Atmospheric Radiation Measurement Program

Facilities Newsletter – May 1999

Okmulgee — The Wooded Site

Of the 24 developed extended facilities throughout the ARM SGP CART site, one is unique. The Okmulgee site is located in the forest at the Okmulgee State Park, five miles west of Okmulgee, Oklahoma.

A top priority of the ARM Program is to obtain measurements in a wide variety of meteorological conditions over the CART site. Measurements of surface energy fluxes, temperature, and solar radiation are needed over differing land surfaces, including forest, to represent the vegetation in and around the CART site accurately. Other extended facilities are located over wheat, pasture, rangeland, alfalfa, and native prairie.

Figure 1. The Okmulgee tower.

Okmulgee State Park contains 535 acres housing 100 campsites, and 6,436-acre Okmulgee Lake offers recreation such as boating, fishing, and water skiing. Standing inconspicuously in the trees near the park manager's residence is the Okmulgee tower. The site was selected because of its consistent canopy of mixed deciduous trees. Installation of a 60-foot tower proved to be quite a task after the soil was discovered to be only four inches deep, overlying a shale bedrock. Workers spent an entire day drilling four deep holes

ARM Facilities Newsletter is published by Argonne National Laboratory, a multiprogram laboratory operated by The University of Chicago under contract W-31-109-Eng-38 with the U.S. Department of Energy.

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into the shale for anchor mounts secured in concrete to stabilize the tower's four legs. Another day was needed to assemble and construct the tower, plus additional drilling to mount and attach guy wires to secure and stabilize the tower against high winds.

Figure 2. A view of Okmulgee Lake from the top of the Okmulgee tower.

A platform that will support the solar infrared radiation station (SIRS) above the tree tops sits at the peak of the tower. Three booms extending from the sides of the tower, about three feet below the top platform, will hold the eddy correlation (ECOR) system, the surface meteorological observation station (SMOS), and the downward-facing radiometers. All of the instrumentation is scheduled to be installed this summer. Currently, the top of the tower is 25 feet above the tree tops. This configuration will permit useful operation for approximately 10 years before the trees grow too close to the instruments.

Special precautions were taken to protect the all-aluminum tower and ARM employees from lightning and electrical shock. An air terminal mounted at the top of the tower is grounded at the base. Because traditional grounding rods could not be used in the shale bedrock, large, four-foot-square copper plates were buried underground as deep as possible, to dissipate any electrical surges. All of the fiber-optic data cables and the shelter at the base of the tower (which houses the electronic and computer equipment) are isolated from possible electrical damage.

To examine all possible aspects of global climate modeling and to stress those models to their limits, ARM scientists must obtain data in many different meteorological and surface conditions. This goal is being accomplished in part with data to be collected from the wooded site at Okmulgee State Park.