BY ORDER OF THE COMMANDER
AIR FORCE SPACE COMMAND

AIR FORCE INSTRUCTION 15-114

AIR FORCE SPACE COMMAND
Supplement 1

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Weather

WEATHER SUPPORT EVALUATION

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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OPR: DORW (Mr. Alan Gibbs)
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AFI15-114, 19 January 1994, is supplemented as follows and applies to HQ Air Force Space Command (AFSPC) and its subordinates units. This supplement does not apply to Air Force Reserve Command nor Air National Guard units. The reporting requirement in this directive is exempt from report control (RCS) licensing in accordance with AFI37-124, The Information Collections and Reports (ICR) Management Program; Controlling Internal, Public, and Interagency Air Force Information Collections.

1.2. HQ AFSPC/DORW will provide HQ AFSPC/DO quarterly assessments of Command weather and space environment products and services performance using at least operational effectiveness (OPVER) and weather warning and advisory (WW/WA) metric data. The assessment will also include a summary of activities to improve forecast operations. In addition, HQ AFSPC/DORW will provide quarterly feedback to AFSPC weather and space environment units on individual unit and Command-wide WW/WA and OPVER performance.

1.3. (Added) The process used to evaluate weather and space environment products and services is described in the flowchart in attachment 4. An example of the AFSPC metric tracking the effectiveness and efficiency of this process is shown at attachment 5. HQ AFSPC/DORW will collect and monitor the number of timely weather support evaluation metric data submissions. HQ AFSPC/DOR will provide feedback to AFSPC OG/CCs at least annually on their performance in support of this process.

2.1.1. (Added) AFSPC units will collect and report monthly Terminal Aerodrome Forecast (TAF) performance (TAFVER) on ceiling and visibility of less than 1500 feet and/or 3 miles at 3, 6 and 12 hours into the forecast. Weather units will report 1500/3 TAFVER data according to para 5.1 (as supplemented) using an electronic version of the format in attachment 6.

2.1.2. (Added) HQ AFSPC/DORW will obtain from Headquarters Air Force Weather Agency (HQ AFWA) monthly Air Force averages of ceiling (1500 feet) and visibility (3 miles) verification data at 3, 6 and 12 hours. This data will contain a measure of forecast successes, missed opportunities, aborts, and correctly forecasted stand-downs. HQ AFSPC/DORW will collect the Air Force TAFVER data at least annually and forward it to all TAFVER reporting units for use in evaluating their performance.

2.1.3. (Added) AFSPC units will compare their 1500/3 TAFVER metric against the Air Force average (monthly value and trend) to help assess the effectiveness of their unit's long-term forecast improvement efforts. Command weather units should also compare their performance against other weather forecasting organizations in the same climatological region to support short-term trend analysis and identification of benchmark opportunities.

3.2. Each AFSPC weather and space environment unit will establish, in coordination with their customers, an operational effectiveness (OPVER) metric. The criteria for the metric will be based on a go/no-go threshold critical to their customers' operations. Observations used to verify these forecasts must be accurate and virtually always available. Sources of observations include but are not limited to certified weather observers, weather radar data, radiosonde data, satellite data, aircrew observations, Digital Ionosonde Sounding System data, Swept Frequency Interferometric Radiometer data, etc. The OPVER metric may not use an element measured in para 2.1. (as supplemented) or 2.2. Weather and space environment units will provide their OPVER data to HQ AFSPC/DORW monthly using the procedures in para 5.1. (as supplemented) and in an electronic format (a suggested format is shown in Attachment 7).

3.2.1. (Added) For each OPVER forecast record whether the predicted element verified. The verification approach must be in terms meaningful to the customer. A recommended methodology involves recording whether the element is predicted to be favorable (F) or unfavorable (U) with respect to the operationally significant threshold. Verify the OPVER forecast as observed either F or U and record the pair (observed/forecast) as FF, UF, FU or UU.

3.2.1.1. Favorable/Favorable (FF)--mission success. This is the number of "go" forecasts for which "go" conditions were observed.

3.2.1.2. Favorable/Unfavorable (FU)--needless mission aborts. This is equal to the number of "no-go" forecasts for which "go" conditions were observed.

3.2.1.3. Unfavorable/Favorable (UF)--mission aborted due to weather or space environment). This is equal to the number of "go" forecasts for which "no-go" conditions were observed.

3.2.1.4. Unfavorable/Unfavorable (UU)--appropriate mission stand-downs. This is equal to the number of "no-go" forecasts for which "no-go" conditions were observed.

3.2.2. (Added) AFSPC weather and space environment units will compare their OPVER forecasts data to a no-skill control measure such as persistence, climatology or a chance forecast. They will provide the control data to HQ AFSPC/DORW at the same time and in the same format they provide their OPVER metric information. The unit will also measure, for their own internal use, individual and unit tendencies to be too optimistic or pessimistic in the OPVER forecast. These tendencies are natural and ideal targets for improvement efforts. Finally, the unit should attempt to capture the natural variability of the processes being measured through the use of upper/lower control limits, significance tests such as chi-square, etc. This information allows decision makers to assess the meaningfulness of the data and helps determine the success/failure of improvement activities or whether corrective action is required.

3.2.3. (Added) AFSPC weather and space environment units will provide a written description of all OPVER criteria to HQ AFSPC/DOR when establishing or changing these metrics. The description will contain the threshold value, how the metric is calculated and how it is verified. Each unit will provide their criteria description under a cover letter signed by the unit's OG/CC.

3.2.4. (Added) AFSPC weather and space environment units will select an OPVER criteria to which they can assign a value added to each forecast. Value added can include dollars and time saved/avoided or

other quantifiable impacts. This measure can use the criteria required in 3.2 above or serve as a separate OPVER metric.

3.2.5. (Added) Units will assign a value-added to each OPVER category (possibly the categories listed in paras 3.2.1.1. - 3.2.1.4.) and include the information in their monthly submission to HQ AFSPC/DORW.

3.2.6. (Added) AFSPC weather and space environment units will ensure adequate sample size for their OPVER forecast metrics. They will accomplish this through a combination of forecasts supporting actual missions and forecasts prepared for unit proficiency training. Units should consider issuing at least 30 forecasts for each OPVER criteria.

3.2.7. (Added) HQ AFSPC will perform a monthly assessment of surface weather observation quality for each unit taking these atmospheric measurements. The observation quality metric is the total number of observations failing Air Force Weather Agency's decode and validation check each month.

5.1. AFSPC weather units will use the electronic form of the AF Form 3810 and the OPVER and 1500/3 TAFVER reports. The unit will use e-mail to send the electronic data to HQ AFSPC/DORW using the address afspdorw@spacecom.af.mil. If a unit does not have access to e-mail, they may send the data to HQ AFSPC/DORW by FAX or mail.

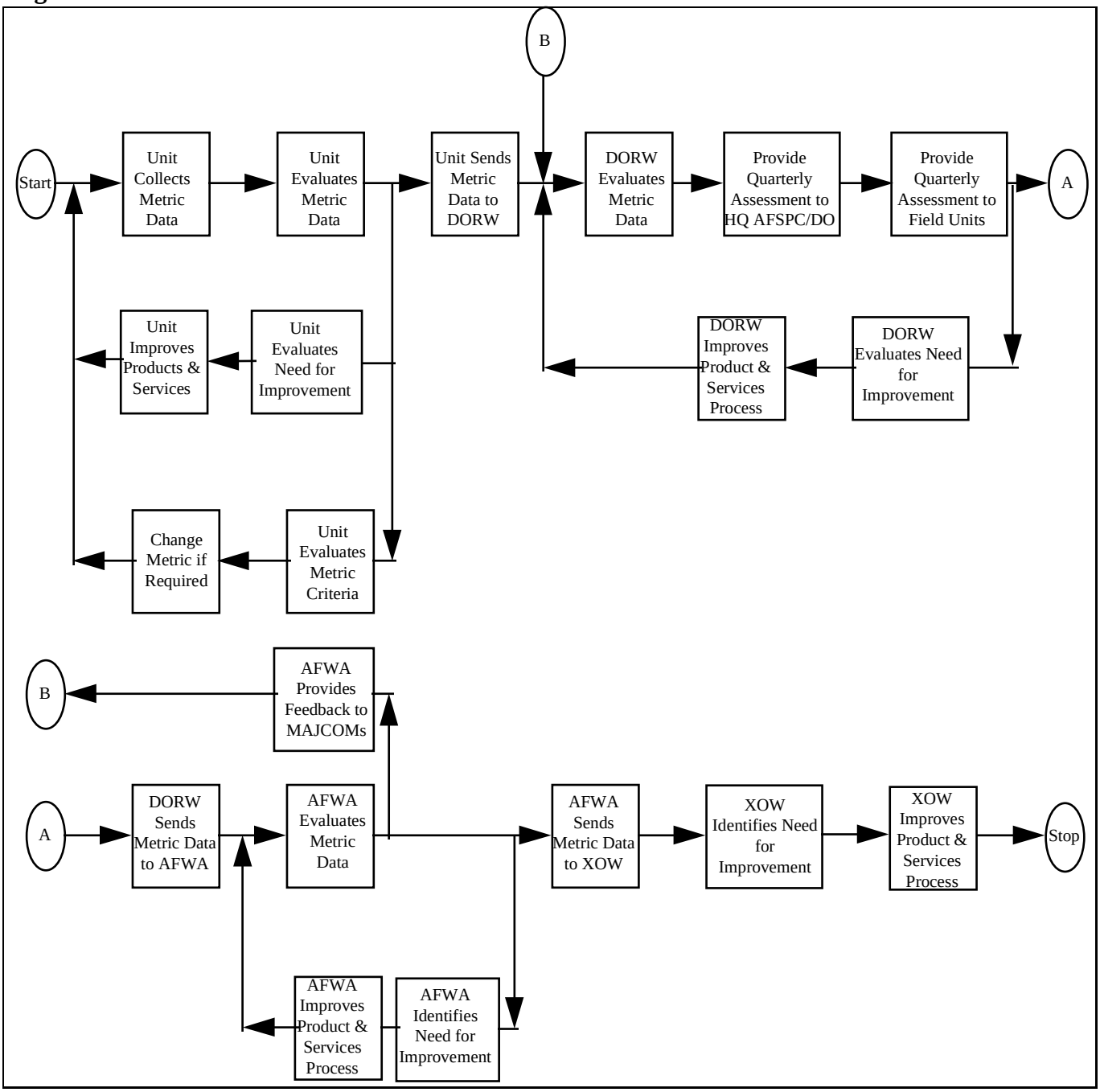
5.5. (Added) AFSPC weather and space environment units will also provide monthly the average forecast experience, in months, for their unit's forecasting personnel. Forecasting experience is defined as the sum of time spent at an assignment where the individual produced operational weather or space environment (as appropriate to the unit's mission) forecasts. Forecasting personnel include enlisted, officer, and civilian forecasters, and unit leadership (if they prepare weather forecasts). AFSPC weather and space environment units will report forecaster experience data to HQ AFSPC/DORW in accordance with para 5.1. (as supplemented). HQ AFSPC/DORW will trend this experience information to better understand positive/negative changes in forecast performance.

A1.2.13. (Added) Additionally, AFSPC units will enter the warning/advisory criteria and the actual amount of negative lead time in the remarks section. This data will help assess the trend in actual lead time being provided to AFSPC weather operations customers.

Attachment 4 (Added)

PRODUCTS AND SERVICES PROCESS FLOWCHART

Figure A4.1. Flowchart.



Attachment 5 (Added)

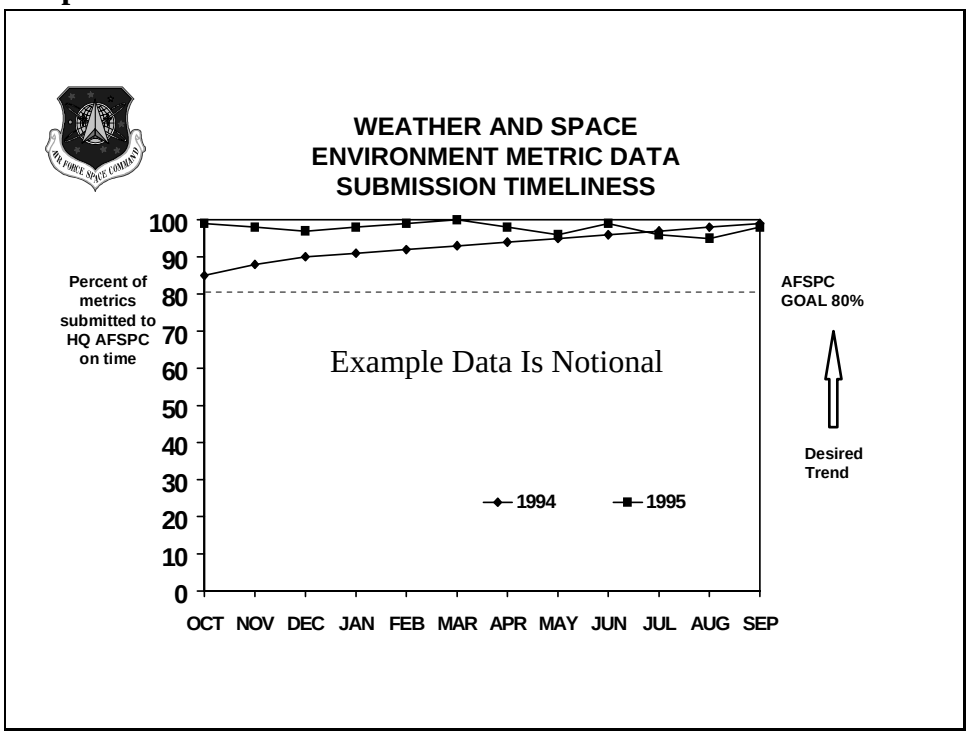
MEASURING AND DISPLAYING PROCESS COMPLIANCE

A5.1. AFSPC will track the ability of the Weather Support Evaluation process to better provide the Command and HQ AFWA the timely and accurate metric data needed to make decisions.

A5.2. The success of the process is contingent on field units providing their evaluation data to higher headquarters. Each metric for each unit represents a submitted product. A product is considered late if it arrives at HQ AFSPC/DORW after the 15th of the month deadline or arrives needing rework which can not be corrected before the 15th of the month deadline. The number of on-time products is divided by the total number of products required during a given month to calculate the Weather and Space Environment Metric Data Submission Timeliness metric (Fig. A5.1.).

A5.3. Analysis of this metric will help Operations Groups ensure their weather and space environment weather support evaluation metric data is accurate and arrives to the customer in a timely manner. The metric will assist HQ AFSPC in its continuous efforts to improve the process.

Figure A5.1. Sample Metric for Data Submission Timeliness.



Attachment 6 (Added)

FORMAT FOR 1500/3 TAFVER METRIC DATA

A6.1. Instrument Meteorological Conditions (IMC) occur when either ceilings and/or visibility are less than 1500 feet and 3 statute miles respectively. If both ceiling and visibility are equal too or greater than 1500/3, Visual Meteorological Conditions (VMC) exist.

A6.2. Put your unit's monthly statistics into a pair of 2 by 2 matrices (Fig A6.1.).

Figure A6.1. Monthly TAFVER Matrices.

OBSERVED	FORECAST: YES	FORECAST: NO
YES	A	B
NO	C	D

OBSERVED	PERSISTENCE: YES	PERSISTENCE: NO
YES	A*	B*
NO	C*	D*

A6.4. The explanation of Figure A6.1. follows:

A6.4.1. "A" is the number of occurrences that were forecast IMC and conditions were IMC.

A6.4.2. "B" is the number of occurrences that were forecast VMC but conditions were IMC.

A6.4.3. "C" is the number of occurrences that were forecast IMC but conditions were VMC.

A6.4.4. "D" is the number of occurrences that were forecast VMC and conditions were VMC.

A6.4.5. "*" denotes persistence's statistics.

A6.5. You must use predominate conditions forecast at the 3-, 6-, and 12-hour blocks for verification--you can not use conditions specified in a "TEMPO" group.

A6.6. The Forecast Skill Score (FSS) is computed as FSS = (F-P)/(1-P) where F = (A+D)/(A+B+C+D) and P = (A*+D*)/(A*+B*+C*+D*).

Attachment 7 (Added)

SUGGESTED FORMAT FOR OPVER METRIC DATA

A7.1. Put your unit's monthly OPVER statistics into a pair of 2 by 2 matrices (Fig A7.1.).

Figure A7.1. Monthly OPVER Matrices.

		FORECAST	
		UNFAVORABLE	FAVORABLE
OBSERVED	UNFAVORABLE	A	B
	FAVORABLE	C	D

		CONTROL	
		UNFAVORABLE	FAVORABLE
OBSERVED	UNFAVORABLE	A*	B*
	FAVORABLE	C*	D*

A7.2. The explanation of Figure A7.1. follows:

A7.2.1. "A" is the number and dollar value of occurrences that were forecast unfavorable and observed conditions were unfavorable.

A7.2.2. "B" is the number and dollar value of occurrences that were forecast favorable but actual conditions were unfavorable.

A7.2.3. "C" is the number and dollar value of occurrences that were forecast unfavorable but actual conditions were favorable.

A7.2.4. "D" is the number and dollar value of occurrences that were forecast favorable and observed conditions were favorable.

A7.2.5. "*" is the no-skill control value such as persistence.

A7.3. The Forecast Skill Score (FSS) is computed as FSS = (F-P)/(1-P) where F = (A+D)/(A+B+C+D) and P = (A*+D*)/(A*+B*+C*+D*).

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