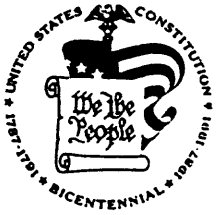
OPERATIONS MANUAL FOR THE CONVERSION AND VALIDATION OF UNIT-VALUES SITE-INDEX DATA FOR THE MASTER WATER DATA INDEX OF THE NATIONAL WATER INFORMATION SYSTEM OF THE U.S. GEOLOGICAL SURVEY

By Scott H. Beddingfield

U.S. GEOLOGICAL SURVEY

Open-File Report 88-180



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ABSTRACT

An operations manual provides computer operations personnel with a description of a computer program and the operational environment required for the program to execute properly. This operations manual provides the information for the conversion and validation of unit-values site-index data for the Master Water Data Index (MWDI) of the National Water Information System (NWIS) developed by the U.S. Geological Survey. Included in this document are sections that describe (1) the general data flow into and out of the program, (2) the physical and logical attributes of all of the input and output files, (3) the conditions under which the program may be executed, (4) the job control language (JCL) used to execute the program, (5) the operating environment, including the needed equipment, how often the program is to be executed, how long the program takes to execute, and how to deal with problems that may develop, (6) the output listings, and (7) the restart and recovery procedures. There is also an appendix containing examples of the output listings generated by the program.

INTRODUCTION

Background

The Master Water Data Index (MWDI) of the National Water Information System (NWIS) of the U.S. Geological Survey serves as a mechanism for documenting the existence and location of site-specific water data stored in the NWIS. The MWDI also contains information about water data and meteorological data available from other organizations throughout the scientific community. The existing MWDI data base of the U.S. Geological Survey's National Water Data Exchange (NAWDEX) is currently used for this purpose, but no longer fulfills all of the needs of the scientific community. The MWDI of the NWIS is a version of the MWDI of the NAWDEX that also contains data from the National Water Data Storage and Retrieval System (WATSTORE) Station Header File and Ground-Water Site Inventory (GWSI) that has been modified to satisfy those unmet needs. To populate the unit-values site-index data base of the MWDI of the NWIS with data from the MWDI of the NAWDEX and the WATSTORE files, a computer program was written.

The development of the program was sponsored by the Branch of Computer Technology, Office of the Assistant Chief Hydrologist for Scientific Information Management, Water Resources Division, U.S. Geological Survey and was developed under the direction of the NWIS Project Office within the Branch of Computer Technology.

Purpose and Scope

This document describes information needed to set up the input and output files, and the required job control language (JCL). This information includes (1) a description of the data flow in and out of the program, (2) a description of the files used in the program that defines the file attributes, (3) an explanation of when the program can be executed, (4) the JCL needed to submit the program for execution, (5) a description of the needed hardware for execution and an estimate of how much central processing unit (CPU) time the program will require to successfully execute, (6) examples of the listings generated by the program, and (7) restart and recovery procedures.

SECTION 1. GENERAL INFORMATION

1.1 Summary

The program described in this document is used for converting unit-values site-index data and other surface-water data elements in the existing MWDI, WATSTORE Station Header File, and GWSI to formats suitable for establishment and loading of the MWDI of the NWIS; for the computation and validation of indexing information pertaining to unit values and other related surface-water data stored in the MWDI using data stored in the unit-values file of WATSTORE; for the computation of the frequencies of collection of unit-value data; and for the generation of transactions that document the existence of groundwater, quality-of-water, and meteorological data stored in the WATSTORE unit-values file for subsequent processing by other software programs. The specifications for the site-index data of the NWIS and those used to develop this program may be obtained by contacting the NWIS Project Office within the Branch of Computer Technology of the U.S. Geological Survey Headquarters Office in Reston, Virginia.

1.2 Hardware Environment

The unit-values conversion and validation program was developed for use on the AMDAHL V7[a] computer located at the U.S. Geological Survey National Center in Reston, Virginia. The program is written in PL/1, level F.

SECTION 2. OVERVIEW

2.1 Software Organization

The organization of the software demonstrating the flow of data through the program including all input and output files is shown in figure 1. As the

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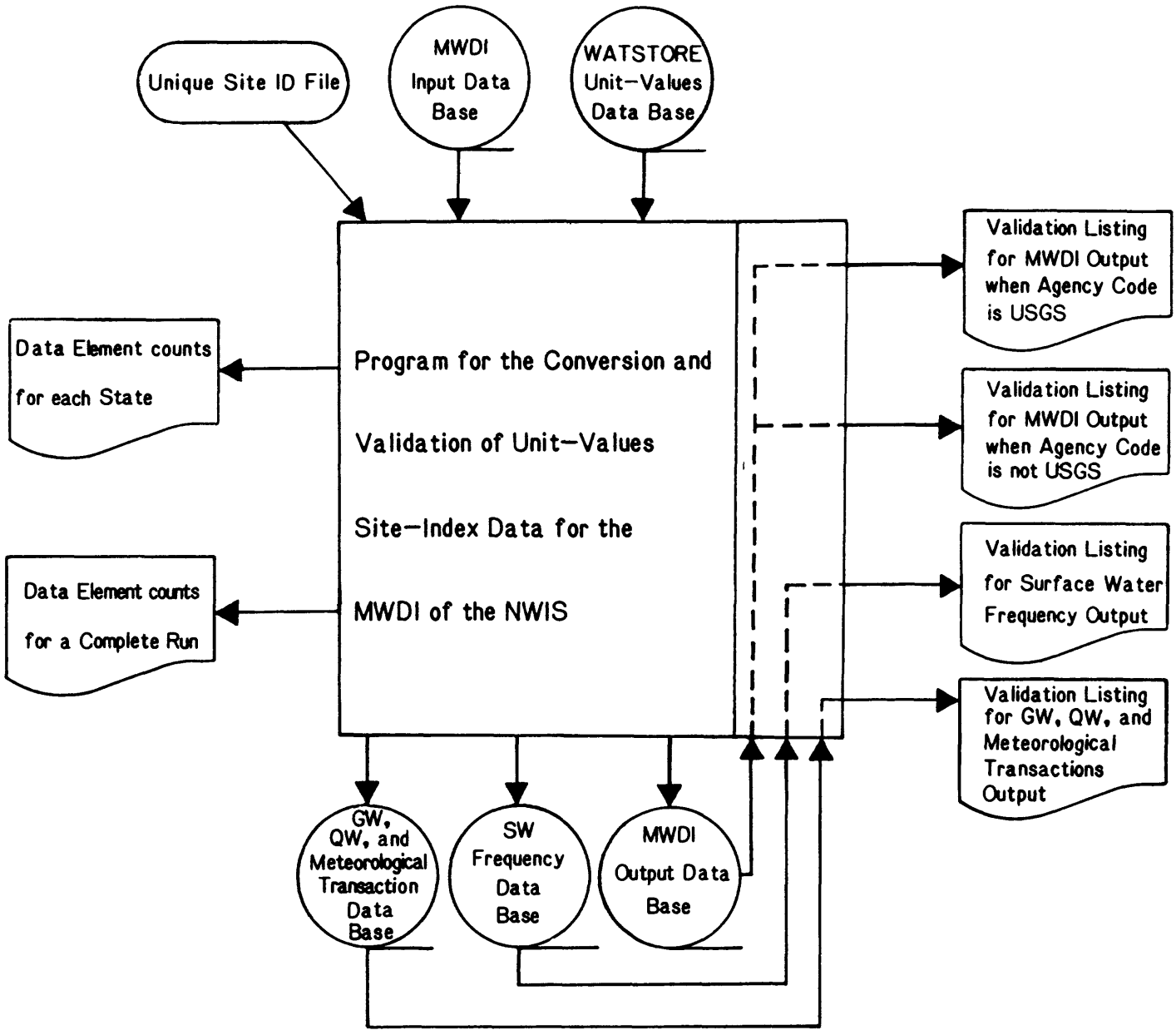
[a] The use of product or trade names in this report is for identification purposes only, and does not constitute endorsement by the U.S. Geological Survey.



EXPLANATION

MWDI, Master Water Data Index
WATSTORE, National Water Data Storage and Retrieval System
NWIS, National Water Information System
GW, ground water
QW, quality of water
SW, surface water
USGS, U.S. Geological Survey

Figure 1.--Data flowing in and out of program IXCVUV.DB.

figure shows, data are input from two tape files, reformatted by the program, and output in various groups to produce three tape files and two types of listings. Then the three output tape files are read back into the program to generate examples of their respective contents.

2.2 File Inventory

The table below lists the physical and logical attributes of all of the tape files used or created by the program.

Another file contains the next available unique site identification number. The file name is NXTAVAL, and it is a direct access disk file with a key size of 2, a record length of 8, and a block size of 1000.

Input and Output Tape File Attributes

[MWDI, Master Water Data Index; WATSTORE, National Water Data Storage and Retrieval System; FB, fixed block; VB, variable block]

File name[1]	File description	Density (bits per inch)	Record format	Record length	Block size
OLDMWDI	MWDI input data.....	6250	FB	1394	18122
WATSTOR	WATSTORE unit-value data.....	6250	VB	11604	18760
NEWMWDI	MWDI output data.....	6250	FB	1370	19180
SWFRQHT	Surface-water frequency history..	6250	FB	44	880
OTRTRNS	Ground-water, quality-of-water, and meteorological transaction data.....	6250	FB	40	800

[1] The file names are the names used in the job control language (JCL) for executing the program.

SECTION 3. DESCRIPTION OF RUN

3.1 Run Progression

This program may only be run as the second in the series of programs for the conversion and validation of site-index data of the NWIS. Although this program is actually an independently executable program, it is also a single component of a series of programs, each of which depends on the previous program to generate the necessary input data to operate. This program uses the MWDI data base generated by the program for the conversion and validation of site-descriptor data for the MWDI, and unit-values data generated from WATSTORE using program H572. The output is then passed on to the program for the conversion and validation of daily-values site-index data for the MWDI for subsequent processing.

3.2 Run Description

This section contains all of the necessary information that operations personnel will need to support the program.

3.2.1 Operating Information

The following information is provided to aid operation center management and personnel in setting up the necessary environment to successfully run the program. The program requires five tape drives, one for each of the five tapes used in this program (two for input and three for output). The tapes to be used are identified by the tape numbers submitted with the JCL used to run the program. (See fig. 2.)

The program will be run as needed to complete the conversion and validation of the unit-values data for the entire MWDI. The execution time required to run the program is dependent on the amount of input data. When data from two states were processed for the high volume test run, the program ran for about 2-1/2 minutes CPU time, with a total elapsed time of about 12 minutes.

Normal problems encountered with the run should be solved according to standard practice. Special problems should be directed to the NWIS Project Office within the Branch of Computer Technology.

3.2.2 Output Reports

There is a listing generated by the program to be used for validating the run. Examples of the different reports generated are in the appendix.

3.2.3 Restart and Recovery Procedures

If the program fails, the standard abnormal termination procedures should be used.

SECTION 4. SELECTED REFERENCES

Bower, D.E., and Dempster, G.R., Jr., 1978, Chapter III. Instructions for unit values file, Section B. Retrieval of data from unit values file (program H572), in WATSTORE User's Guide: U.S. Geological Survey Open-File Report 77-729, v. 5, chap. III, sec. B, 140 p.

U.S. Department of Commerce, 1976, Guidelines for documentation of computer programs and automated data systems: U.S. Department of Commerce, National Bureau of Standards, FIPS PUB 38, 55 p.

```
//xxxxxxxx JOB (nnnnnnnnn,NWIS,5,30),'name',CLASS=C
/*SETUP    224415/H
/*SETUP    110651/H
/*SETUP    222383/HR
/*SETUP    222384/HR
/*SETUP    222385/HR
//STEP1  EXEC PGM=IXCVUV,REGION=950K,TIME=(5,0)
//STEPLIB  DD DSN=AG40WAH.BINARY,DISP=SHR
//         DD DSN=SYS1.PLIX.TRANSLIB,DISP=SHR
//SYSPRINT DD SYSOUT=A
//OLDMWDI  DD DSN=NWIS.IXCVUV.MWDI.INPUT,DISP=(OLD,KEEP),
//         UNIT=TAPE62,VOL=SER=224415,
//         DCB=(RECFM=FB,LRECL=1394,BLKSIZE=18122),LABEL=(1,SL)
//WATSTOR  DD DSN=NWIS.IXCVUV.UNIT.VALUES,DISP=(OLD,KEEP),
//         UNIT=TAPE62,VOL=SER=110651
//NXTAVAL  DD DSN=NWIS.IXCVHD.UIDHV,DCB=DSORG=IS,DISP=SHR,
//         UNIT=3350,VOL=SER=WRD513
//NEWMWDI  DD DSN=NWIS.IXCVUV.MWDI.OUTPUT,DISP=(OLD,KEEP),
//         UNIT=TAPE62,VOL=SER=222383,
//         DCB=(RECFM=FB,LRECL=1370,BLKSIZE=19180),
//         LABEL=(1,SL,RETPD=365)
//SWFRQHT  DD DSN=NWIS.IXCVUV.FREQ.HIST,DISP=(OLD,KEEP),
//         UNIT=TAPE62,VOL=SER=222384,
//         DCB=(RECFM=FB,LRECL=44,BLKSIZE=880),LABEL=(1,SL,RETPD=365)
//OTRTRNS  DD DSN=NWIS.IXCVUV.TRANS.DATA,DISP=(OLD,KEEP),
//         UNIT=TAPE62,VOL=SER=222385,
//         DCB=(RECFM=FB,LRECL=40,BLKSIZE=800),LABEL=(1,SL,RETPD=365)
/*
//
```

Figure 2.--Job control language (JCL) used to submit program IXCVUV.DB for execution.

APPENDIX. EXAMPLES OF OUTPUT LISTINGS

Example 1.--Data-element counts for a state.

STATE: 42

TOTAL SITES IN: 5

TOTAL SITES OUT: 7

TOTAL SITES ADDED: 2

DATA ELEMENT COUNTS:

STATE: 42

DATA ELEMENT	TOTAL IN	TOTAL OUT
UNIQUE SITE IDENTIFIER	5	7
AGENCY STATION NUMBER	4	6
SW ACTIVE CODE	4	6
SW BEGIN YEAR	4	6
SW END YEAR	0	0
SW INTERRUPTED CODE	1	4
UNIT FLOWS	0	
UNIT STAGE	0	
UNIT VOLUMES	0	
SW OTHER DATA AVAILABLE	1	1
SW TELEMETRY CODE	0	0
SW PURPOSE CODE	2	
SW RECORDER TYPE CODE	0	4
STAGE TYPE		4
STAGE FREQUENCY CODE		4
FLOW TYPE		0
FLOW FREQUENCY CODE		0
VOLUME TYPE		0
VOLUME FREQUENCY CODE		0
VELOCITY TYPE		0
VELOCITY FREQUENCY CODE		0
SW DATA STORAGE MEDIA		4
SW SEASONAL CODE		4
SW DATE OF LAST UPDATE		6
SW DATA CODE		4

SW DATA PURPOSE CODE(1)	2
SW DATA PURPOSE CODE(2)	0
SW DATA PURPOSE CODE(3)	0
SW DATA PURPOSE CODE(4)	0
SW DATA BASE IDENTIFIER(1)	4
SW DATA BASE SUBSET IDENTIFIER(1)	4
SW DATA BASE IDENTIFIER(2)	1
SW DATA BASE SUBSET IDENTIFIER(2)	1
SW DATA BASE IDENTIFIER(3)	1
SW DATA BASE SUBSET IDENTIFIER(3)	1
SW DATA BASE IDENTIFIER(4)	0
SW DATA BASE SUBSET IDENTIFIER(4)	0

STATE: 42

NUMBER OF SITES WITH FREQUENCY HISTORIES: 4

NUMBER OF FREQUENCY HISTORY RECORDS: 12

STATE: 42

NUMBER OF GROUND-WATER TRANSACTIONS: 0

NUMBER OF QUALITY-OF-WATER TRANSACTIONS: 4

NUMBER OF METEOROLOGICAL TRANSACTIONS: 0

TOTAL NUMBER OF TRANSACTIONS: 4

Example 2.--Data-element counts for a complete run.

PROCESSING COMPLETED

TOTAL SITES IN: 9
TOTAL SITES OUT: 11
TOTAL SITES ADDED: 2

PROCESSING COMPLETED

TOTAL DATA ELEMENT COUNTS:

DATA ELEMENT	TOTAL IN	TOTAL OUT
UNIQUE SITE IDENTIFIER	9	11
AGENCY STATION NUMBER	7	9
SW ACTIVE CODE	6	8
SW BEGIN YEAR	6	8
SW END YEAR	0	0
SW INTERRUPTED CODE	2	5
UNIT FLOWS	1	
UNIT STAGE	1	
UNIT VOLUMES	0	
SW OTHER DATA AVAILABLE	3	3
SW TELEMETRY CODE	0	0
SW PURPOSE CODE	3	
SW RECORDER TYPE CODE	0	4
STAGE TYPE		5
STAGE FREQUENCY CODE		5
FLOW TYPE		1
FLOW FREQUENCY CODE		1
VOLUME TYPE		0
VOLUME FREQUENCY CODE		0
VELOCITY TYPE		0
VELOCITY FREQUENCY CODE		0
SW DATA STORAGE MEDIA		4

```
SW SEASONAL CODE                                4
SW DATE OF LAST UPDATE                          8
SW DATA CODE                                    4
SW DATA PURPOSE CODE(1)                         3
SW DATA PURPOSE CODE(2)                         0
SW DATA PURPOSE CODE(3)                         0
SW DATA PURPOSE CODE(4)                         0
SW DATA BASE IDENTIFIER(1)                      5
SW DATA BASE SUBSET IDENTIFIER(1)               5
SW DATA BASE IDENTIFIER(2)                      2
SW DATA BASE SUBSET IDENTIFIER(2)               2
SW DATA BASE IDENTIFIER(3)                      1
SW DATA BASE SUBSET IDENTIFIER(3)               1
SW DATA BASE IDENTIFIER(4)                      0
SW DATA BASE SUBSET IDENTIFIER(4)               0

PROCESSING COMPLETED

TOTAL NUMBER OF SITES WITH FREQUENCY HISTORIES:       4
TOTAL NUMBER OF FREQUENCY HISTORY RECORDS:           12
PROCESSING COMPLETED

TOTAL NUMBER OF GROUND-WATER TRANSACTIONS:            0
TOTAL NUMBER OF QUALITY-OF-WATER TRANSACTIONS:        4
TOTAL NUMBER OF METEOROLOGICAL TRANSACTIONS:          7
TOTAL NUMBER OF TRANSACTIONS:                        11
```

Example 3.--Validation listing for Master Water Data Index (MWDI) output.

```
UNIQUE SITE IDENTIFIER:  420000004
AGENCY CODE:  USGS
AGENCY STATION NUMBER:   01547200
SITE TYPE:  SW
STATE CODE:  42
COUNTY CODE:   27
STATE-COUNTY CODE:  42027
DISTRICT CODE:
OTHER DATA AVAILABLE:        6
SW ACTIVE CODE:  Y
SW DATA CODE:  Y
SW BEGIN YEAR:  1954
SW END YEAR:  0000
SW INTERRUPTED CODE:  N
STAGE TYPE:  C
STAGE FREQUENCY CODE:  C
FLOW TYPE:
FLOW FREQUENCY CODE:
VOLUME TYPE:
VOLUME FREQUENCY CODE:
VELOCITY TYPE:
VELOCITY FREQUENCY CODE:
SW DATA STORAGE MEDIA:  C
SW TELEMETRY CODE:
SW RECORDER TYPE CODE:  A
SW DATA PURPOSE CODE:  A
OTHER SURFACE-WATER RELATED DATA:
SW SEASONAL CODE:  S
SW DATE OF LAST UPDATE:  19870109
SW DATA BASE IDENTIFIER(1):  NWIS
SW DATA BASE SUBSET IDENTIFIER(1):  EE
SW DATA BASE DATE OF LAST UPDATE(1):  19870109
SW DATA BASE IDENTIFIER(2):  NWIS
```

```
SW DATA BASE SUBSET IDENTIFIER(2):  DV
SW DATA BASE DATE OF LAST UPDATE(2):  19870109
SW DATA BASE IDENTIFIER(3):  NWIS
SW DATA BASE SUBSET IDENTIFIER(3):  UV
SW DATA BASE DATE OF LAST UPDATE(3):  19870109
SW DATA BASE IDENTIFIER(4):
SW DATA BASE SUBSET IDENTIFIER(4):
SW DATA BASE DATE OF LAST UPDATE(4):         0
```

Example 4.--Validation listing for surface-water frequency output.

```
UNIQUE SITE IDENTIFIER:  420000004
AGENCY CODE:  USGS
AGENCY STATION NUMBER:   01547200
SW YEAR OF MEASUREMENT:  1983
STAGE TYPE HISTORY:  C
STAGE FREQUENCY HISTORY:  C
FLOW TYPE HISTORY:
FLOW FREQUENCY HISTORY:
VOLUME TYPE HISTORY:
VOLUME FREQUENCY HISTORY:
VELOCITY TYPE HISTORY:
VELOCITY FREQUENCY HISTORY:
SW HISTORY DATE OF LAST UPDATE:  19870109
```

Example 5.--Validation listing for ground-water, quality-of-water, and meteorological transactions output.

UNIQUE SITE IDENTIFIER: 390000003

AGENCY CODE: USGS

AGENCY STATION NUMBER: 390425084230000

PARAMETER CODE: 45

YEAR OF MEASUREMENT: 1978

FREQUENCY CODE: C

SEASONAL CODE: S

DATA BASE IDENTIFIER: NWIS

DATA BASE SUBSET IDENTIFIER: UV

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