

MEMORANDUM OF UNDERSTANDING

Between the
State of New Mexico
&
City of Albuquerque
&
The United States Air Force
&
Public Service Company of New Mexico
and
The United States Department of Energy
Office of Energy Efficiency and Renewable Energy

Whereas, the State of New Mexico serves as water resource management for that state; and

Whereas, the City of Albuquerque is responsible for waste water distribution and treatment for Kirtland Air Force Base (Kirtland AFB) as well as for water distribution to the City from

the Albuquerque aquifer; and

Whereas, the United States Air Force operates and maintains Kirtland Air Force Base and utilizes site wells drawing water from the Albuquerque aquifer; and

Whereas, Public Service Company of New Mexico provides electric and gas service to Kirtland Air Force Base and has an interest in reducing water use that impacts demand on those resources; and

Whereas, the Department of Energy promotes the efficient use of energy and water resources through the Office of Energy Efficiency and Renewable Energy (EE/RE); and

Whereas, the Federal Energy Management Program (FEMP) is responsible for helping Federal agencies achieve energy and water savings goals and providing direct technical assistance and is working with the above parties in this regard; and

Now, therefore, it is resolved that the above parties shall work together to establish a water resource management plan, to install water efficient

technologies, and to implement efficient landscape irrigation practices at Kirtland AFB; and

Be it further resolved that technical resources from EE/RE's Sandia National Laboratory and National Renewable Energy Laboratory shall be utilized to identify technologies and facilitate the partnership; and

Be it finally resolved that these parties shall collaborate to develop information, educational materials, and technical transfer papers describing those technologies and practices

established at the site.

MEMORANDUM OF UNDERSTANDING

JOINT STATEMENT OF WORK

Federal Government Water Use Efficiency in Albuquerque, New Mexico

1.0 PARTIES

The partners in this joint project include Kirtland Air Force Base, City of Albuquerque, Sandia National Laboratories, State of New Mexico, Department of Energy's Federal Energy Management Program, the National Renewable Energy Laboratory, and Public Service Company of New Mexico. The Department of the Interior's Bureau of Reclamation will be acting in an advisory capacity on this project.

2.0 BACKGROUND

The Federal Government has been mandated by the Energy Policy Act of 1992 (EPACT) and Executive Order 12902 (March 1994) to reduce energy and water consumption in Federal facilities. In order to demonstrate water resource management and to utilize the diminishing ground water in the Middle Rio Grande Basin more efficiently, a partnership of Federal agencies, state and local governments, and the private sector is being formed. This project will develop a water resource management plan for Kirtland Air Force Base and associated Federal lands as

well as install water efficient technologies and efficient landscape irrigation practices at the site.

The partnership is outlined in this Statement of Work.

The goals of this partnership are:

- * to improve water efficiency at a large Federal site in an area of increasing water resource depletion;
- * to document water and cost savings for all methodologies used to reduce water use at the site;
- * to deploy United States manufactured water efficient technologies and stimulate their use throughout the Federal sector;
- * to demonstrate the effectiveness of public/private partnerships in working toward a common goal;
- * to develop a sense of responsibility at the Federal site and cooperation with the Albuquerque community to reduce water use from the Middle Rio Grande Basin aquifer.

3.0 OVERALL PURPOSE, OBJECTIVES, AND BENEFITS TO THE PARTIES

The purpose of this partnership is to implement and demonstrate the effectiveness of a combination of water resource management techniques at Kirtland Air Force Base.

- * The City of Albuquerque's (City) objective is to reduce water use in their system from Kirtland AFB as well as to manage better the water used from the diminishing Middle Rio Grande Basin aquifer.
- * The State of New Mexico's objective is to encourage efficient water use and management through support of appropriate demonstration projects and through public information, outreach, and technical assistance.
- * Kirtland AFB's objective is to become a model for Federal agencies by managing their water use better, saving water, waste water and energy costs and resources.
- * Sandia National Laboratories' (Sandia) objectives are to manage their water and energy use as well as to play a lead role in assisting in the management of resources in the Middle Rio Grande Basin, to include

identifying of appropriate technologies to do so.

* The Department of Energy's (DOE) objective is to assist Kirtland and other Federal agencies in reducing their water and energy consumption. The Federal Energy Management Program (FEMP) is charged with facilitating the reduction in both energy and water consumption at all Federal sites.

* The National Renewable Energy Laboratory's (NREL) objectives are to facilitate the partnership and to demonstrate the effectiveness of water use efficiency at Federal sites.

* The Public Service Company of New Mexico's (PNM) objective is to enable their customers to reduce the demand on their system by better managing end uses of water which require the use of electricity.

4.0 TECHNICAL OBJECTIVES

The technical objectives of this partnership are derived from the requirements in EPACT and the Executive Order and the present technology deployment and water conservation efforts within

the water device industry and the state and local governments. These objectives will be met by efforts made by all parties working jointly. The results of this partnership will include a report of various applications of water use management. The technical objectives are:

* to develop a water resource management plan for Kirtland AFB and associated Federal lands as a model water conservation site in the Southwest.

* to successfully install water conservation devices and implement efficient landscape irrigation practices by pursuing the feasibility of waste water reuse.

* to use various techniques--awareness and education, technology installation and monitoring,

and best management practices--to ensure that the site manages its water resource more effectively.

* to measure and publicize the benefits of resource conservation and environmental impacts of water use efficiency in this project.

* to protect ground water recharge areas and to participate in enhancement activities where practical.

5.0 INDIVIDUAL RESPONSIBILITIES

The approach to achieving the objectives stated above involves extensive collaboration between

all parties. Each party has roles and responsibilities; a synergistic effort to advance the deployment of water efficient technologies and practices is necessary to support the increased

use of these practices at Federal sites and to reduce Federal water use in Albuquerque. The overall responsibilities are defined here; detailed responsibilities are defined in subsequent

sections of this agreement.

The Department of Energy will provide resources available at their agency to facilitate the partnership. FEMP will coordinate, through NREL, the partnership and monitor the progress of the project. NREL will provide overall partnership facilitation and support--meeting, organization, document preparation, milestone development--as well as oversee training and publicity efforts. In addition, NREL will lead the writing of a technical paper and report detailing the process and results of this project.

The State of New Mexico will provide water conservation awareness and resource management information to the site as well as technical assistance when needed. The State can also provide educational and awareness materials to the tenants at the site.

The City of Albuquerque will assist the site in developing a resource management plan which can work in conjunction with existing conservation plans developed for the City of Albuquerque residents and businesses.

Sandia National Laboratories will establish a baseline of current water use and monitor

subsequent reductions in water use at the site to determine effectiveness of water management efforts. Sandia can also measure the impact on the Middle Rio Grande Basin Aquifer with a groundwater monitoring system. Sandia will participate in water conservation efforts at their

own site by developing and implementing appropriate technologies, by changing landscape irrigation practices to xeriscaping where practical, and by reviewing their industrial process

water use.

Kirtland AFB, with assistance from others, will develop their water resource management plan, install water efficient technologies and implement efficient landscape irrigation practices such as xeriscaping. Kirtland's goals should mirror the City of Albuquerque's plan for a 30% reduction in water use.

Public Service Company of New Mexico will support the overall water project by bringing in appropriate water service company partners who can finance the efforts and install water

efficient devices and systems. PNM has a representative located at the site who can assist Kirtland's water manager in implementing the resource management plan.

6.0 DESCRIPTION OF OVERALL PROJECT

To demonstrate new technologies and practices, they must be installed, maintained, operated, and monitored. In addition, the results of the installation must be effectively communicated to all parties and to others in the state, local, and Federal sectors as well as to the public and private community. This project covered by this Joint Statement of Work has three distinct area for activity: planning, execution, and documentation. Within each of these areas lie numerous tasks.

The objective of planning is to ensure that the resource management plan with technology installation and operation and behavior modification can be effectively implemented and that necessary and appropriate data to evaluate the actions will be obtained. Planning includes tasks related to plan development, site evaluation, alteration of operational and maintenance practices, equipment specification and delivery, and design of a monitoring and validation process.

The objective of execution is to obtain the data necessary to serve as a basis for an evaluation of technologies and changes in operational and behavioral practices. This includes operating and maintaining the site buildings and systems, monitoring performance and the acquisition of data,

and distributing educational and awareness materials and training to the occupants at the site.

The objective of documentation is to record and present the results of the project and make them available. This includes preparation of interim and final results, and participation in activities to communicate the results of the project in support of technology deployment and a model for

water management at Federal sites. This would include following up on awareness campaigns

and documenting behavioral changes resulting from these efforts. All partners will have access

to any documentation collected during or resulting from the project.

A description of each of the tasks to be performed to meet these objectives is provided in Sections 7.0, 8.0, and 9.0. The partners having primary and secondary responsibilities are specified for each task. The anticipated deliverable for each task is also identified.

7.0 PLANNING

The planning effort includes those activities necessary to design this partnership project so that installation of technologies can be made, operational and flow data can be obtained, and a demonstration of the site as a Federal model can be developed. Planning includes any activity up to the point where full operation and plan implementation occur.

7.1 Water Management Plan Development

Develop an enhanced water resource management plan for the site to include surveying existing water delivery systems and uses, operational and maintenance practice changes, new and retrofitted equipment installation, and educational and awareness strategy for tenants at site.

The plan should also include a mechanism for measurement of technical effectiveness as well as a cost-benefit analysis for implementation of all changes.

Primary Responsibility: Kirtland AFB

Secondary Responsibility: City, Sandia, FEMP/NREL, PNM, State

Deliverable(s): Water Resource Management Plan for Kirtland AFB

7.2 Site Evaluation

Obtain a description of the site, the existing building, process and grounds water using systems, with any available operational and maintenance logs and schedules. This should include previous audit reports, schematics, historical water consumption and billing information, sewage discharge and billing information, maintenance records, photographs, any necessary pre-implementation water use measurements, as well as other information required to portray the site as it currently exists. Secure all as-built drawings, including well details, drainline sizes, slopes, and conditions. Develop typical use pattern of residential units by spot metering a portion of these buildings.

Primary Responsibility: Kirtland AFB, Sandia

Secondary Responsibility: City, PNM, FEMP/NREL

Deliverable: A report detailing the baseline water consumption of the site, historical water usage, and water systems that focuses on buildings, landscape irrigation, processes, and water systems to which any changes will be made.

7.3 Operational and Maintenance Schedules

Develop a schedule of any changes in operation of water using devices, equipment, or processes at the site. Determine as well any repairs or alterations that must be made prior to installing any new or retrofit technologies. For example, prior to installing controls on a given irrigation system, all head pressures should be adjusted and heads repaired so that the control strategy will function and save water as intended.

Primary Responsibility: Kirtland AFB

Secondary Responsibility: PNM, Sandia

Deliverable(s): A schedule of changes in operations and maintenance practices which will influence the water use at the site. Prior to installation of controls or new equipment, existing equipment should be repaired and in acceptable working condition.

7.4 Equipment Specification and Delivery

Any new or retrofit technologies should be identified in accordance with the water resource management plan and ordered for delivery to the site. Federal procurement regulations should be applied if purchased directly by the site.

Primary Responsibility: Kirtland AFB

Secondary Responsibility: Sandia, PNM

Deliverable(s): New or retrofit technologies identified and ordered to be installed at the site.

7.5 Water Management Monitoring Design

Develop a plan to monitor the progress of the project in terms of water and wastewater savings, operation and maintenance effectiveness, and impact on the Middle Rio Grande Basin aquifer. Use site baseline figures as well as existing United States Geological Survey statistics to develop metrics for plan.

Primary Responsibility: Sandia

Secondary Responsibility: Kirtland AFB, FEMP/NREL

Deliverable(s): Report detailing plan to monitor effectiveness of water resource management plan--customer satisfaction, equipment operation, and water delivery.

8.0 EXECUTION

The execution effort includes those activities necessary to operate, maintain, monitor, and document the performance of technologies and changes implemented as a result of the water resource management plan and to ensure information on the progress and results associated with the project are made available to all partners in the project.

8.1 Operation and Maintenance

Operate and maintain any new or retrofitted technologies as defined by the

manuals and training provided by the manufacturers, commensurate with the building use, the intended purpose of the technologies and other requirements of the facility manager. This data must be logged with sufficient accuracy to permit detailed cost and reliability analyses to be carried out. In addition, this includes maintaining a log of all O&M activities, parts and materials usage, labor costs, and downtime associated with maintenance of any new technologies.

Primary Responsibility: Kirtland AFB

Secondary Responsibility: Sandia, PNM

Deliverable(s): Report quarterly on operation and maintenance of new or retrofitted equipment at the site.

8.2 Performance Monitoring and Data Acquisition

Monitor the operation of technologies and other building and system functions pursuant to Section 7.4. This includes acquisition of all data (at specified intervals) that is defined as critical to technology or project performance monitoring, and conduct data verification tests to ensure that accurate data is being obtained. Implement all quality assurance program tasks associated with performance and systems and maintenance data acquisition. Poll tenant satisfaction and document behavior modifications as result of the project.

Primary Responsibility: Kirtland AFB, Sandia

Secondary Responsibility: FEMP/NREL

Deliverable(s): Quarterly status report on the testing and data acquisition effort.

8.3 Data and Impact Analyses

Determine savings level to be achieved based on established baseline. Analyze performance and operation and maintenance data to determine the performance, water savings, operating costs, energy use, environmental benefits, and life cycle costing associated with the measures implemented in the water management plan. Measurements should be analyzed from end use, site use, and aquifer use levels with reports detailing impacts on each.

Primary Responsibility: Kirtland AFB, Sandia

Secondary Responsibility: City, FEMP/NREL

Deliverable(s): Preliminary (six months, one year) and final reports (second year) containing results of the data analysis for the entire test period.

8.4 Awareness and Training

Develop awareness and education campaign for site using existing resources available through the State of New Mexico Engineer's Office and the City of Albuquerque. Awareness should reach both residential and commercial tenants, while training would apply for the most part to residential occupants and facility management personnel. Training could include how to xeriscape a lawn, how to set up irrigation systems, how to install and maintain water savings devices.

Primary Responsibility: Kirtland AFB, State of New Mexico

Secondary Responsibility: City, FEMP/NREL, Sandia

Deliverable(s): Plan for awareness campaign as well as for training for both residential and commercial occupants at site.

9.0 DOCUMENTATION

Documentation includes those efforts necessary to record project activities, evaluate the project, determine the level of success, and present the ensuing results of the project. This documentation shall be made to all project partners.

9.1 Interim and Final Reports

The data acquisition pursuant to Section 8.2 and the analysis conducted pursuant to Section 8.3 will make it possible to report on the results of implementation of the water resource management plan. Prepare a report detailing benefits of this type of plan--the technologies installed, the operational and maintenance changes completed, and the awareness and educational materials developed--to the rest of the Federal sector. Describe the "before" condition of the site as well as the performance data, water use, waste water savings, assumptions used in analyses, operating costs, system reliability, service quality, and tenant satisfaction. Describe also the benefits

of this project to the Albuquerque area outside of the Federal sector which can impact other Southwestern watersheds in the same situation.

Primary Responsibility: FEMP/NREL

Secondary Responsibility: Sandia, PNM

Deliverable(s): An interim report one year from start of the project and a final report two years into the project which can be used to describe the effectiveness of the project from both a Federal perspective as well as a Southwestern perspective.

9.2 Communication Strategy

Develop a media campaign as well as a series of technical publications which can either highlight or detail the project, depending on the audience. The media campaign can be targeted at the Albuquerque area as well as to the Federal government and a national water conservation strategy. Technical publications should emphasize the importance of partnerships in completing high quality projects and the benefits to replicating these projects at other sites and in other parts of the country.

Primary Responsibility: FEMP/NREL, Kirtland AFB

Secondary Responsibility: State, City

Deliverable(s): Comprehensive media campaign with press releases and a videotaped story for public interest. Technical papers should target industry publications impacting sectors represented by all partners (utilities, Federal customers, State, and local water offices).

10.0 PROJECT SCHEDULE AND RESPONSIBILITIES

The following schedule shows each of the tasks in Sections 7.0, 8.0, and 9.0 with the start date of each task. It also shows critical events, or milestones, as well as the primary and secondary responsibilities for each task along the critical path of the project.

JSOW Section	Primary Responsibility	Secondary Responsibility	Start Date	Duration	Milestone
7.1 Water Plan	Kirtland	City, FEMP, PNM, Sandia, State	10/24/95	18 months	10/24/95

7.2 Site Baseline	Kirtland, Sandia	City, PNM, FEMP	10/24/95	12 months	10/24/96
7.3 O & M Schedule	Kirtland	PNM, Sandia	1/1/96	12 months	1/1/97
7.4 Equipment	Kirtland	Sandia, PNM	10/24/96	12 months	10/24/97
7.5 Monitoring	Sandia	Kirtland, FEMP	10/24/96	12 months	10/24/97
8.1 O & M	Kirtland	Sandia, PNM	10/24/96	12 months	10/24/97
8.2 Data Acquisition	Kirtland, Sandia	FEMP	10/24/95	24 months	10/24/97
8.3 Impact Analysis	Sandia, Kirtland	City, FEMP	10/24/96	12 months	10/24/97
8.4 Awareness	State, Kirtland	City, FEMP, Sandia	10/24/96	24 months	10/24/97
9.1 Reports	FEMP	PNM, Sandia	4/24/96	18 months	10/24/97
9.2 Communication	Kirtland, FEMP	State, City	4/24/96	18 months	10/24/97

The program will initially be in place for 24 months following the execution of this Joint Statement of Work agreement, after which time the project funding will be assessed. NREL will be responsible for tracking the progress of each task.

11.0 KEY PERSONNEL

The technical contacts for each party are listed below (ed. note: the following contact list has been updated since the MOU was signed):

Party		Contact Person	Telephone Number
City of Albuquerque, New Mexico		Jean Witherspoon	505/768-3633
State of New Mexico	Water Conservation Program	Alice Darilek	505/827-3879
Kirtland Air Force Base	Base Energy and Water Manager	Lt. Randy Whitecotton	505/846-2278

Public Service Company of New Mexico		Randy Ortgiesen	505/848-4497
Sandia National Laboratory		Dennis Engi	505/845-8284
Department of Energy	Federal Energy Management Program	Kate McMordic	505/899-3609
National Renewable Energy Laboratory		Stepanie Tanner	202/646-5218

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