法規名稱：IMPLEMENTING ARRANGEMENT #23 DEVELOPMENT OF A HAZARDOUS WEATHER MONITORING AND FORECAST SYSTEM PURSUANT TO THE AGREEMENT BETWEEN THE TAIPEI ECONOMIC AND CULTURAL REPRESENTATIVE OFFICE IN THE UNITED STATES AND THE AMERICAN INSTITUTE IN TAIWAN FOR TECHNICAL COOPERATION IN METEOROLOGY AND FORECAST SYSTEMS DEVELOPMENT

簽訂日期：民國 100 年 07 月 27 日

生效日期：民國 100 年 07 月 27 日

Article I - Scope

This Implementing Arrangement describes the scientific and technical activities to be undertaken by the American Institute in Taiwan (AIT), through its designated representative, the Global System Division (GSD), (formally the Forecast Systems Laboratory) of the Earth System Research Laboratory (ESRL) of the National Oceanic and Atmospheric Administration (NOAA), United States Department of Commerce. It provides for continuing development of the forecast system being developed by the Joint Forecast Systems Project. This project is a cooperative effort between the Central Weather Bureau (CWB), the designated representative of the Taipei Economic and Cultural Representative Office in the United States (TECRO), and AIT ' s designated representative, NOAA/ESRL/GSD. This Implementing Arrangement is of mutual interest to both TECRO and AIT, hereafter referred to as the parties. The products of this Implementing Arrangement will provide substantial value through development of new and upgraded capabilities and applications that can be integrated into other NOAA/ESRL/GSD systems.

Article II - Authorities

The activities described in this Implementing Arrangement will be carried out under the general terms and conditions established by the Agreement between the Taipei Economic and Cultural Representative Office in the United States and the American Institute in Taiwan for Technical Cooperation in Meteorology and Forecast Systems Development (TECRO-AIT Agreement), and any subsequent revision as agreed to by the

parties. This Implementing Arrangement is the twenty-third such arrangement under a succession of umbrella agreements between TECRO and AIT.
This Implementing Arrangement is hereby attached to that Agreement and becomes part of the Agreement.

Article III - Services
During the period of Implementing Arrangement #23, TECRO’ s and AIT’ s designated representatives respectively, the CWB and NOAA/ESRL/GSD joint team, will expand our work to address the hazardous weather theme. Eight tasks are identified: (1) Development and improvement of satellite products for tropical storm monitoring and prediction; (2) Real-time Analysis and Forecasting with the Advanced Regional Prediction System (ARPS); (3) Improvement and verification of short-range forecasting using the Space-Time Mesoscale Analysis System (STMAS) with remote sensing data; (4) High-Resolution Quantitative Precipitation Estimation and Quantitative Precipitation Forecast (HRQ2) Applications Improvement; (5) Enhanced Nowcasting Decision Assistance Tools; (6) Development of High-Resolution Product Generation Assistance Tools; (7) Global Positioning System (GPS) Radio Occultation Satellite Data Assimilation Using the National Center for Environmental Prediction (NCEP) and Joint Centers for Satellite Data Assimilation (JCSDA) Gridpoint Statistical Interpolation (GSI) Analysis System; and (8) Continuing Interaction on Earlier Cooperative Projects. Tasks under this Implementing Arrangement range from full scale developmental collaboration to system upgrades and support that allow systems to operate with the latest technical and scientific capabilities and specifications. These ongoing activities, described in more detail in the Statement of Work, will include the following eight tasks:

Task #1 Development and Improvement of Satellite Products for Tropical Storm Monitoring and Prediction

During Implementing Arrangement #23, AIT’ s designated representative, NOAA/ESRL/GSD, agrees that NOAA/NESDIS (National Environmental Satellite, Data, and Information Service)/STAR (Center for Satellite Applications and Research) will lead this task. NOAA/NESDIS/STAR will focus on the development of quantitative precipitation estimates from the geostationary satellite (MTSAT). Task #1 will provide NOAA operational blended Total Precipitable Water (TPW), as well as TPW anomaly, digital products and DMSP (Defense Meteorological Satellite Program) Special Sensor Microwave Imager/Sounder (SSMIS) environmental data records (EDR) retrieval algorithms for TECRO’ s designated representative, CWB, for its weather prediction applications. NOAA/NESDIS/STAR scientists will collaborate closely with TECRO’ s designated representative, CWB, for a seamless transition of all science and software into its operational systems.

During Implementing Arrangement #23, NOAA/NESDIS/STAR will provide the initial capability of Quantitative Precipitation Estimation (QPE) from MTSAT. Using both polar orbiting satellites and geostationary satellites, an improved retrieval algorithm SCaMPE (Self-Calibrating Multivariate Precipitation Retrieval) has been developed at NOAA/NESDIS/STAR for future GOES-R program improvement. Because the current algorithm is exclusively developed for GOES satellites that unfortunately do not cover the Taiwan area, additional development has to be conducted to use geostationary satellite data over this area, which is covered by the Japanese MTSAT at present. NOAA/NESDIS/STAR will deliver the SCaMPE algorithm to TECRO’ s designated representative, CWB, however it is CWB’ s responsibility to make the algorithm work in operations

using local MTSAT data to provide precipitation estimation over the Taiwan area. This subtask will include (1) providing documentation of the SCaMPE package, (2) delivering the SCaMPE package and operation manual, (3) supporting the installation of the SCaMPE package, and (4) supporting the migration of SCaMPE for MTSAT.

During Implementing Arrangement #23, NOAA/NESDIS/STAR will also provide the global Total Precipitable Water (TPW) and anomaly digital products. Integrated water vapor content or TPW is an important fact for hydrological analysis. TPW products are currently available from various satellites. However, these products carry different biases and sampling errors due to the difference in algorithms, instruments, and temporal and spatial sampling resolutions. An operational product through blending AMSU, SSM/I and GPS TPW has been developed to generate a unified, meteorologically significant TPW field with a no-gap global coverage in NOAA. NOAA/NESDIS/STAR will deliver real-time blended TPW and anomaly digital products to TECRO’ s designated representative, CWB for forecasters’ analysis.

During Implementing Arrangement #22, NOAA/NESDIS/STAR delivered sounding products from the SSMIS (Special Sensor Microwave Imager and Sounder). During Implementing Arrangement #23, NOAA/NESDIS/STAR will deliver DMSP SSMIS environmental data records (EDR) retrieval algorithms to provide hydrological related analysis.

Microwave Integrated Retrieval System (MiRS) is a multiple instrument one-dimensional (1D Var)

environmental data retrieval package which is focusing on the all-weather all-surface retrieval of temperature and water vapor profiles, as well as surface meteorological parameters, such as rain rate, surface temperature, and so on. This package has been delivered to TECRO ' s designated representative, CWB, for pre-operational testing during Implementing Arrangement #22. As a developing package, some major and minor updates have been implemented after delivery. During Implementing Arrangement #23, NOAA/NESDIS/STAR will provide an update and further improvement of MiRS.

Cloud optical depth and cloud top height can be estimated by combining dual geostationary satellites. However, due to the viewing angle difference, error could be introduced in the detection of clouds. To eliminate such error, viewing angle correction has to be implemented. NOAA/NESDIS/STAR will work with TECRO ' s designated representative, CWB, to develop geostationary satellite viewing angle error correction algorithms to improve the accuracy of cloud detection. During Implementing Arrangement #23, NOAA/NESDIS/STAR will continue providing current delivered satellite data during the collaborative period. In addition, new satellite data, such as SSMIS F18 TDR and NOAA operational global data assimilation system products will also be provided for TECRO ' s designated representative, CWB, for its satellite product development.

Task #2 Real-time Analysis and Forecasting with ARPS

The principal goal of Task #2 is to configure, demonstrate, and deploy a real-time forecasting system at convection-allowing resolution (2.5 km grid spacing) for the TECRO ' s designated representative, CWB, to

obtain accurate 0-3h heavy precipitation forecasts. The forecast system uses ARPS (Advanced Regional Prediction System) developed at the Center for Analysis and Prediction of Storms (CAPS) at the University of Oklahoma. ARPS is a comprehensive regional- to storm-scale atmospheric modeling system. It is a complete system that includes a real-time data analysis and assimilation system, a forward prediction model, and a post-analysis package. The assimilation of radar and other high-resolution observations for convective-scale forecasting is a noted strength of the ARPS system. The 3DVAR-cloud analysis package of ARPS is computationally efficient for producing convective-scale initial conditions, including radar data, while ARPS’ s Ensemble Kalman Filter (EnKF) data assimilation system promises to provide optimal initial conditions for both deterministic and ensemble predictions when computational resources become available.

During Implementing Arrangement #23, AIT’ s designated representative, NOAA/ESRL/GSD, agrees that CAPS at the University of Oklahoma will lead this task. For the IA #23, CAPS will focus on three main task areas: 1) to refine and improve, through the predictions of Morakot and Meiyu cases, the current CWB ARPS forecast system by including additional observations, including those used by CWB WRF; 2) to refine the cloud analysis package for the case studies and make adjustments for the tropical environment and cycled data assimilation, including defining the best strategy for cycled analysis (continuous versus periodic restart from WRF analysis); and 3) to implement a real-time forecast system on the CWB computing system by linking the system with CWB real-time WRF and radar data, and perform limited quasi-real-time testing on CWB computer together with

CWB scientists. CAPS will also examine and improve definitions of land surface characteristics and soil model initial conditions, when possible, and perform objective evaluation of the forecast system for the cases and real-time tests.

TECRO’s designated representative, CWB, will provide support to set up CWB’s HPC systems and link the system with CWB real-time WRF and radar data for running the real-time ARPS Forecast System at CWB. CAPS will provide technical support for CWB scientists to perform case studies for heavy precipitation cases and the real-time test runs. This task will benefit TECRO’s designated representative, CWB, by improving its very-short-range forecasting capabilities, in particular those related to 0-3h heavy precipitation.

Task #3 – Improvement and Verification of Short-range Forecasting Using STMAS with Remote Sensing Data

STMAS (Space and Time Multi-scale Analysis System) is a new and advanced data assimilation technique with a superior analysis advantage. STMAS combines the advantages of objective analysis and modern variational analysis into a unified data assimilation system, and removes the limitations of these data assimilation schemes. During the past few years, TECRO’s designated representative, CWB, has demonstrated the benefit from using STMAS for its operational applications, especially for surface analysis and verification against observation data. During Implementing Arrangement #23, AIT’s designated representative, NOAA/ESRL/GSD, will further improve STMAS 3D analysis for CWB short-range forecasts. For IA #23, there are four main task areas: 1) STMAS hot-start; 2) STMAS-WRF cycling experiment; 3) Downscaling; and 4)

Satellite data assimilation.

Under the STMAS hot-start task, AIT’ s designated representative, NOAA/ESRL/GSD, will implement a fully thermodynamic balanced analysis capability with microphysics for hot-starting WRF model forecasts instead of the cold-start currently being used in WRF forecasts. A cold-started WRF forecast takes 3-6 hours to spin up a balanced microphysics fields, thus resulting in short-range forecasts being unbalanced. STMAS hot-start will introduce a thermodynamic balanced initial condition for WRF forecasts for improving short-range forecasts.

Under the STMAS-WRF cycling experiment task, AIT’ s designated representative, NOAA/ESRL/GSD, will implement a cycling scheme to improve the problem of the lack of observations over the ocean and improve the STMAS background field. A cycling scheme provides a background field for STMAS with its fine resolution WRF forecast. The fine resolution WRF forecast would contain the fine resolution structure of typhoons. It runs a fine resolution of STMAS analysis to initialize a fine resolution WRF forecast, which will be used as a background field at the next data assimilation time. This cycle will be repeated so that the fine resolution background field of STMAS contains finer scale information. The cycling scheme will be tested and evaluated for TECRO’ s designated representative, CWB, for improving short-range forecasts.

Under the Downscaling task, AIT’ s designated representative, NOAA/ESRL/GSD, will implement a downscaling technique that downscales a coarse model forecast into fine scale analysis. Over Taiwan, the

complex terrain structure makes coarse resolution forecasts impossible for providing detailed wind and precipitation forecasts. When a typhoon approaches Taiwan, a downscaling uses a coarse resolution forecast and downscales the forecast to a fine resolution in hopes of delivering fine scale wind and precipitation structures so that detailed warning information will be significantly improved. The downscaling software will be delivered to TECRO ' s designated representative, CWB, for wind structure analysis.

Under the Satellite data assimilation task, AIT ' s designated representative, NOAA/ESRL/GSD, will implement the Community Radiation Transfer Model (CRTM) as a forward operator in STMAS satellite data assimilation. To assimilate satellite data in a variational scheme, the gradient of CRTM is needed, and is called the K-matrix in CRTM. The K-matrix has been carefully tested with the support from the NESDIS. During IA #23, GSD will perform experiments of assimilating satellite data into STMAS analysis and deliver a STMAS with AMSU-A satellite data assimilation capability.

For the four STMAS 3D system implementing tasks, AIT ' s designated representative, NOAA/ESRL/GSD, will start the development of a hot-start capability using the STMAS 3D radar reflectivity analysis operator. TECRO ' s designated representative, CWB, will help test the cycling scheme at CWB, and AIT ' s designated representative, NOAA/ESRL/GSD, will provide technical support for the testing. GSD will develop and evaluate the downscaling software at GSD and STMAS satellite data assimilation for the AMSU-A data. These software modules will be delivered to CWB for improving short-range forecasts. TECRO ' s designated representative, CWB,

and AIT’ s designated representative, NOAA/ESRL/GSD, will collaborate on the verification and model initialization of the STMAS 3D system. These tasks will benefit TECRO’ s designated representative, CWB, in improving and verifying short range forecasting operations.

Task #4 - High-Resolution Quantitative Precipitation Estimation and Quantitative Precipitation Forecast (HRQ2) Applications Improvement

During Implementing Arrangement #23, AIT’ s designated representative, NOAA/ESRL/GSD, agrees that NOAA/NSSL (National Severe Storms Laboratory) will continue research towards refinement, development, and maintenance of HRQ2 applications required for TECRO’ s designated representatives, CWB, the Water Resources Agency (WRA), and the Soil and Water Conservation Bureau (SWCB) operations. The NSSL research is directed towards the integration of the dual-pol (dual-polarization) radar applications in the HRQ2 system.

This task will include real-time calibration correction for C-band dual-pol radars in Taiwan. A new calibration scheme using cloud microphysics observed in Taiwan will be developed and evaluated. This task will monitor the real-time HRQ2 system and improve quality control processes for the dual-pol fuzzy-logic hydrometeor classification. This task will continue to evaluate and refine the dual-pol QPE algorithms and to provide technical support for TECRO’ s designated representative, CWB, for its QPESUMS operations.

NOAA/NSSL will make available to the TECRO’ s designated representative, CWB, as requested, software source code for the calibration correction algorithms

for the C-band dual-pol radar, the dual-pol fuzzy-logic hydrometer classification module and the dual-pol QPE algorithm module.

Task #5 - Enhanced Nowcasting Decision Assistance Tools

The Meteorological Development Laboratory (MDL) of the National Weather Services (NWS) of NOAA has developed a comprehensive suite of decision assistance tools in AWIPS to cover the full scope of hydro-meteorological phenomena and forecaster responsibilities. These tools are SCAN (System for Convection Analysis and Nowcasting), SCAN DMD (SCAN Digital Mesocyclone Detection), FFMP (Flash Flood Monitoring and Prediction), SAFESEAS (System on AWIPS for Forecasting and Evaluation of Seas and Lakes), SNOW (System for Nowcasting of Winter Weather), Fog Monitor, GUARDIAN (General User Alert Display Panel), and the GUI interface to ANC (AutoNowCaster). In the past few years, NOAA/NWS/MDL assisted and supported porting some of those decision assistance tools into the Weather Integration and Nowcasting System (WINS) for TECRO's designated representative, CWB, including SCAN, SCAN DMD, and SAFESEAS.

During Implementing Arrangement #23, AIT's designated representative, NOAA/ESRL/GSD, agrees that NOAA/NWS/MDL will continue to provide technical support and training to the TECRO's designated representative, CWB, to enhance CWB's current WINS system, in the area of nowcasting decision assistance tools that have been already implemented. Those supports include source code modification and configuration appropriate for CWB use. In addition, NOAA/NWS/MDL will provide customization support and training on a few more decision assistance tools for CWB, including the ANC-AWIPS bridge software,

GUARDIAN, and FFMP. The ANC-AWIPS bridge implementation on the WINS system has been initiated and will continue upon the update of CWB ' s ANC system setup. The GUARDIAN was developed to be a general communicator between the software and the user that could be personally configured in ways to reduce notification distractions and maximize situational awareness. The FFMP is an integrated suite of multi-sensor applications which detects, analyzes, and monitors precipitation and generates short-term warning guidance for flash flooding automatically within NWS ' s AWIPS system. It conducts precipitation analyses in a " basin world ", which means all QPE and QPF calculations over a certain time period are done over the areas of small basins with the minimum basin area of about 2 square miles.

Task #6 - Development of High-Resolution Product Generation Assistance Tools During Implementing Arrangement #23, AIT ' s designated representative, NOAA/ESRL/GSD, will continue providing technical support on GFE, Text Formatter (TF), and GHG (Graphical Hazards Generator) to support CWB ' s development of formatter infrastructure of FIES (Forecast Information Editing System). CWB plans to implement its own rule-based Chinese text formatter to provide a heavy rainfall report. GSD will also provide the necessary training to CWB visitor(s) to implement such a Chinese text formatter system as part of CWB ' s FIES.

GFE/verification system software training (BOIVerify) was coordinated by the AIT ' s designated representative, NOAA/ESRL/GSD, to TECRO ' s designated representative, CWB, during Implementing Arrangement #21 and #22. GSD will continue to coordinate necessary forecaster training of using BOIVerify during hazardous

weather situations during Implementing Arrangement #23 if needed. The benefit of this task is for the TECRO's designated representative, CWB, to establish its text formatter infrastructure and assistance tools to support the high resolution forecast product generation.

Task # 7 - Global Positioning System (GPS) Radio Occultation Satellite Data Assimilation Using the NCEP/JCSDA Gridpoint Statistical Interpolation (GSI) Analysis System

As part of the COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate) mission, TECRO's designated representative, CWB, will support the inclusion or improvement of GPS Radio Occultation (RO) observations from the COSMIC mission into the NCEP's regional and global system with the Gridpoint Statistical Interpolation (GSI) data assimilation under the joint collaboration project between NOAA/NASA/DoD, JCSDA, and CWB. NCEP is the National Centers for Environmental Prediction under NOAA's NWS. JCSDA (Joint Center for Satellite Data Assimilation) is a multi-agency research center tasked with improving the use of satellite data for analyzing and predicting weather, the ocean, climate, and the environment. JCSDA partner agencies are NASA (National Aeronautics and Space Administration), NOAA, and DoD (Department of Defense).

The main objectives of this collaborative project are to tune and test the assimilation of GPS RO data in the NCEP regional and global system, and to accelerate and enhance the use of GPS RO data in global numerical weather prediction at CWB. Currently, TECRO's designated representative, CWB, is performing global numerical weather prediction using its own global model

and the GSI data assimilation system, which was implemented in July 2010. Through this collaboration, CWB would further enhance its global data assimilation system and make optimal use of satellite data, including COSMIC/FORMOSAT-3. This task will cover the use of GSI for both global and regional capabilities. In exchange, CWB will contribute to the tuning and testing of the GPS RO assimilation in the NCEP regional and global system.

Task #8 - Continuing Interaction on Earlier Cooperative Projects

Several earlier cooperative tasks have been completed. Technology has been transferred successfully and is beginning to be used operationally at the facilities of TECRO’ s designated representative, CWB. NOAA/ESRL/GSD’ s development activities in these areas will continue, and further NOAA/ESRL/GSD interaction with CWB is important to keep CWB staff up to date on current developments. This task will directly improve and update CWB’ s current forecast assistant and decision making system at an appropriate level, including new AWIPS and relevant forecast assistant application software releases and available documents. AIT’ s designated representative, NOAA/OAR/GSD, released the latest AWIPS OB 9.2.6 and

necessary test datasets to TECRO’ s designated representative, CWB, near the end of 2010. This version is the one currently being used by NOAA/NWS. This version is ready to accept dual-pol radar products and has the capability to integrate radar data with environment sampling of temperature, relative humidity, wind, equivalent potential temperature, wet-bulb temperature, and pressure at the height of the radar beam. CWB will access data from two new dual-pol radars soon, so this new radar product display capability will

be extremely useful for its forecast and decision making operation. NOAA/ESRL/GSD will continue to make available any latest AWIPS-build software, and technical support of AWIPS applications such as warning tools (WarnGen, GHG), if applicable, during Implementing Arrangement #23.

Under a NOAA/NWS contract with the Raytheon Technical Services Company (since 2005), the next generation of AWIPS (called AWIPS II) is being developed. AWIPS II is based on the Service Oriented Architecture (SOA). AIT’s designated representative, NOAA/ESRL/GSD, is tasked with performing an Independent Validation and Verification (IV &V) for each task order released by Raytheon. NOAA/ESRL/GSD will provide training and share experience with AWIPS II in the area of SOA, EDEX (Environmental Data Exchange) handles data ingest, storage and communication, and CAVE (Common AWIPS Visualization Environment), is the graphical user interface to CWB visitors during Implementing Arrangement #23.

AIT’ s designated representative, NOAA/ESRL/GSD, has a long history of supporting research and operational weather forecasting by developing advanced prototype workstation display systems, including an ongoing ALPS (AWIPS Linux Prototype System) development, which is an update of AWIPS. NOAA/ESRL/GSD will provide necessary support in the area of porting ALPS during Implementing Arrangement #23.

For the data feed support, AIT’ s designated representative, NOAA/ESRL/GSD, will continue to provide the NOAAPORT data feed for CWB’ s data assimilation purposes during Implementing Arrangement #23.

This continuing interaction task will benefit TECRO’ s designated representative, CWB, with the updated knowledge of the forecast assistant and decision making systems developed at NOAA. This task also provides the important data feed of NOAAPORT for CWB’ s daily numerical weather prediction operation needs. Finally, AIT’ s designated representative, NOAA/ESRL/GSD, will provide necessary training and support to visitors and forecasters, continue the exchange of visits, provide necessary papers and reports, and continue our e-mail interactions, if applicable.

Article IV - Responsibilities of TECRO

In addition to participation in the joint project team, TECRO through its designated representative, CWB, shall:

A. Provide overall coordination project activities at the CWB facility;

B. Assign appropriate staff to perform the activities defined in this Implementing Arrangement and provide support in accordance with the terms of the umbrella agreement; and

C. Fulfill its responsibilities under the Statement of Work for Implementing Arrangement #23.

Article V - Responsibilities of AIT

In addition to participation in the joint project team, AIT, through its designated representative, NOAA/ESRL/GSD, shall:

A. Provide overall coordination project activities at the NOAA/ESRL/GSD facility in Boulder, Colorado;

B. Provide administrative support for preparing reports for delivery to TECRO’ s designated representative, CWB, in accordance with this Implementing Arrangement;

C. Assign appropriate staff to perform the activities defined in this Implementing Arrangement and provide support in accordance with the terms of the umbrella agreement; and

D. Fulfill its responsibilities under the Statement of Work for Implementing Arrangement #23.

Article VI - Financial Provisions

In accordance with the TECRO-AIT Agreement, TECRO is required to reimburse AIT for all costs incurred by AIT ' s designated representative, NOAA/ESRL/GSD, in association with the project covered by this Implementing Arrangement. AIT shall transfer to NOAA/ESRL/GSD all payments made by TECRO to AIT for costs incurred by NOAA/ESRL/GSD in association with this Implementing Arrangement.

The total cost for activities described in this Implementing Arrangement is mutually agreed to be U.S. $1,500,000. TECRO agrees to transfer fifty percent of the funds to AIT in advance, with the remaining fifty percent to be transferred upon completion of the year ' s activities, to the extent that funds for this purpose have been provided by TECRO. The performance by AIT ' s designated representative, NOAA/ESRL/GSD, of activities under this Implementing Arrangement is subject to the availability of funds.

Article VII - Intellectual Property Considerations

No intellectual property considerations are expected to arise in conjunction with activities described in this Implementing Arrangement. Existing system designs and computer software of the forecast system of AIT ' s designated representative ' s, NOAA/ESRL/GSD, are in the public domain. Reports, specifications, and computer software prepared under this Implementing Arrangement also will be in the public domain once NOAA and CWB have approved them in final form.

Article VIII - Effective Date, Amendment, and Termination

This Implementing Arrangement is effective on the date of the last signature hereto. This Implementing Arrangement may be amended and/or terminated in accordance with the terms of the

Agreement. The estimated completion date for the activities described in this Implementing Arrangement is December 31, 2011, and the termination date of this Implementing Arrangement is June 30, 2012.

FOR THE TAIPEI ECONOMIC AND CULTURAL REPRESENTATIVE OFFICE IN THE UNITED STATES:	FOR THE AMERICAN INSTITUTE IN TAIWAN:
Leo Lee	Barbara J. Schrage
Deputy Representative	Managing Director
July 27, 2011	May 4, 2011