

CECW-EH

Regulation
No. 1110-2-8155

31 July 1996

Engineering and Design HYDROMETEOROLOGICAL DATA MANAGEMENT AND ARCHIVING

1. Purpose

This regulation establishes policy and provides guidance and procedures applicable to the management and archiving of hydrometeorological data used for planning/project studies and project operations. It provides a recommended format for archiving data.

2. Applicability

This regulation is applicable to all HQUSACE elements and USACE commands involved in civil works projects and activities. This guidance applies to contractors or others performing work for the Corps of Engineers. It applies to hydrologic studies and the hydrometeorologic data of multidiscipline studies and water control management functions. The regulation applies to all data acquired, collected, used, or generated beginning 1 January 1996. Alternatives to the recommended archive format must be approved by CECW-EH.

3. References

- a. ER 1110-2-240, Water Control Management.
- b. ER 1110-2-249, Management of Water Control Data Systems.
- c. ER 1110-2-1460, Hydrologic Engineering Management.
- d. Standard Hydrometeorological Exchange Format (SHEF), NOAA Technical Memorandum NWS WR-180, August 1983.

4. Definitions

Appendix A contains definitions of terms used in this regulation.

5. General

a. *Data Management Overview.* The Corps of Engineers obtains hydrometeorological data from a variety of sources. It is the using element's responsibility that all data, regardless of its origin, be reasonable and accurate before use in studies or for operational purposes. After use, all appropriate data must be archived as described herein. Archiving is required to provide data for project or study accountability, to enable Corps offices to disseminate and/or exchange data, and to provide a consistent data file system suitable as legal documentation.

b. *Data Categories.* For the purposes of this regulation, data is divided into three categories: time series data, XY data, and supplementary data. The processing, management, and archiving of spatial data, imagery, geographic information systems (GIS), and other data are not addressed in this regulation.

(1) Time series data. A single data variable that changes with time. Examples of time series data are: hourly precipitation, maximum daily air temperature, instantaneous river stage, or daily visitor-day attendance.

(2) XY data. A series of pairs of two data variables that define a single valued functional relationship. Examples of XY data are: stage-discharge curve, elevation-damage curve, depth-temperature profile, water

surface profile, or flood frequency curve. An XY data set may have an associated reference date/time.

(3) Supplementary data. Other data associated with model input, model output, parameters, status, or control sequences. Examples of supplementary data are: rainfall-runoff model input files, water surface profile output files, tabular reports of damages for alternative plans, peak discharges, weather bulletins, or news reports.

6. Data Processing

Processing of study and operational data includes data conversion, validation, and derivation of secondary data.

(1) Data conversion. The conversion process for data includes the unpacking and/or transformation of raw data from its original acquired form to a functional form consisting of engineering units such as feet, meters, or degrees Fahrenheit. The raw values must not be corrected, edited, or changed in any way from those received from a data acquisition source or cooperating agency.

(2) Data validation. Any data used in studies or in making an operational decision must be validated. In operational use, data that has been validated must not be returned to the raw database. Validated data should be written to a processed database as part of the screening process. Validation may be accomplished by automated or manual means. This process may include estimating values for missing or erroneous data.

(3) Derivation of secondary data. The derivation of secondary data items from primary data includes the application of one or more mathematical functions. Examples of deriving secondary data are: obtaining river flow from river stage readings using a rating curve, computation of mean daily flow from hourly values, and computation of incremental precipitation from cumulative precipitation data.

7. Archiving

a. Organization of archive file. The archive file is organized to provide a logical grouping of related data. Corps operational data shall be organized into **raw** archive files and **processed** archive files. Raw and

processed data will each be partitioned into separate archive files by geographic region, calendar year, and data category (i.e., time series, XY, and supplementary). Corps study data shall be organized into **study** archive files. Study data will be partitioned into separate archive files by data category (i.e., time series, XY, and supplementary). Appendix B shows the structure of an archive file.

b. Archive content and ordering.

(1) Time series data. The recommended format of time series archive records is defined in Appendix C. Within each time series archive file, the data will be organized alphabetically by station ID. Within the station ID, the data will be organized alphabetically by parameter. Within the parameter, the data will be organized by increasing date/time.

(a) Operational data. This must include times series data that are required to define the manner in which a Corps project was operated. For a reservoir project, a minimum of inflow, outflow, and pool elevation data would normally be required. The archive file may also include gate settings, storage, evaporation, or other time series data that define the operation of the project.

(b) Study data. This must include times series data used in the study, including precipitation, flow, and other data used to develop unit hydrograph, routing, or other hydrologic parameters. It includes data used to test model behavior, or as input to produce model results. The computed model results must be included for all conditions relevant to the study. This may include model-computed hydrographs, stages, reservoir storage, and pool elevation.

(2) XY data. The recommended format of archive XY records is defined in Appendix D. Within each XY archive file, the data will be organized alphabetically by station ID. Within the station ID, the data will be organized alphabetically by X parameter, and then alphabetically by Y parameter.

(a) Operational data. The archive must include XY records that are required to define the operation of the project. This may include stage-discharge, elevation-area-storage, storage-outflow, or other relationships. XY data used in project operations in a given

year should be archived each year regardless of whether or not the data changed from the previous year.

(b) Study data. The archive must include XY records that are required to define the study. This may include stage-discharge rating curves, stage-damage relationships, or similar functions. Analysis results such as flow-frequency curves and flow-duration curves should be included.

(3) Supplementary data. The recommended format of supplementary archive records is defined in Appendix E. The order of records in the supplementary archive file is determined by the local Corps office.

(a) Operational data. Any supplementary information that contributes to the determination of a critical model step, flow forecast, release determination, or related step should be archived. This would include simulation model input files, model output files, macro files, decision memos, or other related information.

(b) Study data. Model input and the corresponding output files that evaluate all alternative plans investigated should be stored as part of the archive records.

c. Media and distribution of archived data.

(1) Media.

FOR THE COMMANDER:

5 Appendices
APP A - Definitions
APP B - Archive File Structure
APP C - Time Series Record Definition
APP D - XY Data Record Definition
APP E - Supplementary Data Record Definition

(a) Care must be exercised when selecting the media on which to store archive files. The media selected should have a relatively long life span, both in its physical characteristics and the availability of devices to read the media. The media selected should be vendor-independent and commonly available in other Corps offices. Archive files should be structured to fit on a single media item.

(b) As new storage devices improve with advancements in technology, all previous archive files should be copied to new media.

(2) Storage of archive files.

(a) Multiple copies of each archive file must be made. One write-protected copy of the archive must be stored at the responsible office. A duplicate copy of the archive file must be stored at the next higher headquarters office, or at another offsite location approved by the next higher headquarters.

(6) Archive files containing raw data will be retained a minimum of 5 years. Archive files containing study or processed data must be kept indefinitely.



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