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**TACTICS, TECHNIQUES,
AND PROCEDURES FOR
FIELD ARTILLERY
METEOROLOGY**

OCTOBER 2007

HEADQUARTERS, DEPARTMENT OF THE ARMY

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Tactics, Techniques, and Procedures for Field Artillery Meteorology

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Preface

This publication provides the United States Army and United States Marine Corps (USMC) commanders, artillerymen, and meteorology (MET) crew members with tactics, techniques, and procedures for the employment of MET sections. This publication describes the equipment and tasks required to develop MET data from the selection of the MET station location to the dissemination of the MET data.

This publication implements the following North Atlantic Treaty Organization (NATO) standardization agreements (STANAGs).

- STANAG 4044, *Adoption of a Standard Atmosphere.*
- STANAG 4061, *Adoption of a Standard Ballistic Meteorological Message.*
- STANAG 4082, *Adoption of Standard Artillery Computer Meteorological Message.*
- STANAG 4103, *Format of Request for Meteorological Message for Ballistic and Special Purposes.*
- STANAG 4140, *Adoption of a Standard Target Acquisition Meteorological Message.*
- STANAG 4168, *Characteristics of Hydrogen Generating Equipment.*

This publication applies to U.S. Army and Marine Corps planning and warfighting personnel, the Active Army, the Army National Guard/Army National Guard of the United States, and the United States Army Reserve unless otherwise stated.

The proponent of this publication is United States Training and Doctrine Command. Send comments and recommendations on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) directly to:

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U.S. Army Field Artillery School
ATTN: ATSF-DD
Fort Sill, OK 73503-5600

Chapter 1

Commander and Staff Considerations

Combat experience has proven the importance of providing accurate and timely meteorological data to both artillery and other units. MET sections provide data to enhance first round accuracy, effective downwind predictions, intelligence preparation of the battlefield, and forecast capabilities of the staff weather officer. The commander and staff must include meteorology in the planning process. The planning process focuses on what data is needed, who needs it, and how will they get it. Artillery meteorology, as one of the five requirements for accurate predicted fires, plays an increasingly vital role in today's changing operational environment. Accuracy of indirect fires increases the lethality and directly relates to other issues of strategic importance such as collateral damage.

1-1. Since MET is one of the five requirements for accurate and predicted fires it is considered part of the precision fires system of systems. MET sections provide data to enhance first round accuracy, effective downwind predictions, intelligence preparation of the battlefield, and forecast capabilities of the staff weather officer. The commander and staff who include meteorology in the planning process should always use the most accurate MET data available as it will benefit the most. The planning process focuses on what data is needed, who needs it, and how will they acquire it.

SECTION I OVERVIEW

NOTE: The U.S. Army Intelligence Center and Fort Huachuca is the proponent for Army general and tactical weather requirements, except those relating to artillery MET.

MISSION

1-2. The mission of the MET section is to produce and disseminate valid and timely MET data in formatted messages. Example messages and checking procedures are at appendix A. These messages are as follows:

- Computer
- Ballistic (type 2 and type 3)
- Target acquisition
- Target area MET (Meteorological Measuring Set–Profiler [MMS-P] only)
- Basic wind report (MMS–P only)
- Fallout MET (FOMET)
- World Meteorological Organization (WMO) messages
- Sound ranging messages to allied units.

U.S. ARMY MET SECTIONS

- 1-3. Under the modular structure, Army MET sections are deployed as follows:
- Each brigade combat team (BCT) will have one Fires Battalion that will include a MET section.
 - Each STRYKER Brigade will have one field artillery (FA) battalion (BN) that will include a MET section.
 - Each Fires Brigade will have three MET sections as part of the Target Acquisition Battery.

U.S. MARINE CORPS MET SECTION

1-4. The MET section is divided into four MET teams in an artillery regiment. These teams provide support to the battalions and batteries of the regiment. The teams are given tactical missions based on current as well as future operations.

MET SYSTEMS

1-5. There are two basic MET systems deployed throughout the field artillery: The Meteorological Measuring Set (MMS), AN/TMQ-41, and the Meteorological Measuring Set–Profiler (MMS–P), AN/TMQ-52. These systems are highly mobile, automated data processing and MET data acquisition systems. Both systems operate in any type of climatic condition and over any type of terrain where tactical operations require employment of FA. The preferred meteorological support assets during traditional maneuver warfare are the MMS-P and the MMS. Both systems are vehicle-borne systems. The MMS-P provides localized now-casts of atmospheric numerical weather predictions, whereas the MMS provides meteorological data to using units by tracking a balloon borne radiosonde, which provides vertical zoned atmospheric numerical meteorological output.

MMS (AN/TMQ-41)

1-6. The AN/TMQ-41 uses three passive modes to track a balloon-borne radiosonde that transmits the upper air data to the ground station. These are the radio navigational aid (NAVAID), radio direction finding (RDF), and Global Positioning System (GPS) modes. The NAVAID and GPS modes have a remote launch capability. The AN/TMQ-41 can track the radiosonde and process data while on the move.

MMS-P (AN/TMQ-52)

1-7. The AN/TMQ-52 uses mesoscale modeling (MM5) with 4-kilometer grid spacing granularity, as well as software coupled with the Unified Post Processing System (UPPS) to generate MET data upon request. The MM5 model ingests upper air data (NAVAID and GPS modes), surface observation data, terrain data, regional observations, and large scale weather data. The MM5 model also takes into consideration historical, topographical, climatological weather data, as well as vertical and horizontal resolutions. The resulting model output is transferred to the UPPS to eliminate model biases. The model restarts every 30 minutes, providing data with a staleness of no more than 30 minutes. Using this data, the MMS-P generates MET data for the mid point of the trajectory, which is based on the gun location and the target location as well as target area MET. Additionally, the AN/TMQ-52 is capable of operating in two degraded modes (see paragraph 1-9). Future block improvements to MMS–P include decreasing the reliance on radiosondes, decreasing the amount of section equipment, and decreasing the number of section personnel. The ultimate goal of profiler is to be imbedded on to the firing platform.

CAPABILITIES

1-8. The capabilities of the met section vary based on the specific system being used. Both systems provide met data for use by the field artillery. The mms system is the older system and operational concept is based on providing met data from radiosonde observations. The mms-p operational concept is based on the system ingesting a variety of sources of raw met input and producing met data via a model.