Enclosure 1

The extension of the 1970 Agreement on the U.S./ Mexico Meteorological and Hydrologic Program between the governments of the United States of America and the United Mexican States, effective May 13, 2001, and signed by the U.S. Embassy in Mexico City on behalf of the U.S. National Oceanic and Atmospheric Administration (NOAA) and by the Secretario de Relaciones Exteriores de los Estados Unidos Mexicanos provides for the establishment of a joint plan supporting meteorological and hydrological cooperation between the two countries.

The Agreement (paragraph 11 of the Agreement and in paragraphs 2 and 3 of its Annex I), provides for a Program of Activities, which shall be defined and agreed to annually by an exchange of letters between the Directors of the cooperating agencies - the NOAA Assistant Administrator for Weather Services for the United States and the Deputy Director General of Technical Affairs for the National Water Commission for Mexico.

In accordance with the above, the Mexican National Water Commission and the U.S. National Weather Service agree to work on the activities detailed in the enclosed Project Implementation Plan in calendar year 2005.

Brigadier General David L. Johnson
USAF (Ret.)

NOAA Assistant Administrator
For Weather Services

Date: 15 JUL 2005

Dr. Felipe I. Arreguín Cortés

Subdirector General Técnico
Comisión Nacional del Agua

Date: 300805

Dr. Antonio Acosta Godínez

Gerente de Aguas Superficiales e Ingeniería de Ríos
Subdirección General Técnica
Comisión Nacional del Agua

Date 300805

Enclosure 2

2005 Project Activities

1. Background

The Comisión Nacional del Agua (CNA) is the Mexican agency responsible for the Federal hydraulic infrastructure and national water resources management. In 1996, CNA launched the Modernization of Water Resources Management Project (PROMMA), supported with World Bank funds, to decentralize and improve water resources management. The U.S. National Weather Service (NWS) provided technical assistance to CNA to support the PROMMA project from 1996 through 2003 under the Agreement on the U.S./Mexico Meteorological and Hydrologic Program.

Since 2003, the NWS has continued to support CNA in the area hydrologic forecasting (a continuation of project activities similar to those accomplished under PROMMA). Specifically, in the area of hydrology, the CNA and NWS are working together to transfer the NWS River Forecast System (NWSRFS) technology to the Surface Water and River Engineering Office (GASIR) to improve hydrological forecasting.

This CNA/NWS project is expected to be completed at the end of calendar year 2005, though both parties agree to review the overall scope of the project during the year.

2. Objectives

Proposed tasks for 2005 focus on the continuation of developing operational hydrologic forecast centers that issue useful and in-demand products in México City and in selected regional offices, including the development of a new regional forecast center. This will be accomplished through the development and enhancement of feasible concept of operations plans, involvement of users, and training. Though important 2005 objectives are to focus on the forecast center operations as part of the 2005 program, the NWS does propose to work closely with CNA engineers to implement the NWSRFS in two additional basins.

3. Financial Arrangements

The services performed by NOAA/NWS under this part shall be reimbursed by CNA in the following manner:

1) The payments under this part shall not exceed US $345,000. Any project-related costs incurred above this amount will not be reimbursed and will be the responsibility of NOAA/NWS unless a revised budget is first negotiated with and approved by CNA.

2) All payments shall be in United States dollars.

3) CNA shall pay NOAA/NWS, or cause to be paid, for expenditures incurred by NOAA/NWS in carrying out the services. All project-related expenditures will be billed at cost.

To accomplish these objectives, the CNA has agreed that the NOAA/NWS will provide technical assistance to CNA within their areas of expertise on a reimbursable basis, unless other arrangements are specified and mutually agreed.

CNA shall make necessary arrangements to reimburse NOAA for all costs incurred by NOAA associated with services provided to CNA. NOAA will provide CNA with documentation supporting requests for reimbursement. Requests for reimbursement will be sent to:

Comisión Nacional del Agua
Av. Insurgentes Sur No. 2416
Col. Copilco el Bajo, Delegación Coyoacán
CP 04340, Mexico D.F.

Payment will be made to NOAA by electronic fund transfer. The CNA's financial institution will prepare a funds transfer message to the U.S. Treasury. The Treasury Department's ABA number for deposit messages is 021030004. This number should be entered by the sending bank for all deposit messages sent to the Treasury. The agency location code is BNF=/AC-131400001.

Additional information: Contact Person: Mr. Curt Barrett, Telephone number 301-713-1784 x136

4. Description and Budget of Activities

The NWS and CNA agree on the tasks and estimated task budgets for 2005. Task descriptions are provided in the attachment.

The following is a task-by-task breakdown of project costs.

Task 2005.1SPRCNA Operations

Operational Support	US$ 22,000
Forecast Center Support	US$ 67,000
Systems Operation Monitoring	US$ 15,000
Hydrologic Development	US$151,000
Forecast Center Implementation	US$ 19,000
Training-System Development	US$ 15,000
Online Documentation System Development	US$ 16,000
Reservoir Operations Model Update	US$ 18,000
Task 2005.2 NWS Project Management and Support	US$ 22,000
Total Project Cost (2005)	**US$345,000**

5. Schedule

Work will begin on August 1, 2005 and finish December 15, 2005.

6. Project Review

At least every two months, CNA and NWS representatives will meet to review the progress, accomplishments, budget, and deliverables of the tasks above, and to consider modifications proposed by

either party. A revised plan will be prepared by the NWS whenever the parties agree to modifications.

ATTACHMENT

TASK DESCRIPTIONS

SPRCNA Operations

Operational Support

NOAA/NWS has worked with CNA to implement forecast systems for the Noroeste, Rio Bravo, Golfo Norte, and Centrales del Norte regions. The primary objectives to be met are to provide support for daily forecast operations and to assist with system administration and system updates according to needs identified by GASIR in the course of system operation. NOAA/NWS will download and review forecast system files from GASIR as requested and conduct forecast discussions with forecasters. Updates to the forecast system software will be made as new releases are available. Ongoing assistance will also be provided in defining new stations in the system, updating rating curves, improving graphical displays, and updating segment definitions to reflect changes in parameters or available data.

Forecast Center Support

The regional forecast centers responsible for the rivers for which forecast systems have been implemented are outlined below:

Region	Location	Rivers
Noroeste	Hermosillo	Ríos Yaqui, Sonora, Mayo
Río Bravo	Monterrey	Río Bravo
Golfo Norte	Ciudad Victoria	Ríos Panuco, San Fernando Soto la Marina, Guayalejo/Tamesi
Centrales del Norte	Torreón	Ríos Nazas, Aguanaval
Pacifico Norte	Culiacan	Río Fuerte

Regional forecast centers have been established at each of these locations, except for the Pacifico Norte Region in Culiacan (Rio Fuerte forecasts are currently generated by the Noroeste region). The objective is to provide on-site training and support for regional staff to establish procedures, strengthen forecast operations and promote products, building on development activities from previous years.

NOAA/NWS will provide training and support at each of these forecast offices. The travel will be coordinated with GASIR so that appropriate staff from Mexico City can also participate. The following activities will be considered for each forecast center:

- Present the operations procedures and associated documents that were prepared in 2004
- Introduce and demonstrate the on-line documentation system that will be prepared this year
- Review hydrologic forecast system and NWSRFS concepts
- Review forecast system structure, topology, and models
- Review revised reservoir simulation and modeling procedures

- Review and update products

System Operations Monitoring

NOAA/NWS will develop a System Operations Monitor with a web interface that will allow internal CNA staff to review the status of forecast operations at any of the existing regional forecast centers. Status information that will be presented for each forecast center includes the following:

- Last date on which the forecast system was run
- Latest date to which the forecast system was updated (latest carryover date)
- A list of forecast groups included in each forecast system
- For each forecast group, a list of segments comprising the forecast group
- For each segment, a list of key time series together with the peak value of the time series and the date and time at which the peak occurs.

The System Operations Monitor will be available through a link on the GASIR forecasting web page and will be hosted on the *azteca* workstation.

Hydrologic Development

Hydrologic development for 2005 will include implementing forecast systems for the Rio Sinaloa and the Rio Culiacan in the state of Sinaloa. These basins are located in the Pacifico Norte region, and the resulting implementations will be combined with the Rio Fuerte forecast system at a new forecast center that will be established in Culiacan.

NOAA/NWS will coordinate with GASIR and regional office staff while performing all of the steps associated with forecast system development, including the following:

- Data collection and review
- Data analysis and processing
- Model calibration
- Forecast system initialization
- Testing and installation

These activities will include the standard elements of analysis and development that have been performed previously for other basins in Mexico. CNA staff will support data collection and will provide regional staff with information at key stages in the development to obtain their input and feedback. Important areas of feedback will include data quality control, water balance analysis, forecast system configuration, and calibration.

Forecast Center Implementation

A new forecast center will be established at the Pacifico Norte region in Culiacan. This center will assume responsibility for forecasting the Rios Culiacan and Sinaloa when they are put into operation in 2005, and will take over operation of the Rio Fuerte forecast system from the Noroeste region. The primary elements of forecast center implementation are:

- Equipment purchase, delivery, and installation
- Data transmission and ingest
- Forecast product development
- Operations training
-

One LINUX workstation will be purchased under this task and delivered to GASIR in Mexico City. NOAA/NWS will coordinate with CNA to configure the workstation and have it transferred to the Pacifico Norte regional office in Culiacan. Once delivered, the workstation will be integrated into the network environment and forecast operations will be initiated. The Rio Fuerte forecast system operation will be transferred from the Noroeste to the Pacifico Norte region at that time.

One critical element of forecast operations at the forecast center will be the data flow that permits the forecast system to receive and ingest data. This is accomplished through an automatic process initiated through CNA's hydrologic information system (SIH), either locally at each regional office, or at the central SIH in Mexico City. NOAA/NWS will coordinate with GASIR staff and Pacifico Norte region staff to determine the most effective approach for data ingest and to implement it.

NOAA/NWS will work with GASIR to implement a basic set of products for the forecast system. These will be based on the current web-based products generated at the other forecast centers. A web server will be configured on the same workstation that runs the forecast system. NOAA/NWS will provide basic training in system operations, including a demonstration and explanation of the process of generating products, and an opportunity will be given to local managers to be briefed on the system and potential products. Managers will be invited to identify potential users beyond themselves and the forecasters, and to identify additional products that might be generated.

Training-System Development

Ongoing training will be needed in Mexico to strengthen forecast operations in recently implemented regional offices as well as for the establishment of new operations in additional regions. An important part of this training is hands-on experience with the operation of the forecast system. Historically, hands-on training has taken place using whichever system the user would ultimately operate and using the operational state of the system at the time of training. A more targeted approach is needed to that uses a pre-defined system to focus on specific training needs. A related need is an operational demonstration system that can be used to help potential system users and managers evaluate forecast system technology in general. A training/demonstration dataset will be developed to meet the needs of CNA, and will do the following:

- Reflect the current operational environment in Mexico, including all four regional forecast centers and their associated forecast system files
- Include files representing daily hydrometeorological observations (SHEF messages) that can be activated to

simulate day-to-day operations for a simulation period of several weeks

- Include periods during the latter part of 2004 in which significant precipitation occurred in several of the basins
- Include satellite precipitation grids that can be evaluated together with gage-based MAP to enhance understanding of the rainfall field
- Include scripts to re-initialize the dataset following a simulation period
- Include instructions for simulation sequences that illustrate various aspects of forecast system operation and simulation characteristics

This dataset will be installed at each of the regional forecast centers, as well as at GASIR in Mexico City. The system will be demonstrated for GASIR staff in Mexico City.

On-line Documentation System Development

NOAA/NWS will develop a web-based documentation system for operational forecasters and managers. The web pages will be available from central and regional offices. The following elements will be included:

- Past basin implementation reports - These reports document the hydrologic forecast system development for each basin implemented to date. They describe data collection, data analysis, calibration, and initialization activities. These reports contain useful reference information for each system, including its initial state of implementation.
- NWSRFS user documentation with links in both English and Spanish - Spanish translations of much of the documentation have been prepared, but are not continually updated with changes to the English versions. As a result, it may be useful for CNA staff to obtain general information from the translated documents, while referring to the current official documentation in English as a reference for formatting and specific commands.
- Operations Manual - An operations manual for daily hydrologic forecasting in CNA using NWSRFS has been prepared. This manual will be formatted for reference through the documentation system.
- Overview of LINUX operating system commands
- Common commands for the *vi* editor
- System process summary that documents the automated processes that operate on the forecast system computers
- User's manual for the NWSRFS graphical user interface
- Trouble shooting ideas
- IFP overview and basic instructions

Reservoir Operations Model Update

Reservoirs have a significant impact on river discharge in all of the regional forecast systems that have been implemented to date. The implementation of the reservoirs has focused on representing the physical characteristics of the reservoirs, published flood

operations plans (where available), and monthly release projections provided by GASIR. In actual operation of the reservoirs, however, considerable flexibility is exercised.

NOAA/NWS will update the reservoir model parameters in the forecast system to allow forecasters to better model short term planned releases or to simulate operations scenarios to assist in decision making. The following activities will be completed in conjunction with GASIR staff:

- Work with GASIR staff to outline a general approach for real-time reservoir operations that can be applied to the majority of reservoirs implemented as part of the forecast system in Mexico.
- Implement the approach outlined above for up to 10 reservoirs.
- Review segment definitions prepared by GASIR staff for any additional reservoirs that they propose to update.
- Provide training to CNA staff that will be operating the forecast system for reservoirs that are updated. This will be done in conjunction with other training visits during the project.

NWS Project Management and Support

The objectives of this task are to manage the project and coordinate project activities. Project management activities include the following:

- Provide technical, policy and managerial control of the project
- Prepare quarterly, semi-annual and final reports describing the activities
- Account for all of the 2005 project tasks that are undertaken by NOAA/NWS staff and consultants
- Coordinate project activities between the NWS, GASIR, SMN, PROMMA, IMTA, CNA Regional Offices, IBWC, WGRFC, and other participants as needed
- Maintain accounting, contract monitoring, and reporting systems to assure that the project is managed properly