EVALUATION SUMMARY PART

PD-ABE-143
ISN 77174

(BEFORE FILLING OUT THIS FORM, READ THE ATTACHED INSTRUCTIONS)

A. REPORTING A.I.D. UNIT (Mission or AID/W Office)
USAID Morocco
(EE # 608-90-2)

B. WAS EVALUATION SCHEDULED IN CURRENT FY ANNUAL EVALUATION PLAN?
yes [X] slipped [ ] ad hoc [ ]

C. EVALUATION TIMING
interim [ ] final [ ] ex post [ ] oth
Project Assistance Complet
Report

ACTIVITY OR ACTIVITIES EVALUATED (List the following information for project(s) or program (s) evaluated; if not applicable, list title and date of the evaluation report)

Project #	Project/Program Title (or title & date of evaluation report)	First PROAG or equivalent (FY)	Most recent PACD (mo/yr)	Planned LOP Cost ('000)	Amou Obli to D ('00
608-0190	Morocco Winter Snowpack Augmentation	1984	9/89	6,000	6,0

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

Action(s) Required	Name of officer respondible for Action	Date Action to be Completed
1. Complete final project accounting and de-obligation of excess funds.	BUREC/USAID	6/30/90
2. Continue monitoring of post-project program operations.	USAID/GOM	Ongoing

F. DATE OF MISSION OR AID/W OFFICE REVIEW OF EVALUATION: N/A mo ___ day ___ year ___

Report Date: mo 3 DAY 22 YR 90

G. APPROVALS OF EVALUATION SUMMARY AND ACTION DECISIONS:

Signature / Typed Name / Date	Project/Program Officer	Representative of Borrower/Grantee	Evaluation Officer	Mission or AID/W Office Director
	Eric R. Loken	N/A	John Wiebler	Charles W. Johnson

From 1984 to 1989 the Governments of Morocco and the United States cooperated in Programme Al Ghait, a $12,000,000 project to investigate the feasibility of augmenting water supplies in Morocco through weather modification. A demonstration project was set up in the upper Oum er Rbia basin, which is on the northwestern side of the central High Atlas Mountains. Promising cloud formations were treated with silver iodide released from aircraft and, beginning in 1987, from a network of ground-based generators. Clouds were seeded on 144 days over the five winters of operations. An extensive effort went into developing the required infrastructure, providing modern equipment, and training over 100 Moroccan personnel to conduct and evaluate the project. The project provided Morocco with its first weather radar and its first airborne systems for collection of cloud physics data. New rawinsonde stations were established at Beni Mellal and Tissa to obtain upper air data every 12 hours. A satellite ground receiving station and an image processing system were provided to monitor clouds. Extensive communications and microcomputing systems were provided to transmit and analyze scientific data. Airflow and precipitation models were adapted to Morocco to guide operational decisions. Scientific studies by Reclamation and its contractors and Moroccan scientists concentrated on the seedability of clouds over the Atlas Mountains and statistical methods of evaluating effects of cloud seeding. Seedable conditions, as indicated by the presence of supercooled liquid water in clouds at concentrations up to 0.7 g/m^3 at temperatures down to -12°C, were found to occur on 15 to 30 days per winter. The evaluation studies, which were based on a target-control design using streamflow as the response variable, indicated that 6 years of experimentation would be required to provide a 50-percent probability of detecting a 10-percent increase in streamflow due to seeding. The potential effects of augmented streamflow upon the operation of the Oum er Rbia River and upon the local and national economy were studied with the aid of computer models. This report covers the project design, the contributions of the two Governments involved, the development of Moroccan institutions to handle such a complex program, the technology transfer and scientific studies accomplished, and the results of the streamflow and economic analyses using models. A section on problems encountered and lessons learned is included for the benefit of other persons or agencies contemplating large, complex projects involving more than one national government.

DESCRIPTORS — weather modification/ cloud seeding/ precipitation augmentation/ precipitation enhancement/ artificial seeding/ cloud physics/ orographic clouds/ supercooled liquid water/ cloud liquid water/ liquid water content/ ice crystals/ snow/ precipitation/ transport and diffusion/ clouds/ air flow modeling/ precipitation modeling/ snow cover runoff modeling/ economic studies/ hydrologic modeling/ benefit-to-cost ratios/ satellite observations/ LANDSAT/ NOAA AVHRR/ radar echoes/ drought relief/ water resources management/ MRPP/ double ratio/ statistical evaluation/ target-control area/ technology transfer.

IDENTIFIERS — Morocco/ Atlas Mountains/ Khouribga/ Casablanca/ Azilal/ Beni Mellal/ Bin El Ouidane/ Oued Oum er Rbia basin/ Northwest Africa.

EVALUATION COSTS

1. Evaluation Team

Name	Affiliation	Contract Number OR TDY Person Days	Contract Cost OR TDY Cost (US$)	Source of Funds
D.A. Matthews A.S. Dennis C.L. Hartzell J.G. Medina P. Goorian R.W. Cheney K.D. Shuyler C.L. Borda	Water Augmentation Group, Bureau of Reclamation, U.S. Department of the Interior, Denver Office, Colorado	PASA No. IMA-0190-P-IW 4093-00	$5,727,526 (total LOP contract amount)	Project

2. Mission/Office Professional Staff Person Days (estimate) 10

3. Borrower/Grantee Professional Staff Person-Days (estimate) N/A

A.I.D. EVALUATION SUMMARY PAR

J. SUMMARY OF EVALUATION FINDINGS, CONCLUSIONS AND RECOMMENDATIONS (Not to exceed the 3 pages provided)
Address the following items:

EXECUTIVE SUMMARY

The Kingdom of Morocco established Programme Al Ghait in the early 1980's as an emergency response to a severe, prolonged drought. Its primary goal was to utilize weather modification techniques to augment rainfall. In 1983, at the direction of His Majesty King Hassan II, the Government of Morocco (GOM) requested assistance with the project from the United States of America (USA). The U.S. Agency for International Development (USAID) signed an agreement with GOM in May 1984 to initiate a $6 million technical assistance program that provided both scientific equipment and training for the project, making Programme Al Ghait a joint USA-GOM undertaking.

The primary objectives of the joint project were to:

1. Implement a scientifically based cloud seeding demonstration program for winter precipitation augmentation over the upper portion of the Oued Oum Er Rbia basin in the Atlas Mountains to alleviate the existing drought conditions, assess the amount of additional water produced in the river/reservoir system as a result of the demonstration program, and evaluate the effects of increased winter precipitation on runoff and its subsequent uses.

2. Examine cloud and precipitation processes to improve the scientific basis of the demonstration program and obtain evidence of its physical plausibility.

3. Concurrent with the first two objectives, transfer winter precipitation augmentation technology through informal and formal training to enable Moroccan personnel to design, plan, implement, monitor, and evaluate similar winter precipitation augmentation projects over the mountainous areas of Morocco.

4. Increase the awareness of the need for an improved water management program in the Oued Oum Er Rbia basin which would consider weather modification as one of many water resources options.

These objectives were largely attained during the past 5 years.

Institutional Structure

Programme Al Ghait was established by His Majesty King Hassan II under the "Haut Coordonnateur," General Kabbaj of the Royal Air Force (FRA), and his Project Manager, Colonel Bamaarouf. The project grant agreement was administered by Mr. Bensari, Director of the National Meteorological Organization (Direction de la Meteorologie Nationale, or DMN), and Colonel Bamaarouf. Mr. Benarafa, Director of the project, and Mr. Loukah, Deputy Director, led a team of over 50 meteorologists, technicians, and observers from the DMN and more than 10 pilots and 20 supporting aircraft mechanics and technicians from the FRA. These personnel were dedicated to cloud seeding operations, scientific data collection, and analysis.

The Moroccan contributions, which totaled about $7 million in facilities and services, included over 100 personnel, facilities for personnel and equipment at all project sites, cloud seeding aircraft, and ground-based silver iodide generators for seeding, complete with operators and maintenance. Facilities for project management, direction of operations, equipment maintenance and supply, data

Date this summary prepared: September 1989

archiving, and scientific analysis were provided by the DMN in Casablanca. The GOM provided the field operations center and facilities for Morocco's first weather radar in Khouribga, 180 kilometers southeast of Casablanca. Rawinsonde launch facilities were built at Beni Mellal and Tissa, about 230 and 260 kilometers southeast of Casablanca, respectively.

Airborne seeding operations were conducted up to the spring of 1986 by four OV-10 aircraft based at Marrakech and thereafter by two King Air 100 aircraft based at Kenitra, 200 kilometers northeast of Casablanca. One of the King Airs was equipped with Morocco's first cloud physics data acquisition system in 1987. In addition, a radar-equipped Alpha Jet was available for high-altitude seeding missions throughout the duration of the project. It was normally based at Meknes.

American assistance provided over $2 million in scientific equipment and supplies. These included the weather radar with its digital recording system, a cloud physics data acquisition system, aircraft navigation systems, a satellite direct-readout ground station and analysis system, 2 rawinsonde systems, 12 microcomputers and software for them, radio communications systems, telecopier and facsimile data receivers, electronics workshop and test equipment, tools, and miscellaneous other hardware and expendable supplies. The balance of the $4 million was provided in technology transfer, which included long- and short-term training programs, both formal and informal, project design and management, and administrative assistance for procurement.

Scientific basis. - The project was designed to use the latest available technology in winter orographic cloud seeding to increase the precipitation efficiency of cold clouds in the Central High Atlas Mountains in the vicinity of 32° N. and 7° W. The project used silver iodide (AgI) as the seeding agent. Silver iodide particles act as ice nuclei, converting supercooled cloud droplets to ice crystals, which can grow rapidly into snowflakes. The silver iodide was released from aircraft, ground-based seeding generators, or both during periods when seedable clouds existed that could affect the target area. The methods were similar to those successfully employed in operational and research projects in the Sierra Nevada of California, an area with climate and geography similar to those of Morocco.

Project design. - Due to the severity of the ongoing drought, the cloud seeding plan called for the treatment of all storms with seeding potential that were expected to affect the drainage area of about 7000 km^2 feeding Bin El Ouidane reservoir. A target-control design was selected for the statistical evaluation. This design required the selection of a control area near the target. Cloud systems affecting the control area were not to be treated, but measurements would be made for eventual use in the evaluation of seeding effects. Streamflow was selected as the primary response variable for the statistical evaluation because lengthy records existed for the target and control areas. Streamflow is also the variable of primary importance to Moroccan water resources needs.

Major Achievements

1. **Implementation of field operations.** - The field program was initiated in July 1984 with the construction of facilities and staffing of project headquarters and field sites. Headquarters were set up at the Casablanca Anfa Airport. Field sites, including the radar operations center and a rawinsonde station, were activated. Cloud seeding aircraft were modified for cloud seeding and placed on station at Marrakech.

A detailed scientific operations plan was developed for Morocco and used to guide meteorological and technical personnel in the daily conduct of operations. Seeding operations began in November 1984 and continued through May 1985. The same operational season applied in subsequent field seasons through May 1989. As previously noted, after the spring of 1986, aerial cloud seeding was accomplished by King Air aircraft operated from Kenitra.

Cloud seeding efficiency was less than desired for the first 2.5 years, when all seeding was conducted by aircraft and field personnel were still receiving basic training. Seeding efficiency increased substantially, from less than 15 to more than 70 percent, after ground-based silver iodide generators were installed in January 1987, to provide more continuous seeding.

Field operations conducted from 1984 to 1989 resulted in the seeding of 15 to 25 storm events during each season, with a total of 144 seeded days during the 5 years. Weather forecasts were prepared for each day from November through April of each season. Radar surveillance was maintained throughout all storms affecting the area except when equipment failed.

During 1985, a specially instrumented jet aircraft from the University of North Dakota was operated in Morocco to collect cloud physics data pertaining to the seedability of winter clouds. Beginning in 1987, the project's specially instrumented King Air collected detailed data on cases considered important to physical studies. Analyses of these data have helped in developing and refining seeding strategies and procedures.

2. **Transfer of technology.** - The technology transfer process was the most important aspect of the project. The process involved the training of personnel, acquisition of vital equipment, and the conduct of a demonstration cloud seeding program. Three phases of training were employed with Moroccan scientists and technicians to provide a solid foundation for them to fully conduct the project. The training consisted of (a) informal on-the-job training, (b) formal seminars and lectures which presented the theoretical basis of weather modification and cloud physics principles, and (c) joint collaborative studies which reinforced previous material and dealt in depth with scientific information on Moroccan clouds and weather, cloud seeding strategies, and improved evaluation of seeding results.

On-the-job training of electronics technicians and engineers was particularly emphasized in their training. Scientists from the United States presented courses and seminars in Morocco, and Moroccan scientists and engineers visited the United States where various training and collaborative studies were conducted. Over 50 scientists received direct training from 20 American experts. Over 30 student-months of formal seminar training were received in Morocco by meteorologists, technicians, and engineers. In addition, four scientists completed their Master of Science degrees in the United States. Two other students were funded under the USAID sector support training project and completed theses on topics related to the project. Nine electronics technicians spent more than 23 person-months training in the United States. Eight operational and four research meteorologists spent more than 25 person-months conducting studies and learning about American scientific techniques on American projects in the United States. These scientists and engineers returned to Morocco to implement their new knowledge on project operations and scientific and evaluation studies.

3. **Scientific analysis and evaluation.** - A number of physical studies have been conducted as part of Programme Al Ghait. Some of these have concentrated on understanding seeding opportunities in Morocco. Physical studies with measurements taken inside precipitating storms of the High Atlas indicate that conditions which are favorable to seeding occur frequently and extend over large areas. Analyses of supercooled clouds observed in 1985 by the University of North Dakota cloud physics aircraft indicated that supercooled liquid water occurred often, with concentrations ranging from 0.2 to 0.7 g/m³ in the absence of natural ice at temperatures of -5 to -12 °C. These conditions are considered favorable for cloud seeding and, to some degree, more so than those found in the Sierra Nevada of California, where ice occurred more frequently. Cloud physics data collected after 1987 with the instrumented King Air have confirmed the earlier estimates of frequency and areal extent of regions of opportunity for seeding. Radar, satellite, and numerical modeling studies are being conducted to better define the frequency of favorable opportunities and the areal extent of seedable conditions detected in the cloud physics analyses.

Statistical analysis of historical target and control streamflow data indicated that at lea 6 years with cloud treatment are necessary to provide a 50-percent probability of detecting 10-percent increase in streamflow. However, only 1.5 years of seeded results are available fo evaluation, as a result of the elimination for analysis purposes of the first 2.5 seasons o seeding due to the low initial cloud seeding efficiency (less than 15 percent) and unavailabilit of control streamflow for the 1988-89 season. With only a 1.5-year treated sample availabl which represents about one-fourth of the required data, it was decided not to analyze an seeded results because they could be misleading. Even when the 1988-89 results becom available, at least 4 more years of efficient cloud seeding are required for the statistica evaluation.

4. **Increased awareness of weather modification as a water resources management option.** - Hydrologic and economic studies were designed to assess the economic feasibility of cloud seeding programs in Morocco. These studies were conducted by Moroccan water resources agencies working with Reclamation hydrologic and economic experts and DMN scientists to develop objective methods for the evaluation of hydrologic impacts on the Moroccan economy. Through close cooperation and collaboration, the water resources management institutions in Morocco eventually became aware of Programme Al Ghait and its potential for impacts on their operations. American experts presented special seminars and workshops to the Moroccan water resources experts and Programme Al Ghait staff. Such meetings increased interest in weather modification as an additional tool in water resources management. Preliminary results of conducted studies provided additional credence to its feasibility for that purpose.

Hydrologic studies produced some interesting results. Numerical river simulation models that included the hydroelectric generating characteristics of powerplants and irrigation and domestic water diversions within the Oued Oum Er Rbia basin were used to simulate the effects of additional water from November to July of the period 1940 to 1985. The additional water represented the effects of 5- and 10-percent increases in monthly streamflow due to seeding. The Administration de Hydraulique (Hydraulique) river model that was employed gave results indicating significant increases of 46 and 89 gigawatt hours (GWh) above the normal annual average hydroelectric power generation for the 5-and 10-percent streamflow increases, respectively. The National Electrical Organization (ONE) river model produced

about 30 percent more power in similar simulations over the 46-year period, supporting the Hydraulique model estimates. Annual average reservoir storage increased 60 and 100 millions of cubic meters (M m^3) above the normal for the 5-and 10-percent augmented flows in simulations performed. This resulted in irrigation water diversion increases of 28.5 and 53.0 M m^3. Domestic water demands were largely fully met without the enhancements from seeding; however, simulations indicated an average annual increased delivery of 2.5 and 4.6 M m^3 for the respective 5- and 10-percent increases.

Economic analysis of the hydrologic impacts and project costs and benefits indicates that the benefits from cloud seeding will most likely exceed the costs. Initial hydrologic river model simulations indicate that augmented hydroelectric power, irrigation water, and municipal and industrial water will provide a benefit-to-cost ratio greater than 1.0 as a result of seeding. Note that benefit-to-cost estimates were based on a sensitivity analysis using a range of values for water, agricultural products, and hydroelectric power, which are difficult to establish without a comprehensive evaluation of any subsidies. The available data used in this economic analysis were incomplete; therefore, additional studies are needed to provide a better range of estimates of benefit-to-cost ratios.

Lessons Learned

A number of useful lessons were learned during the past 5 years which may benefit future projects. Noteworthy were the following items:

Management

- A **National Steering Committee** (NSC) which coordinated interagency activities and expedited installation and construction of facilities was very helpful for project coordination among agencies and throughout the country.

- A **Project Steering Committee** (PSC) which coordinated project activities and made critical decisions with direct USAID and Resident Scientific Advisor (RSA) input was found to be very effective in managing the project.

- American project implementation would have been more efficient with an **implementation team** of three resident experts in electronics, weather modification operations, and scientific project management. In future projects, such a team should be provided and the electronics and operations experts should reside in the host country during the first 6 to 12 months.

- A complete **scientific operations plan** and set of **position descriptions** and specific **work plans** for all personnel should be prepared at the beginning of any future projects for personnel management and scientific guidance.

- A complete staff should be assigned at the outset of each project, and personnel assigned to a project should remain with it throughout its existence.

- The **data management position** is a critical scientific position for scientific data collection, quality control, and archival. This position should be filled at the beginning of projects

and all data handling procedures established during the first 6 months and maintained the scientific team.

- **Annual monitoring reviews by senior experts who initially designed the project were ve helpful in maintaining the project's continuity and its original goals and objectives ar should be provided in future projects.**

- **External evaluation team** monitoring of the project was found useful when combined wit the annual monitoring reviews and should be provided in future projects.

Training

- **Long-term training** was found to be an excellent alternative for specific research contracts The master's-level student research and theses on project-related topics were very successful in transferring high-level expertise to Morocco and accomplishing research goals. This type of activity is highly recommended.

- Long-term students should start their training at the beginning of the project so that their findings contribute to the project design and they may participate in its operations and evaluation.

- **Scientific collaboration** between individual Moroccan and American experts in cloud physics, radar, numerical modeling, and field operations was found to be very effective with scientific interaction in Morocco followed by continued research in the United States. Frequent quarterly or trimester trips to Morocco and annual trips to the United States were the most productive. This form of informal scientific interaction and educational exchange was one of the most successful aspects of technology transfer and is highly recommended for future projects.

- **Peace Corps English language training** was very successful and is recommended for future projects.

Operations

- **Sufficient time and resources for the conduct of field operations and the physical and statistical evaluation of results should be incorporated into the original project design to permit a comprehensive evaluation of the seeding effects so that the host country may make sound scientific and economic decisions regarding the application of weather modification as a water resources management option.**

- **Co-location of operational and research facilities such as aircraft, operations directors, and scientific teams is highly recommended.**

- **A comprehensive equipment procurement, installation, inventory control, and training plan is needed at the beginning of the project. This plan should include detailed training needs for electronics and maintenance technicians and equipment managers.**

Recommendations

1. **The Moroccan Government should continue the project to reach scientifically sound results and to arrive at a final decision as to the project's capability as a water resources management option.** - The project should be continued for a minimum of 4 more years to acquire a seeded sample adequate to determine whether cloud seeding effects are large enough to be economically beneficial. In order to obtain the required sample, the project should continue to follow the existing management plan including the conduct of:

- Regular PSC meetings.
- Scheduled NSC meetings and annual reviews.
- Normal cloud seeding operations, data collection, and scientific and evaluation studies following the project design and operations plan utilizing the existing facilities and trained personnel.

The following items are seen as vital to be accomplished in connection with continuation of the project:

- Fund an annual budget in both dirhams and foreign exchanges as appropriate to support the continued execution of Programme Al Ghait, including its personnel, equipment and supplies, and cloud seeding materials.
- Establish an autonomous officially constituted and recognized organization whose primary mission is to carry out Programme Al Ghait.
- Complete the installation of the ground-based seeding generator network, so that all of the current target area is seeded during all seedable events.
- Continue scientific operations and data collection in accordance with the Operations Plan.
- Execute a formal agreement between the Programme Al Ghait organization and the FRA whereby the FRA continues to provide the aircraft and seeding materials required to carry out the seeding operations.
- Execute a formal agreement among Programme Al Ghait and ONE and Hydraulique whereby ONE and Hydraulique provide promptly the streamflow data for evaluating the program.

Funding to continue the project will require a significant increase from the Ministry of Finance above the previous budgets for 1984-89, when American funds provided many expendable supplies, instruments, and parts.

2. **The scientific research capabilities should be enhanced.** - The scientific team has begun a series of interesting and useful studies which should be completed. This work will require more time and effort for detailed scientific analyses, data quality control, and development and

refinement of software and data bases for the display and processing of information. Larg data samples and better stratification of events into homogeneous samples are needed to dr sound scientific conclusions.

Research results should be published in scientific journals and presented at profession meetings. Presentation of results to other Moroccan water resources experts will help the to understand the conditions that may produce opportunities for precipitation enhanceme and subsequent improvements in water resources. Presentations to the international scientif community will improve the general understanding of the physical processes of precipitatio in northwest Africa and the potential for weather modification in that region, so other natior may benefit from Morocco's experience. More general studies from the Programme Al Gha data sets may lead also to better weather forecasting and understanding of the structure c storm systems in that region.

Specific scientific data collection and studies recommended for the project include th following:

- Studies of the radar and satellite data should be expanded to describe th mesosynoptic physical characteristics of precipitation events in Morocco. These results should then be combined with the cloud microphysical observations anc numerical modeling simulations to better understand the physical mechanisms tha cause precipitation in Morocco. Radar data collection and quality control should continue in accordance with the Operations Plan through 1993.

- Additional data collection and analyses are needed in the areas of cloud physics and statistical evaluation. These data should be collected from 1989 to 1993 in order to continue existing analyses and provide required expanded sample sizes.

- Statistical-physical evaluation techniques that deal with the large natural variation of precipitation in the target and control areas need further study. The search fo covariates for the statistical evaluation should be expanded to at least furthe exploration of the use of the Rhea model. This research will require continued effort and careful analysis. The numerical modeling work of Mr. El Majdoub and Mr. Abidi should be continued to better quantify the precipitation and runoff received in Morocco and lend support to other studies that are dealing with the physical mechanisms of the precipitation process.

3. **The United States should continue involvement in the project.** - Continued American participation in the project was recommended by the Final External Evaluation Report and the Annual Monitoring Report in 1989. Those reports recommended continued involvement for at least the next 4 years until a sound scientific result can be obtained.

The United States should look for ways to support continued scientific collaboration after the end of the current USAID project to ensure that sound scientific results can be obtained over the next 4 years. This assistance would consist of:

- Continued monitoring of the GOM progress in successfully implementing recommendations 1 and 2 above, and if the monitoring indicates that the GOM is successfully continuing Programme Al Ghait, then the United States should consider limited additional assistance in the areas of:

  - Statistical evaluation studies.
  - Improved application of numerical precipitation and air flow models.
  - Expanded and improved cloud physics aircraft data collection and analysis.
  - Improved radar data collection and analysis.
  - Mesoscale analyses and storm system seedability studies.
  - Expanded and improved hydrologic and economic applications studies.

In summary, the joint Moroccan-American Programme Al Ghait has been a successful program of technical assistance and technology transfer. It has resulted in the establishment of a well-trained team of meteorologists and technicians who are able to conduct scientific weather modification operations and physical and evaluation studies on data collected. This type of scientific exchange has benefited the Moroccan meteorological service and the international meteorological community through the increased scientific observational capabilities and the basic knowledge gained from the project's scientific studies. These new observational capabilities will contribute new data to the international community to better understand daily weather and global climate.

ATTACHMENTS (List attachments submitted with this Evaluation Summary; always attach copy of full evaluation report, even if one was submitted earlier)

"Programme Al Ghait - Morocco Winter Snowpack Augmentation Project - A Cooperative Project Between the Kingdom of Morocco and the United States - Final Report (No. R-89-14)"; U.S. Bureau of Reclamation (BUREC), Department of the Interior, Denver Office, Colorado; September 1989.

COMMENTS BY MISSION, AID/W OFFICE AND BORROWER/GRANTEE

Attached is the above-referenced Final BUREC Report for the subject Snowpack Project submitted to U.S.A.I.D. under Participating Agency Service Agreement No. IMA-0190-P-IW-4093-00. This report provides an excellent and comprehensive documentation of the project, with the sole exception of the final Mission disposition towards any additional USAID support for post-project Al Ghait Programme activities. This exception applies particularly to the report's Recommendation 3., which calls for continued U.S. involvement in the program following the 30 September 1989 Project Assistance Completion Date (see pp. xii-xiii of the report Executive Summary and pp. 220-221 of the text).

As written (boldface), this statement recommends an open-ended commitment of continued U.S. assistance to Programme Al Ghait for at least an additional four years of scientific operations. While the proposed source of this continued U.S. assistance is not specified, the implication is that USAID should provide this additional support in the interest of "protecting" its previous $6 million, five-year investment in the project. This recommendation is certainly understandable in view of the lack of statistically significant scientific results within the planned project implementation timeframe. USAID does not, however, agree with this recommendation.

Following several years of close project monitoring, the Mission became concerned regarding the Government of Morocco(GOM) commitment to adequately support and sustain Al Ghait Programme activities following the cessation of USAID assistance. In general, this concern is reflected in the BUREC report's Recommendations 1. and 2. (see pp. xi-xii of the report Executive Summary and pp. 219-220 of the text), which call for enhanced GOM financial, administrative and technical resources for Programme Al Ghait, in addition to continuing program operations. On the eve of the project assistance completion date, these issues were raised to the Prime Minister. While our GOM counterparts have been silent on the outcome of those discussions, it is apparent that the GOM has not committed the additional financial resources to Programme Al Ghait. USAID assistance has therefore been terminated as planned, and routine monitoring of post-project operations is continuing.