeding areas which might result in increases in malaria rates.

The latrine construction component of the project is designed to further complement the water production and health education activities. Significant reduction in coliform and other bacteriological levels should be realized in surface waters in proximity to target villages where latrines are successfully introduced. The potential for groundwater contamination and secondary uptake by proximal wells is considered to be extremely unlikely for several reasons. First, experience in the region indicates that soil structures require lining of all cisterns to prevent collapse; this is achieved through use of concrete or other materials impermeable or nearly impermeable to liquid wastes. Second, the depth of the latrines will be only on the order of 3-4 meters, well above the anticipated minimum well depth of 25-30 meters and far exceeding that which could normally result in secondary contamination. Finally, latrine siting will be conducted in such a way as to assure that the already minimal opportunity for contamination is further reduced by locating structures downslope and a minimum of 15 meters from the well site.

The water quality testing component of the project is designed, as previously mentioned, to assure that well contamination is identified as soon as practicable and remedial measures taken to preclude human consumption. In addition, other water sources may be analyzed as deemed advisable during the course of the project. In most cases, testing will be restricted to examination for total and fecal coliforms, although other bacteriological or physico-chemical parameters may also be determined as necessary.

All training activities will be in the fields of geology, geophysics, well engineering, health and sanitation education, or associated fields. No training will be conducted in any program where activities are undertaken which might significantly affect the environment.

Construction activities are expected to include remodeling and/or possible new construction of minor facilities for offices, mechanical garages, storage rooms or training facilities. All such sites were visited during the current survey and no significant adverse impact is expected to result from these activities. With respect to the mechanical garage facilities, disposal of waste grease and oil will be conducted in such a way as to assure that contamination of surface water or other sensitive systems is obviated or minimized to the extent practicable.

Lists of commodities which are expected to be procured are included in the PP Amendment. None of these, and none of the uses to which they will be put, are expected to result in significant adverse environmental impact. No pesticides of any kind will be procured by the project; the only controlled substances which may be procured will include reagents or other chemicals required to carry out normal water quality testing.

Environmental Action Recommended

It is recommended that the training component and health and sanitation education program component of the project be categorically excluded pursuant to 22 CFR 216.2(c)(2)(i) and 22 CFR 216.2(c)(viii), respectively. It is also recommended that all other project components be accorded negative determinations pursuant to the provision 22 CFR 216 and the analysis contained herein.

While there are a number of threatened or endangered species recognized by the U.S. Department of Interior which have ranges including the project area, the degree of human impact there, the elimination or near total reduction of most wildlife populations of significance, and the nature of the project all strongly suggest that adverse impacts to listed species or their critical habitat will not occur.

ILLUSTRATIVE BUDGET WORKSHEETS

Method of computation: Most one-time expenditures are expected to be made in calendar year 1985, and 1985 costs have been inflated by 15 percent to arrive at 1986 costs. Recurrent costs have been computed by inflating for each successive year by 15 percent, with the exception of salaries, which have been computed at 5 percent. Personnel costs have been based on a family of four.

SUMMARY

Long Term Technical Assistance (PSC)	\$1,101,439
UNICEF, for drilling and pump installation subcomponent	2,090,000
Short Term Technical Assistance	180,000
Local Project Coordinator	16,380
Vehicles	501,305
Drilling Equipment, Pumps, Operating Expenses, POL	635,750
Rural Health Interventions	146,440
Abomey-Bohicon Complex	345,000
Latrines	225,000
Rainwater Catchment Systems	100,000
Participant Training	210,000
Water Quality Testing	26,125
	<u>5,577,484</u>

Contingency \$672,516, or 10.76% of LOP (\$6,250,000)

DIRECT A.I.D. FUNDED LONG TERM TECHNICAL ASSISTANCE (PSC)

Senior Advisor/Project Manager	30 PM	\$391,270
Civil Engineer	30 PM	403,929
Health Advisor	24 PM	306,240
		<u>\$1,101,439</u>

COOPERATIVE AGREEMENT WITH UNICEFPersonnel

Hydrogeologist		
Geophysicist		
Master Driller		
Master Mechanic		
Senior Project Officer		
50 percent of time of environmental sanitarian		
5.5 PY/YX 3yr = 16.5 PY (198 PM) @ \$70,000/PY		\$1,264,800

<u>Commodities, supplies</u>	495,120
<u>Operating expenses</u>	330,080
	<u>\$2,090,000</u>

SHORT TERM TECHNICAL ASSISTANCE

Management/Financial/Procurement/Logistics through IQC	8 PM
Epidemiological/Sociological	3 PM
Evaluation	3 PM
Training Coordinator	4 PM
	<u>18 PM</u>
15 PM @ \$10,000/PM = \$180,000	

GPRB PROJECT COORDINATOR

Salary: 36 PM x \$325/mo (unlikely to increase due to austerity program of GPRB)	\$11,700
Housing: 36 PM x \$130/mo	4,680
	<u>\$16,380</u>

VEHICLES

(1) Mercedes 1313 chassis long	cost	\$47,500
	spares	4,750
	POL \$3000/yr x 2.75 yrs	8,250
	Insurance \$500/yr x 3 yrs	1,500
	per vehicle, buying 1	<u>\$62,000</u>
(1) Mercedes 1313 short chassis	cost	\$42,500
	spares	4,250
	POL \$3000/yr x 2.75 yrs	8,250
	Insurance \$500/yr x 3 yrs	1,500
	per vehicle, buying 1	<u>\$56,500</u>
(1) Mercedes 1313 with tanker	cost	\$42,500
	spares	4,250
	POL \$3000/yr x 2.75 yrs	8,250
	Insurance \$500/yr x 3 yrs	1,500
		<u>\$56,500</u>

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(2) Peugeot 404 Bache	cost	\$8,750
	spares	875
	POL \$2000/yr x 2,75 yrs	5,500
	Insurance \$100/yr x 3 yrs	300
	per vehicle	<u>\$15,425</u>
	buying 2	\$30,850
(3) Daihatsu Low Deck double cabin	cost	\$15,500
	spares	1,550
	POL \$3000/yr x 2,75 yrs	8,250
	Insurance \$200/yr x 3 yrs	600
	per vehicle	<u>\$25,900</u>
	buying 3	\$77,700
(1) Land Rover	cost	\$20,000
	spares	2,000
	POL \$3000/yr x 2,75 yrs	8,250
	Insurance \$200/yr x 3 yrs	600
	per vehicle, buying 1	<u>\$30,850</u>
(5) 9 passenger station wagons, Type Peugeot 504	cost	\$8,000
	spares	2,000
	POL \$2000/yr x 2.75 yrs	5,500
	Insurance \$100/yr x 3 yrs	300
	per vehicle	<u>\$15,800</u>
	buying 4	\$63,200
(10) Motorcycles: health interventions support	cost	\$1,000
	spares	100
	POL \$500/yr x 2,75 yrs	1,375
	per motorcycle	<u>\$2,475</u>
	buying 50	\$123,750
Total vehicles		\$501,350

DRILLING EQUIPMENT AND PUMPS

Drilling Rig: Type Ingersoll Rand TH 55		\$400,000
	spares	40,000
	POL (\$10,000/yr x 2 yrs)	20,000
	Insurance (\$100/yr x 2 yrs)	200
		<u>\$460,200</u>

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Pumps	
India Mark II from India, delivered	
\$250/pump	
\$110 per each pump's tubing	
\$360 for each pump x 230 pumps	\$82,800
spare parts for pumps (\$25 x 230)	5,750
Drilling operating expenses, POL, etc.	87,000
	<u>\$635,750</u>

RURAL HEALTH INTERVENTIONS

A. Rural Training

<u>Health Education Materials</u>	\$100,000
<u>District team training: workshops/seminars</u>	
50 people, 40 days per year (several sessions) for 2.5 yrs	
number of days per person = 100	
number of days for all district personnel = 5,000	
cost, @\$5 per diem	\$25,000
<u>Village Health Committee training</u>	
4-5 people per village (225 villages), or about 1000 people	
5 day long sessions a year for 2.0 yrs = 10 days/person	
13 days/person x 1000 people = 10,000 days	
no per diem; food and transport only @ \$1.50	\$15,000
<u>Provincial Supervisory Operational and Technical Unit Workshops</u>	
10 workshops (LOP), 3 days each = 30 days/person	
12 people x 30 days/person = 360 days @ \$5 per diem	\$1,800
Total rural training	\$141,800

B. Monitoring Trips

<u>National Directorate Chiefs (4)</u>	
2 trips/year x 2 years = 4 trips/person	
4 trips/person x 4 people = 16 trips	
trips of 4 days each x 16 trips = 64 days @ \$10 per diem	\$640
<u>Chief Provincial Directorate Representatives (4)</u>	
4 trips/yr x 2/5 = 10 trips/person = 40 trips	
4 days/trip x 40 days = 160 days @ \$7.50 per diem	\$1,200

Provincial Supervisory Operational and Technical Unit	
20 trips/yr x 2.5 = 50 trips of 2 people each = 100 trip.	
2 days/trip x 100 trips = 200 days @ \$5 per diem	\$1,000
Project Coordinator	
12 trips/year x 2.5 years = 30 trips x 4 days each =	
120 days @ \$15 per diem	\$1,800
Total Monitoring Trips	\$4,640

ABONEY-BOHICON PROJECT HEADQUARTERS COMPLEX

Remodeling and construction of structures for project office, warehouse, repair shops, and improving training centers	\$175,000
Equipping Office	75,000
Equipping Training Centers	5,000
Operating Expenses for Complex (\$20,000 x 3 yrs)	60,000
Expendible Supplies for Complex (\$10,000 x 3 yrs)	30,000
	<u>\$345,000</u>

LATRINE PILOT ACTIVITIES

\$50 per latrine x 20 latrines/village x 225 villages 1,000 x 225	\$225,000
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RAINWATER CATCHMENT SYSTEMS

\$200 per system x 10 per villages x 50 villages	\$100,000
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PARTICIPANT TRAINING

US degree training @ \$70,000/degree x 2 people	\$140,000
Short term training in Europe or Africa :	
\$10,000/mo x 5 people	50,000
English language remedial training	20,000
	<u>\$210,000</u>

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WATER QUALITY CONTROL TESTING

Commodities	\$8,000
Processing	13,125
Transportation and Per diem	5,000
	<u>\$26,125</u>

UNDP CONTRIBUTION

This figure primarily represents the \$1,600,000 drilling equipment purchased for the 1980 multi-lateral project, depreciated by 75 percent

\$400,000

PEACE CORPS CONTRIBUTION

\$475,000

GPRB CONTRIBUTION**SUMMARY**

Salaried Personnel	\$684,855
Unsalariated Personnel	444,375
Use of facilities (constructive rent)	34,650
Land	25,000
Operating expenses and POL	92,000
Construction materials for latrines, rainwater catchment systems	50,000
	<u>\$1,330,880</u>

This \$1,330,880 Host Country contribution is 15.74 percent of total LOP funding of all donors and 21.29 percent of A.I.D. LOP funding.

GPRB SALARIED PERSONNEL

Position Title	Number of Persons	Person Months	\$/Month	Estimated Value
Project Coordinator	1	36.0	300	10,800
National Directors	4	14.4	250	6,075
Provincial Supervisors	3	81.0	200	16,200
District Supervisors	12	388.8	175	68,040
Field Agents	50	1,620.0	150	243,000
Hydraulic Service, senior personnel	9	324.0	200	64,800
Hydraulic Service, assistants	11	396.0	150	59,400
Hydraulic service, pump installer	2	72.0	150	10,800
Hydraulic service, pump mechanics	4	144.0	125	18,000
Hydraulic service, draftsman	1	36.0	175	6,300
Drivers of National Directors	4	14.4	100	1,440
Office Staff, 2 secretaries, 2 accountants	4	144.0	150	21,600
2 Guards, 2 messengers, 2 warehouse personnel	6	216.0	100	21,600
Village Animators	50	900.0	100	90,000
Laborers	10	360.0	75	27,000
Senior Support Staff	8	28.8	225	6,480
Administrative Staff	18	64.8	150	9,720
		4,867.2		\$684,855

Non-Salaried GPRB Personnel

Village Health Workers and Committee Members 6 per village x 225 = 1,350 people 1,350 people giving 1.5 PM each = 2,025 PM 2,025 PM x \$75/PM constructive value	\$151,875
Pump Repair Maintenance Volunteers 3 per village x 225 = 675 people 675 people giving 4 PM each = 2,700 PM 2,700 PM x \$75/PM constructive value	\$202,500
Village Latrine Construction 1,000 villages have build latrines x \$50 per latrine constructive value of donated labor for each latrine	\$50,000
Village Rainwater Catchment System 500 systems x \$80 per system constructive value of donated labor for each system	\$40,000
	<u>\$444,375</u>

INFRASTRUCTURE/OPERATING EXPENSES/MATERIALS

<u>Item</u>	<u>Constructive Value</u>
Rent of adjacent traing center building for 9 months over LOP	\$2,250
Rent of existing warehouse facility, 36 months	32,400
Land donated for construction of office, repair shop, expansion of warehouse	25,000
Operating expenses for Cotonou offices, e.g., phone, expendibles	20,000
POL for 8 vehicles of GPRB staff over 3 years	70,000
Construction materials (sand, gravel, water) for latrines, rainwater systems	50,000
	<u>\$201,650</u>

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