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Meteorological Monitoring at the Savannah River Site in 1995

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INTRODUCTION

The meteorological monitoring program at the Savannah River Site (SRS) has traditionally provided weather information for a variety of needs such as input for calculating the transport and diffusion of an accidental release of an atmospheric contaminant or applications which require a longer term data base representative of the local climatology[1]. These applications include dosimetric and air quality calculations, engineering analyses, environmental characterizations, and risk assessments. In today's shrinking budgetary climate, new initiatives for the SRS meteorological monitoring program are developing. These new initiatives and an overview of the meteorological monitoring program at the SRS are presented.

MONITORING NETWORK

Meteorological monitoring is conducted on a network of eight towers over the 300 square mile SRS (Figure 1). Tower siting was primarily based on the locations of the highest potential source terms on-site. The specific locations for the towers (Area towers) were chosen using the following requirements:

- located within 0.5-1.0 mile of the facility,
- situated above relatively undisturbed forest (SRS is primarily covered by forest),

- raised at similar mean sea level (MSL) elevations to the nearby facility,
- measurements taken at the major facility stack height of 61m above the ground surface to ensure representative dose calculations.

Additional meteorological instrumentation on the WJBF-TV tower near Beech Island, SC provides data at seven heights up to 304m. Another 61m tower (Central Climatology) was erected near the geometric center of the site in a cleared area so that near surface vertical profiles of several different variables could be measured.

INSTRUMENTATION

Instrumentation on the Area towers is located at 61m and 2m and is manufactured by Met One. At 61m, a model 1585 bi-directional vane (bivane) is used to make measurements of horizontal (azimuth) and vertical (elevation) wind direction and direct measurements of turbulence expressed as standard deviations of fluctuations about mean azimuth (σ_A) and elevation (σ_E) angles. Wind speed measurements are made with model 1564B cup anemometers. Platinum resistance probes, model T-200, measure temperature, and lithium-chloride resistance probes, model DP-200B, measure dew point. Both probes are housed within a fan aspirated solar radiation shield. A fan aspirated platinum resistance temperature probe is also mounted at the 2m level. In D area, an additional level at 36m is instrumented with a bivane and anemometer to measure local terrain induced wind flows.

Meteorological instrumentation on the WJBF-TV tower is located at 2m, 18m, 36m, 91m, 137m, 243m, and 304m. All levels above 2m are instrumented with a Climet model 012-8A bivane, model 011-1 cup anemometer, and a Rosemont model 78 temperature sensor in a wind aspirated housing. The 2m level is

instrumented with a fan aspirated temperature sensor only. The bivanes have been modified to improve their reliability and performance. Sensor exchanges on the TV tower are performed by professional climbers.

Central Climatology is equipped with Met One instrumentation at four levels (2m, 18m, 36m, and 61m) with an identical configuration as the 61m level of the Area towers. Atmospheric pressure, rainfall, evaporation, solar and long wave radiation, and soil temperature measurements are also made at Central Climatology.

A suite of detailed procedures are used to conduct semi-annual calibrations for all meteorological instrumentation[2].

DATA COLLECTION

Data acquisition is accomplished with analog-to-digital (A/D) circuit boards and digital transmission units (DTU) which supply instrument output voltage data to a central location, the Weather INformation and Display (WIND) System computers (VAX 8550's), via dedicated, conditioned phone lines. The A/D board and DTU located in the data building near the base of each tower send information every 1.5 seconds to a receiving DTU and then to the WIND System. Six-hundred data points per fifteen minute period are processed through range checks and acceptable values are used to create fifteen minute averages. Data are archived in a relational data base.

NEW INITIATIVES

Two Cooperative Research and Development Agreements (CRADA) with Met One Instruments have been created to develop an aerodynamically improved bi-directional wind vane and a fiber optic based measurement system for a wind

vane. In both cases, Met One is primarily responsible for developing prototypes which will then be tested at SRS in a wind tunnel and in the field. These agreements are part of an initiative to enhance U.S. manufacturing competitiveness by utilizing expertise available at DOE sites. Future meteorological monitoring initiatives are expected to involve mobile monitoring systems, field experiments, and community assistance with hazardous material safety systems and forecasting support.

ACKNOWLEDGEMENTS

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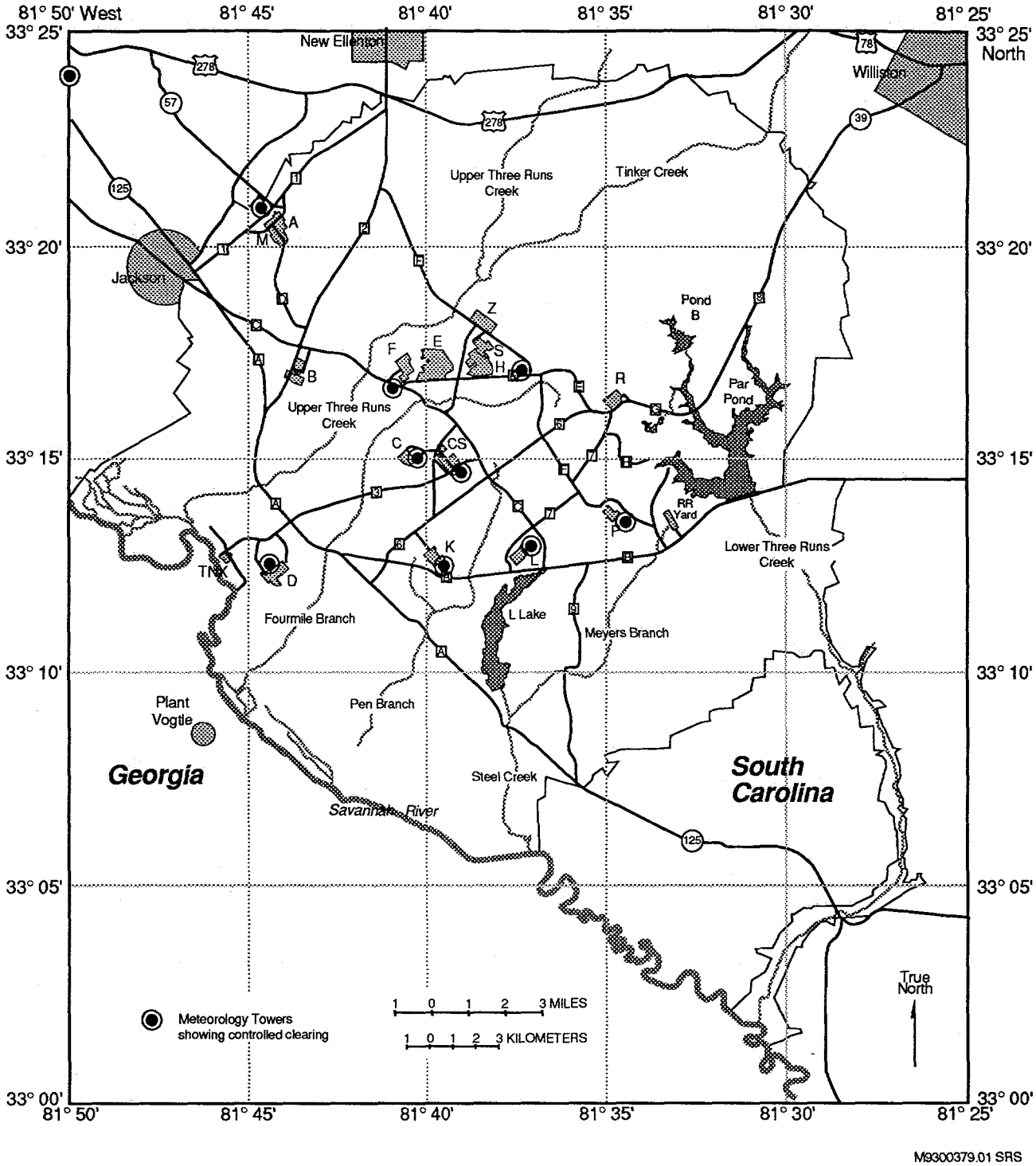

Figure 1. Meteorological monitoring tower network at the Savannah River Site.