



U.S. DEPARTMENT OF  
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## **ARM Climate Research Facility**

### **The U.S. Department of Energy Management Plan**

February 2011



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# **ARM Climate Research Facility**

## **The U.S. Department of Energy Management Plan**

February 2011

Work supported by the U.S. Department of Energy,  
Office of Science, Office of Biological and Environmental Research

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## 1.0 Mission

### **Mission Statement for the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Climate Research Facility**

The U.S. Department of Energy's (DOE's) ARM Climate Research Facility (ARM Facility) has been designated a national user facility for the purpose of providing this unique asset for the study of global change to the broader national and international research community. Research at this facility will include the study of alterations in climate, land productivity, oceans or other water resources, atmospheric chemistry, and ecological systems that may alter the capacity of the Earth to sustain life. Global change research also includes study, monitoring, assessment, prediction, and information management activities to describe and understand the interactive physical, chemical, and biological processes that regulate the total Earth system; the unique environment that the Earth provides for life; changes that are occurring in the Earth system; and the manner in which such system, environment, and changes are influenced by human actions.

## 2.0 Background

Over the last few decades, the U.S. Government has invested billions of dollars in the development of infrastructure to improve the nation's ability to stay at the forefront of science and technology research. As part of this investment, DOE has established several major research facilities for use by the scientific community for the studying the interactions between energy use and the environment. The U.S. Global Change Research Act of 1990 established an interagency program within the Executive Office of the President to coordinate U.S. agency-sponsored scientific research designed to monitor, understand, and predict changes in the global environment. At that time, it was determined that the highest priority area for new research was to develop an improved understanding of how clouds affect the radiation balance of the atmosphere (e.g., incoming solar radiation and outgoing infrared radiation or heat energy) and hence influence the Earth's climate.

To address the need for new research on clouds and radiation, DOE established the ARM Program. Since 1990, the ARM Program has supported a combination of field measurements and modeling studies designed to improve the representation of clouds in understanding and predicting changes in the Earth's climate. Through the ARM Program, DOE has funded the development of several highly instrumented ground stations for studying cloud formation processes and their influence on radiative transfer and for measuring other parameters that determine the radiative properties of the atmosphere.

These stations also provide enhanced sites for periodic airborne and remote sensing studies and complement atmospheric observations being made by satellite.

The scientific infrastructure that has been created as part of the ARM Program is a valuable national and international asset for advancing scientific knowledge of Earth systems. In fiscal year (FY) 2003, DOE designated the ARM sites as a national scientific User Facility. The FY2004 budget included an increment for enhancing the sites to provide more research capability for the global scientific community. The budget increment provided the resources to build and expand on the existing infrastructure to broaden

the scientific scope of the sites and to support a larger user base. In 2009, the ARM Facility was provided \$60M in Recovery Act funding to expand its measurement capabilities and to update its infrastructure. Measurement needs had been identified through a series of workshops over the preceding several years. Information about the Recovery Act upgrades is available at <http://www.arm.gov/about/recovery-act>. The resulting new ARM Facility has enormous potential to contribute to a wide range of interdisciplinary science in areas such as meteorology, atmospheric aerosols, hydrology, biogeochemical cycling, and satellite validation, and to provide potential monitoring sites where remote sensing and modeling related to homeland security can be validated.

The ARM Facility has a strong collaboration with the Atmospheric System Research (ASR) Program. ASR was formed from the merger of the former ARM Science Program and the Atmospheric Science Program (ASP). In addition, as a Science User Facility, ARM serves the broader climate research community, and solicitations for use of the facility are open to anyone. ARM also seeks scientific input from both ASR and the broader research community to ensure that it is responsive to the community's observational needs.

The ARM Facility supports routine as well as new field campaigns, new long-term measurement systems, new instrument testing and validation, new scientific algorithm development for adding value to instrument data, and enhanced data access. The requirements for these services are developed in cooperation with representatives of the non-ARM climate (or appropriately related) research community. While the ARM Facility does not provide direct funding for scientific research, small amounts of funding may be provided to allow the facility to assist with logistics, the development of datastreams and archiving, and other activities associated with the facility usage.

### **3.0 Oversight and Reporting Requirements**

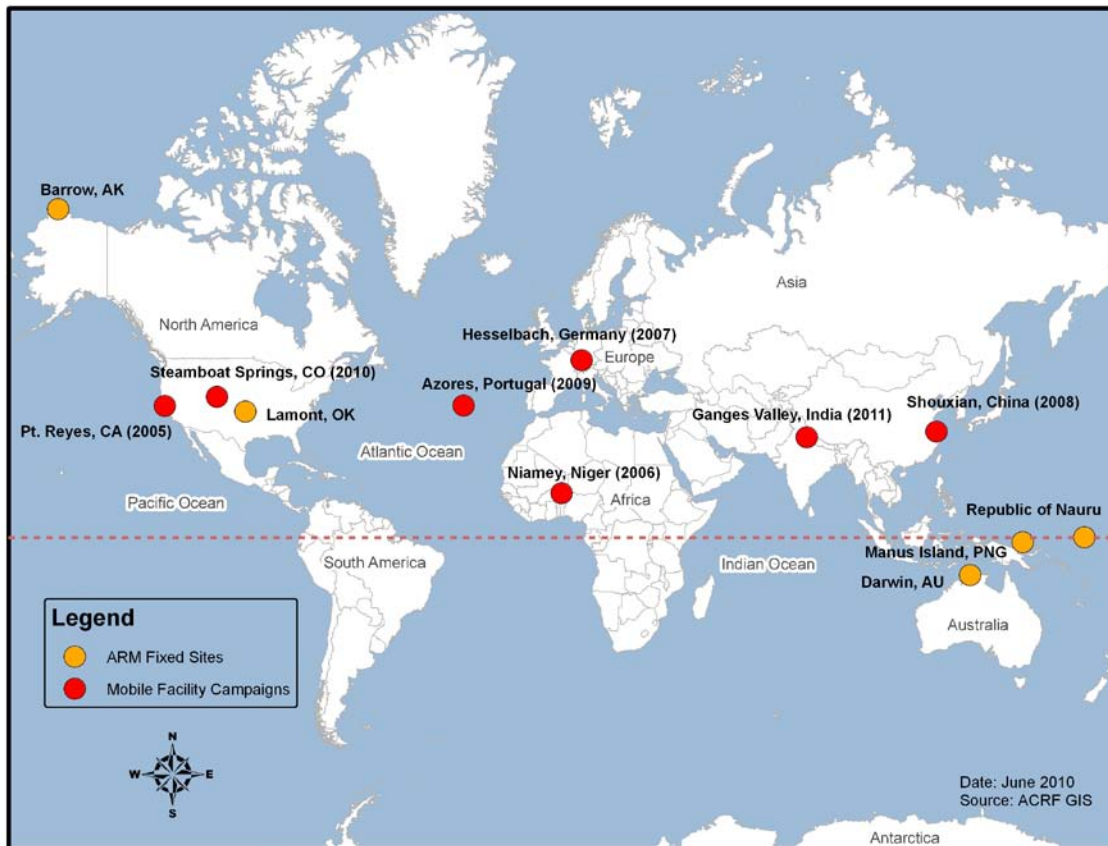
Oversight of the ARM Facility is provided by the DOE/ARM Program Managers and, through that office, the Biological and Environmental Research Advisory Committee (BERAC), a committee of scientists nominated to review programs of DOE's Office of Biological and Environmental Research.

As a matter of government policy, all DOE User Facilities, including the ARM Facility, have a number of reporting requirements. ARM is required to report to the DOE ARM Program Manager, to the U.S. Department of Energy's Office of Biological and Environmental Research, and to the White House Office of Management and Budget (OMB). A primary requirement for ARM is the documentation of users. Users for this purpose are defined as visitors to any of the ARM sites. The category of users also includes data users at the ARM Data Archive or any of the local site data systems.

The main performance measure for site operations is the data availability for each instrument at each site. The Operations Manager is responsible for keeping the instruments operating as continuously as possible and keeping the data flowing to the Data Archive, where the data and metadata are eventually made available to users. The Data Quality Office is responsible for data usability, ensuring that the data are of known and reasonable quality. The Data Quality Office routinely provides rigorous data quality checks and reports problems to the Operations Manager. These problems are resolved as quickly as possible, and the causes and solutions to the problems are documented to help prevent any future data loss. The Data Archive is the repository of all ARM data and all User Facility data. The Archive Manager is responsible for user data accessibility.

## 4.0 Location and Instruments

The ARM permanent research sites represent three different climatic regimes: (1) Southern Great Plains (SGP), (2) North Slope of Alaska (NSA), and (3) Tropical Western Pacific (TWP). Respectively, these sites address a range of climatic conditions: (1) variable midlatitude climate conditions, (2) land and land-sea-ice arctic climate, and (3) the tropical warm pool in the western Pacific Ocean. In addition, two ARM Mobile Facilities (AMF) are deployed for short-term field campaigns (approximately 1 year) at sites around the world. The locations of the ARM permanent research sites are shown in Figure 1. Details on the specific nature of each site at the instrumentation at each can be found on the ARM web site at <http://www.arm.gov/instruments/>.



**Figure 1.** Locations of ARM Fixed Sites and Mobile Facility Deployments.

### 4.1 Southern Great Plains

The SGP site consists of in situ and remote sensing instrument clusters arrayed across north-central Oklahoma and south-central Kansas. The ARM SGP site is the largest and most extensive climate research field site in the world and can be viewed as a real observatory. The site includes a Central Facility with extensive core instrumentation. Routinely operating instruments at the Central Facility include one of only two continuously operated Raman lidars in existence; millimeter-wavelength cloud radar, micropulse lidar, microwave radiometer, and multiple radar wind profilers. These remote sensors are augmented by state-of-the-art surface radiation measurements, balloon-borne atmospheric profiling,



and dutiful surface latent and sensible heat flux measurements. Additional subsets of instrumentation are situated at extended facilities distributed across the SGP site. In addition to the study of clouds and radiation, scientific activity ongoing at the SGP site includes studies of the carbon, water, and energy cycles at the landscape scale and aerosols. Because the SGP site contains one of the largest collections of ground-based remote sensors and continuous measurements for atmospheric research in the world, it is an ideal site for major collaborative field projects.

## **4.2 North Slope of Alaska**

The NSA site provides data about cloud and radiative processes at high latitudes. Routinely operating instruments include millimeter-wavelength cloud radar, micropulse lidar, a number of radiometers, and other instruments for atmospheric profiling and measurements of surface meteorology. Data from these instruments are being used to understand cloud processes in the Arctic and to refine models and parameterizations as they relate to Arctic climate. The site consists of a facility at Barrow, Alaska, which includes a subset of the instruments available at the SGP Central Facility.

The NSA site provides a test bed for studies of climate change at high latitudes. In this region, ice (including snow) is the predominant form of condensed water most of the year, both in the air and on the surface. Ice and snow scatter, transmit, and absorb sunlight and radiant heat much differently than water. There is very little water vapor in the atmosphere, changing the impact of the atmosphere on the propagation of radiant energy, particularly radiant energy propagating upwards from the surface, and on the performance of some atmospheric remote sensing instruments. The major "pumps" for the global ocean currents are at high latitudes, and there is good reason to believe that those pumps will be affected by climate-related changes in the atmosphere. High-latitude atmospheric processes over both land and sea must be characterized for incorporation into global climate models.

## **4.3 Tropical Western Pacific**

The TWP site includes an area at the equator near Indonesia. This region of the world plays a large role in the inter-annual variability observed in the global climate system. For instance, the El Niño/Southern Oscillation phenomenon has far-reaching implications for weather patterns over much of the Northern Hemisphere, and perhaps the entire planet. The TWP consistently has the warmest sea surface temperatures on the planet and is referred to as the Pacific "warm pool." The warm pool supplies heat and moisture to the atmosphere above it, resulting in the formation of deep convective cloud systems, which in turn produce high-altitude cirrus clouds that spread out over much of the region. The TWP site is composed of facilities at Manus Island in Papua New Guinea; the island Republic of Nauru; and Darwin, Australia. Data are transmitted continuously from each site by satellite relay for distribution and archival. Instruments at each of the TWP facilities include millimeter-wavelength cloud radar, a micropulse lidar, a number of radiometers, and other instruments for atmospheric profiling and measurements of surface meteorology. The Darwin site instrumentation suite includes the second of the two continuously operated Raman lidars in existence.

## **4.4 ARM Mobile Facility**

The ARM Mobile Facility (AMF) has been designed to explore science questions beyond those addressed by ARM's current fixed sites at the SGP, NSA, TWP locales. With instrumentation and data systems similar to the fixed sites, the AMF is deployed to locations around the world for campaigns lasting 6 to 18 months. It is designed to operate in any environment, from the cold of the poles to the heat of the tropics. Proposed deployment sites are reviewed by the ARM Science Board based on an evaluation of the scientific and collaborative opportunities as well as projected demands on available resources.

AMF1 was initially developed in 2005 and has been deployed to Point Reyes, California; Niamey, Niger; Heselbach, Germany; Shouxian, China; and the Azores, Portugal. AMF2 is experiencing its first deployment to the Storm Peak Laboratory near Steamboat Springs, Colorado. AMF2 has similar capabilities to the first but is designed to be more modular and is capable of being deployed in more difficult environments, including onboard research vessels.

## **4.5 ARM Aerial Facility**

As an integral measurement capability of the ARM Facility, the ARM Aerial Facility (AAF) provides airborne measurements required to answer science questions proposed by the ASR Science Team and the external research community. Aircraft choice is dictated by science requirements—such as the required measurements and desired flight profile—and aircraft availability. Multiple aircraft are available to address the wide range of aircraft measurement requirements associated with atmospheric science issues. Data obtained from the aircraft are documented, checked for quality, integrated into the ARM Data Archive, and made available in a timely and consistent manner for use by the scientific community.

# **5.0 Management Structure**

The ARM Facility management structure is designed to provide representation of the diverse facility components and representation of the user community (see Figure 2). The facility components are managed on a day to day basis by Infrastructure Management Board. Since 1992, the use of ARM facilities has been dominated by ARM and ASR-related activity, but with clearly distinguishable groups of collaborators (users) loosely related to ARM and ASR or not at all. The facility science board reviews major proposals to use the facility and includes membership from both ASR and non-ASR scientists to represent this diverse user community.

## **5.1 DOE ARM Program Manager**

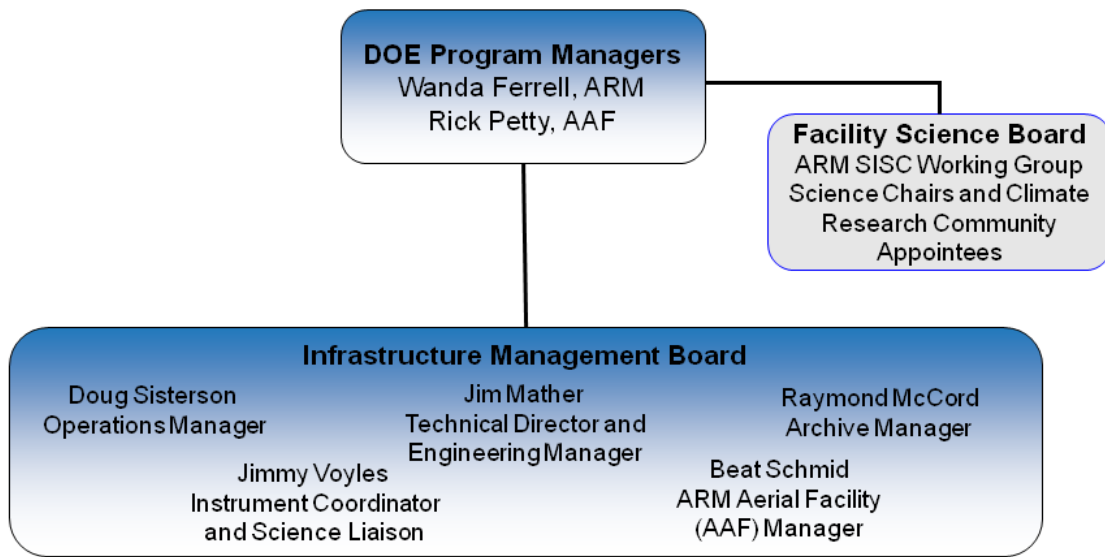
The DOE Program Manager directs and empowers the ARM budgeting, planning, coordination, and management of activities within the ARM structure.

## **5.2 Infrastructure Management Board**

The Infrastructure Management Board (IMB) consists of the Technical Director, Operations Manager, Archive Manager, Aerial Facility Manager, and the Science Liaison. These positions are described

below. The members of the IMB are responsible to DOE management for their respective ARM Facility components and serve as the primary points of contact for their respective areas. The IMB meets with the DOE Program Managers (usually via teleconference) on a weekly basis to discuss a broad range of matters pertaining to the management of the ARM Facility. The IMB is responsible for the overall ARM budget that is proposed to the DOE Program Managers for review and approval. The IMB assesses the impacts of all requests for use of the ARM Facility and screens science requests for use of the ARM Facility prior to consideration by the Science Board. It also provides information regarding the feasibility, cost, and facility impact associated with each request. The IMB works with DOE management on strategic planning using input from the user community as guidance for how to best configure the facility to serve research needs. The IMB Charter can be found in Appendix B.

## ARM Climate Research Facility Management



**Figure 2.** ARM Climate Research Facility Management.

### 5.2.1 Technical Director

The Technical Director is the chair of the IMB and is the primary point of contact for the ARM Facility. The Technical Director is responsible for coordinating the evaluation of the costs, logistics, and other requirements associated with full proposals for field campaigns at the ARM Facility before they are brought before the Science Board for discussion. The Technical Director works with the ARM Science Liaison on discussions regarding projects that are under consideration by the Science Board. The Technical Director provides the engineering services required for the operation and enhancement of the facility. The Technical Director is responsible for overseeing the implementation of user requirements with the Operations and Archive Managers, and the ARM Science Liaison. The Technical Director is also responsible for making sure that DOE User Facility policies (<http://www.er.doe.gov/ober/facilities.html>) are followed.

## **5.2.2 Operations Manager**

The Operations Manager is responsible for ensuring efficient, effective, and continuous operation of instruments and data systems. The Operations Manager helps to develop cooperative relationships with international, regional, and local governments in order to develop and operate fixed and mobile sites. The Operations Manager ensures that field operations are conducted in accordance with DOE and laboratory applicable safety and security policies. The Operations Manager is responsible for maintaining the User Reporting system.

## **5.2.3 Archive Manager**

The Data Archive Manager is responsible for the proper storage and access of all user facility data.

## **5.2.4 Science Liaison**

The ARM Science Liaison is responsible for coordinating the overall field campaign screening process within the IMB. The Science Liaison serves as the communication link between the IMB and the Science Board. The Science Liaison works with the IMB to promote the use of the ARM Facility by the external scientific community and to resolve user issues that might arise regarding external science projects conducted at the ARM Facility.

## **5.3 IMB Support**

### **5.3.1 User Facility Support Administrator**

The Support Administrator assists with the processing of pre-proposals and proposals for use of the ARM Facility. The Support Administrator is also responsible for assisting with administrative issues related to the DOE requirements for National User Facilities. This includes such tasks as preparing facility statistics and processing foreign visitor requests. The representative of the User Facility Support Administrator team attends the annual DOE User Facility Administrator's meeting along with a member of the IMB to learn about new policies for DOE User Facilities.

### **5.3.2 Financial Administrator**

The Financial Administrator is responsible for working with the IMB to formalize and track the integrated ARM budget plan.

## **5.4 Science Board**

The objective of the ARM Science Board is to ensure that the best quality science is conducted at the DOE User Facility known as the ARM Climate Research Facility. The goal of the User Facility is to serve scientific researchers by providing unique data and tools to facilitate scientific applications for improving understanding of climate science.

The function of the ARM Science Board is to review proposals for use of the ARM Facility. These proposals may be submitted by members of the ASR Science Team or by any other interested users of the facility, including the U.S. government agencies engaged in scientific research, colleges and universities, and other interested international scientific and educational bodies. The Science Board coordinates with the ARM IMB to assess the availability and resource requirements of the proposed facility usage. The ARM Science Board considers facility usage proposals in a timely manner to assist the scientific investigators with their proposals for funding from their prospective funding agencies.

The ARM Science Board consists of eleven members. The Board is chaired by a respected scientist in the field of climate science or a related science who is appointed by the DOE ARM and ASR Program Managers. In addition to the Chair, the Science Board includes five members from the ASR Science and Infrastructure Team Steering Committee who represent the interests of ASR and five members who represent the interests of the broader scientific community. The DOE ARM and ASR Program Managers appoint Board members. Board business is conducted mostly by e-mail correspondence, but the Board meets formally on an annual basis. Board correspondence and meetings are facilitated by the ARM Science Liaison. Significant access requests may be deferred to consideration at the annual meeting. The Science Board Charter is contained in Appendix A.

## **6.0 Logistics for Users**

The ARM Facility is managed as a DOE User Facility despite its geographic displacement from major DOE installations. DOE guidelines for visitors and access are followed in all cases. Formal procedures are used to accommodate users at the ARM sites. Activities at the ARM Facility fall under the DOE's safety and security policies. Therefore, requests for visits and data accounts on user data systems by foreign nationals require substantial lead time for approval.

There are several major types of activities conducted by users. These include:

- A request for data from the Archive
- A visit to a site (real or virtual)
- A field campaign.

### **6.1 Requests for Archived Data**

Any scientist can request data from the Archive. The request process includes the creation of an "Archive account." The creation of Archive accounts is user-initiated through the archive user interface accessible from the web. This account creation provides ARM with information about how to contact the user (email, phone number, etc.) and their affiliation (educational status, institutional status, etc.). The Archive keeps detailed records about data requests that enable future reports about "who uses how much of which data types from where and what time periods." The Archive also generates monthly reports summarizing the data volumes requested and the size of the active user community. Data from both routine and field campaign measurements are accessible, and data access is monitored by Archive operations.

## **6.2 Site Visits (Real or Virtual)**

A request for a site visit or an account on a site data system is submitted using the Site Access Request System (SARS). SARS is a collection of web-based tools used by ARM to provide advance notice of on-site visits to site managers in order to coordinate support. The system also provides the means for applicants to request and for administrators to manage access to onsite and offsite computer facilities (virtual access). Using SARS allows users to easily communicate their needs to ARM site managers and operations staff for site support and network or remote access. It also provides a method of continuing communications with ARM personnel if requirements change or if unforeseen complications or issues arise. There are several types of Site and Computer Access Requests that can be made. All forms are found on the ARM website and should be submitted online.

### **6.2.1 Physical On-Site Visit Request**

A physical request submission (SARS form) is required to visit an ARM site. Advance notice of a site visit through this form is necessary to ensure the safety of on-site visitors, to help provide whatever support is needed during the visit, and to make the experience of the visitor as productive and pleasant as possible. This form also is necessary for scheduling the activities of site staff.

### **6.2.2 Request to Connect a Visiting (On-Site) Device (PC or Instrument) to an ARM Network**

A special form is used for requesting access to an ARM network. A SARS form is also used for requesting permission to connect a PC, instrument, or other device to an ARM site network whether the requester will be present at the site or not.

### **6.2.3 User Account Request**

A User Account Request submission is required to request a user account on a system at the Data Management Facility (DMF) or at an ARM site. The DMF is the recommended location to get near real-time access to ARM datastreams. The accounts at ARM sites are intended to provide local on-site support for visiting scientists and engineers using the facilities for scientific research, for ARM infrastructure staff, or for users requiring access to local instruments. These accounts are approved for a limited time frame.

### **6.2.4 Remote (Off-site) Network Access to any Instrument or Computer System at an ARM Climate Research Facility**

This type of submission should be used to request network access to a system located on an ARM facility from a location outside the facility.

## **6.3 Field Campaign**

A field campaign (also known as an intensive operational period, or IOP) is a research activity that is proposed, planned, and implemented at one or more research sites. Any ARM Facility activity that requires an augmentation in the routine data acquisition operation of a site is designated a field campaign

for management purposes. Management procedures related to field campaigns are described on the [ARM website](#). Research activities are designated as field campaigns if they have the potential to change the routine operational procedure at any of the research sites, even for a short period of time. The support of guest instrumentation at a research site is considered a field campaign. A major field experiment that might include ships or aircraft activities at or near a research site requires extensive planning of a year or more. Deployments of the AMF are also characterized as field campaigns. Information and guidelines about proposing field campaigns can be found at <http://www.arm.gov/campaigns/submit-proposals>. To request changes in routine data acquisition or to test and validate new instruments, users must submit a preproposal. Information on the preproposal process can be found in the [Field Campaign Guidelines](#) available on the ARM website. The online preproposal form can be found on the ARM website at <http://www.arm.gov/campaigns/propose>.

Although it is a policy to not loan out spare ARM instruments to users, the preproposal form should be used for a case-by-case review of the unusual circumstance involving ARM instruments.

Preproposals are routed to the ARM Science Liaison, who contacts the IMB for preproposal screening. The IMB is responsible for reviewing preproposals and related facility infrastructure needs and making recommendations on whether a full proposal should be requested. Preproposals are categorized based on the level of logistical and financial support requested and the extent to which the request might impact ongoing scientific activities. The lead scientist on a preproposal is notified several weeks after submitting the preproposal as to whether a full proposal will be requested or not. Once a full proposal is submitted, the IMB provides further information regarding costs and logistics for presentation to the ARM Science Board. Proposals are reviewed by the ARM Science Board based on scientific merit and the feasibility and costs associated with User Facility use. The Science Board then makes a recommendation to the DOE Program Manager on the scientific merit and priority of the proposed research.

## 7.0 User Reporting Requirements

All data and data products that result from ARM-supported research are generally archived (with appropriate documentation) in the ARM Data Archive. ARM-supported data are required to be submitted and are maintained as part of the permanent ARM Data Archive. Other data resulting from use of the ARM Facility are archived by collaborative agreement with the ARM Facility, especially if the data can be useful to a broader scientific community. ARM's data policy is derived from the policies of the U.S. Global Change Research Program (USGCRP), which encourages "free and open" access to data and research results.

Data from instruments temporarily installed at a site can also be temporarily archived and made available to a limited group of researchers who are in collaboration with the principal investigator. This restricted sharing of data is only temporary. In the long term, this Archive provides access to all data and data products developed through ARM. It includes data from field campaigns and from special studies at each of the sites and deployments of the AMF and AAF. Data submitted to the Archive undergo strict review to ensure that only high-confidence data are accessible from the Archive. This requires that data are of known, reasonable, and documented quality and available in a timely manner.

Data archival and release for the ARM Facility are pursuant to the USGCRP as described on the USGCRP website: <http://www.globalchange.gov>.

- Continuing commitment to the establishment, maintenance, validation, description, accessibility, and distribution of high-quality, long-term data sets.
- Full and open sharing of the full suite of global data sets for all global change researchers.
- Preservation of all data needed for long-term global change research.
- Data archives that include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.
- Use of national and international standards to the greatest extent possible.
- Provision of data at the cost of reproduction to global change researchers in the interest of full and open data access.
- For programs in which selected principal investigators have initial periods of exclusive data use, data should be made openly available as soon as they become widely useful. In each case, the funding agency should explicitly define the duration of any exclusive use period.

## 8.0 Education and Outreach

### 8.1 Education Program

The ARM Facility supports education and outreach efforts in communities located near its research sites. The mission of ARM Education and Outreach is to promote science education and increase climate change awareness by focusing on three goals: student enrichment, teacher support, and community outreach. The educational efforts require that science education needs of schools at each host site be identified and addressed individually in order to provide the most benefit to existing science curricula. These unique cultures pose various challenges to an integrated approach to education. To meet these challenges, the Education Team has been successful in providing lesson plans, educational materials, and information kiosks that incorporate climate science as well as basic scientific knowledge and perspectives. Ongoing development of culturally relevant lesson plans, teacher training, and presentation materials make up a new set of lesson plans at all sites. These materials include computer kiosks in Barrow, Alaska; Nauru; and Manus. ARM encourages visitation to the climate research sites and use of ARM data by educators and students or the use of the ARM education and outreach website (<http://education.arm.gov>). Requests for educational site visits may be made directly to the Site Manager using the Site Access Request Form.

### 8.2 Outreach Program

The primary goal of the ARM Outreach Program is to develop awareness of ARM activities and the ARM Facility and to relay scientific results and successes to students and to general audiences. The Outreach Team regularly updates the ARM website to include current events and activities at ARM sites, new research results, and a compilation of summaries of published ARM research results or other significant



ARM accomplishments. The Outreach Team facilitates prompt and comprehensive responses to inquiries and information requests from scientists and agency personnel and publicizes successful ARM research stories in appropriate venues. Communication specialists develop materials that provide up-to-date information on instrumentation, data, and project results from ongoing science at the ARM sites. The Outreach Team also makes presentation materials available for ARM users to use at meetings and other scientific venues.

## **Appendix A**

### **Charter for the ARM Climate Research Facility Science Board**

#### **A.1 Objective of the Science Board**

The objective of the ARM Science Board is to promote the Nation's scientific enterprise by ensuring that the best quality science is conducted at the U.S. Department of Energy (DOE) User Facility known as the Atmospheric Radiation Measurement (ARM) Climate Research Facility. The goal of the User Facility is to serve scientific researchers by providing unique data and tools to facilitate scientific applications for improving understanding of climate science.

#### **A.2 Function of the Science Board**

The function of the Science Board is to review proposals for use of the ARM facility. These proposals may be submitted by the ASR Science Team or by any other interested users of the Facility, including U.S. government agencies engaged in scientific research, colleges and universities, and other interested international scientific and educational bodies. The Infrastructure Management Board determines the availability and resource requirements of the proposed facility usage for consideration of the Science Board in its review. While the ARM Facility does not provide direct funding for scientific research, small amounts of funding might be provided to allow the facility to assist with logistics, the development of datastreams and archiving, and other activities associated with the facility usage. The Science Board will consider facility usage proposals in a timely manner to assist the scientific investigators with their proposals for funding from their prospective funding agencies.

Examples of proposals that will be considered by the ARM Science Board include the conduct of field campaigns using the ARM fixed sites, the ARM Mobile Facilities (AMF), and the ARM Aerial Facility. The Board may set up specialty teams to address particular issues under its mandate, e.g., logistics associated with use of the ARM Mobile Facility.

#### **A.3 Science Board Members**

The ARM Science Board consists of eleven members. The Board is chaired by a respected scientist in the field of climate science or a related science who is appointed by the DOE ARM and ASR Program Managers. In addition to the Chair, the Science Board includes four members from the ASR Science and Infrastructure Steering Committee (SISC) who represent the interests of the ASR Program and five members who represent the interests of the broader scientific community. All Board members will serve a term of two years, and this term is renewable. In order to have the members serve overlapping terms, some members may initially be selected to begin as a second-year member with his or her term automatically renewed for two more years (i.e., the member is initially appointed to serve for three years). The DOE ARM and ASR Program Managers will appoint all Science Board members.

The U.S. Department of Energy will provide financial support for the ARM Board. Board members will have their costs reimbursed through agreement with the Department of Energy.

#### **A.4 Science Board Meetings and Communications**

The Board will meet at a minimum once a year, and in addition, it may meet at such times and places as determined by its members. Most communications are expected to take place via email and conference calls. The Board will work by consensus of its members, and disputes will be mediated by the Chair in conjunction with the DOE Program Manager. Additional technical experts may participate in Board deliberations at the invitation of the members. The Support Administrator will be responsible for organizing meetings and teleconferences of the Science Board. The Science Liaison will serve as the Executive Secretary for the Science Board and will keep the minutes of the Board Meeting and serve as the liaison between the IMB and the Science Board.

## **Appendix B**

# **Charter for the ARM Climate Research Facility Infrastructure Management Board**

### **B.1 Objective**

The overall role of the Infrastructure Management Board (IMB) is to provide budgets for the ARM Facility and to assess facility needs and usage. The objective of the IMB is to provide fair and equitable distribution of available funds between the fixed site facility infrastructure costs, field campaigns and special projects, and mobile facility development and deployment. The IMB also assesses and proposes budgets for the future needs of the ARM Facility. The IMB plays a critical role in the effort to significantly increase the number of users of ARM beyond ASR Science Team members to help to fulfill the DOE mission for ARM to be a successful national user facility. An important function of the IMB is to ensure that the distribution of facility funds allows for the increase of new users without inhibiting the achievement of ASR scientific progress.

### **B.2 Function of the Infrastructure Management Board**

The IMB is responsible for the overall ARM budget that is proposed to the DOE Program Manager for review and approval. Budgets are determined based on the expected allocation of funds from the DOE Program Manager's office, the proposed costs of operating the user facility infrastructure, and the proposed costs associated with science requests. The IMB assesses the impacts of all requests for use of the ARM Facility. The IMB coordinates the screening of science requests for use of the ARM Facility prior to consideration by the Science Board and provides information regarding the feasibility and costs associated with the requests. Once a request has been sent to the Science Board for evaluation, the IMB provides to the Science Board detailed information regarding costs and resource use and potential impact on the ARM Facility. The IMB determines budget allocations for mobile facility development and deployment, field campaigns at the fixed sites, and individual user requests. Budgets will be tracked and maintained by the ARM Financial Administrator.

### **B.3 Membership of the Infrastructure Management Board**

The IMB will consist of the ARM Technical Director (voting), the Operations Manager (voting), the Archive Manager (voting), the ARM Aerial Facility Manager (voting), and the Science Liaison (voting). The IMB is supported by the ARM Support Administrator (non-voting).

The ARM Technical Director is the Chair of the IMB and is the primary point of contact for the ARM User Facility. The Science Liaison is responsible for coordinating the valuation of the costs, logistics, and other requirements associated with full proposals at the ARM Facility before they are brought before the Science Board for discussion. The Technical Director will work with the Science Liaison on discussions regarding projects that are under consideration by the Science Board. The Technical Director is responsible for overseeing the implementation of user requirements with the Operations Manager,

Archive Manager, the Science Liaison, and the User Facility Support Administrator. The Technical Director provides the engineering services required for the operation and enhancement of the facility. The Technical Director is also responsible for making sure that facility policies are being followed.

The Operations Manager is responsible for ensuring efficient, effective, and (to the extent possible) continuous operation of instruments and data system; ensuring cooperative relationships with international, regional, and local governments; and ensuring that field operations are conducted in accordance with DOE, laboratory, and applicable safety and security standards. The Operations Manager is responsible for maintaining the User Reporting System.

The Archive Manager is responsible for the proper storage and access of all user facility data.

The Science Liaison serves as the Liaison between the IMB and the Science Board. The Science Liaison works with the Technical Director to promote the use of the ARM Facility by the external scientific community and to resolve User issues that might arise regarding external science projects conducted at the ARM Facility.

## **B.4 ARM Coordination**

Science requests to use the ARM Facility will be submitted via the preproposal process. The Science Liaison has overall responsibility for the field campaign preproposal process. The Support Administrator team documents and tracks the preproposals and forwards them to the IMB for screening before they are brought to the Science Board for review and evaluation. In addition, the Site Manager and Site Scientist for the site or sites involved in an ARM request may participate. Once a science request has passed the screening process, a full proposal is requested. The science project will then be brought to the Science Board for consideration and will also be forwarded to the IMB to assess the cost impact of the proposed work. All science requests will be tracked and their status updated as needed. The Support Administrator team will be responsible for working with the Technical Director to organize meetings and teleconferences of the IMB and the Science Board. The Support Administrator team is also responsible for assisting with the reporting of user facility performance metrics, reports, and other reporting requirements set by the DOE Program Manager.



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