Waste and Environmental Services

Standard Operating Procedure

for **ROUTINE METEOROLOGICAL DATA PROCESSING**

☐   NUCLEAR ENVIRONMENTAL SITE APPROVED *(if applicable)*

Responsible Division Leader	Organization	Signature	Date
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1.0 PURPOSE AND SCOPE

This procedure describes the routine meteorological data processing performed by the LANL Meteorological Monitoring Program. This procedure applies to meteorological data processing that is performed on a weekly, monthly, and yearly basis.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

The code MDM.out (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.2.1 "Binary File Edits" on shelf at TA-59-001-178) compares recent data with predetermined ranges for each variable. MDM.out replaces data outside of these ranges with the missing code, -999999.0, and sends e-mail regarding automatic edits to the meteorologist for data quality control.

The instrument technician logs all activities that might affect data quality in a notebook. Data that are known to be bad are noted by station, date, time period, and variable in the Meteorological Station Logbook kept in the Meteorological Laboratory (TA-59-001-178).

At least once weekly, the meteorologist reviews all e-mail generated by MDM.out and visually inspects time series of all variables using the qc.pro Wave code (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," documentation for PV-Wave code qc.pro). Problems not detected by the range checking and any corrections to the automatic edits are noted in the logbook. Instructions from the meteorologists and instrument technician are the basis for the weekly processing as described below.

During the first week of each month, a monthly weather summary for the previous month is generated for the official Los Alamos weather station (currently at TA-6) and the station that represents the White Rock area (currently TA-54). These summaries are based on data stored in two special files called laarc (Los Alamos station) and wrarc (White Rock station). Most of the data in these files come from the TA-6 and TA-54 binary files, but information on snow and special weather observations come from other sources. The Monthly Data Processing section below explains how to update the laarc and wrarc files and use the updated files to create the monthly weather summary.

During the first two weeks of January, the following data processing is performed for the previous year:
- A graphical annual summary is generated that summarizes the annual temperature range, precipitation, and snowfall.
- wind roses and a precipitation summary are generated to be posted on the Weather Machine (web page).
- new archive station files are created to store data from the station files.
- new datalogger annual files are created.

Year's End Data Processing describes the procedure for doing the above.

2.2 Precautions

None.

3.0 EQUIPMENT AND TOOLS

No equipment and tools are needed.

4.0   STEP-BY-STEP PROCESS DESCRIPTION

4.1   Weekly Data Processing

Computer Technician

1. Check the Meteorological Station Logbook for each station to see if there are any data edits recorded since the last data processing session.

2. Execute MDM.out in an open window and make necessary edits (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.2.1, "Binary File Edits").

3. Create an edit command file (example: stationidyyyy.edits). Stored on wxmach in /data/edits/towerid/toweridyyyy.edits.

4. Initial and date the meteorological station logbook when edits have been completed.

5. Append stationidyyyy.edits with the edit command archive file (example: cat stationidyyyy.edits>> /data/edits/stationid/stationidyyyy.edits) and verify the file was appended by adding the size of the files in Step 5 and comparing to the size of the edit command archive file appended. ***Note: Edit command files are archived in the event that the binary data files are destroyed. The data as well as the edits may be recovered.***

6. Return to the window running MDM.out and update the archive files (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.2.2, "Updating From Circular Files"). ***Note: Edits must be completed before update occurs.***

7. Verify that the data in the circular files have been moved to an archive file by using MDM.out and selecting choice number 3 from the "Utilities and Diagnostics" menu, then select number, 14 Data Availibity (r:AR_DATA_DIR & CI_DATA_DIR) (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.2, "Testing and Diagnostics").

4.2   Monthly Data Processing

Computer Technician

1. Check the Meteorological Station Logbook for each station to verify that all edits have been completed for the month.

2. Create an archive edit command file using MDM.out and manually enter data for snow and trace amounts (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.2.1, "Binary File Edits"). Zero snowfall and snow depth for the month. Insert -1 for days on which trace amounts of precipitation, snowfall and snow depth were observed. Insert snowfall and snow depth data taken from Daily Observation Sheet (Attachment 1).

3. Update laarc and wrarc archive files (see steps 8-10 in Weekly Data Processing).

	4.	Update the wx_observation file. Open a text editor window and open /data/met_archive/wx_observations.txt and add daily observations recorded on Daily Observation Sheet. Examples of observations: fog, ice pellets, glaze, thunder, hail (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," wx_obs.pro).
	5.	Run monthly summary by opening an Xterm window and activating PV-Wave software (see monthly_summary.pro for details). Running monthly_summary.pro produces either a "ps" or "gif" file, a "lis" file, and an "info" file. Run monthly_summary.pro twice to produce both a "ps" file and a "gif" file.
	6.	Move the "gif" file to Wx_machine. For example, the command might be: mv mon_sum_laarc_mm-yyyy.gif /home/wxmach/httproot/archives/monthlysummaries/ Mmmyyyy.gif where Mmm denotes the month in three letter format such as "Jan".
	7.	Table Run extremes for Wx_machine by opening an Xterm window and running wave and executing the following command: extremes, 'xxarc',/html, file='XXExtremes.html' (where XX is LA or WR and xxarc is laarc for Los Alamos archive or wrarc for White Rock archive). Exit wave and Xterm window. Modify the date of the revised files to the current date by using ved/vi XXExtremes.html. Move the files XXExtremes.html to /home/wxmach/httproot/climate/.

4.3	Year's End Data Processing	
Computer Technician	1.	Update station archive files (follow steps 8-10 of Weekly Data Processing), including laarc and wrarc.
	2.	Run the monthly summary (follow steps 1 - 9 of the chapter *Monthly data processing*)
	3.	Run the annual summary for Los Alamos using TA-6 (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," as.pro for details).
	4.	Put GIF images on the Wx_machine (follow Step 8 of the chapter *Monthly data processing*).
	5.	Update products on green website (see /home/wxmach/codes/products2green.pl).
	6.	Run extremes for Wx_machine (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," wi.pro for details).
	7.	Create new station archive and circular files (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," MDM.out section 2.3.3, "A Circular File").
	8.	Table Cell inde Generate wind roses and add to Wx_machine (see "User's Guide to UNIX Software for ESH-17 Meteorological Operations," windrose.pro for details).

5.0   PROCESS FLOW CHART

None.

6.0　ATTACHMENTS

Attachment 1:　Distribution list for Monthly Summary

7.0　REVISION HISTORY

Revision No. *(Enter current revision number, beginning with Rev.0.0)*	Effective Date *(DCC inserts effective date for revision)*	Description of Changes *(List specific changes made since the previous revision)*	Type of Change *(Technical [T] or Editorial [E])*
ESH-17-403 R0	03/31/1998	New document	
ESH-17-403 R1	08/30/1999	Added new information	T,E
SOP-5160 R0	02/15/2008	Reformatted, minor editorial changes	E

Using a CRYPTOCard, click here to record "self-study" training to this procedure.

If you do not possess a CRYPTOCard or encounter problems, contact the ERSS training specialist.

ATTACHMENT 1: DISTRIBUTION LIST FOR MONTHLY SUMMARY

5160-1

DISTRIBUTION LIST FOR MONTHLY SUMMARY

Records Use only

Los Alamos
NATIONAL LABORATORY
— EST. 1943 —

Definitions

"graph": monthly weather summary page showing vertical bars of temperature and precipitation at left, printed info at right. A page is created for Los Alamos, and a page is created for White Rock.

"text": monthly weather summary page containing written description of weather for all of Los Alamos county.

"table": monthly weather summary page with rows containing temperature extrema, precipitation, records broken or tied, etc. One row for each day. A page is created for Los Alamos and a page is created for White Rock.

Los Alamos graph
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