Part – K

DATABASE

Part – K DATABASE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Part - K DATABASE

K1 General

The average annual precipitation in the Philippines amount to as much as 2,000 mm. The country which is blessed with water resources is, on the other hand, devastated from time to time by a capricious excess water, flood. On the contrary the skewed rainfall distribution in terms of time and place liable to bring drought damages to the country. To cope with the situation various meteo-hydrologic gauging stations have been established all over the country to observe and monitor the situation. All of the water related agencies of the Philippines such as DPWH, NWRB, NIA, NPC and PAGASA have carried out hydrologic studies in addition to the establishment of gauging stations. Most of the studies have proceeded to planning for the counter measures to these disaster. Some measures such as multipurpose dam scheme and river improvement works are implemented and are on operation.

Meteo-hydrologic data, the results of the previous studies and the inventory of the planned and existing facilities are indispensable for the National Water Resources Management Master Plan Study. Like wise, to establish a system which enables to own such data and information jointly among the agencies concerned may contribute much to make the agency's activity effective because such data and information are, so far, obtained mostly by single agency and masked unintentionally to other agencies, otherwise, the data and information are availed effectively to their studies.

In this respect, the design and establishment of a database is included in the National Water Resources Management Master Plan Study as a component.

K2 Existing Database

K2.1 Database System for Groundwater Established by NWRB

(1) The National Water Resources Board conducted the Philippine Groundwater Summary Project in May, 1989 with financial assistance from the National Statistical Coordination Board. The primary purpose of this project was to consolidate all existing groundwater data and to provide summary of statistics. It also aimed for improving the compilation and reporting of groundwater data. The results of the study was contained in a series of 14 regional reports.

Software used : DBASE III

(2) The Philippine Groundwater Data Bank project which was financed by UNDP and spearheaded by the Local Water Utilities Administration was conducted in 1988. The National Water Resources Board with other water agencies participated in this project with NWRB as the seat for Central Data Bank. The Philippine Groundwater Data Bank, Geographic Information System has been established to consolidate all well data into one comprehensive national computerized system, followed by systematic mapping of groundwater potential. The PGDB has also designed standard well data entry forms to be used for encoding data. Standard groundwater entry forms were exemplified in Figure K-1 to Figure K-6, and examples of standard outputs from Philippines Groundwater Data Bank were shown in Figure K-7 to Figure K-14. Standard outputs include:

- Numerical Report of Well Data (FOXPRO)
- Graphical Drawing of Well Data (AUTOCAD)
  - Well Construction Data
  - Strata Log
  - Pie Diagram
  - Potential Yield
- Well Discharge Time-Series Graph (AUTOCAD)
- Water Level Time-Series Graph (AUTOCAD)
- Chloride Content Time-Series (AUTOCAD)
- Groundwater Level, Discharge, Chloride Content vs. Time (AUTOCAD)
- Groundwater Level from several wells vs. time (AUTOCAD)
- Hydrogeological Maps
  - Well Location Map
  - Cyclogram Map
  - Water Level Map
  - Transmissivity Map
  - Hydrogeological Map
  - Pie Diagram Map

Software Used :

- FOXPRO version 2.5 - database system for collection, systematization and processing of groundwater data.
- AUTOCAD Release 11 - for presentation of hydrogeological output and statistical outputs.

- MICROSTATION version 4.0 or 4.25 - for presentation of hydro-geological output and statistical outputs.
- DOS 5.0 or higher
- QEMM Memory Manager
- ORACLE version 6.0

Hardware :

- 486 DX computer w/ SVGA graphics card or higher
- 16 MB Main Memory
- 200 MB Hard Drive or higher
- HP Laser Jet Printer
- 24" x 36" Digitizer Tablet
- A0 Ink Jet Plotter

K2.2 Database System for Water Permittees Established by NWRB

The Water Permittees Database has been designed to consolidate all granted water permits. The printed output gives a tabular form of all water permit grantees, addresses, permit numbers, location, source of water, amount of water granted, usage and the date granted.

Software Used : DBASE III

K2.3 Other Database

Various agencies have carried out studies, plan and construction in line with each jurisdictions. Each project conducts data collection as the commencement activities. And each work duly prepare and publish reports as a consequence of data collection and works. Those reports are mostly stored in the library of the agencies. Agencies perform water related project are as follows;

Economic development	: NEDA
Water resources development	: NWRB, DPWH, NIA, NPC, LWUA, MWSS and DILG
Multipurpose dam	: NWRB, DPWH, NIA and NPC
Flood control	: DPWH
Irrigation	: NIA
Hydropower	: NPC
Drainage	: DPWH
Water supply	: NRWB, LWUA, MWSS and DILG
Watershed management and environment	: NWRB, DENR

The volume of data and reports prepared by those agencies tend to exceed for more than the managing capacities of the library. And there are cases not able to locate the report and could not be referred to although otherwise it could have furnished valuable information to many studies.

K3 New Database System Constructed by the Study

K3.1 Objective of Database System

The objective of the database to be established are

(1) To store the meteorological and hydrological data and information in the manner that afford an easy retrieval. And thereby the system support the efficiency of the Study activity.
(2) To store the water related inventory with regard to the existing study, plan, design and already implemented facility in the manner that afford an easy retrieval. And thereby the system support the efficiency of the Study activity.
(3) To distribute complete data and information described above to right place and right person through accessing to the database which is to be managed and maintained by NWRB after the Study.

This database system focuses on the storing data and information gathered by this project - the National Water Resources Management Master Plan Study.

K3.2 Overall Design of the Database System

(1) Basic specifications requisite to the database system

In order to store the latest data at any time, the database must include the function of addition and renewal. To afford easy access, it is very important that the database system is able to retrieve visually. Along this line, the improvement of the interface for users using mapping information are to be highlighted. The system to be established must be flexible against future expansion in the volume of data and the technical development in both software and hardware. Adaptability to the existing data and system is required to avail the existing data and system to the maximum extent. Acquired knowledge and technique should be observed and a set back due to the shift of system should be avoided.

The database system to be established should consists of 1) Meteo-hydrological Database - rainfall database and stream flow database, 2) Irrigation database, 3) Database of the project inventories - dam inventory database, 4) Socio-economy database, 5) Groundwater database. The structure of database system is shown in Figure K-15.

(2) Design of the database system

Overall design of the database system was carried out as follows;

i) System

For the time being, the database to be introduced is to be utilized by the Study Team and NWRB on demand base. A team member or a staff of NWRB sit in front of the system and operate it to get data. And the stand alone type of system is adopted. However, the system is so designed as to be converted easily to client / server type so that multiple user can access to the system through LAN.

ii) Data volume / Turn around time / Output form

Data and information installed into the database require approximately 100 MB of

memory. Large volume of data in the future can still be stored in the computer since it has a capacity of 4.3 GB of memory. Even in case data of other stations are stored, the hard disk may accommodate data for 3 years at shortest. The hard disk can be enlarged up to 31.6 GB.

The turn around time for retrieving a daily value for one year is estimated at one or two second which is considered allowable.

The output form or devices are monitors and printers.

iii) Language

All data files had been coded mostly using EXCEL and FOXBASE. A user friendly approach in the form of menus had been devised to aid the user/users of the system. On the basis of data store volume and retrieval, Microsoft ACCESS was selected for the database software. ACCESS has good adaptability to Windows NT and Windows 95 which are prevailing operation system in NWRB.

iv) Input devices

Most of data are encoded and input through keyboard. However input of figures especially maps are through digitizer and scanner.

v) Processing

The total annual rainfall, mean monthly discharge, mean annual discharge and the flow duration curve were the standard outputs derived from mathematical and statistical operation of large quantities of information collected.

vi) Output

For the time being, available standard outputs from the system are as follows : 1) A tabular form of station information, daily rainfall and discharge, mean monthly average in each station in every year. 2) A summary of monthly rainfall and mean monthly discharge for each station. 3) Flow duration curve for each stations.

vii) Storage / File structure

A file is a basic unit of storage that enables a computer to distinguish one set of information from another. A user can retrieve, change, delete, save or send to an output device. The capacity of the computer being used is 4.3 GB which is more than enough to store the amount of data and information available for encoding. In addition to this, an removable drive with a capacity of 1.0 GB is available.

viii) Backup

A backup copy of all data files should be done regularly for safeguarding the files from loss should the copy be damaged or destroyed. Backup for small files can be done using floppy disk and for large files can be done using an external hard disk or magneto optical disk.

ix) Power

In case of power failures, the uninterrupted power supply (UPS) has been a very powerful tool for protecting files from total damage. It gives the user ample time to save

and close his computer system. The UPS (600 watts) is available to cope with power failures.

Design of the database was carried out to construct each sub system compose this database system. The design work was done in order 1) Purpose, 2) Contents of the data, 3) Method of the retrieval, 4) Contents of the indication, 5) Flow of the display, 6) Design of the screen image, 7) Method to add and renew the data.

K3.3 Selected Hardware and Software

The hardware and software were prepared in line with the design of database system. Prepared computer system are shown in Figure K-16. Because of consideration in the near future, the hardware was selected the computer equipped function as server machine. The database system will be used on the plural computers through the connection to network (LAN using 10 Base-T Ethernet Cable).

In this project, the Operating System (OS) was selected Microsoft Windows NT 4.0. The OS is called generally 'BASIC SOFTWARE', because of OS have the function as the operation of file system, the management and the control of in-out instruments. Representative OS is provided UNIX, Windows NT and Net Ware. There are three reasons for this selection. One of them is that Windows NT 4.0 have sufficient processing abilities. The second reason is the superiority in user's interface. The third reason is the easy management because NWRB has a lot of experience in the operating system.

The Database Management System (DBMS) is indispensable in case of handling the large scale data and information. Therefore, the advancement of processing speed of the database system was striven by using DBMS. In this project, the DBMS was selected Microsoft Access 97. There are two points to be considered in this selection such as the efficiency and the compatibility. The former is due to the fact that Access 97 can convert easily the table made by Microsoft Excel already prepared in NWRB into readable form. The latter means that this application is able to import the database of other kinds.

The main features of prepared hardware and software are as follows;

(1) Hardware

COMPUTER	:	COMPAQ PROLIANT 800
CPU	:	Pentium Pro 200 MHz
MEMORY	:	64 MB
HDD	:	4.3 GB
MONITOR	:	COMPAQ V70 COLOR DISPLAY

(2) Software

OS	:	Microsoft Windows NT 4.0
DBMS	:	Microsoft Access 97
OTHERS	:	Microsoft Office 97

K3.4 Construction of the Database System

The database system have been constructed in line with the design of system. Relationship of each sub system is shown in Figure K-17. The features of each sub system are described as below. And the data and information compiled in the database are listed and shown in Table K-1.

(1) Rainfall Database

Rainfall database have 2 tables for information of gauging station and time series data. Contents of these tables are indicated in Table K-2 and K-3. This system is possible to retrieve from retrieval menu or region mapping information. A flow of the database screen image is shown in Figure K-18. In this database, standard outputs is as follows;

- Result of retrieved rainfall gauging station
- Annual table of daily rainfall amount
- Graph of annual hyetograph
- Table of total monthly rainfall amount

Target of rainfall data is daily rainfall in this database. Data was collected from two agencies. One of them is PAGASA, and the other one is NPC.
The data of PAGASA are furnished in the form of diskettes which is saved as TEXT format. 49 points as synoptic station of PAGASA was stored. The period of this data is roughly for 34 years since 1961 to 1995. NPC data are provided in the form of diskettes as well which is saved as LOTUS123 format. This information focus on Region X and Region XII of Mindanao island. 53 rainfall gauging stations was stored into the database. But most of these stations have short term records, the stations which were recorded more than 10 years are only 20 sites.

(2) Streamflow Database

This database also consist of two tables. One of them is for information of stream flow gauging stations such as name, location, region, river basin and so on. And other one is table of daily time series data. These data structure is shown in Tables K-4 to K-6. This system is possible to retrieve from retrieval menu or regional mapping information. A flow of the database screen image is shown in Figure K-19. With respect to the part of output, standard outputs include below;

- Result of retrieved gauging stations
- Annual table of mean daily discharge and gauge height
- Graph of Annual hydrograph
- Table of mean monthly discharge
- Graph of flow duration curve

Examples of standard outputs are shown in Figures K-20 to K-23.

Data of surface water focus on daily mean discharge. Discharge data were mainly gathered from BRS and NPC, nevertheless a part of these data were stored as published data on NWRB 's library.
The stream flow gauging stations of major river have been selected by Hydrologist of the

Study Team. These are to do hydrological analysis and tally 23 stations. In addition to stations selected by Hydrologist, the data of 18 stations were stored into the database. The published data of BRS's streamflow gauging station was available to the period before 1972. In the period between 1973 and 1979, the data were obtained in the form of photo copy from BRS. Discharge data in these period was encoded by NWRB 's encoders using software such as EXCEL and FOXPRO. In 1980-1984, daily values of discharge have been already encoded by BRS. The gauge height records were converted to discharge applying rating curves of the stream flow to generate streamflow data after 1985.

(3) Dam Inventory Database

Data set includes information of location, dam purpose, hydrology, reservoir, dam structure and others have been constructed. Data structure and flow of screen image are shown in Table K-7 and Figure K-24, respectively. In Figure K-24, database users are possible to search data from retrieval menu and to edit data easily using Add/Remove menu. The standard outputs from this database are exemplified in Figure K-25 and K-26.

The information have been selected by Dam Planner of JICA Study Team. And these data were encoded by NWRB 's staff. The encoded are the information on 56 schemes.

(4) Socio-Economy Database

The socio-economic data is basis for forecasting of municipal and industry water demand and agricultural water demand. It is considered that storing these data is very useful in comprehending the grounds for the socio-economic projection and also in updating them in the future when necessary.

This database stores the data such as population, employment and GDP of each province, which were collected and/or projected by socio-economist of the Study Team. These data structure is shown in Tables K-8 to K-10. It is possible to retrieve this database system from retrieval menu or regional map, and to search provincial or regional projection results which are shown as the values and the annual average growth ratio for the period from 1970 to 2025. A flow of the database screen image is shown in Figure K-27, and standard output in this database is shown in Figure K-28.

(5) Agricultural Data (Irrigation Database)

This database deals with the salient features of National Irrigation System (NIS) and irrigation water requirement data of each province. These data and information have been gathered mainly from NIA and BWSM by agricultural water demand analyst of the Study Team, and were encoded by NWRB 's staff. A table of 115 schemes of NIS and 90 irrigation projects have been stored in the database for the initial installation.

This database consists of three master tables. One of them is the salient features of NIS, and other two are prepared for the irrigation water requirement data. Structure of these data are indicated in Tables K-11 to K-15. A flow of screen image is shown in Figures K-29 and K-30. The standard outputs from this database are as follows;

- Table of salient features of NIS
- Table of irrigation water requirement by each province

Example of these standard outputs are shown in Figures K-31 and K-32.

(6) Groundwater Database

This database focuses on deep well and spring water data of Level III system which deal mainly with the municipal and industrial water use. Number of water resources facilities for deep well, spring and surface water in each water district, its quantity of water and population served in the water district are stored in the database. These data structure is shown in Table K-16. In the database, the data can be retrieved from retrieval menu on a screen, which has region name, province name and name of water district. A flow of screen image on the retrieval operation is shown in Figure K-33. Standard outputs from this database are as follows;

- Water district groundwater data
- Provincial summation of water district groundwater data
- Regional summation of water district groundwater data

Examples of these standard outputs are shown in Figures K-34 to K-36.

(7) Probability Calculation Tool

This was developed as a tool to estimate easily the probability of hydrologic events such as rainfall and discharge data. With respect to the methodology of the frequency analysis, Gumbel method and Log Pearson Type III distribution were adopted, since these methods are in general used all over the world. The input data of hydrologic events are encoded directly on the form of this tool, and can also be read from external file such as Microsoft Excel. Besides, this tool can print out the log-normal probability paper with plotting position by Hazen's formula. A flow of screen image for the operation is shown in Figure K-37. The standard output was shown in Figure K-38.

(8) Mapping information

Mapping information system was adopted in order to assist database retrieval visually. The retrieval method of this function is shown in Figure K-39. Map data have been already generated by NWRB using MICROSTATION. These data are incorporated in the database system as following procedures;

1) On the MICROSTATION environment, map data was exported to IGS format.
2) IGS format file transfer by external storage.
3) IGS format file was edited on the VISIO environment, and was saved as VISIO drawing file.
4) VISIO drawing file was imported as unbound OLE (Object Linking and Embedding) object frame on the ACCESS environment.

K4 Matters to be Noted Concerning Transference of Database System to NWRB

K4.1 Hardware and Software

The database system and its equipment such as hardware, software and other materials are going to be transferred to NWRB after the completion of the Study. Herein, the list of equipment which are transferred to NWRB is shown below. These will have to be managed and maintained by NWRB for the future use. Especially, it is recommended that person in charge should take a backup regularly in order to safeguard the files against unexpected loss.

(1) Computer : COMPAQ PROLIANT 800
- CPU : Pentium Pro 200 MHz
- MEMORY : 64 MB EDO DIMM
- HDD : Wide Ultra SCSI 2.1GB x 2
- FDD : 1.44 MB diskette drive (3.5 inch)
- CD-ROM : Integrated 8 x CD-ROM drive
- MOUSE : PS/2 Port Mouse
- KEYBOARD : PC/AT Enhanced Keyboard (101/102 Key)
- NETWORK : Integrated Netflex-3 10 T UTP Module PCI Bus

(2) Monitor : COMPAQ V70 COLOR DISPLAY (17 inch)

(3) Power Equipment
- UPS : APC BACK-UPS Pro 1400
- Transformer : MTB100 (220V to 100V)

(4) Outputs Equipment
- Printer : HP LASERJET 4V
- Data Switch : Manual Data Switch 4:1

(5) Network equipment
- HUB : IO-DATA Ethernet 8 Port Hub
- Network Cable : 10 BASE-T Ethernet Cable x 5

(6) Communications Equipment
- MODEM : US Robotics 33600 bps Modem

(7) Software
- OS : Microsoft Windows NT 4.0
- Others : Microsoft Office 97 Professional

K4.2 Concerning Maintenance and Strengthening of Database System

In this project, the frame of the database system has been mainly constructed. The system is brought its ability into full play when a lot of data are accumulated into the database. Therefore, it is hoped that the data and information be more increased to the database in the future. Besides, the work to add and renew the data must be regularly continued to prevent that database will become stale. However, in point of work to encode data, it is necessary to examine sufficiently about the data quality. Therefore, it is considered that the personnel in charge about the encoding data needs to be assigned in order to keep the constant level of the data quality.

In recent years, the technology in the field of the information system is has much advanced. The advanced technology will promote the diffusion of the new system in the aspect of the price. It is desirable that the consolidated computer networking system among the concerned agencies

will be built as soon as possible for the future in the Philippines. When the workability is improved by establishing the transmission system of the data using the network, the latest data will become available effectively. The transportation of data by the paper would result in not only time loss in encoding the data again, but also the unavoidable careless mistakes.

K5 Preparation of Operation Manual for Database

The manual has been prepared to operate and maintain the constructed new database system. The manual is shown in Attachment-1. In this manual, retrieval method on how to add / edit data and output samples of each database sub-system is described visually. The beginner user will be able to acquire the operation step by step because a way of operating is shown with the examples. Besides, it contains the useful advice in the operation and maintenance, especially the necessity which takes a backup of the database system, to manage and maintain the database system in the future. The operation manual for data base which was prepared in the first stage field investigation is prepared in this Part-K as "Attachment to Part-K: OPERATION MANUAL FOR DATABASE".

K6 Development Plan of National Water Information Network

The design and establishment of a National Water Information System (NWIN) is one of the sub-components of the water management of World Bank – Water Resources Development Project (WRDP). In the World Bank-WRDP Report dated October 1996, NWIN is a computer-based network system that electronically links the databases of the collection agencies and providing easy access to user agencies. This envisages to be done via modems in the medium term under the WRDP, in which the NWRB will act as the central database to which the various agencies will be linked. The database that will ultimately be linked to NWIN will include, but not be limited to hydrologic, hydrogeologic, meteorologic, physiographic databases including related infrastructures, socio-economic, environmental and library databases. The generating agencies under the medium-term are PAGASA, BRS, EMB, DENR, GMB, LWUA and NIA. These agencies including NEDA as a major user agency will be responsible for maintaining their respective databases which will be in their custody. The NWIN structure would allow each agency to operate the system independently.

Part – K

Tables

Table K-1 NUMBER OF RECORDS IN THE INITIAL INSTALLATION

Nos	Database Name	Table Name	Number of Records
1	Rainfall Database	t_RainStation	102
2		t_Rain01	39,081
3		t_Rain02	25,566
4		t_Rain03	38,349
5		t_Rain04	202,702
6		t_Rain05	61,359
7		t_Rain06	25,566
8		t_Rain07	34,697
9		t_Rain08	47,480
10		t_Rain09	25,566
11		t_Rain10	119,797
12		t_Rain11	38,349
13		t_Rain12	143,170
14	Streamflow Database	t_RiverStation	41
15		t_River01	45,657
16		t_River02	24,837
17		t_River03	40,908
18		t_River04	19,358
19		t_River05	27,393
20		t_River06	51,132
21		t_River07	33,237
22		t_River08	41,639
23		t_River09	0
24		t_River10	21,183
25		t_River11	8,035
26		t_River12	55,519
27		t_RatingTable	941
28		t_RiverBasin	429
29	Dam Inventory Database	t_Dam	56
30	Socio-Economy Database	t_EconoPopulation	76
31		t_EconoEmployment	76
32		t_EconoGDP	76
33	Irrigation Database	t_IrrgNis	115
34		t_IrrgCalendar	16,200
35		t_IrrgCrop	9
36		t_IrrgProject	90
37		t_IrrgWaterReqt	3,240
38	Groundwater Database	t_GroundwaterLevIII	404

Table K-2 LIST OF DATA STRUCTURE ON RAINFALL DATABASE (1/2)

[table name : t_RainStation]

Nos	Field Name	Data Type	Field Size	Description
1	Nos	Number	Long Integer	
2	DataOwner	Number	Integer	Agency name owned the data
3	StationID	Text	10	ID of gauging station
4	Region	Number	Integer	Water resources region
5	Location	Text	255	Name of balangay
6	Town	Text	255	Name of town
7	Province	Text	255	Name of Province
8	Lat1	Number	Integer	Degree of latitude
9	Lat2	Number	Integer	Minute of latitude
10	Lat3	Number	Integer	Second of latitude
11	Lon1	Number	Integer	Degree of longitude
12	Lon2	Number	Integer	Minute of longitude
13	Lon3	Number	Integer	Second of longitude
14	Elevation	Number	Single	Elevation in meter
15	StartRecYear	Number	Integer	Initial year stored into the database
16	EndRecYear	Number	Integer	Last year stored into the database
17	LatestUpdate	Date/Time		

Table K-3 LIST OF DATA STRUCTURE ON RAINFALL DATABASE (2/2)

[table name : t_Rain + (RegionNo)]

Nos	Field Name	Data Type	Field Size	Description
1	Region	Text	2	Water resources region
2	DataOwner	Text	2	Code number of agency owned the data
3	DataType	Text	2	Type of data
4	StationID	Text	10	ID of rainfall gauging station
5	Year	Number	Integer	
6	Month	Number	Integer	
7	Day	Number	Integer	
8	Value	Number	Single	Daily rainfall amount in mili meter

Table K-4 LIST OF DATA STRUCTURE ON STREAMFLOW DATABASE (1/3)

[table name : t_RatingTable]

Nos	Field Name	Data Type	Field Size	Description
1	Nos	Number	Long Integer	
2	TableID	Number	Integer	ID of rating table
3	GaugeHeight	Number	Single	Gauge height in meter
4	Discharge	Number	Single	Discharge in cubic meter per second

Table K-5 LIST OF DATA STRUCTURE ON STREAMFLOW DATABASE (2/3)

[table name : t_RiverStation]

Nos	Field Name	Data Type	Field Size	Description
1	Nos	Number	Long Integer	
2	DataOwner	Number	Integer	Agency name owned the data
3	StationID	Text	10	ID of gauging station
4	River	Text	255	Name of the river
5	RiverBasinCodeNo	Text	5	Code number of river basin
6	Region	Number	Integer	Water resources region
7	Location	Text	255	Name of balangay
8	Town	Text	255	Name of town
9	Province	Text	255	Name of Province
10	Lat1	Number	Integer	Degree of latitude
11	Lat2	Number	Integer	Minute of latitude
12	Lat3	Number	Integer	Second of latitude
13	Lon1	Number	Integer	Degree of longitude
14	Lon2	Number	Integer	Minute of longitude
15	Lon3	Number	Integer	Second of longitude
16	DrainageArea	Number	Single	Drainage area in square kilo meter
17	SiteInfo	Text	255	Detail information of observation site
18	StartRecYear	Number	Integer	Initial year stored into the database
19	EndRecYear	Number	Integer	Last year stored into the database
20	LatestUpdate	Date/Time		
21	GageInfo	Text	255	Information of gauge

Table K-6 LIST OF DATA STRUCTURE ON STREAMFLOW DATABASE (3/3)

[table name : t_River + (RegionNo)]

Nos	Field Name	Data Type	Field Size	Description
1	Region	Text	2	Water resources region
2	DataOwner	Text	2	Code number of agency owned the data
3	DataType	Text	2	Type of data
4	StationID	Text	10	ID of rainfall gauging station
5	Year	Number	Integer	
6	Month	Number	Integer	
7	Day	Number	Integer	
8	Value	Number	Single	Mean daily discharge in m3/sec
9	GH	Number	Single	Mean daily gauge height in meter

Table K-7 (1/2) LIST OF DATA STRUCTURE ON DAM INVENTORY DATABASE

[table name : t_Dam]

Nos	Field Name	Data Type	Field Size	Description
1	id	Auto Number	Long Integer	
2	NameScheme	Text	100	Agency name prepared project scheme
3	Agency	Text	50	Water resources region
4	Region	Number	Integer	
5	Province	Text	50	
6	RiverSystem	Text	50	Name of main stream river
7	Stream	Text	50	Name of river
8	MapName	Text	50	
9	Map_250	Yes/No		1/250,000 map
10	Map_50	Yes/No		1/50,000 map
11	Lat1	Text	2	Degree of latitude
12	Lat2	Text	2	Minute of latitude
13	Lat3	Text	2	Second of latitude
14	Lon1	Text	3	Degree of longitude
15	Lon2	Text	2	Minute of longitude
16	Lon3	Text	2	Second of longitude
17	Purpose_I	Yes/No		Irrigation
18	Purpose_P	Yes/No		Power
19	Purpose_FC	Yes/No		Flood control
20	Purpose_MI	Yes/No		Municiple and industry
21	StudyLevel	Text	50	Study level such as M/P, F/S, D/D
22	StudyYear	Number	Integer	
23	CatchmentArea	Number	Single	
24	DenudationRate	Number	Single	
25	SpecficDischarge	Number	Single	
26	MeanDischarge	Number	Single	
27	BasinAverageRainfall	Number	Single	
28	DesignFlood	Number	Single	
29	FullSupplyLevel	Text	50	
30	MinOperatingLevel	Number	Single	
31	SurchargeLevel	Number	Single	
32	DrawdownDepth	Text	50	
33	GrossStorageVol	Number	Single	
34	ActiveStorageVol	Number	Single	
35	FloodControlSpace	Number	Single	
36	DeadStorageVol	Number	Single	
37	Geology	Text	255	
38	DamType	Text	50	
39	CrestElevation	Number	Single	
40	BottomElevation	Number	Single	
41	DamHeight	Number	Single	
42	CrestLength	Number	Single	
43	EmbankmentVolume	Number	Single	
44	PriceLevelYear	Number	Integer	
45	TotalConstructionCost	Number	Single	
46	DamCost	Number	Single	
47	PowerFacilitiesCost	Number	Single	
48	WaterSupplyCost	Number	Single	
49	InstalledCapacity	Number	Single	
50	LengthWaterway	Text	50	

Table K-7 (2/2) LIST OF DATA STRUCTURE ON DAM INVENTORY DATABASE

[table name : t_Dam]

Nos	Field Name	Data Type	Field Size	Description
51	DiameterWaterway	Number	Single	
52	TailwaterLevel	Number	Single	
53	PlantMaxDischarge	Number	Single	
54	FirmDischarge	Number	Single	
55	RatedNetHead	Text	50	
56	FirmPeakPower	Number	Single	
57	AnnualTotalEnergy	Number	Single	
58	FirmEnergy	Number	Single	
59	SecondaryEnergy	Number	Single	
60	TotalIrrigationArea	Number	Single	
61	StartSupplyIrrigationWater	Number	Integer	
62	EndSupplyIrrigationWater	Number	Integer	
63	AnnualMeanDischargeIrrigation	Number	Single	
64	MonthlyMaxDischargeIrrigation	Number	Single	
65	AreaMunicipalWater	Text	50	
66	MeanDischargeMunicipal	Text	50	
67	OtherDescription1	Text	255	Other description
68	OtherDescription2	Text	255	- do -
69	OtherDescription3	Text	255	- do -
70	OtherDescription4	Text	255	- do -
71	OtherDescription5	Text	255	- do -
72	OtherDescription6	Text	255	- do -
73	OtherDescription7	Text	255	- do -
74	OtherDescription8	Text	255	- do -
75	OtherDescription9	Text	255	- do -
76	DataSource1	Text	255	Data source
77	DataSource2	Text	255	- do -
78	DataSource3	Text	255	- do -
79	DataSource4	Text	255	- do -
80	DataSource5	Text	255	- do -

Table K-8 LIST OF DATA STRUCTURE ON SOCIO-ECONOMY DATABASE (1/3)

[table name : t_EconoPopulation]

Nos	Field Name	Data Type	Field Size	Description
1	ProvinceID	Number	Integer	
2	Pop1970	Number	Single	Population in 1000 persons in 1970
3	Pop1975	Number	Single	Population in 1000 persons in 1975
4	Pop1980	Number	Single	Population in 1000 persons in 1980
5	Pop1985	Number	Single	Population in 1000 persons in 1985
6	Pop1990	Number	Single	Population in 1000 persons in 1990
7	Pop1995	Number	Single	Population in 1000 persons in 1995
8	Pop2000	Number	Single	Population in 1000 persons in 2000
9	Pop2005	Number	Single	Population in 1000 persons in 2005
10	Pop2010	Number	Single	Population in 1000 persons in 2010
11	Pop2015	Number	Single	Population in 1000 persons in 2015
12	Pop2020	Number	Single	Population in 1000 persons in 2020
13	Pop2025	Number	Single	Population in 1000 persons in 2025

Table K-9 LIST OF DATA STRUCTURE ON SOCIO-ECONOMY DATABASE (2/3)

[table name : t_EconoEmployment]

Nos	Field Name	Data Type	Field Size	Description
1	ProvinceID	Number	Integer	
2	Employ1970	Number	Single	Employment in 1000 persons in 1970
3	Employ1975	Number	Single	Employment in 1000 persons in 1975
4	Employ1980	Number	Single	Employment in 1000 persons in 1980
5	Employ1985	Number	Single	Employment in 1000 persons in 1985
6	Employ1990	Number	Single	Employment in 1000 persons in 1990
7	Employ1995	Number	Single	Employment in 1000 persons in 1995
8	Employ2000	Number	Single	Employment in 1000 persons in 2000
9	Employ2005	Number	Single	Employment in 1000 persons in 2005
10	Employ2010	Number	Single	Employment in 1000 persons in 2010
11	Employ2015	Number	Single	Employment in 1000 persons in 2015
12	Employ2020	Number	Single	Employment in 1000 persons in 2020
13	Employ2025	Number	Single	Employment in 1000 persons in 2025

Table K-10 LIST OF DATA STRUCTURE ON SOCIO-ECONOMY DATABASE (3/3)

[table name : t_EconoGDP]

Nos	Field Name	Data Type	Field Size	Description
1	ProvinceID	Number	Integer	
2	GDP1970	Number	Single	GDP in billion pesos in 1970
3	GDP1975	Number	Single	GDP in billion pesos in 1975
4	GDP1980	Number	Single	GDP in billion pesos in 1980
5	GDP1985	Number	Single	GDP in billion pesos in 1985
6	GDP1990	Number	Single	GDP in billion pesos in 1990
7	GDP1995	Number	Single	GDP in billion pesos in 1995
8	GDP2000	Number	Single	GDP in billion pesos in 2000
9	GDP2005	Number	Single	GDP in billion pesos in 2005
10	GDP2010	Number	Single	GDP in billion pesos in 2010
11	GDP2015	Number	Single	GDP in billion pesos in 2015
12	GDP2020	Number	Single	GDP in billion pesos in 2020
13	GDP2025	Number	Single	GDP in billion pesos in 2025

Table K-11 (1/2) LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (1/5)

[table name : t_IrrgNis]

Nos	Field Name	Data Type	Field Size	Description
1	ID	Auto Number	Long Integer	
2	Region	Number	Integer	Water resources region
3	SystemName	Text	100	Name of Irrigation System
4	Source	Text	50	Source of water supply
5	ApprovedWaterRights	Text	50	Approved water rights
6	OfficialOpeningYear	Text	50	Official opening of the system
7	OriginalConstructionCost	Text	50	Original construction cost
8	DateOfRehabilitation	Text	50	Date of rehabilitation
9	CostOfRehabilitation	Text	50	Cost of rehabilitation
10	CurrentStatus	Text	50	Current status
11	FirmedUpServiceArea	Number	Single	Firmed-up service area
12	DesignedArea	Number	Single	Desighed area
13	PotentialArea	Number	Single	Potential area
14	NumberOfLandowners	Text	50	Number of landowners
15	NumberOfFarmersServed	Number	Single	Number of farmers served
16	AverageFarmSize	Number	Single	Average farm size
17	NumberOfLots	Number	Single	Number of lots
18	DiversionType	Text	50	Diversion type
19	DiversionCapacity	Text	150	Diversion capacity
20	LengthOfMainCanal	Number	Single	Length of main canal
21	LengthOfLaterals	Number	Single	Length of laterals
22	NumberOfTurnouts	Number	Single	number of turnouts
23	LengthOfServiceRoads	Number	Single	Length of service roads
24	LengthOfAccessRoads	Number	Single	Length of access roads
25	DrainageDensity	Number	Single	Drainage density
26	FarmditchDensity	Number	Single	Farmditch density
27	ClimaticCondition	Text	50	Climatic condition (coronas)
28	AverageAnnualRainfall	Number	Single	Average Annual rainfall
29	Crop	Text	255	Main crops
30	Town1	Text	30	Town served
31	Town2	Text	30	- do -
32	Town3	Text	30	- do -
33	Town4	Text	30	- do -
34	Town5	Text	30	- do -
35	Town6	Text	30	- do -
36	Town7	Text	30	- do -
37	Town8	Text	30	- do -
38	Town9	Text	30	- do -
39	Town10	Text	30	- do -
40	Province1	Text	30	Province served
41	Province2	Text	30	- do -
42	Province3	Text	30	- do -
43	Province4	Text	30	- do -
44	Province5	Text	30	- do -
45	Province6	Text	30	- do -
46	Province7	Text	30	- do -
47	Province8	Text	30	- do -
48	Province9	Text	30	- do -
49	Province10	Text	30	- do -

Table K-11 (2/2) LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (1/5)

Nos	Field Name	Data Type	Field Size	Description
50	Served1	Number	Single	Area served in hectare
51	Served2	Number	Single	- do -
52	Served3	Number	Single	- do -
53	Served4	Number	Single	- do -
54	Served5	Number	Single	- do -
55	Served6	Number	Single	- do -
56	Served7	Number	Single	- do -
57	Served8	Number	Single	Area served in hectare
58	Served9	Number	Single	- do -
59	Served10	Number	Single	- do -
60	AverageYear	Text	20	Average year of irrigated / benefitted are
61	WetIrrigatedArea	Number	Single	Irrigated area in hectare in wet season
62	DryIrrigatedArea	Number	Single	Irrigated area in hectare in dry season
63	ThirdIrrigatedArea	Number	Single	Irrigated area in hectare in third season
64	WetBenefittedArea	Number	Single	Benefitted area in hectare in wet season
65	DryBenefittedArea	Number	Single	Benefitted area in hectare in dry season
66	ThirdBenefittedArea	Number	Single	Benefitted area in hectare in third season
67	WetAverageYield	Number	Single	Average yield in cav/ha in wet season
68	DryAverageYield	Number	Single	Average yield in cav/ha in dry season
69	ThirdAverageYield	Number	Single	Average yield in cav/ha in third season
70	NatureOfContract1	Text	30	Nature of contract
71	NatureOfContract2	Text	30	- do -
72	NatureOfContract3	Text	30	- do -
73	NumberOfFIA1	Number	Single	Number of FIA
74	NumberOfFIA2	Number	Single	- do -
75	NumberOfFIA3	Number	Single	- do -
76	LengthOfCanalUnderContract1	Number	Single	Length of canal under constract in km
77	LengthOfCanalUnderContract2	Number	Single	- do -
78	LengthOfCanalUnderContract3	Number	Single	- do -
79	AreaCovered1	Number	Single	Area covered in hectare
80	AreaCovered2	Number	Single	- do -
81	AreaCovered3	Number	Single	- do -
82	FutureExpansion	Text	255	Future Expansion
83	Deterioration	Text	255	Deterioration of the System
84	OtherImformation	Text	255	Other Information

Table K-12 LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (2/5)

[table name : t_IrrgCalendar]

Nos	Field Name	Data Type	Field Size	Description
1	ProjectID	Number	Integer	
2	Month	Number	Integer	
3	Decade	Number	Integer	
4	Order	Number	Integer	
5	Col1	Text	1	
6	Col2	Text	1	
7	Col3	Text	1	
8	Col4	Text	1	
9	Col5	Text	1	
10	Col6	Text	1	

Table K-13 LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (3/5)

[table name : t_IrrgCrop]

Nos	Field Name	Data Type	Field Size	Description
1	CropID	Number	Long Integer	
2	CropName	Text	50	Name of crop

Table K-14 LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (4/5)

[table name : t_IrrgProject]

Nos	Field Name	Data Type	Field Size	Description
1	ProjectID	Number	Long Integer	
2	ProvinceID	Number	Long Integer	
3	Crop1	Number	Integer	Kind of crop
4	Crop2	Number	Integer	- do -
5	ProjectName	Text	50	Name of irrigation project
6	RainSt	Text	50	Station for rainfall
7	EvapSt	Text	50	Station for evaporation

Table K-15 LIST OF DATA STRUCTURE ON IRRIGATION DATABASE (5/5)

[table name : t_IrrgWaterReqt]

Nos	Field Name	Data Type	Field Size	Description
1	ProjectID	Number	Long Integer	
2	Month	Number	Integer	
3	Decade	Number	Integer	
4	RainData	Number	Single	Rainfall data
5	EvapData	Number	Single	Evapotranspiration data
6	LandSoak	Number	Single	Land soak / flood
7	EvapTrans	Number	Single	Evapotranspiration
8	DeepPerco	Number	Single	Deep percolation
9	CropWaterReqt	Number	Single	Crop water requirement
10	EffRain	Number	Single	Effective rainfall
11	CropIrrgReqt	Number	Single	Crop irrigation Requirement
12	OverallEff	Number	Single	Overall effect
13	DiversionReqt	Number	Single	Diversion requirement
14	Wduty	Number	Single	W*DUTY in l/s/h
15	Critical	Text	4	

Table K-16 LIST OF DATA STRUCTURE ON GROUNDWATER DATABASE

{ table name : t_GroundwaterLevIII }

Nos	Field Name	Data Type	Field Size	Description
1	ID	Number	Long Integer	
2	Region	Number	Integer	Water resources region
3	Province	Text	50	
4	WaterDistrict	Text	50	
5	Wells	Number	Integer	Number of well resources
6	SPs	Number	Integer	Number of spring water resources
7	SurW	Number	Integer	Number of surface water resources
8	DW	Number	Single	Quantity of water from deep well
9	SP	Number	Single	Quantity of water from spring water
10	GW	Number	Single	Summation of DW and SP
11	SW	Number	Single	Quantity of water from surface water
12	sourceT	Text	5	
13	TotalQ	Number	Single	Summation of GW and SW
14	PopServed	Number	Long Integer	Population served
15	lqcdQ	Number	Single	Usage quantity
16	Pop	Number	Long Integer	Population
17	ServRatio	Number	Single	PopServed divided by Pop
18	ServiceMunicipality	Text	255	
19	Year	Number	Integer	

Part – K

Figures

PHILIPPINE GROUNDWATER DATABASE

SCREEN 1: LOCATION **WELL NO:**

PGDB NO	-		SOURCE			LOCAL NO		
OTHER NO					BASIN			
LONGITUDE		X MM		X PTM		BASIN AREA		
LATITUDE		Y MM		Y PTM		LOC. METHOD		
PROV.CODE		PROV		GRD. ELEV		ELEV. ACCU.		
ADDR/OWNER								
MUN. CODE	XXX	MUNICIPALITY						
BGY. CODE	XXX	BARANGAY						

SCREEN 2: WELL CONSTRUCTION DATA *SOURCE:*

COMP DATE	/ /	LEVEL		OWN'P		TYPE		USE	
OPERATING?		LIFT. DEVICE		GRAVEL PACK ϕ (mm)		-			
M.P. AB. GROUND (m)		STATIC WL (mBMP)				MSL	XXXXXXXXX		

BOREHOLE DEPTH	ϕ (mm)	CASING ϕ (mm)	TYPE	TOP (mbg)	BOT (mbg)	SCREEN TYPE	PERF	SLOT (mm)	TOP (mbg)	BOT (mbg)

SCREEN 3: STRATA LOG DATA *SOURCE:*

DRILLER			DRILL. METHOD		DESCRIBED BY		
DEPTH TO UNDERSIDE OF LAYER (mbg)	FORM.		F. AREA	XXXXXXXXX	LOGS		
	CODE	BRIEF DESCRIPTION OF PENETRATED STRATA					PERM. CLASS

Figure K-1 STANDARD GROUNDWATER DATA ENTRY FORMS (1/6)

PHILIPPINE GROUNDWATER DATABASE

WELL NO:

SCREEN 4: STEP DRAWDOWN PUMPING TEST *SOURCE:*

DATE		*BY*		*NO. STEPS / DURATION(min)*	
Q MAX (l/s)				*TRANSMISS. (m^2/sec*10^-3)*	
TOTAL DRAWDOWN, Σδsw (m)				*AQUIF LOSS COEF.B (sec/m^2)*	
SPECIFIC CAPACITY (l/s/m)		XXXXXXXX		*WELL LOSS CONS.C (sec^2/m^5)*	

SCREEN 5: CONSTANT DISCHARGE PUMPING TEST *SOURCE:*

DATE		*BY*			DRAWDN.	RECOV.
DURATION (min)				*TRANS. (m^2/sec*10^{-3})*		
DISCHARGE (l/s)				*OBSERVATION WELL*		
TOTAL DRAWDOWN (m)				*STORAGE (*10^{-3})*		
SP. CAP. END TEST (l/s/m)		XXXXXXX		*LEAKAGE (sec^{-1}*10^{-10})*		
WELL POTENTIAL		XXXXXXX		*TRANS. (m^2/sec*10^{-3})*		

SCREEN 6: WATER QUALITY ANALYSIS *SOURCE:*

SAMP. DATE		*pH*		*TDS*		*TSS*		*ODOR*	
COLOR		*Ca++*		*NH_4+*		*NO_3-*		*CO_2*	
COND.μS/CM		*Mg++*		*Zn++*		*NO_2-*		*H_2S*	
TEMP °C		*Mn++*		*Cu++*		*CO_3=*		*CH_4*	
TURBIDITY		*Fe++*		*HCO_3-*		*PO_4≡*		*O_2*	
ALKALINITY		*Na+*		*SO_4=*		*F-*		*B*	
T.HARDNESS		*K+*		*Cl-*		*SiO_2*		*Pb*	

SCREEN 7: GROUNDWATER LEVELS HISTORY *SOURCE:*

MEASURING PT. (M.P)		*M.P. AB. GROUND*		*PERIOD.M.*	

DATE	*GW LEVEL BMP (m)*	*SWL?*	*DATE*	*GW LEVEL BMP (m)*	*SWL?*	*DATE*	*GW LEVEL BMP (m)*	*SWL?*

Figure K-2 STANDARD GROUNDWATER DATA ENTRY FORMS (2/6)

PHILIPPINE GROUNDWATER DATABASE

WELL NO:

SCREEN 8: GROUNDWATER DISCHARGE HISTORY *SOURCE:*

DATE	Q (m^3/h)	DATE	Q (m^3/h)	DATE	Q (m^3/h)	DATE	Q (m^3/h)

SCREEN 9: CHLORIDE CONTENT HISTORY *SOURCE:*

DATE	CL (ppm)	DATE	CL (ppm)	DATE	CL (ppm)	DATE	CL (ppm)

SCREEN 10: OTHER INFORMATION *SOURCE:*

1. If abandoned, reason why?
2. Previously free flowing? When? When did it stop free-flowing?
3. No. of persons in the household? (If private well, for domestic use)
4. No. of household water borrowers?
5. Description of water quality. (taste, color, etc.)
6. Other remarks

Figure K-3 STANDARD GROUNDWATER DATA ENTRY FORMS (3/6)

PHILIPPINE GROUNDWATER DATABASE

SCREEN 1: LOCATION SPRING NO:

SPRING NO	-S	NAME			SOURCE		
BASIN				BASIN AREA		CATCH. AREA	
LONGITUDE		X MM		X PTM		LOC. METHOD	
LATITUDE		Y MM		Y PTM		GRD. ELEV.	
PROV. CODE						ELEV. ACCUR.	
ADDR/OWNER							
MUN. CODE		MUNICIPALITY					
BGY. CODE		BARANGAY					

SCREEN 2: OTHER INFORMATION SOURCE:

D A T E	/ /	DISCHARGE (L/S)		LEVEL	
CAPTAGED		CAPTAGE TYPE		OWN'P	
ROCK TYPE		FORMATION		USE	

SCREEN 3: WATER QUALITY ANALYSIS SOURCE:

SAMP. DATE		pH		TDS		TSS		ODOR	
COLOR		Ca++		NH_4+		NO_3-		CO_2	
COND. µS/CM		Mg++		Zn++		NO_2-		H_2S	
TEMP °C		Mn++		Cu++		CO_3=		CH_4	
TURBIDITY		Fe++		HCO_3-		PO_4≡		O_2	
ALKALINITY		Na+		SO_4=		F-		B	
T.HARDNESS		K+		Cl-		SiO_2		Pb	

SCREEN 4: SPRING DISCHARGE HISTORY SOURCE:

DATE	Q (m^3/h)	DATE	Q (m^3/h)	DATE	Q (m^3/h)	DATE	Q (m^3/h)

Figure K-4 STANDARD GROUNDWATER DATA ENTRY FORMS (4/6)

VALID ENTRIES FOR RESPECTIVE FIELDS

1. LOCATION

LOCATION METHOD

OLM	Plotted in Office from Maps
FLO	Located in the Field
OLC	Plotted in Office by Using Recorded Coord. or GPS
ALL	Approximate Location within 500 meters
ALB	Approximate Location within Barangay
ALM	Approximate Location within Municipality
ALT	Approximate Location within 1:50,000 Base Map

ELEVATION ACCURACY

	No Entry
GP	GPS
LE	Levelling
AL	Altimeter
MR	Map Reading
UN	Unknown

2. WELL CONSTRUCTION

CASING/SCREEN TYPE

	No More Entry
UN	Unknown
ST	Steel
SS	Stainless Steel
BI	Black Iron
RP	Reinforced Plastic
CR	Concrete
MX	Mixed
PV	PVC
CL	Clay

SCREEN PERFORATION

	Unknown
WW	Wire Wound
MP	Machine Perforated
HP	Manually Perforated
LO	Louvre

SERVICE LEVEL

1, 2, 3

OWNERSHIP

	Unknown
PUB	Public
PRI	Private

WELL TYPE

	Unknown
OD	Open Dug Well
IOD	Improved Open Dug Well
ROD	Rehab. Open Dug Well
SW	Shallow Well
RSW	Rehab. Shallow Well
DW	Deep Well
RDW	Rehab. Deep Well
FF	Free Flowing Well
RFF	Rehab. Free Flowing Well

WELL USE

	Unknown
DRK	Drinking
WAS	Washing
IRR	Irrigation
IND	Industrial
INS	Institutional
COM	Commercial
OBS	Observation Well
UTI	Utility
ABD	Abandoned

LIFTING DEVICE

	Unknown
HP	Hand Pump
SP	Submersible Pump
CP	Centrifugal Pump
VA	Vertical Axis Pump (Turbine)
BU	Bucket with Rope

3. STRATA LOG

DRILLING METHOD

	Unknown
PE	Percussion
DH	Down Hole Ham.
RO	Rotary
HD	Hand Dug

SAMPLES DESCRIBED BY

	Unknown
GS	Groundwater Specialist
DS	Drilling Supervisor
DR	Driller
OT	Others

LOGS PERFORMED

	No Log
PE	Penetration
CA	Caliper
GR	Gamma Ray
SP	Self Potential
RS	Resistivity
FL	Flow

Figure K-5 STANDARD GROUNDWATER DATA ENTRY FORMS (5/6)

LITHOLOGY CODES

	No Entry
EA	SOIL
G	GRAVEL
g	gravel
P	PEBBLES
p	pebbles
B	BOULDERS
b	boulders
S	SAND
S1	FINE SAND
S2	MEDIUM SAND
S3	COARSE SAND
s	sand
I	SILT
i	silt
IC	SILT/CLAY (LOAM)
ic	silt/clay (loam)
CI	CLAY/SILT (LOAM)
ci	clay/silt (loam)
C	CLAY
c	clay
K	CONGLOMERATE
BR	BRECCIA
SS	SANDSTONE
SH	SHALE; CLAYSTONE; SILTSTONE
V	VOLCANIC ASH
V1	FINE VOLCANIC ASH
V2	MEDIUM VOLCANIC ASH
V3	COARSE VOLCANIC ASH
v	volcanic ash
PU	PUMICE
pu	pumice
T	TUFF
T1	FINE TUFF
T2	MEDIUM TUFF
T3	COARSE TUFF
t	tuff
A	ADOBE
a	adobe
AG	AGGLOMERATE
CO	CORALS (DEBRIS)
co	corals (debris)
LL	CORALLINE LIMESTONE
ll	coralline limestone
L	LIMESTONE
l	limestone/calcareous
DO	DOLOMITE
do	dolomite
PE	PEAT, LIGNITE
pe	peat, lignite
HA	HALITE
ha	halite
GY	GYPSUM
gy	gypsum
EX	EXTRUSIVES
IN	INTRUSIVES
VO	VOLCANIC ROCK (UNDIF.)
MB	MARBLE
PH	PHYLITE, SCHIST
GN	GNEISS
R	ROCK (UNKNOWN)
X	UNKNOWN
Y	ALTERNATING LAYERS (3RD COL)

PERMEABLE CLASS

	Unknown
PC	Permeable Consolidated
PU	Permeable Unconsolidated
S	Semipermeable
I	Impermeable

4. STEP DRAWDOWN PUMPING TEST

PUMPING TEST DONEBY

	Unknown
GS	Groundwater Specialist
DS	Drilling Supervisor
DR	Driller
OT	Others

5. CONSTANT DRAWDOWN PUMPING TEST

PUMPING TEST DONEBY

	Unknown
GS	Groundwater Specialist
DS	Drilling Supervisor
DR	Driller
OT	Others

6. WATER QUALITY ANALYSIS

ODOR

OL	ODORLESS
SM	SLIGHTLY SMELLY
ST	STRONG SMELL
	NO INFORMATION

COLOR

CL	CLEAR
CD	CLOUDY
TB	TURBID
	NO INFO

7. GROUNDWATER LEVELS HISTORY

MEASURING POINT (MP)

	Unknown
TC	Top of Casing
PE	Pedestal
GR	Ground
SP	Sounding Pipe

Figure K-6 STANDARD GROUNDWATER DATA ENTRY FORMS (6/6)

PHILIPPINE GROUNDWATER DATABASE
WELL RECORD

38513-0016 W5.2

SCREEN 1: LOCATION

PGRB No	38513-0016	Source	KELLE-LANUA-NCWD 1980			Excel No	W5.2		
Other No	RE6678			Basin	4	-BINOOD RIVER			
Longitude	123°56'36	E WGS	96.5	E PTM	822.455	Basin Area	65.5		
Latitude	10°22'44	N WGS	100.9	N PTM	1149.119	Loc. Method	GLN		
Prov. Code	CEB CEBO				Gr. Elev	39.47	Accu.	UN	
Addr/Owner	CASTLI				NCWD				
Mun. Code	CON CONSOLACION				Year	1980	Pop	82,270	
Bgy. Code	003 Castle					0	Pop	3,353	

SCREEN 2: WELL CONSTRUCTION DATA

Borehole Depth (m)	Borehole ϕ (mm)	Casing ϕ (mm)	Type	Top (mbg)	Bot (mbg)	Screen Type	Screen Pos't	Slot (mm)	Top (mbg)	Bot (mbg)
31.0	553	356	UN	-0.50	33.0	BS	WW	3.5	33.0	43.1
73.0	683	355	UN	39.0	73.0	UN	KP	6.0	63.0	53.0
						UN	KP	6.0	59.0	61.0
						BS	WW	3.5	63.0	43.0
						UN	KP	6.0	63.0	43.0

Comp Date	09/01/78	Level		Own'p		Type	UNK	Con
Operating?		Elec. Device		Gravel Pack ϕ (mm)		5.0 -	8.0
W.P. ab. Ground (m)	0.50	Static WL (mbmp)	26.50	MSL	3.47		

SCREEN 3: STRATA LOG DATA

Driller		Drill. Method	RR	Described By	RS
Depth to Underside of Layer (mbg)	Form. Code	Brief Description of Penetrated Strata	Form. Class
3.0	BA	TOPSOIL	I
9.0	L	LIMESTONE WITH CLAY	C
8.0	LLL	HARD COR. LIMESTONE WITH SOFT BROWN LIMESTONE	C
17.0	LLL	HARD COR. LIMESTONE WITH SOFT GRAY LIMESTONE	C
29.0	LLL	HARD COR. LIMESTONE WITH SOFT BROWN LIMESTONE	C
22.0	LL	HARD CORALLINE LIMESTONE	C
44.0	LLL	HARD COR. LIMESTONE WITH SOFT CREAM LIMESTONE	C
53.0	L	CREAMY BONDED LIMESTONE W/HARD,WHITE LIMEST.	C
73.0	LL	POORLY CONSOLIDATED UNSORTED COR. LIMESTONE	C

page 1 of 3

SCREEN 4: STEP DRAWDOWN PUMPING TEST

Date	09/01/78	By	GT	No Steps / Duration (min)	4/60
Q Max (l/s)			48.65	Transmissiv. (m2/sec*10^-3)	
Total Spec. Drawd. Ssw (m)			38.85	Aquifer Loss Coef.B(sec/m2)	58.00
Specific Capacity (l/s/m)			6.47	Well Loss Coeff. C(sec2/m5)	2810

SCREEN 5: CONSTANT DISCHARGE PUMPING TEST

Date	09/01/78	By	GT		Drawdo.	Recov.
Duration (min)			1560	Transm. (m2/sec*10-3)	10.00	
Discharge (l/s)			48.30	OBSERVATION WELL NO.	1	
Total Drawdown (m)			39.72	Storage (*10-3)	1.40	
Sp. Cap. End Test (l/s/m)			6.5	Leakage (m-1*10-10?)		
Well Potential			RECHG	Trans. (m2/sec*10-3)		

SCREEN 6: WATER QUALITY ANALYSIS (PPM or mg/l)

Samp. Date	09/13/78	pH	6.90	TDS		TSS		COCR	OL
Color		Ca++	58.0	NH4+	0.02	NO3-	35.0	CO2	37.00
Cond. µS/CM		Mg++	16.0	Ba++		NO2-		H2S	
Temp °C	28.3	Na++	0.02	Cu++		CO3=		CH4	
Turbidity		Fe++	0.03	HCO3-	309	PO4=		O2	
Alkalinity	616.0	Na+	336.5	SO4=	19.00	P-		B	
T. Hardness	330	K+		Cl-	32	SIO2	16.2	FD	

SCREEN 7: GROUNDWATER LEVELS HISTORY

Measuring Pt.(M.P)	TC	M.P. ab. Ground	0.50	Period. m.	Yes

Date	GW Level Bmp (m)	SWL?	GW Level MSL	Date	GW Level Bmp (m)	SWL?	GW Level MSL
04/15/78	26.50	Yes	3.47	05/01/80	30.30	No	-4.13
06/30/78	26.00	Yes	3.97	05/15/80	33.80	No	-3.83
07/30/78	26.00	Yes	3.97	05/30/80	33.80	No	-3.93
08/30/78	25.85	Yes	4.12	06/01/80	34.00	No	-4.03
09/30/78	25.80	Yes	4.17	07/01/80	34.50	No	-4.53
10/30/78	25.70	Yes	4.27	07/10/80	34.60	No	-4.63
11/13/78	25.60	Yes	4.37	07/30/80	34.60	No	-4.63
12/13/78	29.50	Yes	0.47	08/15/80	35.00	No	-5.03
12/30/78	25.83	Yes	4.13	08/17/80	35.30	No	-5.33
01/30/79	25.93	Yes	4.03	01/01/81	34.70	No	-5.23
02/28/79	25.95	Yes	4.02	02/15/81	33.70	No	-3.73
03/30/79	26.00	Yes	3.97	03/30/81	33.60	No	-3.63
04/30/79	26.00	Yes	3.97	04/10/81	34.30	No	-4.83
05/30/79	25.20	Yes	3.97	05/10/81	34.00	No	-4.83
06/30/79	26.00	Yes	3.97	06/10/81	34.00	No	-4.83
07/10/79	25.70	Yes	4.27	07/10/81	34.00	No	-4.83
08/30/79	25.90	Yes	4.07	08/15/81	33.10	No	-5.13

SCREEN 8: GROUNDWATER DISCHARGE HISTORY

Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)
03/01/83	143.00	11/30/83	141.00	07/15/84	120.00	02/15/85	107.14
04/20/83	130.00	12/15/83	150.00	04/15/84	130.00	03/15/85	106.51
05/01/83	145.00	01/20/82	139.00	05/15/84	125.00	04/15/85	97.30
05/15/83	141.00	04/15/82	141.00	06/15/84	122.00	05/15/85	98.45
05/20/83	139.00	05/30/82	135.00	07/20/84	122.00	06/15/85	92.83
06/01/83	143.00	06/20/83	140.00	08/20/84	123.00	07/15/85	98.10
07/01/83	145.00	08/15/83	139.00	09/20/84	123.00	08/15/85	99.40
07/10/83	136.00	09/10/83	140.00	10/15/84	126.00	09/15/85	99.65
07/30/83	146.00	11/20/83	146.00	11/15/84	123.00	10/15/85	98.20
08/15/83	130.00	12/15/83	133.00	12/30/84	123.00	11/15/85	102.50
08/17/83	136.00	01/15/83	130.00	01/10/85	118.01	12/15/85	98.90
01/01/84	150.00	02/15/83	133.00	03/30/85	122.86	01/15/87	96.80
02/15/83	153.00	03/15/83	132.00	04/30/85	118.15	02/15/87	97.33
03/20/83	152.00	04/15/83	133.50	05/05/85	118.15	03/15/87	95.20
04/10/83	145.00	05/30/83	124.00	06/05/85	119.48	04/15/87	96.48
05/19/83	140.60	07/05/83	123.00	04/05/85	120.43	06/15/87	93.50
06/10/81	151.00	04/10/83	130.00	09/30/85	113.20	07/15/87	92.30
07/19/81	150.00	08/30/83	132.00	10/05/85	108.43	08/15/87	90.00
08/15/81	147.00	10/15/83	121.00	11/05/85	108.43	09/15/87	84.70
10/15/81	149.00	02/15/84	135.00	01/15/86	103.69	10/15/87	85.40
11/30/81	149.00	03/15/84	130.00	02/15/86	107.14	11/15/87	86.40

SCREEN 9: CHLORIDE CONTENT HISTORY

Date	Cl (ppm)	Date	Cl (ppm)	Date	Cl (ppm)	Date	Cl (ppm)
03/30/83	41	01/20/82	35	07/30/84	13	07/01/90	28
04/30/83	39	02/22/82	33	09/30/84	18	08/01/90	28
05/30/83	35	03/30/81	32	04/30/84	23	01/01/91	26
02/30/40	37	04/30/82	35	05/30/84	17	02/01/91	26
08/30/40	34	05/20/82	27	06/30/84	16	03/01/91	25
09/30/40	29	06/15/82	26	07/30/84	23	04/01/91	28
10/30/40	31	07/30/83	27	08/30/84	15	05/01/91	25
12/30/40	20	08/30/82	26	09/29/84	19	06/01/93	26
01/30/81	31	09/30/82	25	10/30/84	19	07/01/93	21
02/28/81	25	10/30/82	25	11/30/84	17	08/01/93	21
03/30/81	28	11/30/82	24	12/30/84	17	09/01/91	22
04/30/81	31	12/30/82	22	05/30/85	19	10/01/93	20
05/30/81	33	01/30/83	21	06/30/85	24	11/01/93	21
06/30/81	33	02/28/83	26	07/30/85	18	12/01/93	20
07/30/81	26	03/30/83	21	08/30/85	20	01/01/92	18
04/20/83	29	04/20/83	20	09/30/85	23	02/01/92	17
09/30/81	28	06/30/83	26	01/01/90	26	03/01/92	19
10/30/81	26	07/30/83	22	02/01/90	28	04/01/92	19
11/30/81	33	08/30/81	23	04/01/90	32	05/01/92	28
12/30/81	29	01/30/84	15	06/01/90	30	06/01/92	20
01/20/82	26	03/20/84	19	07/01/90	24	07/01/92	23

BRA NWRB 07/13/97

Figure K-7 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - NUMERICAL REPORT OF WELL DATA (1/2)

PHILIPPINE GROUNDWATER DATABASE
WELL RECORD

38513-0016 **W5.2**

SCREEN 7: GROUNDWATER LEVELS HISTORY (Continued)

Date	GW Level BHP (m)	SWL?	GW Level MSL	Date	GW Level BHP (m)	SWL?	GW Level MSL	Date	GW Level BHP (m)	SWL?	GW Level MSL	Date	GW Level BHP (m)	SWL?	GW Level MSL
10/15/81	35.83	No	-5.83	06/15/87	40.76	No	-10.73	07/15/89	34.33	No	-4.33	06/30/90	35.60	No	-5.43
11/30/81	35.83	No	-5.83	01/15/88	41.80	No	-11.03	08/15/89	34.63	No	-4.65	07/25/90	33.59	No	-3.62
09/20/82	35.70	No	-5.73	04/15/88	41.75	No	-11.78	09/15/89	35.18	No	-5.21	08/31/90	33.63	No	-3.66
01/25/83	39.10	No	-9.33	07/25/88	35.06	No	-5.07	10/15/89	34.73	No	-4.82	03/02/91	38.59	No	-8.62
08/10/83	41.10	No	-11.33	08/25/88	36.07	No	-6.05	11/15/89	34.74	No	-4.77	05/03/91	43.16	No	-12.19
08/30/83	41.05	No	-11.03	12/25/88	36.88	No	-6.93	12/15/89	35.39	No	-5.33	06/03/91	43.62	No	-12.65
02/15/84	41.10	No	-11.03	01/25/89	37.14	No	-7.17	01/24/90	34.93	No	-4.96	07/01/91	33.50	No	-3.53
08/30/85	40.00	No	-10.03	03/15/89	34.76	No	-4.77	02/01/90	35.10	No	-5.13	10/01/91	33.68	No	-3.91
04/05/85	41.00	No	-10.03	04/15/89	33.86	No	-3.93	03/22/90	35.20	No	-5.33				
01/15/87	40.78	No	-10.03	05/25/89	34.86	No	-4.09	08/30/90	35.03	No	-5.30				
02/15/87	40.86	No	-10.07	06/25/89	34.69	No	-4.73	05/08/90	35.75	No	-5.78				

SCREEN 8: GROUNDWATER DISCHARGE HISTORY (Continued)

Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)	Date	Q (m3/h)
12/15/87	87.82	04/15/88	83.60	04/25/83	70.50	03/15/83	72.00	02/01/90	69.20	07/25/90	831.80	04/01/91	87.80	10/03/91	76.53
01/15/88	121.80	12/13/84	97.20	05/15/83	72.00	10/25/89	70.50	03/22/90	69.23	08/31/90	69.20	05/01/91	87.80	11/03/91	59.01
03/15/88	89.20	03/15/89	84.70	06/15/83	72.00	11/25/83	73.40	04/28/90	69.23	01/01/91	67.90	06/01/91	85.70	12/03/91	87.00
07/15/88	84.00	02/25/89	72.00	07/15/89	71.28	12/15/83	72.00	05/08/90	69.23	02/01/91	90.00	08/01/91	100.00		
07/25/88	81.00	03/15/89	72.00	08/15/89	72.00	01/24/90	70.50	06/28/90	70.50	03/01/91	90.00	09/01/91	78.20		

SCREEN 9: CHLORIDE CONTENT HISTORY (Continued)

Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)	Date	CL (ppm)
08/01/92	19	09/01/92	20	10/01/92	19	11/01/92	20	12/01/92	21						

Figure K-8 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - NUMERICAL REPORT OF WELL DATA (2/2)

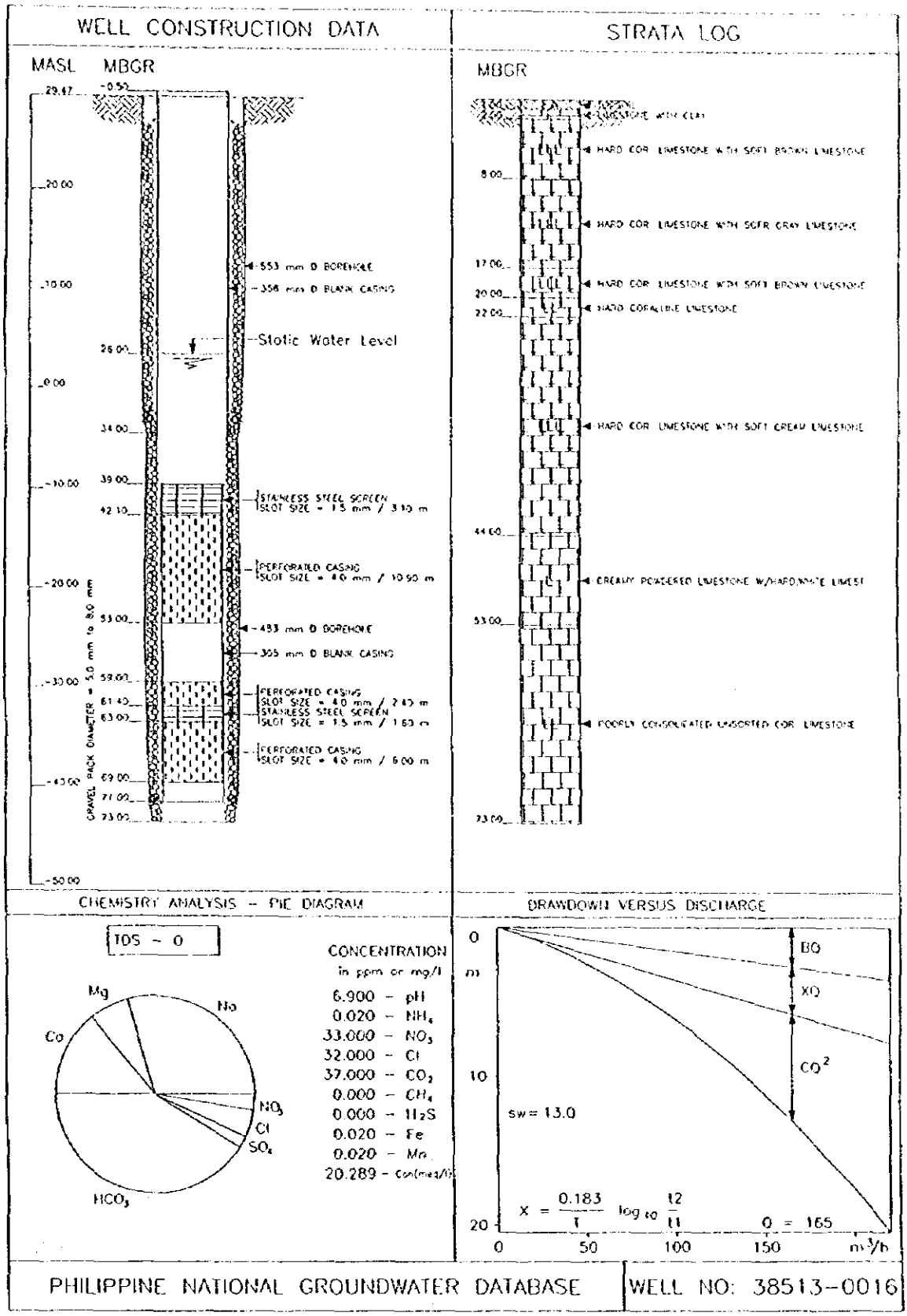


Figure K-9 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - GRAPHICAL DRAWING OF WELL DATA

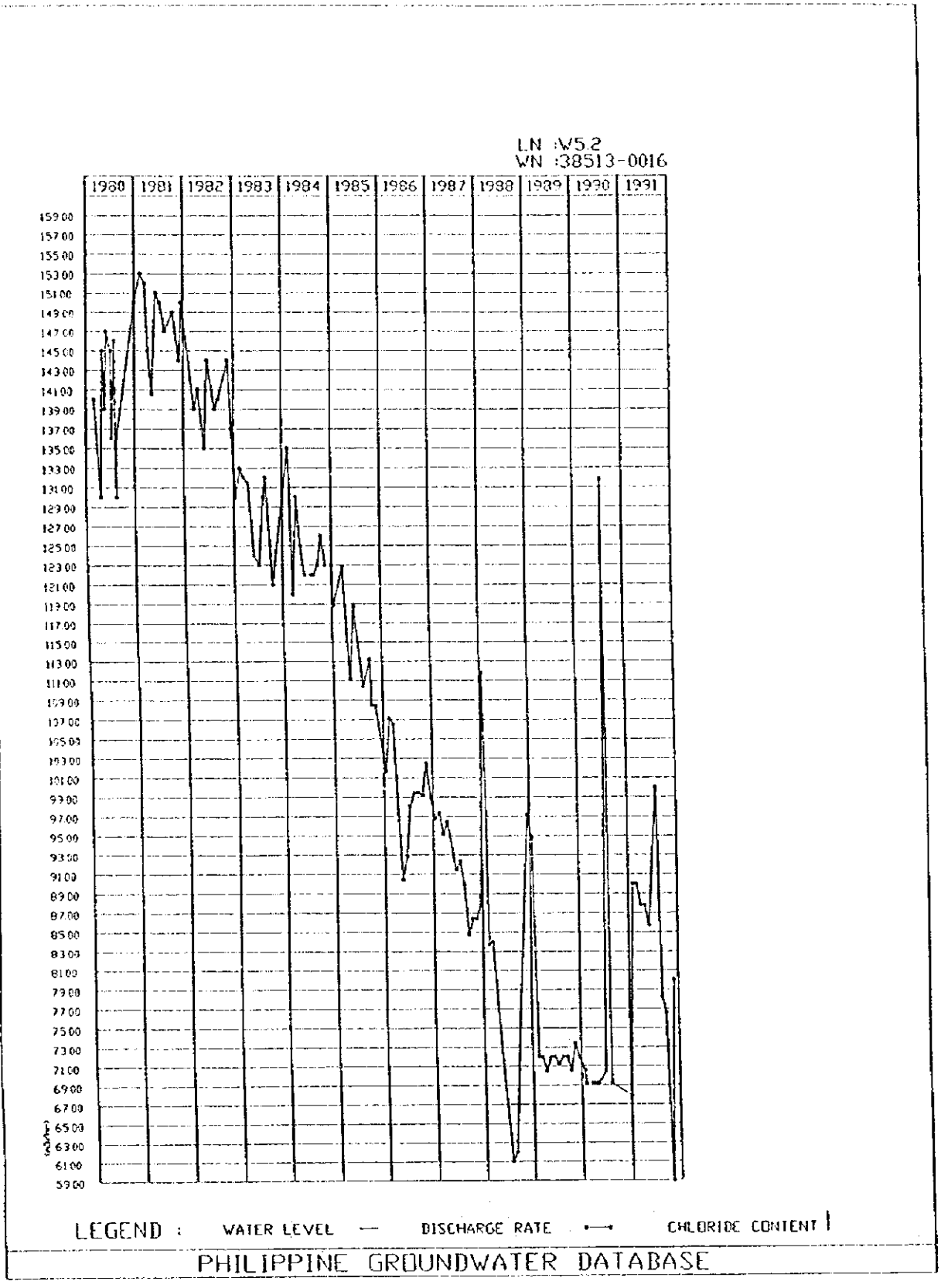


Figure K-10 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - WELL-DISCHARGE TIME-SERIES GRAPH

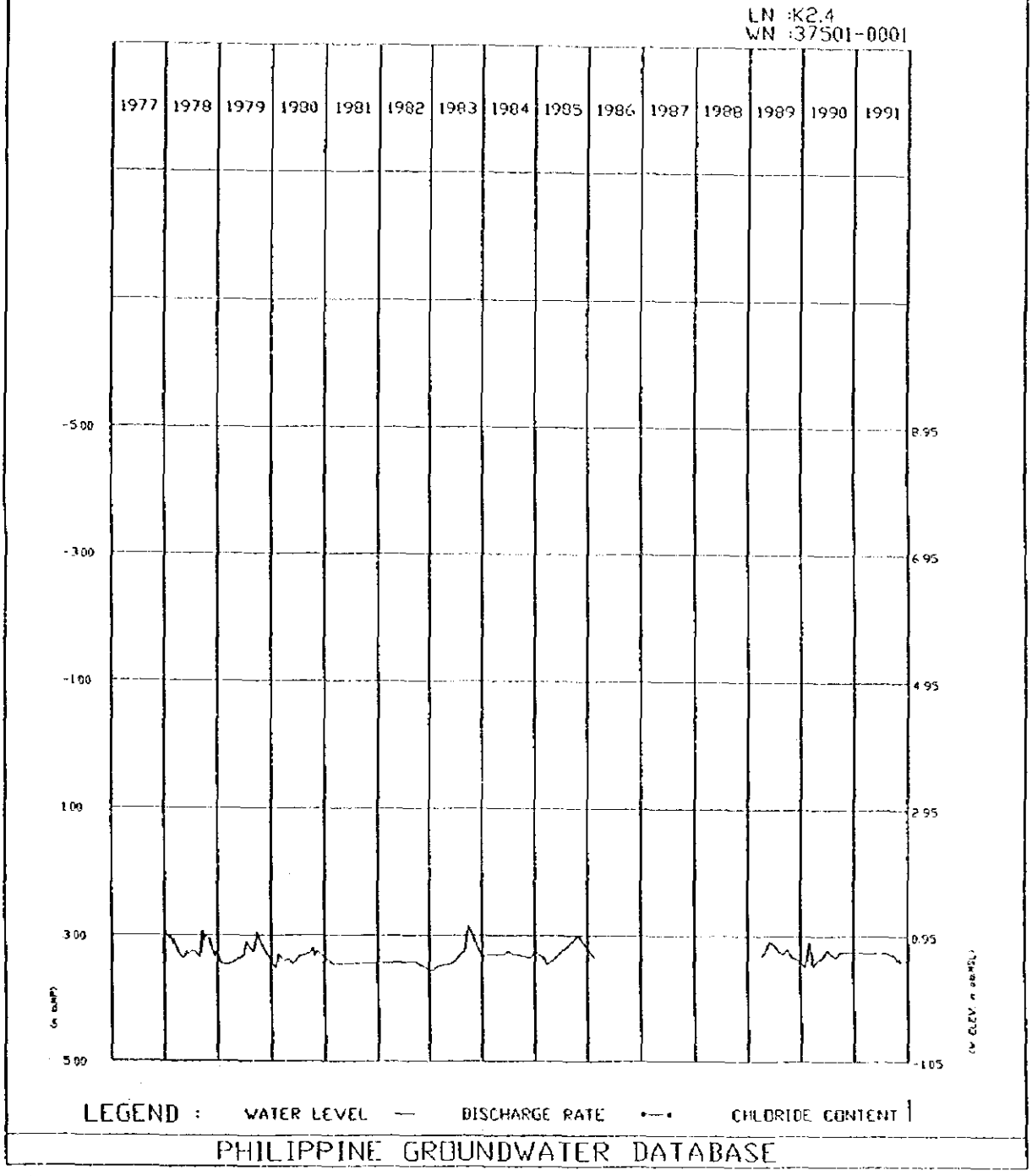


Figure K-11 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - WATER LEVEL TIME-SERIES GRAPH

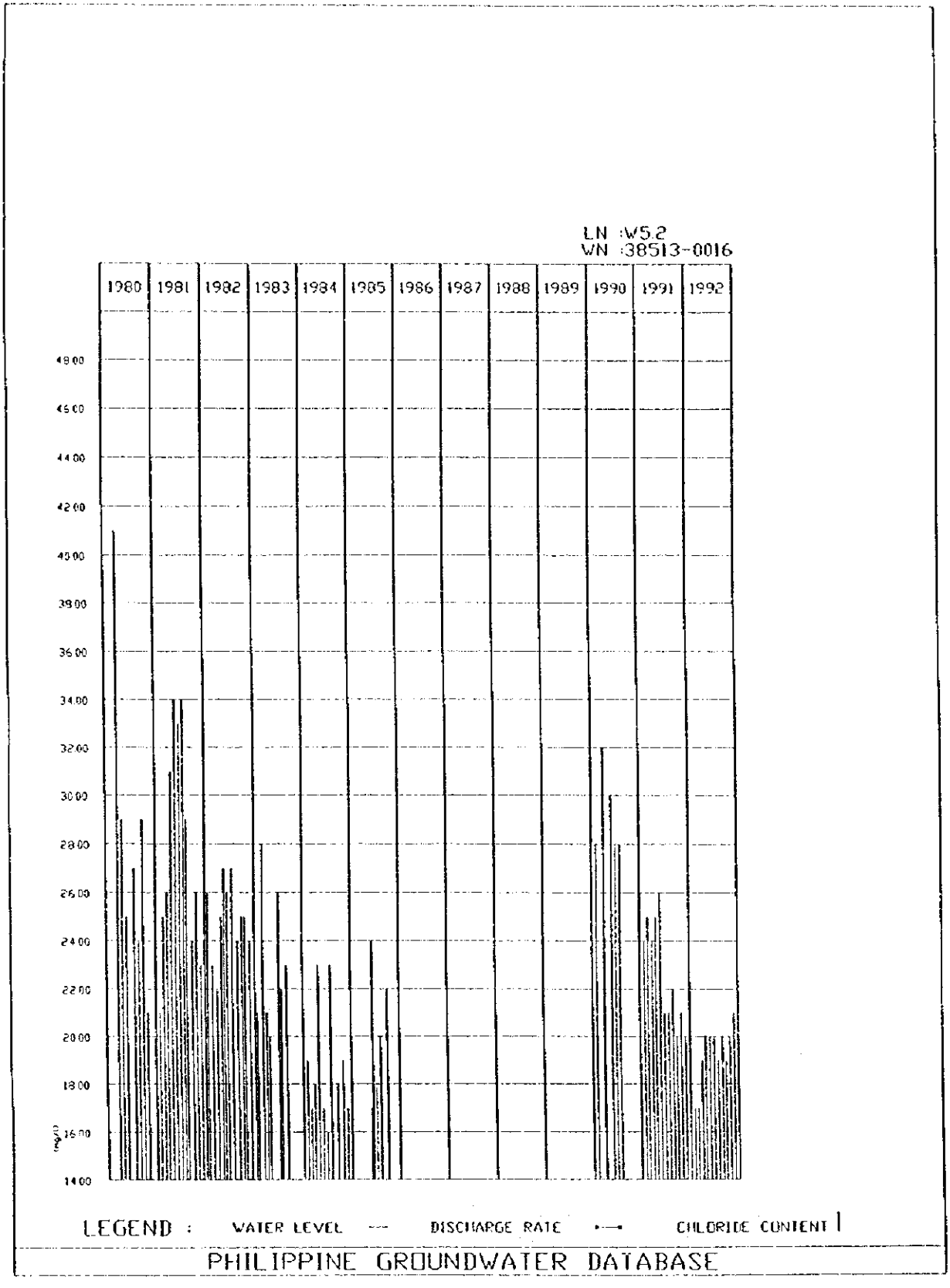


Figure K-12 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - CHLORIDE CONTENT TIME-SERIES

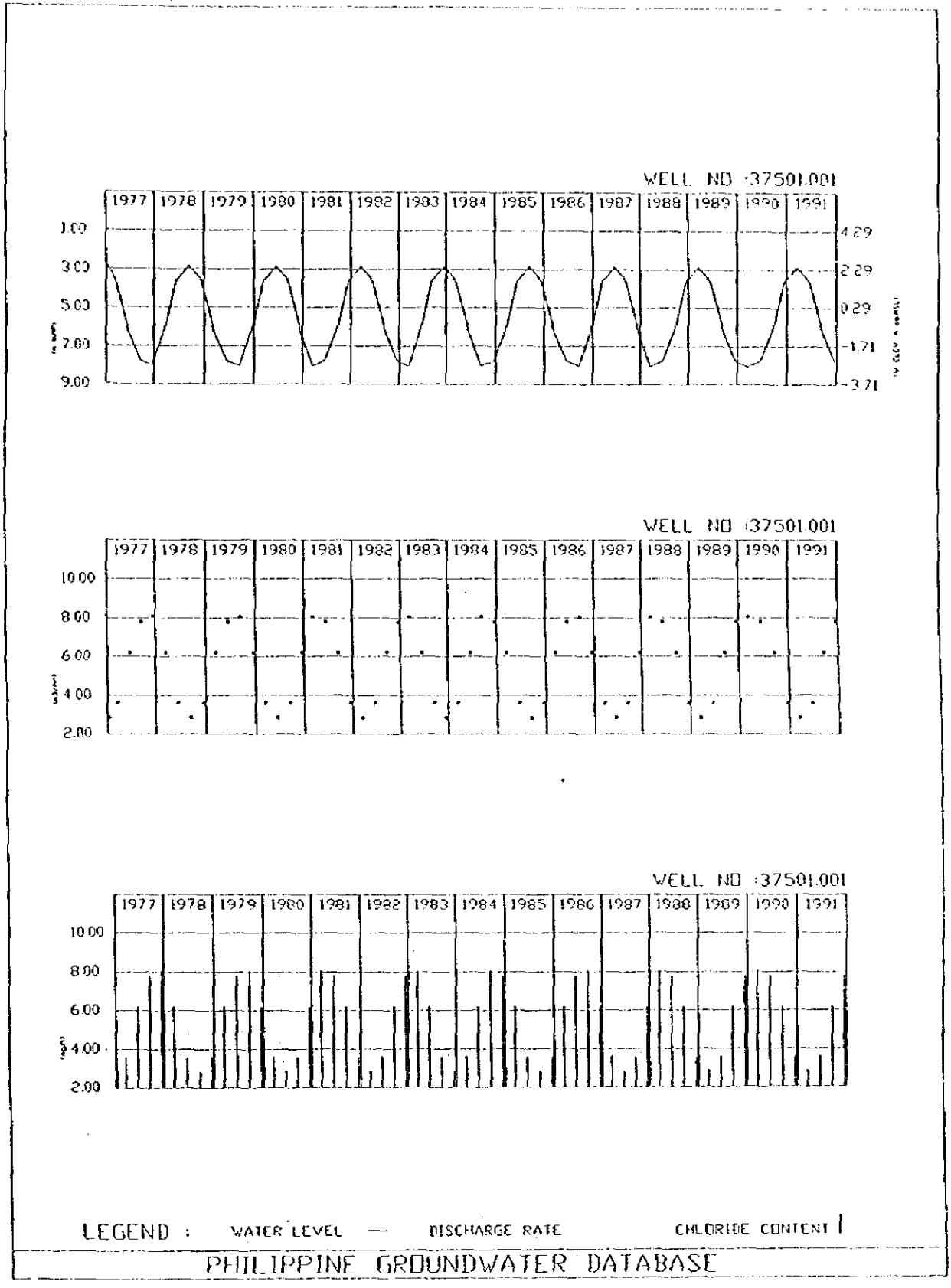


Figure K-13 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - GROUNDWATER LEVEL, DISCHARGE, CHLORIDE CONTENT VS. TIME

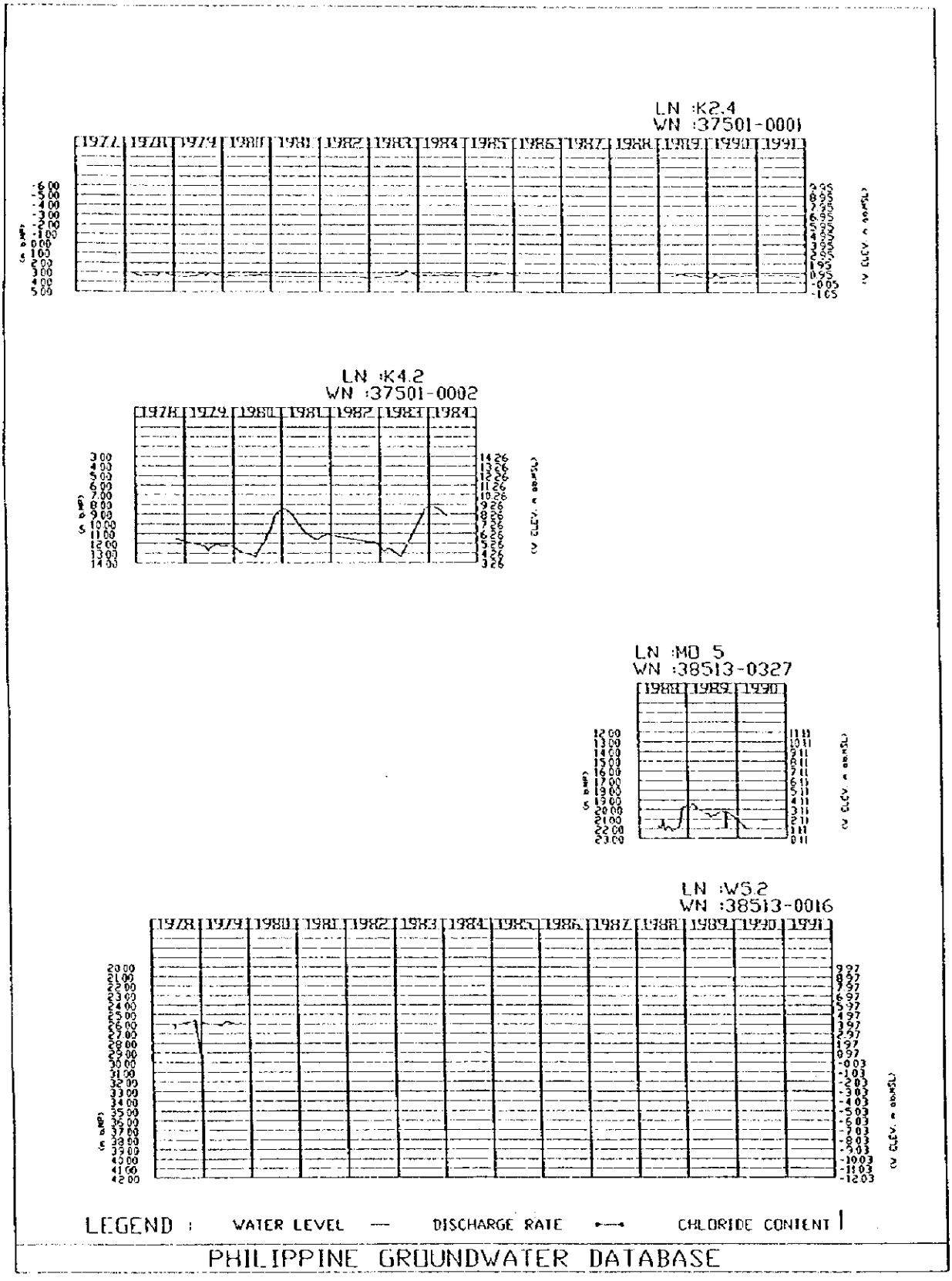


Figure K-14 EXAMPLES OF STANDARD OUTPUTS FROM PGDB - GROUNDWATER LEVEL FROM SEVERAL WELLS VS. TIME

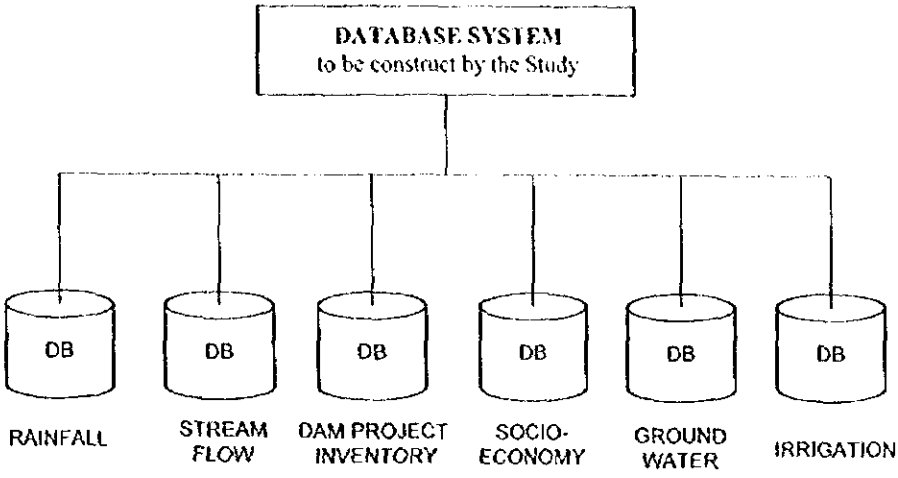


Figure K-15 STRUCTURE OF THE DATABASE SYSTEM

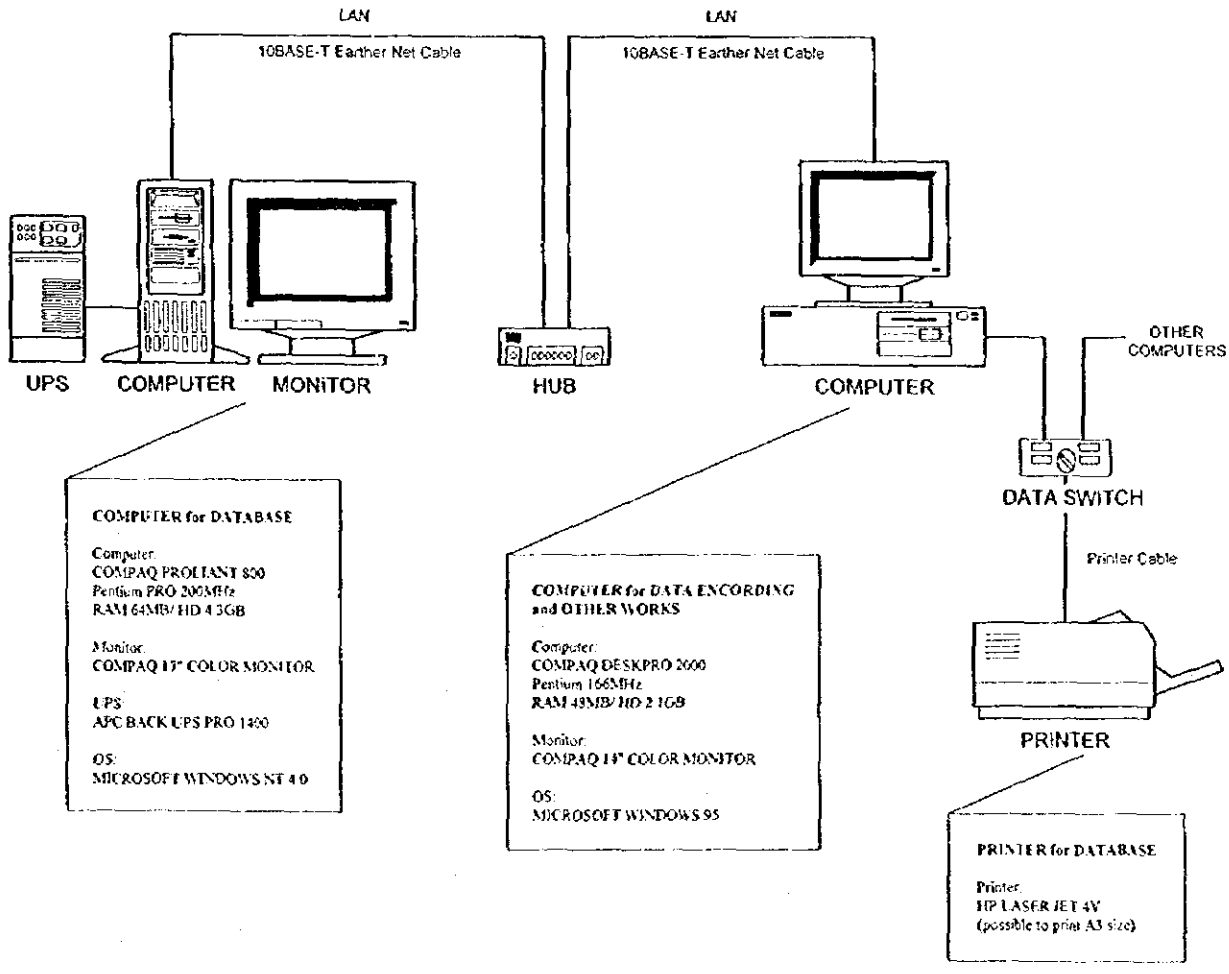


Figure K-16 COMPUTER SYSTEM PREPARED BY STUDY TEAM

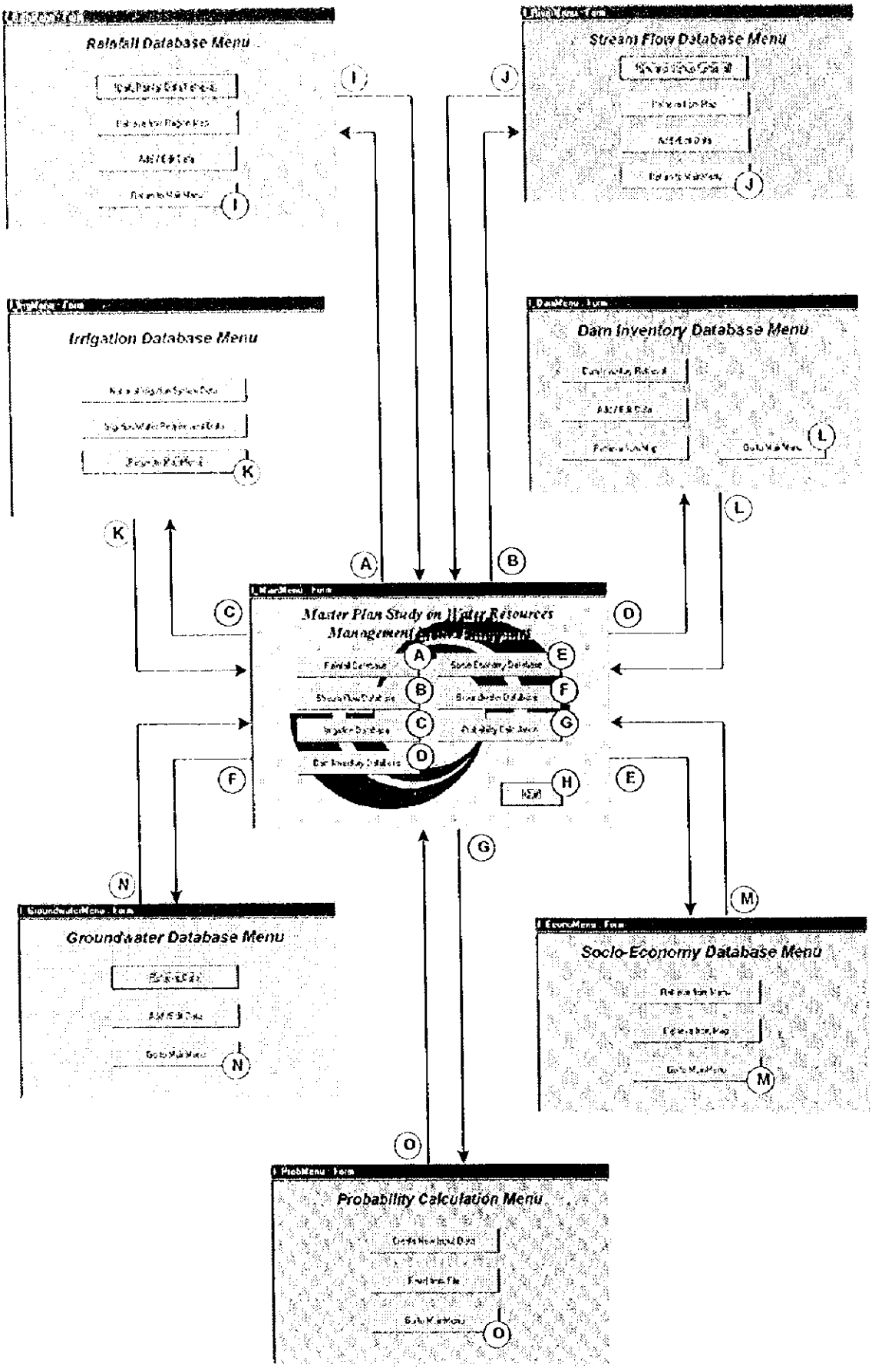


Figure K-17 RELATIONSHIP BETWEEN EACH DATABASE SUB-SYSTEM

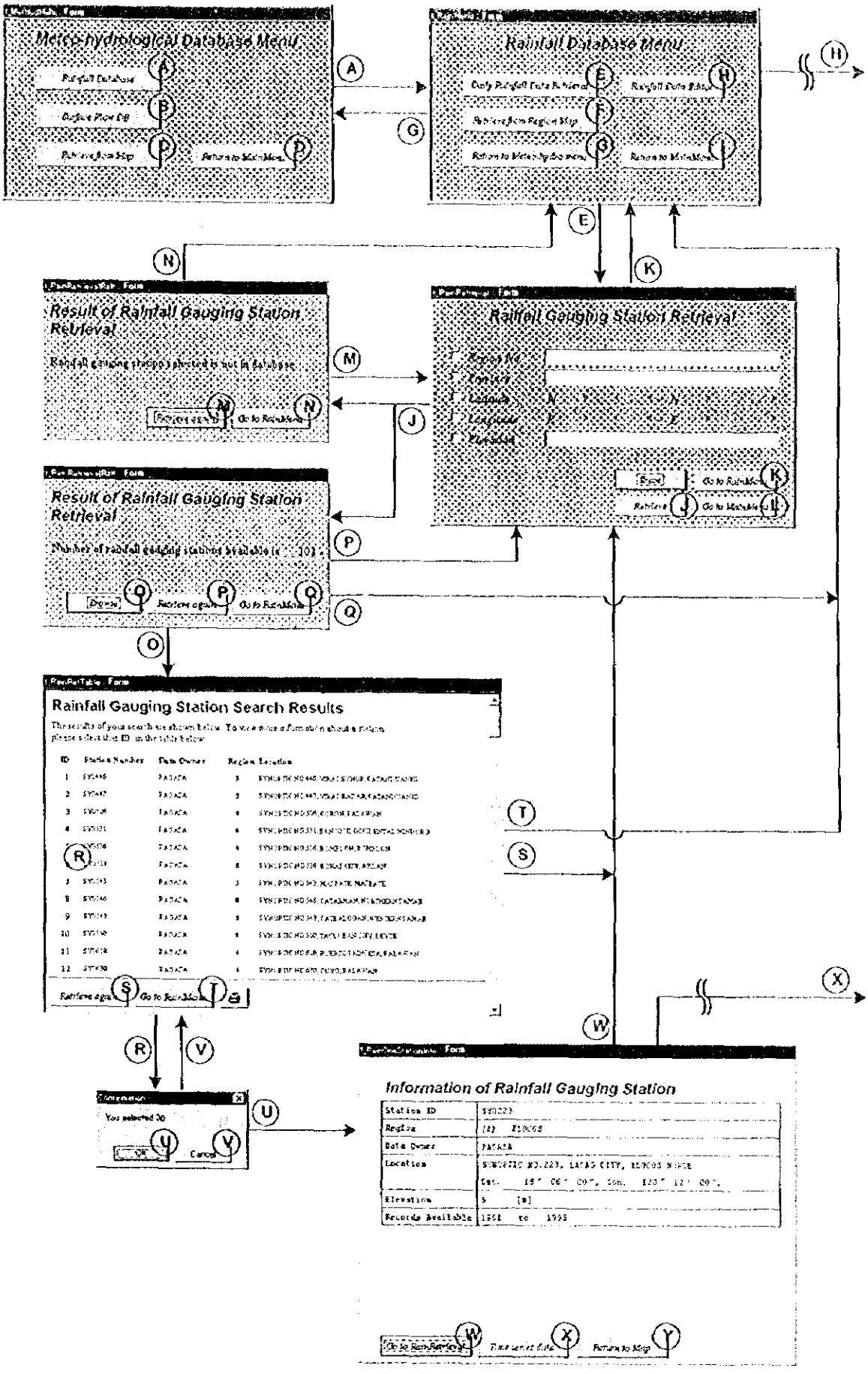


Figure K-18 (1/3) FLOW OF SCREEN IMAGE ON RAINFALL DATABASE

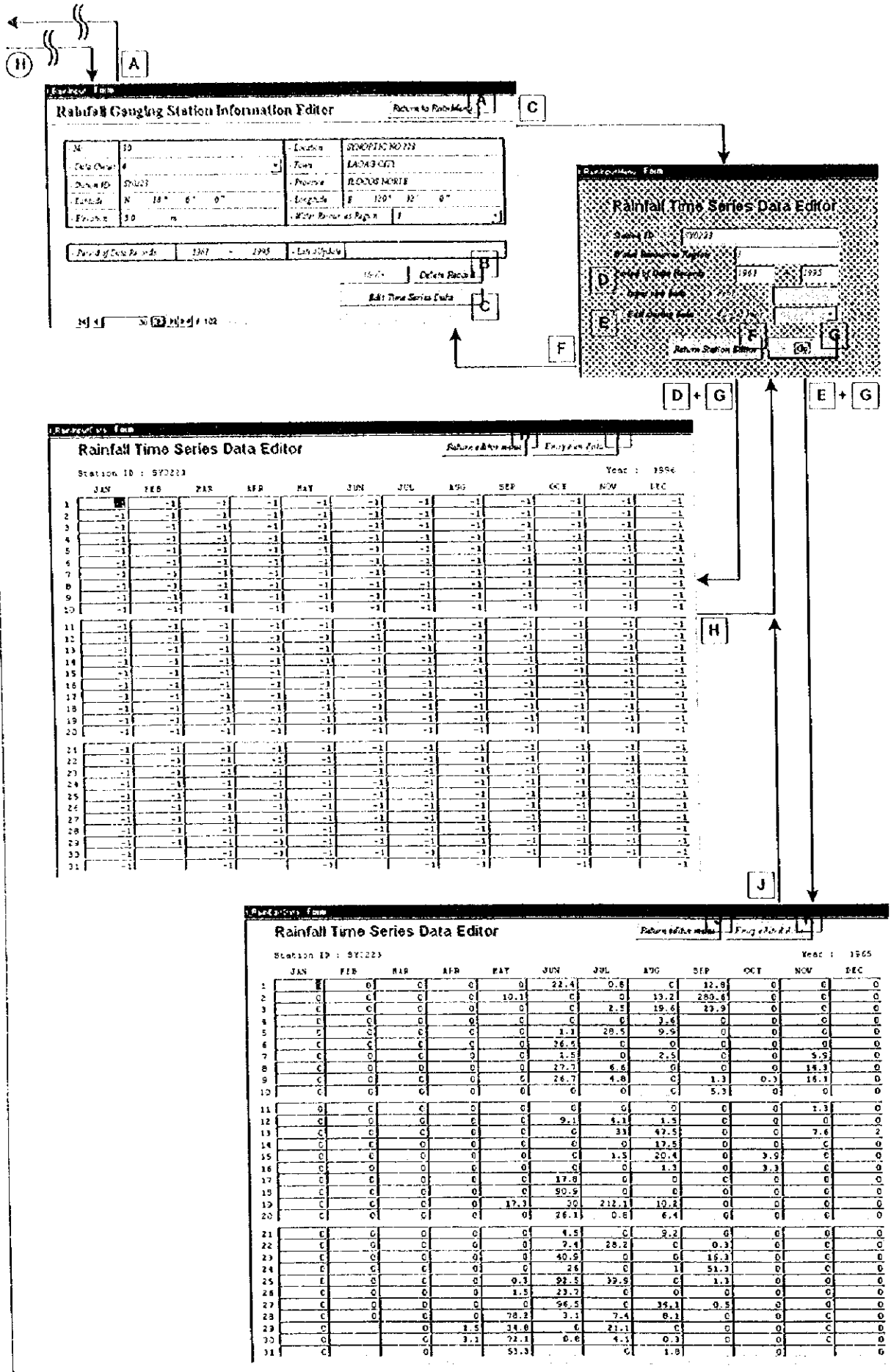


Figure K-18 (2/3) FLOW OF SCREEN IMAGE ON RAINFALL DATABASE

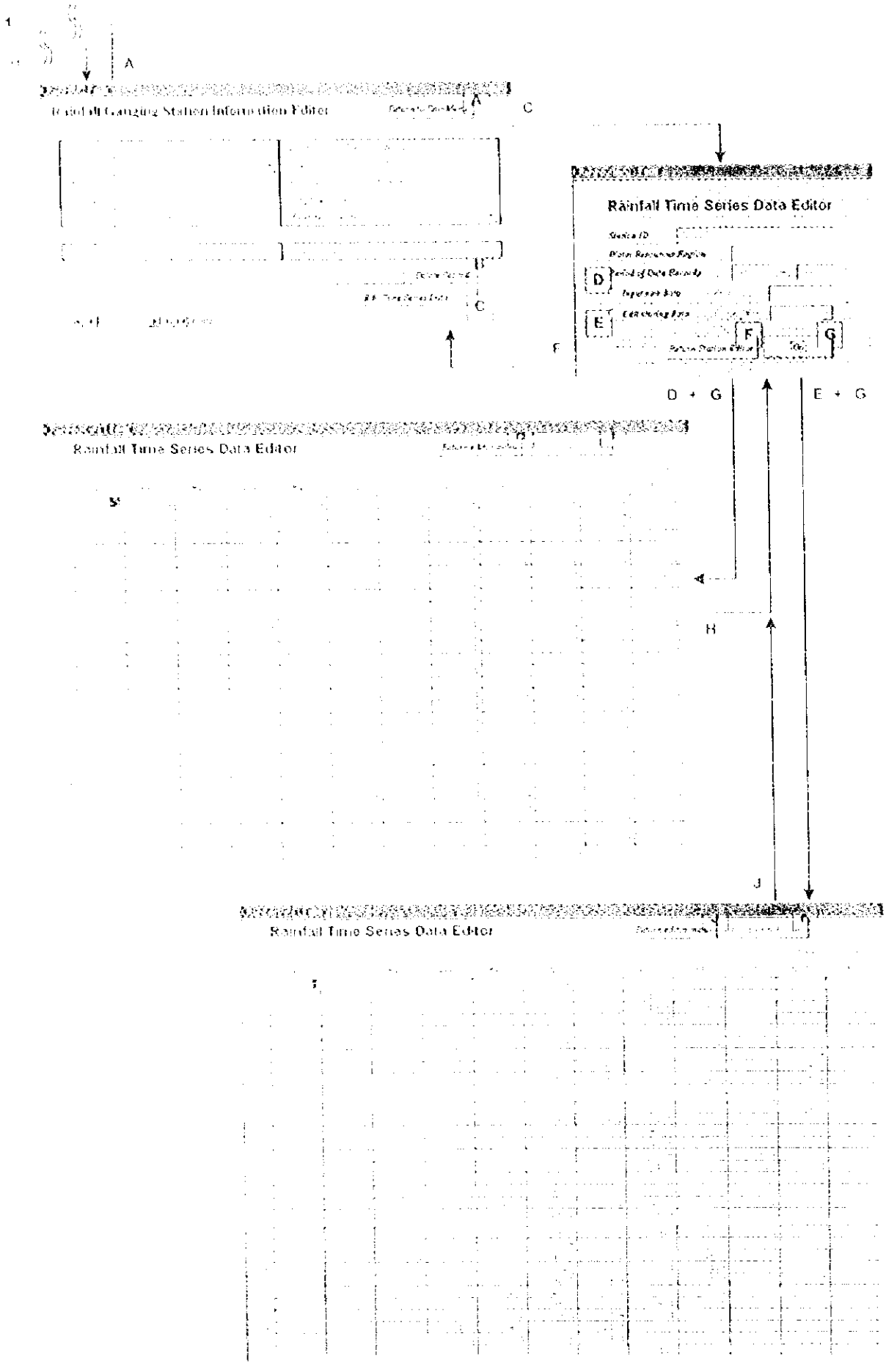


Figure K-18 (2/3) FLOW OF SCREEN IMAGE ON RAINFALL DATABASE

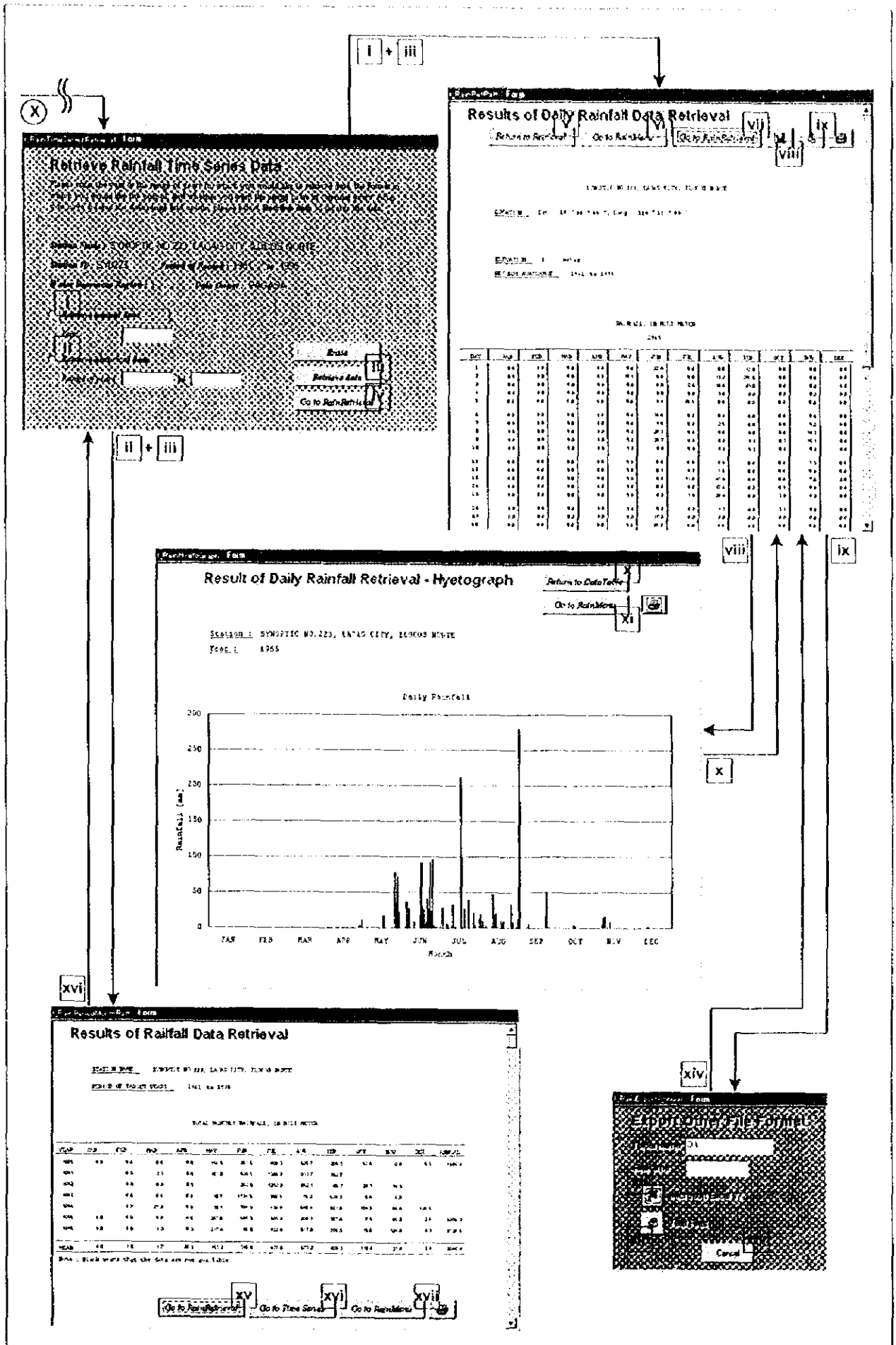


Figure K-18 (3/3) FLOW OF SCREEN IMAGE ON RAINFALL DATABASE

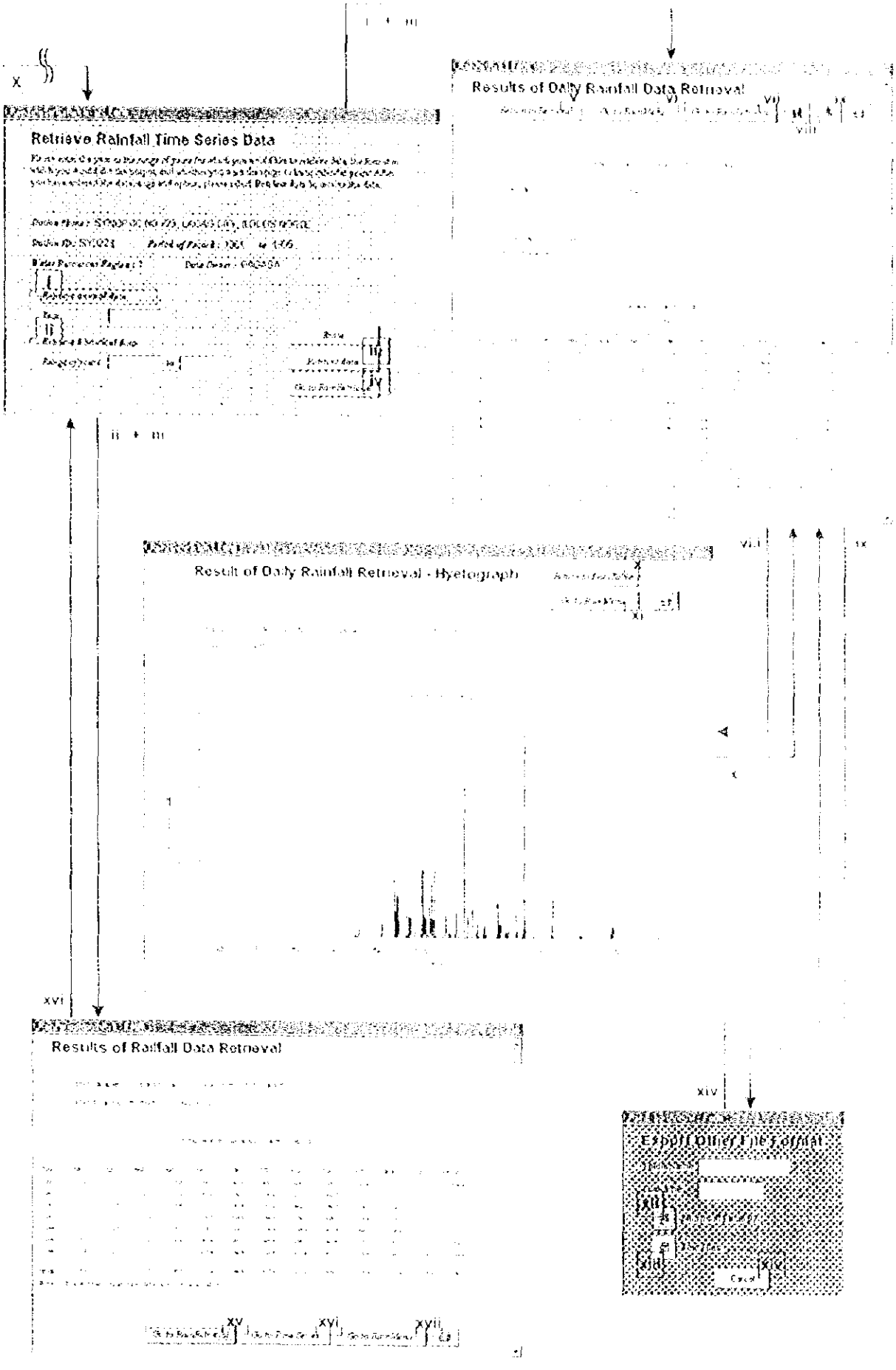


Figure K-18 (3/3) FLOW OF SCREEN IMAGE ON RAINFALL DATABASE

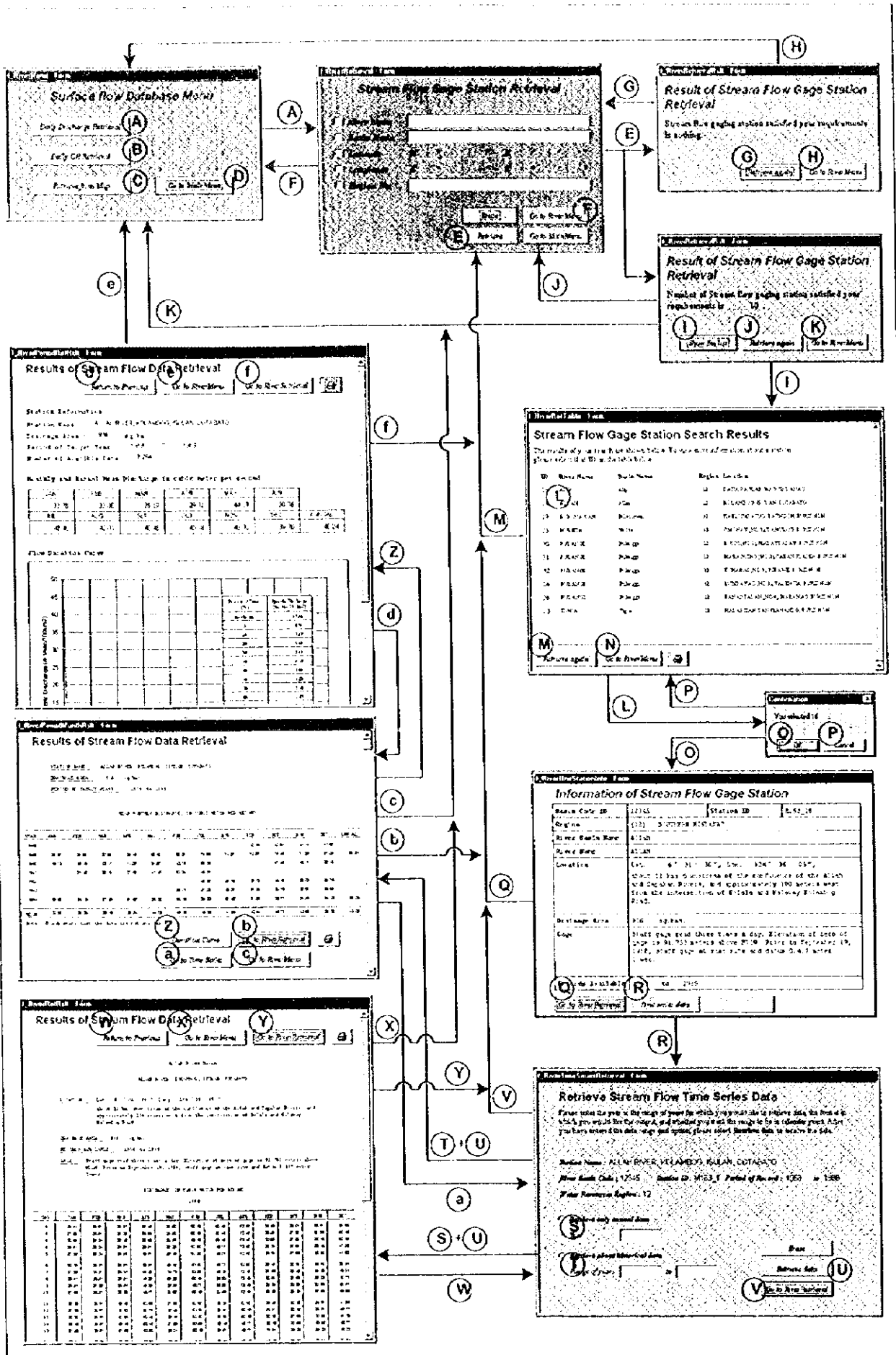


Figure K-19 FLOW OF SCREEN IMAGE ON STREAMFLOW DATABASE

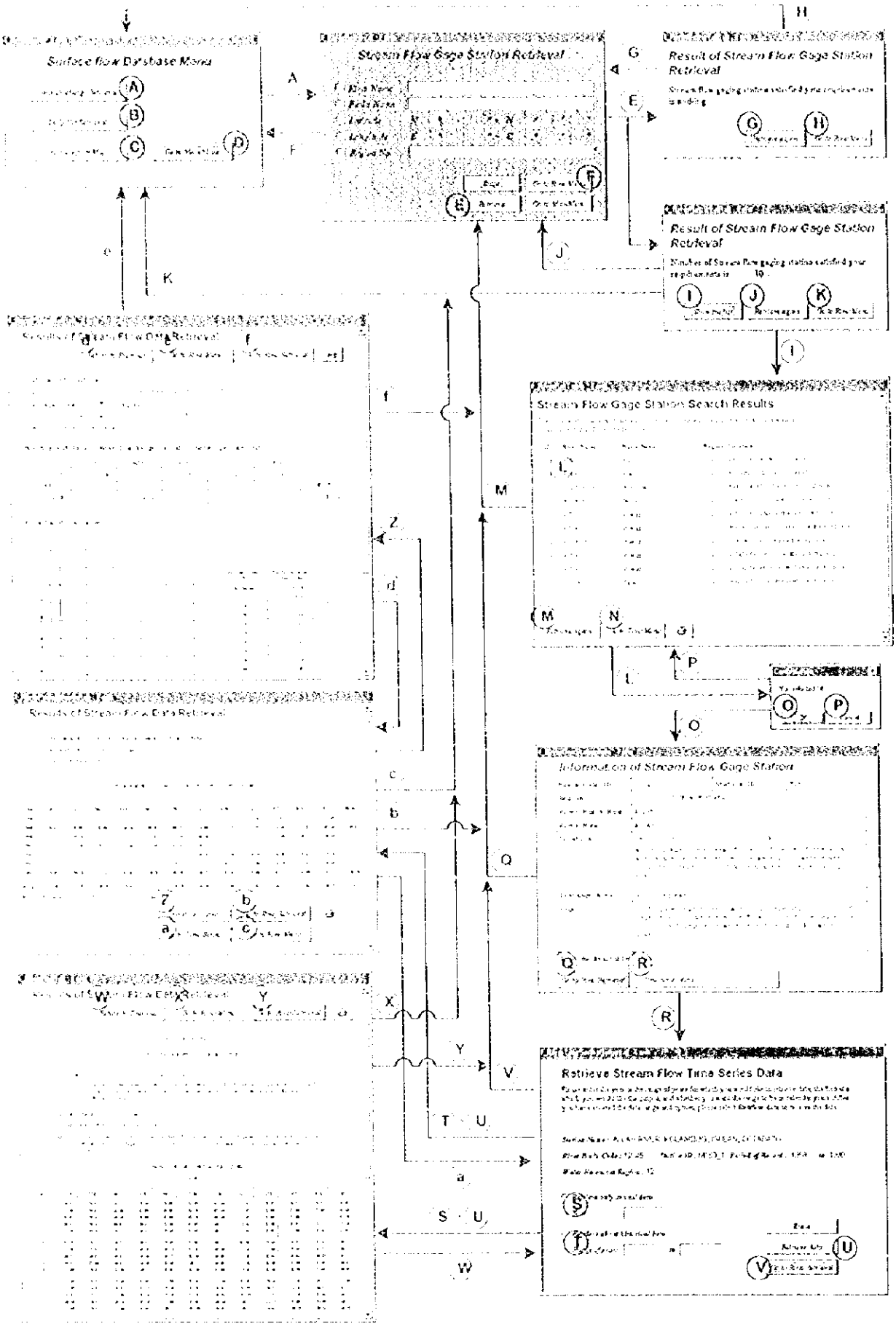


Figure K-19 FLOW OF SCREEN IMAGE ON STREAMFLOW DATABASE

Stream Flow Gage Station Search Results

ID	River Name	Basin Name	Region	Location
1	ABRA	Abra	1	BUMAGCAT, TAYUM, ABRA
40	ABULOG	Abulug	2	BULU, KABUGAO, KALINGA APAYAO
13	AGNO	Agno	3	POBLACION, BAYBAMBANG, PANGASINAN
2	AGUSAN	Agusan	10	KALAW BRIDGE, MONKAYO, DAVAO
38	ALIP	Alip	12	DATU, PAGLAS, MAGUINDANAO
14	ALLAH	Allah	12	KOLAMBOG, ISULAN, COTABATO
39	AMBAYOAN	Agno	3	SANTA MARIA, SAN NICOLAS, PANGASINAN
9	ANGAT	Angat	3	LONGOS, PULILAN, BULACAN
3	BICOL	Bicol	5	STO. DOMINGO, NABUA, CAMARINES SUR
20	BONGA	Laoag	1	BANGAY, DINGRAS, ILOCOS NORTE
29	BUBUNAWAN	Bubunawan	12	KABLI IMBATUG, BAUNGON, BUKIDNON
28	CAGAYAN	Cagayan	10	UGUIABAN, MISAMIS ORIENTAL, CAGAYAN DE ORO
41	CAGURAY	Agusay	4	OTOYAN, SAN JOSE, OCCIDENTAL MINDORO
15	CARCAR	CarCar	7	POBLACION, CARCAR, CEBU
17	DAGUITAN	Dagubtan-Marabang	8	POBLACION, BURAUEN, LEYTE
21	GASGAS	Laoag	1	MANALPAC, SOLSONA, ILOCOS NORTE
19	ILOG	Ilog	6	PANDAN ORONG, KABANKALAN, NEGROS OCCIDENTAL
4	JALAUR	Jalaur	6	SIMSIMAN, CALINOG, ILOILO
5	JALAUR	Jalaur	6	CALLAN, POTOTAN, ILOILO
22	LAOAG	Laoag	1	POBLACION, LAOAG, ILOCOS NORTE
18	LINGAYON	Palo	8	LINGAYON, ALANGALANG, LEYTE
6	LOBOC	Loboc	7	TIGBAO, LOBOC, BOHOL
25	MAMBUSAO	Mambusao	6	TUMALAUD, MAMBUSAO, CAPIZ
35	MULETA	Muleta	12	OMONAY (NO 3), DAMULOG, BUKIDNON
26	PADADA	Padada-Maint	11	LAPULABAO, HAGONOY, DAVAO DEL SUR
7	PAMPANGA	Pampanga	3	PASIG, CANDABA, PAMPANGA
8	PAMPANGA	Pampanga	3	SAN AGUSTIN, ARAYAT, PAMPANGA

Figure K-20 EXAMPLE OF STANDARD OUTPUTS FROM SURFACE FLOW DATABASE (1/4)

Allah River Basin

ALLAH RIVER, KOLAMBOG, ISULAN, COTABATO

LOCATION : Lat. 6 ° 31 ' 30 ", Long. 124 ° 36 ' 05 "
about 11 kms downstream of the confluence of the Allah and Sapakan Rivers, and approximately 100 meters west from the intersection of Nolala and Kalaway-Kolambog Road.

DRAINAGE AREA : 936 sq.kms.

RECORDS AVAILABLE : 1958 to 1989

GAGE : Staff gage read three times a day. Elevation of zero of gage is 91.753 meters above MLLW. Prior to September 19, 1958, staff gage at same site and datum 0.407 meter lower.

DISCHARGE, IN CUBIC METER PER SECOND

1964

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	26 51	26 51	26 51	29 45	36 80	52 19	50 43	73 40	35 33	26 51	26 51	36 80
2	27 98	26 51	32 39	33 86	36 80	52 19	50 46	73 40	33 86	27 98	27 98	50 43
3	30 92	25 04	29 45	38 86	33 86	52 19	50 43	73 40	33 86	27 98	22 10	52 19
4	26 51	25 04	26 51	38 51	32 39	53 90	43 77	73 40	32 39	30 92	22 10	47 06
5	27 98	25 04	26 51	38 51	29 45	53 90	43 77	73 40	30 92	27 98	30 92	41 93
6	92 39	26 51	26 51	38 51	29 45	53 90	43 77	53 90	29 45	30 92	30 92	38 51
7	27 98	26 51	26 51	45 35	36 33	53 90	45 35	73 40	27 98	29 45	36 33	19 51
8	26 51	26 51	26 51	45 35	36 33	52 19	36 80	73 40	30 92	30 92	36 33	10 77
9	26 51	27 98	25 51	45 35	32 35	43 77	36 80	73 40	32 39	33 86	33 86	38 51
10	27 98	26 51	32 39	43 77	30 92	52 19	33 86	73 40	32 39	32 39	27 98	36 80
11	32 39	26 51	29 45	53 90	27 98	53 90	32 39	53 90	29 45	22 10	26 51	41 95
12	27 98	26 51	30 92	52 19	29 45	53 90	30 92	52 19	26 51	22 10	26 51	43 77
13	30 92	26 51	33 86	50 43	29 45	53 90	30 92	52 19	22 10	27 98	30 86	45 33
14	29 45	26 51	29 45	50 43	27 98	53 90	29 45	43 77	22 10	33 86	33 86	43 77
15	27 98	26 51	27 98	53 90	25 04	52 19	26 51	43 77	19 64	35 33	35 33	40 22
16	26 51	26 51	27 98	53 90	22 10	43 77	22 10	50 43	17 18	35 33	38 51	38 51
17	26 51	26 51	26 51	53 90	30 92	50 48	27 98	50 43	20 87	41 93	36 80	35 33
18	27 98	26 51	26 51	55 85	32 39	52 19	27 98	43 77	22 10	43 64	40 22	30 92
19	26 51	26 51	25 04	55 85	32 39	52 13	27 98	50 43	22 10	47 06	38 51	26 51
20	27 98	26 51	25 04	59 75	35 33	50 43	26 51	50 43	20 87	50 43	41 93	26 51
21	27 98	26 51	26 51	59 75	43 64	43 77	25 04	52 19	19 64	50 43	47 06	27 98
22	26 51	30 92	26 51	59 75	43 64	50 43	23 57	52 19	17 18	40 22	40 22	29 45
23	26 51	29 45	25 51	59 75	45 35	50 43	23 57	73 40	14 72	38 51	36 80	30 92
24	26 51	29 45	25 51	61 70	50 43	47 06	22 10	73 40	53 90	40 22	41 93	29 45
25	26 51	26 51	26 51	59 75	50 43	47 06	22 10	73 40	53 90	43 64	38 51	29 45
26	26 51	26 51	25 51	59 75	36 80	45 35	73 40	73 40	50 48	33 86	43 64	29 45
27	26 51	26 51	25 51	61 70	36 80	43 64	73 40	73 40	43 77	33 86	36 80	27 98
28	26 51	26 51	25 51	59 75	73 40	43 64	73 40	73 40	43 77	27 98	36 80	30 92
29	26 51	26 51	25 51	61 70	73 40	41 93	53 90	45 35	50 43	26 51	36 80	30 92
30	30 92		25 51	61 70	53 90	40 22	47 06	56 80	50 43	26 51	33 86	27 98
31	30 92		26 51		53 90		45 35	35 35		26 51		26 51
TOTAL	927 38	776 14	847 15	1548 02	1187 42	1505 85	1216 17	1903 29	950 73	1047 02	1037 49	1067 39
MEAN	29 92	26 76	27 33	51 60	38 30	50 20	39 23	61 40	31 69	33 77	34 58	34 43
MAX	92 39	30 92	33 86	61 70	73 40	53 90	73 40	73 40	53 90	50 43	47 06	52 19
MIN	26 51	25 04	25 04	33 86	22 10	43 22	22 10	35 35	14 72	22 10	22 10	10 77
ESTM	31 36	26 59	29 20	55 13	43 92	53 63	41 91	65 59	33 86	36 08	36 95	36 79
CM	8 56	7 16	7 82	14 29	10 96	13 90	11 23	17 57	8 78	9 66	9 58	9 85
HA-M	6013	5406	7319	13375	10259	13011	10508	16444	8214	9046	8964	9222

ANNUAL TOTAL = 14014 65 MEAN = 38 29 MAX = 92 39 MIN = 10 77 ESTM = 43 51 CM = 129 36 HA-M = 121061

Figure K-21 EXAMPLE OF STANDARD OUTPUTS FROM SURFACE FLOW DATABASE (2/4)

STATION NAME : ALLAH RIVER, KOLAMBOG, ISULAN, COTABATO

DRAINAGE AREA : 936 sq.kms.

PERIOD OF TARGET YEARS : 1958 to 1989

MEAN MONTHLY DISCHARGE, IN CUBIC METER PER SECOND

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1958									42.36	42.54	44.44	41.65	
1959	39.67	39.85	32.85	36.45	68.90	58.27	36.58	74.07	72.87	75.45	71.20	67.05	59.51
1960	10.73	15.45	13.41	14.02	34.87	43.79	38.29			47.45	43.17	39.46	
1961		21.40	25.75	22.69	41.45	53.04	49.31						
1962							46.37	27.19	35.18	46.29	28.62	25.26	
1963						25.77	27.22	30.07	27.39	30.78	33.67	36.95	
1964	29.92	26.76	27.33	51.60	38.30	50.19	39.23	61.43	31.69	33.77	34.58	34.43	38.29
1965	19.24	13.72	27.22										
1966													
1967			22.70	27.47	60.53	54.64	43.67			43.71	51.39	41.11	
1968	40.45	58.14	19.10	30.63	80.58	32.83	41.82	39.79	54.47	75.37	55.45	44.68	44.38
1969	60.92	24.77	15.61	10.33	85.15	133.31	192.21	104.89	57.60	38.04	41.06	46.21	67.94
1970	47.51	45.87	43.82	37.13	50.81	127.78	33.29	24.27	29.51	74.30	66.99	57.00	50.23
1971	50.75	31.18	30.71	31.37	27.30	12.47	39.76	13.93	71.69	73.74	71.75	27.47	40.18
1972	24.29	46.57	61.50	45.66	37.22	33.56	26.58	24.32	25.44	32.26	32.96	25.73	34.61
1973	29.53	19.76	19.29	12.72	25.24	58.13	61.32	63.04		55.05	67.32	58.41	
1974	54.75	58.05	57.03	56.54	73.21	70.20	62.51	52.50	52.61	43.67	48.64	58.71	58.32
1975	55.78	45.50	45.44				60.35	58.59	61.96	60.43	63.18	60.13	
1976	58.67	58.47	61.43	60.30									
1977													
1978													
1979													
1980						1.93	0.55	0.90	0.47	1.00	0.77	1.33	
1981	1.32	0.66	0.16	0.14	43.61	52.03	56.31	42.54	54.36	64.26	77.74	64.35	39.04
1982	60.22	74.22	39.21	39.27	41.77	43.63	17.91	27.08	19.58	16.92	16.73	13.16	34.24
1983	15.36	9.87	4.89	3.92	4.72	15.17	23.32	23.77	23.92	17.05	14.63	21.46	14.89
1984													
1985													
1986		26.26	15.17					37.09	33.58	40.54	38.26		
1987	16.28	13.56	9.38	12.40	15.60	17.78	18.18	32.20		21.71	16.43		
1988	13.14	19.85	22.14	20.37	24.06	13.35	35.91	59.76	34.94	60.45	38.54	25.81	31.63
1989	8.68	16.97	30.37	39.32	77.92	80.88	70.25						
MEAN	33.80	32.36	28.16	29.54	44.13	49.19	48.36	41.96	40.54	45.77	43.82	39.70	43.02

Note : Blank means that the data are not available

Figure K-22 EXAMPLE OF STANDARD OUTPUTS FROM SURFACE FLOW DATABASE (3/4)

Results of Stream Flow Data Retrieval

Station Information

Station Name : ALLAH RIVER, KOLAMBOG, ISULAN, COTABATO

Drainage Area : 936 sq.km

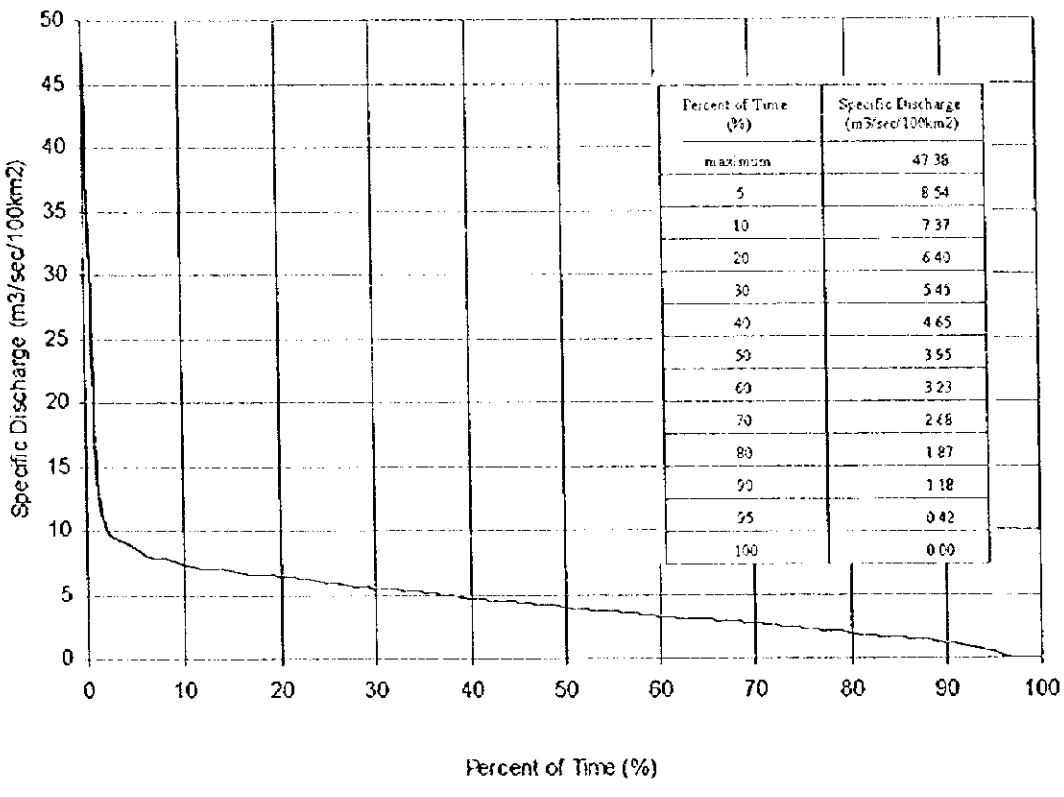
Period of Target Year : 1958 ~ 1989

Number of Availble Data : 7,294

Monthly and Annual Mean Discharge in cubic meter per second

JAN	FEB	MAR	APR	MAY	JUN	
33.78	33.00	28.19	29.71	44.17	50.76	
JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
48.40	42.01	40.48	45.78	43.70	39.70	40.04

Flow Duration Curve



Percent of Time (%)	Specific Discharge (m3/sec/100km2)
maximum	47.38
5	8.54
10	7.37
20	6.40
30	5.45
40	4.65
50	3.95
60	3.23
70	2.68
80	1.87
90	1.18
95	0.42
100	0.00

Figure K-23 EXAMPLE OF STANDARD OUTPUTS FROM SURFACE FLOW DATABASE (4/4)

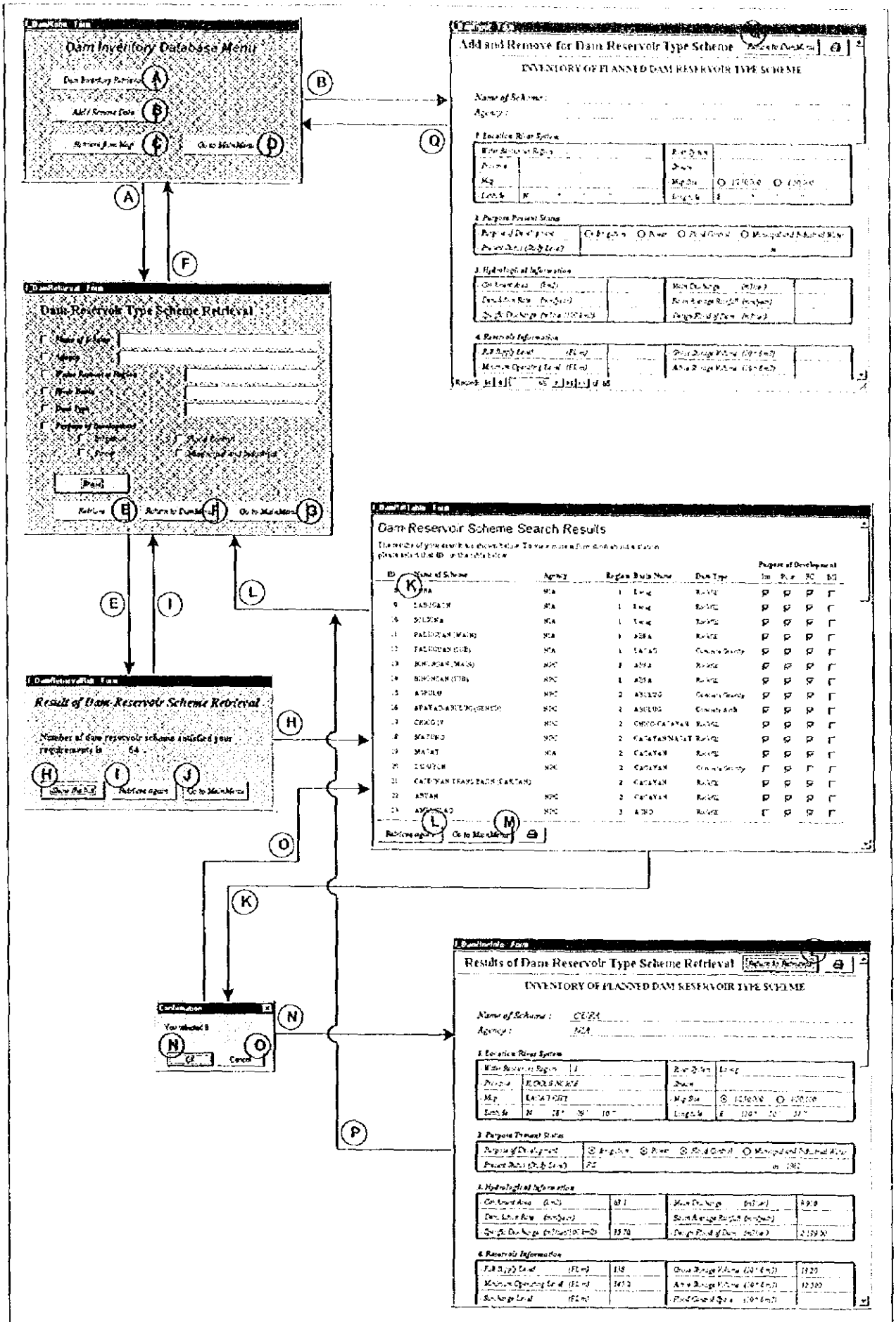


Figure K-24 FLOW OF SCREEN IMAGE ON DAM INVENTORY DATABASE

Dam-Reservoir Scheme Search Result

ID	Name of Scheme	Agency	Region	Basin Name	Dam Type	Purpose of Development			
						Irri	Pow	FC	MI
8	CURA	NIA	1	Laoag	Rockfill	☑	☑	☑	☐
9	LABUGAON	NIA	1	Laoag	Rockfill	☑	☑	☑	☐
10	SOLSONA	NIA	1	Laoag	Rockfill	☑	☑	☑	☐
11	PALSIGUAN (MAIN)	NIA	1	ABRA	Rockfill	☑	☑	☑	☐
12	PALSIGUAN (SUB)	NIA	1	LAOAG	Concrete Gravity	☑	☑	☑	☐
13	BINONGAN (MAIN)	NPC	1	ABRA	Rockfill	☑	☑	☑	☐
14	BINONGAN (SUB)	NPC	1	ABRA	Rockfill	☑	☑	☑	☐
15	AGBULU	NPC	2	ABULUG	Concrete Gravity	☑	☑	☑	☐
16	APAYAO-ABULUG (GENED)	NPC	2	ABULUG	Concrete Arch	☑	☑	☑	☐
17	CHICO IV	NPC	2	CHICO-CAGAYAN	Rockfill	☑	☑	☑	☐
18	MATUNO	NPC	2	CAGAYAN/MAGAT	Rockfill	☑	☑	☑	☐
19	MAGAT	NIA	2	CAGAYAN	Rockfill	☑	☑	☑	☐
20	DIDUYON	NPC	2	CAGAYAN	Concrete Gravity	☐	☑	☐	☐
21	CASECNAN TRANS-BASIN (DAKGAN)		2	CAGAYAN	Rockfill	☑	☑	☑	☐
22	ABUAN	NPC	2	CAGAYAN	Rockfill	☑	☑	☑	☐
23	AMBUKLAO	NPC	3	AGNO	Rockfill	☐	☑	☑	☐
24	BINGA	NPC	3	AGNO	Rockfill	☐	☑	☑	☐
25	SAN ROQUE	NPC	3	AGNO	Rockfill	☑	☑	☑	☑
26	BALOG-BALOG	NIA / NPC	3	AGNO	Rockfill	☑	☑	☑	☑
27	PANTABANGAN	NIA	3	PAMPANGA	Earthfill	☑	☑	☑	☑

Figure K-25 EXAMPLE OF STANDARD OUTPUTS FROM DAM INVENTORY DATABASE (1/3)

INVENTORY OF PLANNED DAM-RESERVOIR TYPE SCHEME

Name of Scheme : CURA

Agency : NIA

1. Location/River System

- Water Resources Region	1	- River System	Laoag
- Province	ILOCOS NORTE	- Stream	
- Map	LAOAG CITY	- Map Size	◉ 1/250,000 ○ 1/50,000
- Latitude	N 18° 09' 10"	- Longitude	E 120° 50' 57"

2. Purpose/Present Status

- Purpose of Development	◉ Irrigation ◉ Power ◉ Flood Control ○ Municipal and Industrial Water
- Present Status (Study Level)	F/S in 1982

3. Hydrological Information

- Catchment Area (km2)	63.1	- Mean Discharge (m3/sec)	9.910
- Denudation Rate (mm/year)		- Basin Average Rainfall (mm/year)	
- Specific Discharge (m3/sec/100 km2)	15.70	- Design Flood of Dam (m3/sec)	2,139.00

4. Reservoir Information

- Full Supply Level (EL m)	155	- Gross Storage Volume (10^6 m3)	13.20
- Minimum Operating Level (EL m)	145.0	- Active Storage Volume (10^6 m3)	12.500
- Surcharge Level (EL m)		- Flood Control Space (10^6 m3)	
- Drawdown Depth (m)	43	- Dead Storage Volume (10^6 m3)	0.70
- Geology			

5. Main Dam Information

- Dam Type	Rockfill	- Dam Height (m)	59.0
- Crest Elevation (EL m)		- Crest Length (m)	
- Bottom Elevation (EL m)		- Embankment Volume (10^6 m3)	0.41

6. Construction Cost (at the Price Level of)

- Total Project Construction Cost (10^6 US$)	
Dam Cost (10^6 US$)	
Power Facilities Cost (10^6 US$)	
Water Supply Facilities Cost (10^6 US$)	

Figure K-26 EXAMPLE OF STANDARD OUTPUTS FROM DAM INVENTORY DATABASE (2/3)

7. Main Features of Hydropower

Installed Capacity	*(MW)*		*- Rated Net Head*	*(m)*	
Length of Waterway	*(m)*		*- Firm Peak Power*	*(MW)*	
Diameter of Waterway	*(m)*		*- Annual Total Energy*	*(GWh)*	
Tailwater Level	*(EL.m)*		*Firm Energy*	*(GWh)*	
Plant Maximum Discharge	*(m3/sec)*		*Secondary Energy*	*(GWh)*	
Firm Discharge	*(m3/sec)*				

8. Main Features of Irrigation

- Total Irrigation Area Covered by Water Supply from the Reservoir (ha)		
- Period of Irrigation Water Being Supplied	*From month*	*to month*
- Annual Mean Discharge Supplied	*(m3/sec)*	
- Monthly Maximum Discharge	*(m3/sec)*	

9. Main Features of Municipal Water Supply

- Main Area Served by the Municipal Water Supply System		
- Mean Discharge Used for Municipal Water Supply	*(m3/sec)*	

10. Other Description on the Dam-Reservoir Scheme

Discharge is too over-estimated.
To be diverted into the Labugaon reservoir.
Dead storage volume for sediment is too small.

Note

Source of Data : *Asiatic Consultants Inc.*

Survey/Inventory

Proposed Hydel Projects, NPC

Figure K-26 EXAMPLE OF STANDARD OUTPUTS FROM DAM INVENTORY DATABASE (3/3)

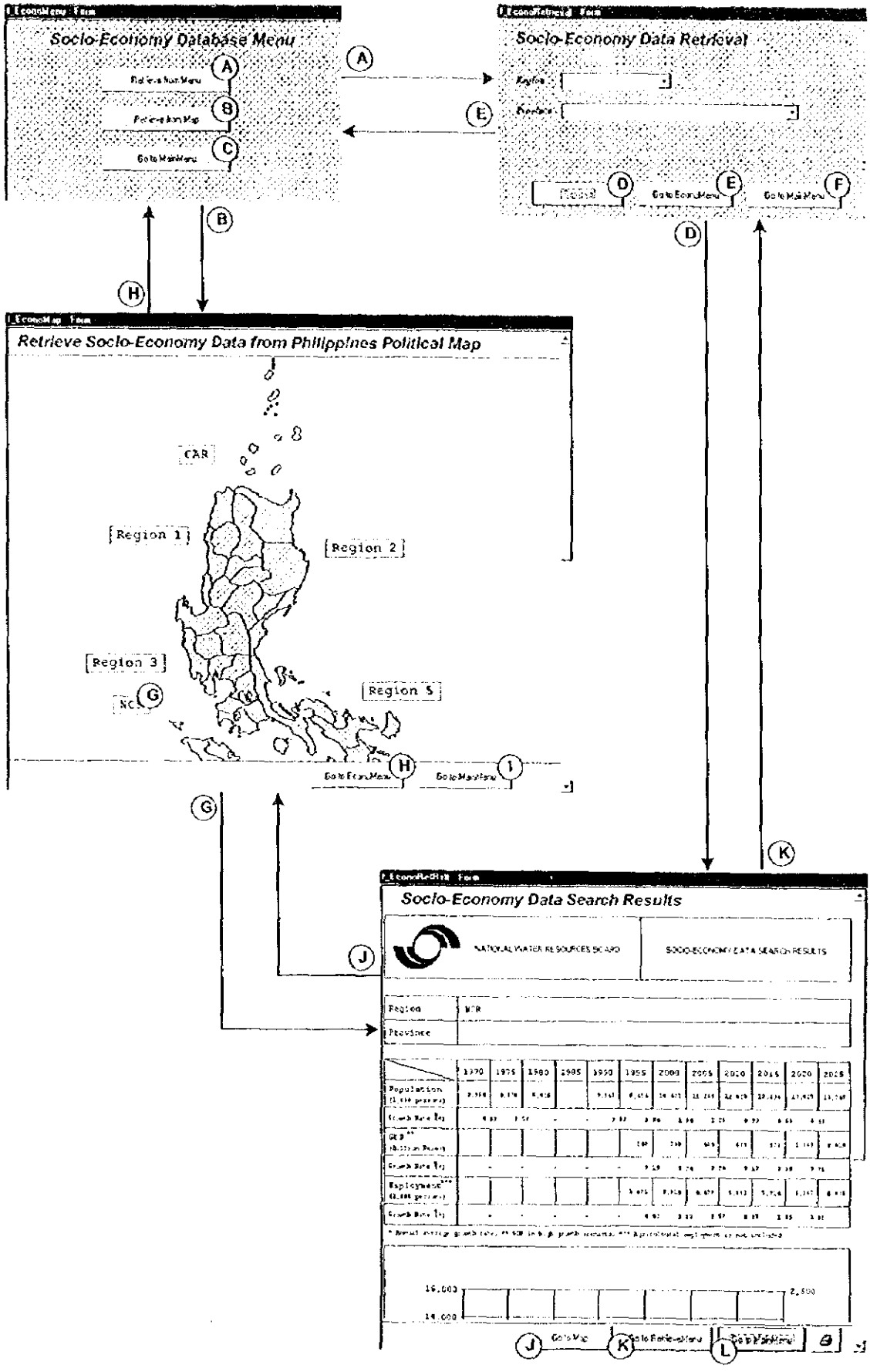


Figure K-27 FLOW OF SCREEN IMAGE ON SOCIO-ECONOMY DATABASE

NATIONAL WATER RESOURCES BOARD | SOCIO-ECONOMY DATA SEARCH RESULTS

Region	NCR
Province	METRO MANILA

	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025
Population (1,000 persons)	3,964	4,870	5,926		7,947	9,454	10,405	11,289	12,020	12,593	13,025	13,349
Growth Rate* (%)		4.63	3.88	-	-	3.53	1.94	1.64	1.26	0.93	0.68	0.49
GDP ** (Billion Pesos)						240	340	484	688	973	1,389	2,019
Growth Rate* (%)		-	-	-	-	7.19	7.34	7.26	7.17	7.39	7.76	
Employment *** (1,000 persons)						3,075	3,819	4,477	5,083	5,714	6,307	6,836
Growth Rate* (%)		-	-	-	-	4.43	3.23	2.57	2.37	1.99	1.62	

* Annual average growth rate, ** GDP in high growth scenario, *** Agricultural employment is not included

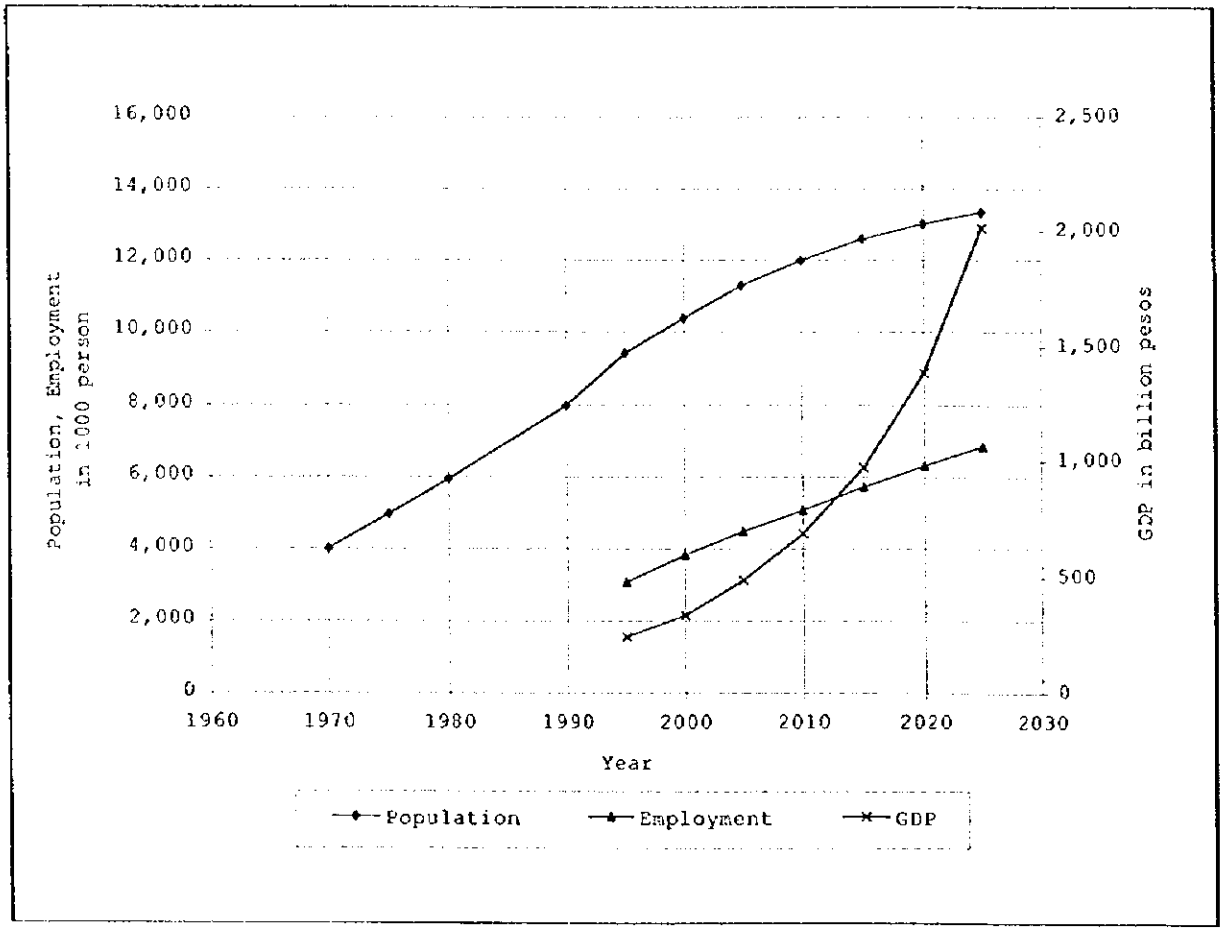


Figure K-28 EXAMPLE OF STANDARD OUTPUT FROM SOCIO-ECONOMY DATABASE

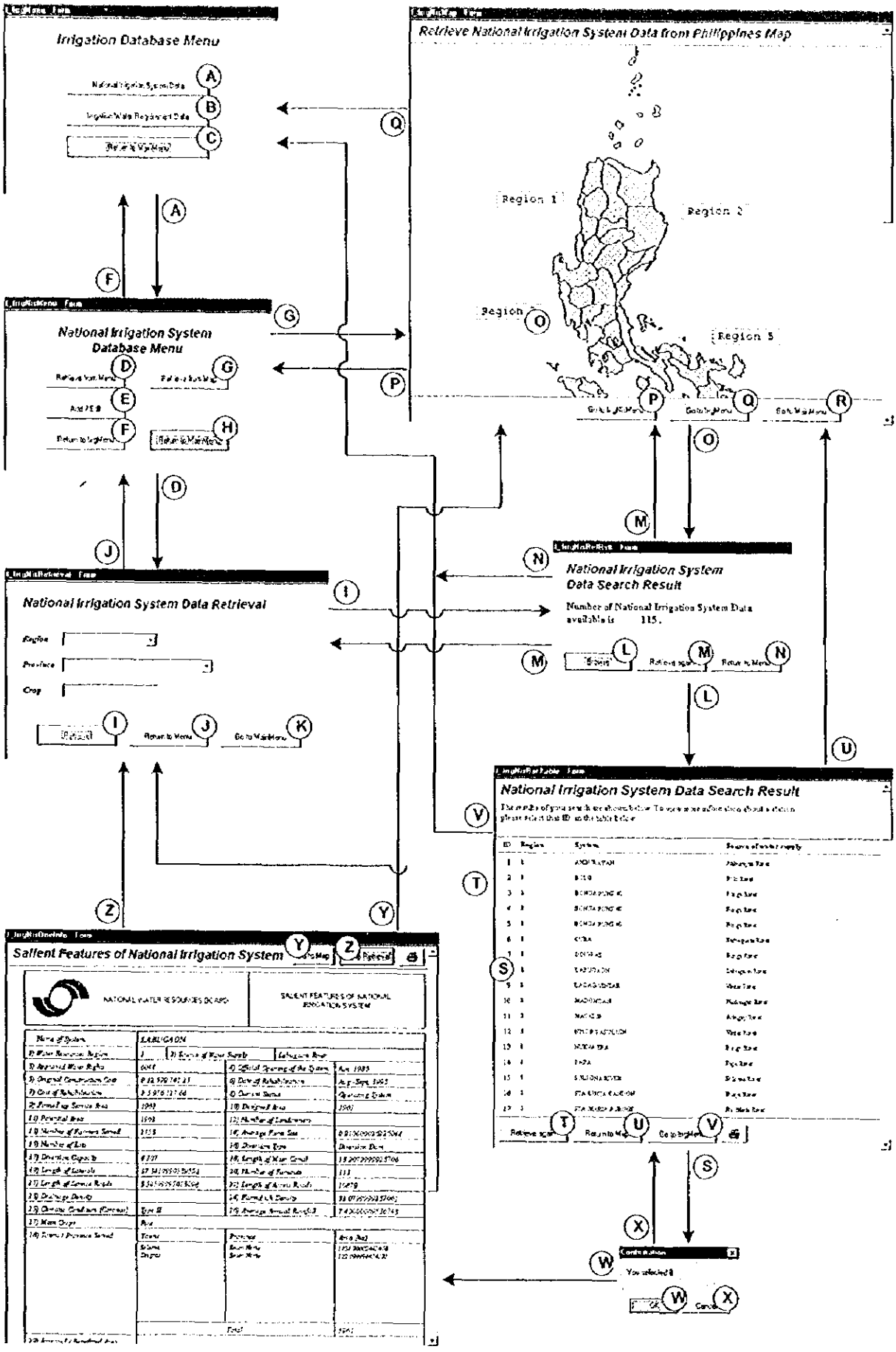


Figure K-29 FLOW OF SCREEN IMAGE ON IRRIGATION DATABASE (1/2)

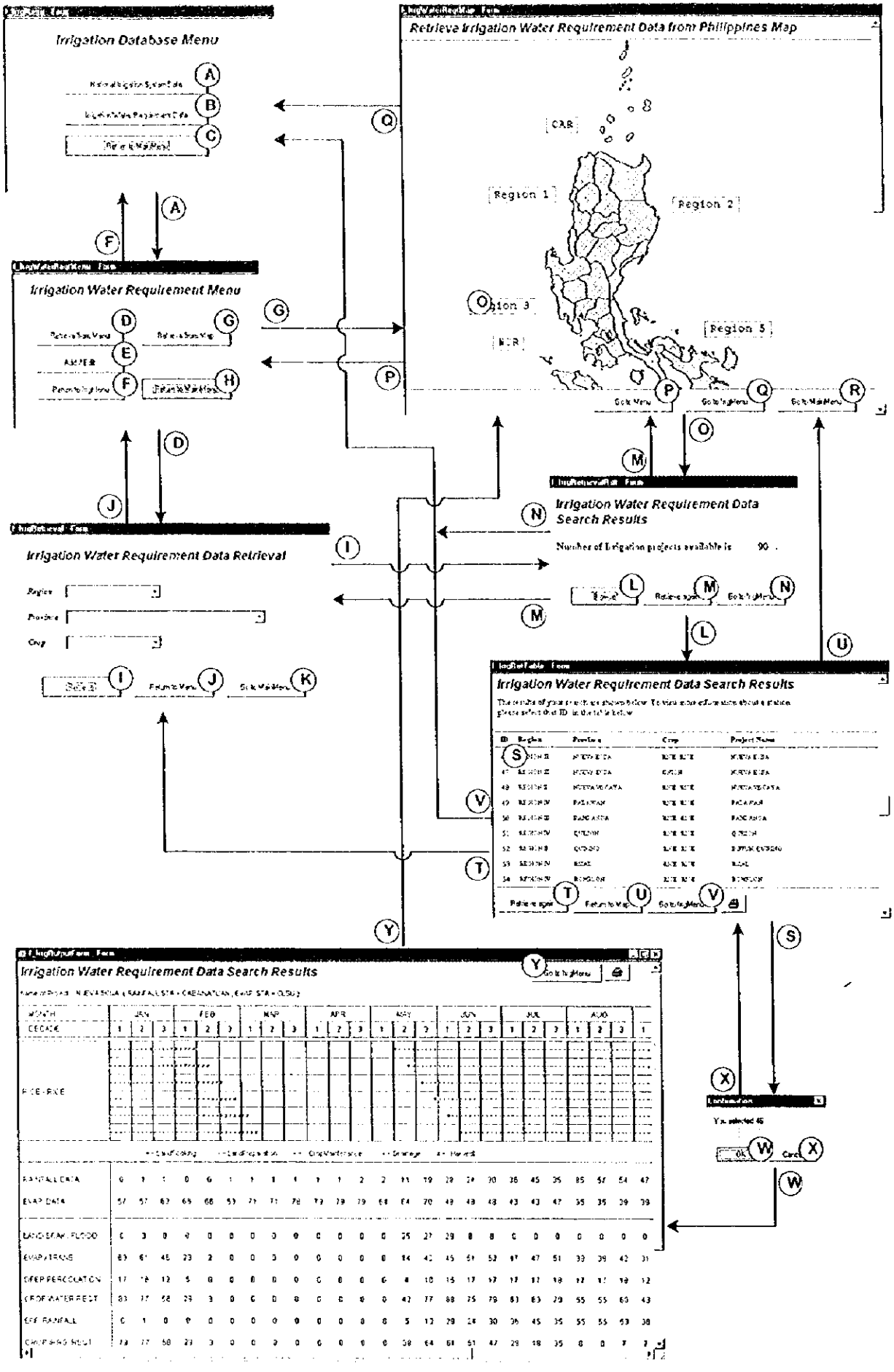


Figure K-30 FLOW OF SCREEN IMAGE ON IRRIGATION DATABASE (2/2)

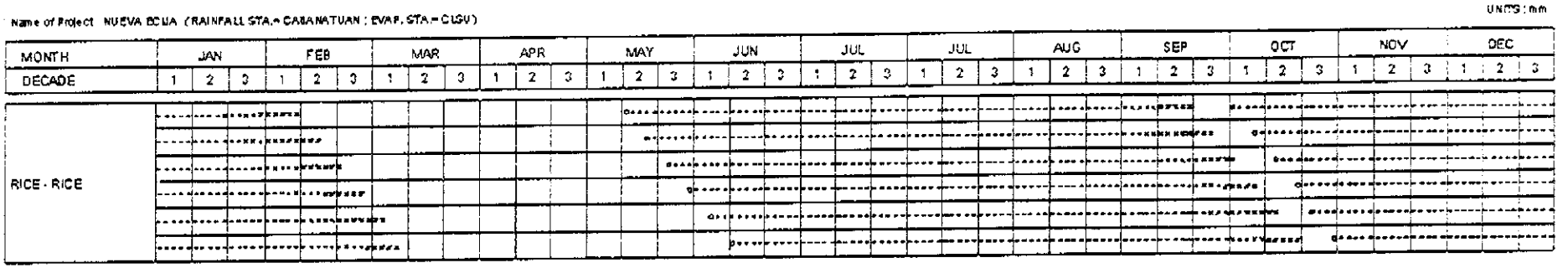
NATIONAL WATER RESOURCES BOARD

SALIENT FEATURES OF NATIONAL IRRIGATION SYSTEM

Name of System	***LABUGAON***			
1) Water Resources Region	*I*	*2) Source of Water Supply*	*Labugaon River*	
3) Approved Water Rights	*6044*		*4) Official Opening of the System*	*Jun 1986*
5) Original Construction Cost	*P 12,599,741.25*		*6) Date of Rehabilitation*	*Aug.-Sept. 1993*
7) Cost of Rehabilitation	*P 5,956,127.66*		*8) Current Status*	*Operating System*
9) Firmed-up Service Area	*1961*		*10) Designed Area*	*1961*
11) Potential Area	*1961*		*12) Number of Landowners*	
13) Number of Farmers Served	*2153*		*14) Average Farm Size*	*0.910000026226044*
15) Number of Lots			*16) Diversion Type*	*Diversion Dam*
17) Diversion Capacity	*4.707*		*18) Length of Main Canal*	*13.9079999923706*
19) Length of Laterals	*17.3419990539551*		*20) Number of Turnouts*	*111*
21) Length of Service Roads	*3.59599995613098*		*22) Length of Access Roads*	*10879*
23) Drainage Density			*24) Farmditch Density*	*31.0799999237061*
25) Climatic Condition (Coronas)	*Type II*		*26) Average Annual Rainfall*	*7.400000095367143*
27) Main Crops	*Rice*			
28) Towns / Province Served	***Towns***	***Province***		***Area (ha)***
	Solsona	*Ilocos Norte*		*1838.900024414062*
	Dingras	*Ilocos Norte*		*122.099998474121*
		Total		*1961*
29) Irrigated / Benefitted Area				
Average	*1985-1995*			
Season	***Wet***	***Dry***	***Third***	
Irrigated Area (ha)	*1290*	*790*		
Benefitted Area (ha)	*1290*	*790*		
Average Yield (cav/ha)	*80*	*60*		
30) Farmers Irrigators Association (FIA) with Memorandum of Agreement for Operation and Maintenance	***Nature of Contract***	***Number of FIA***	***Length of Canal (km) under contract***	***Area Covered (ha)***
	Type III	*6*	*31.25*	*1169.93994140625*
31) Future Expansion	*Expansion of about 790 has. when the system is provided with drainage re-use structure in the d'stream areas,& 650 has. When the Palsiguan RMPP, Phase II is implemented.*			
32) Deterioration of the System				
33) Other Information				

Figure K-31 EXAMPLE OF STANDARD OUTPUT FROM IRRIGATION DATABASE (1/2)

Figure K-32 EXAMPLE OF STANDARD OUTPUT FROM IRRIGATION DATABASE (2/2)



Name of Project : NUEVA ECIJA (RAINFALL STA.= CABANATUAN ; EVAP. STA.= CLSU)

UNITS : mm

MONTH	JAN			FEB			MAR			APR			MAY			JUN			JUL			JUL			AUG			SEP			OCT			NOV			DEC		
DECADE	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
RICE - RICE																																							

o= LandSoaking - = Land Preparation = = Crop Establishment + = Drainage * = Harvest

RAINFALL DATA	0	1	1	0	0	1	1	1	1	1	1	2	2	11	19	28	24	30	36	46	39	36	46	35	86	57	54	47	53	46	14	11	7	9	6	4	1	3	2
EVAP. DATA	57	57	63	66	66	53	71	71	78	79	79	79	64	64	70	48	48	48	43	43	48	43	43	47	35	35	39	39	39	39	40	40	44	46	46	46	51	51	57
LAND SOAK / FLOOD	0	0	0	0	0	0	0	0	0	0	0	0	0	25	27	29	8	8	0	0	8	0	0	0	0	0	0	0	0	7	21	27	28	8	6	0	0	0	0
EVAP / TRANS	63	61	46	23	2	0	0	0	0	0	0	0	0	14	40	46	51	52	47	47	52	47	47	51	39	39	42	31	16	4	11	25	42	49	50	50	57	57	62
DEEP PERCOLATION	17	16	12	5	0	0	0	0	0	0	0	0	0	4	10	15	17	17	17	17	17	17	17	18	17	17	18	12	6	1	5	10	17	17	17	17	17	17	18
CROP WATER REQT.	80	77	58	29	3	0	0	0	0	0	0	0	0	42	77	88	75	79	63	63	79	63	63	70	56	56	60	43	22	12	37	62	87	72	71	66	73	73	81
EFF. RAINFALL	0	1	0	0	0	0	0	0	0	0	0	0	0	5	13	28	24	30	36	46	30	36	46	35	56	56	53	36	21	9	6	8	7	9	6	4	1	3	2
CROP IRRG. REQT.	79	77	58	29	3	0	0	0	0	0	0	0	0	38	64	61	51	47	28	18	47	28	18	35	0	0	7	7	2	4	31	54	80	63	65	60	72	71	79
OVERALL EFF.	55	55	55	55	55	0	0	0	0	0	0	0	0	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	55	55	55	55	55	55	55	55	55	55
DIVERSION REQT.	144	139	105	52	5	0	0	0	0	0	0	0	0	87	141	135	113	104	62	41	104	62	41	78	0	0	16	16	4	7	57	97	146	116	119	114	101	128	143
W'DUTY (L/S/H)	1.67	1.61	1.10	0.60	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1.49	1.56	1.30	1.20	0.71	0.47	1.20	0.71	0.47	0.82	0.00	0.00	0.17	0.18	0.04	0.08	0.66	1.13	1.69	1.34	1.38	1.32	1.51	1.49	1.50

NOTE : Rainfall data is for 80% probability of occurrence or 6 out of 5 years.

0.00 = CRITICAL

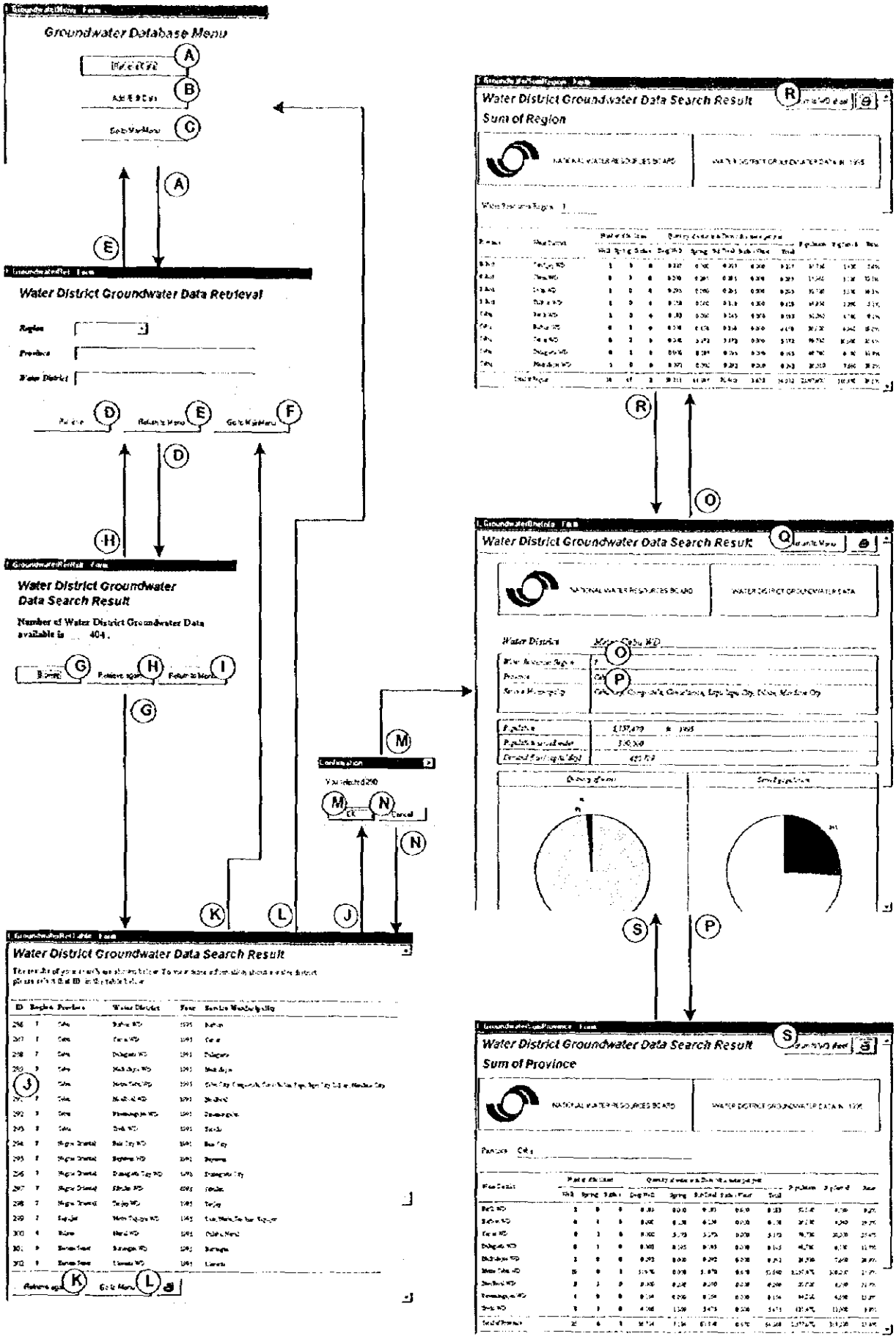


Figure K-33 FLOW OF SCREEN IMAGE ON GROUNDWATER DATABASE

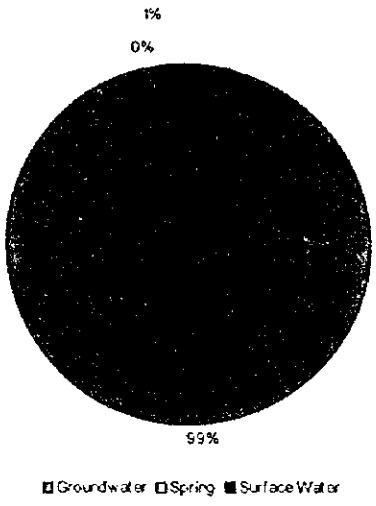
NATIONAL WATER RESOURCES BOARD	WATER DISTRICT GROUNDWATER DATA

Water District *Metro Cebu WD*

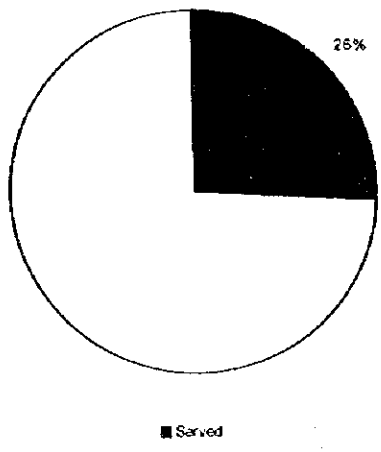
Water Resources Region	*7*
Province	*Cebu*
Service Munincipality	*Cebu City, Compostela, Consolacion, Lapu-lapu City, Liloan, Mandaue City*

Population	*1,157,470 in 1995*
Population served water	*300,000*
Demand (liter/ capita/ day)	*480.729*

Quantity of water



Served population



	Number of water resources facilities	*Quantity of water (million cu.m / year)*
Well	*19*	*51.970*
Spring	*0*	*0.000*
Sub total of Groundwater	***19***	***51.970***
Surface water	*1*	*0.670*
Total	***20***	***52.640***

Figure K-34 EXAMPLE OF STANDARD OUTPUT FROM GROUNDWATER DATABASE (1/3)

NATIONAL WATER RESOURCES BOARD

WATER DISTRICT GROUNDWATER DATA IN 1995

Water Resources Region 7

Province	Water District	Number of facilities			Quantity of water in million cubic meter per year					Population	PopServed	Ratio
		Well	Spring	Surface	DeepWell	Spring	SubTotal	SurfaceWater	Total			
Bohol	Candijay WD	1	0	0	0.227	0.000	0.227	0.000	0.227	25,730	1,430	5.6%
Bohol	Clarin WD	0	3	0	0.000	0.285	0.285	0.000	0.285	15,960	5,120	32.1%
Bohol	Leon WD	1	0	0	0.295	0.000	0.295	0.000	0.295	32,720	5,330	16.3%
Bohol	Tafibon WD	1	0	0	0.118	0.000	0.118	0.000	0.118	41,850	2,290	5.1%
Cebu	Barili WD	1	0	0	0.183	0.000	0.183	0.000	0.183	52,060	4,780	9.2%
Cebu	Borbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,020	4,940	19.0%
Cebu	Carcar WD	0	2	0	0.000	5.172	5.172	0.000	5.172	78,230	20,000	25.4%
Cebu	Dalaguete WD	0	1	0	0.000	0.195	0.195	0.000	0.195	48,780	6,180	12.7%
Cebu	Madridejos WD	1	0	0	0.292	0.000	0.292	0.000	0.292	26,510	7,660	28.9%
Cebu	Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,157,470	300,000	25.9%
Cebu	Moalboal WD	0	1	0	0.000	0.290	0.290	0.000	0.290	22,020	6,980	31.7%
Cebu	Pinamungajan WD	1	0	0	0.164	0.000	0.164	0.000	0.164	44,010	6,680	15.2%
Cebu	Toledo WD	3	1	0	4.106	1.369	5.475	0.000	5.475	121,470	12,000	9.9%
Negros Oriental	Bais City WD	1	0	0	0.174	0.000	0.174	0.000	0.174	63,360	9,470	14.9%
Negros Oriental	Bayawan WD	0	3	0	0.000	2.131	2.131	0.000	2.131	90,950	21,120	23.2%
Negros Oriental	Dumaguete City WD	6	0	1	0.673	0.000	0.673	2.962	3.635	92,640	71,250	76.9%
Negros Oriental	Sibulan WD	0	1	0	0.000	0.409	0.409	0.000	0.409	31,210	3,590	11.5%
Negros Oriental	Tanjay WD	1	1	0	0.679	0.679	1.357	0.000	1.357	65,630	18,990	28.9%
Siquijor	Metro Siquijor WD	2	3	0	0.333	0.499	0.832	0.000	0.832	57,680	8,520	14.8%
Total of Region		38	17	2	59.213	11.187	70.400	3.632	74.032	2,097,800	516,330	24.6%

Figure K-35 EXAMPLE OF STANDARD OUTPUT FROM GROUNDWATER DATABASE (2/3)

NATIONAL WATER RESOURCES BOARD

WATER DISTRICT GROUNDWATER DATA IN 1995

Province Cebu

Water District	Number of facilities			Quantity of water in million cubic meter per year					Population	PopServed	Ratio
	Well	Spring	Surface	DeepWell	Spring	SubTotal	SurfaceWater	Total			
Banli WD	1	0	0	0.183	0.000	0.183	0.000	0.183	52,060	4,780	9.2%
Borbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,020	4,940	19.0%
Carcar WD	0	2	0	0.000	5.172	5.172	0.000	5.172	78,730	20,000	25.4%
Dalaguete WD	0	1	0	0.000	0.195	0.195	0.000	0.195	48,780	6,180	12.7%
Madridejos WD	1	0	0	0.292	0.000	0.292	0.000	0.292	26,510	7,660	28.9%
Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,157,470	300,000	25.9%
Moalboal WD	0	1	0	0.000	0.290	0.290	0.000	0.290	22,020	6,980	31.7%
Pinamungajan WD	1	0	0	0.164	0.000	0.164	0.000	0.164	41,010	6,680	15.2%
Tredo WD	3	1	0	4.106	1.369	5.475	0.000	5.475	121,470	12,000	9.9%
Total of Province	25	6	1	56.714	7.184	63.898	0.670	64.568	1,577,070	369,220	23.4%

Figure K-36 EXAMPLE OF STANDARD OUTPUT FROM GROUNDWATER DATABASE (3/3)

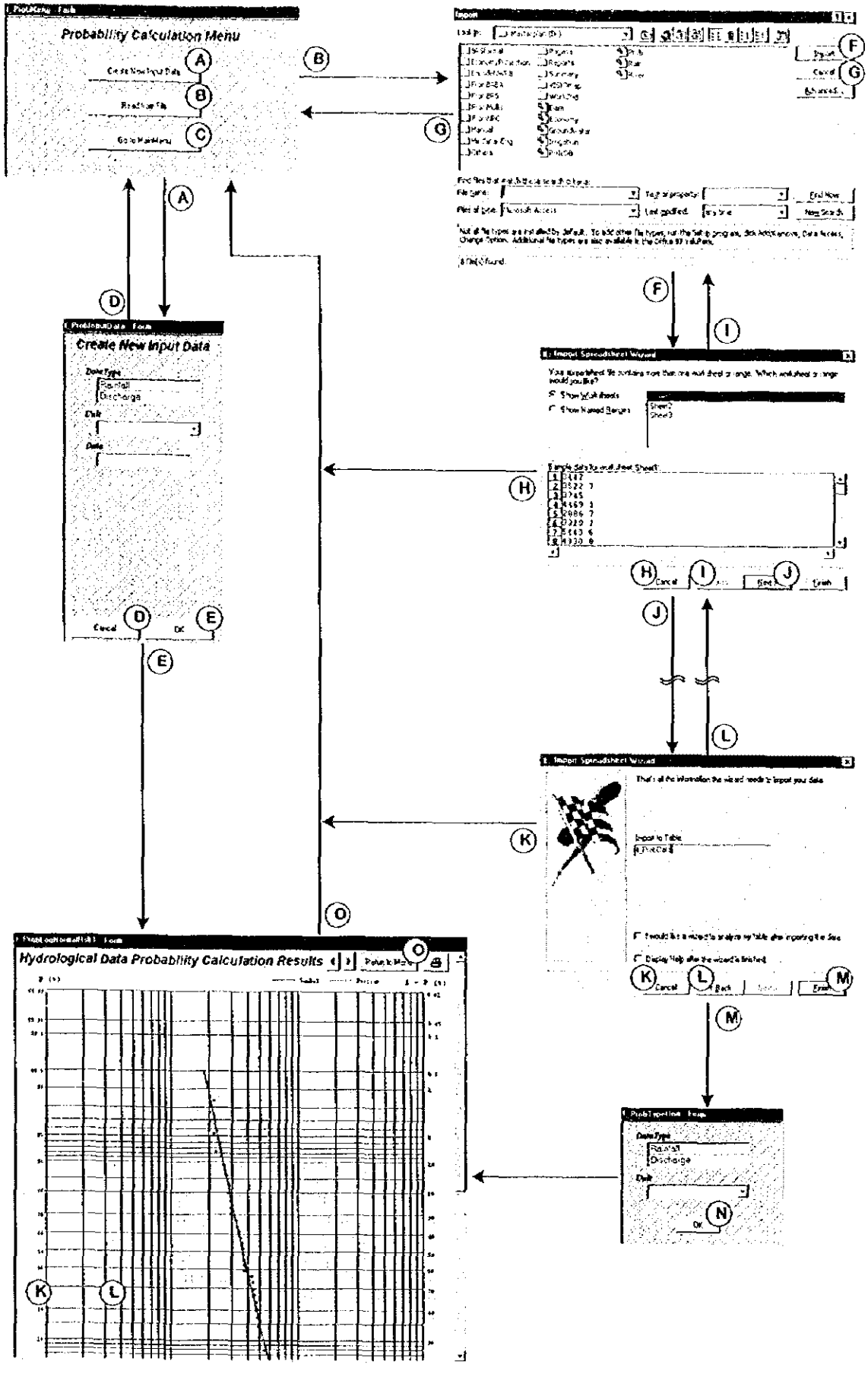
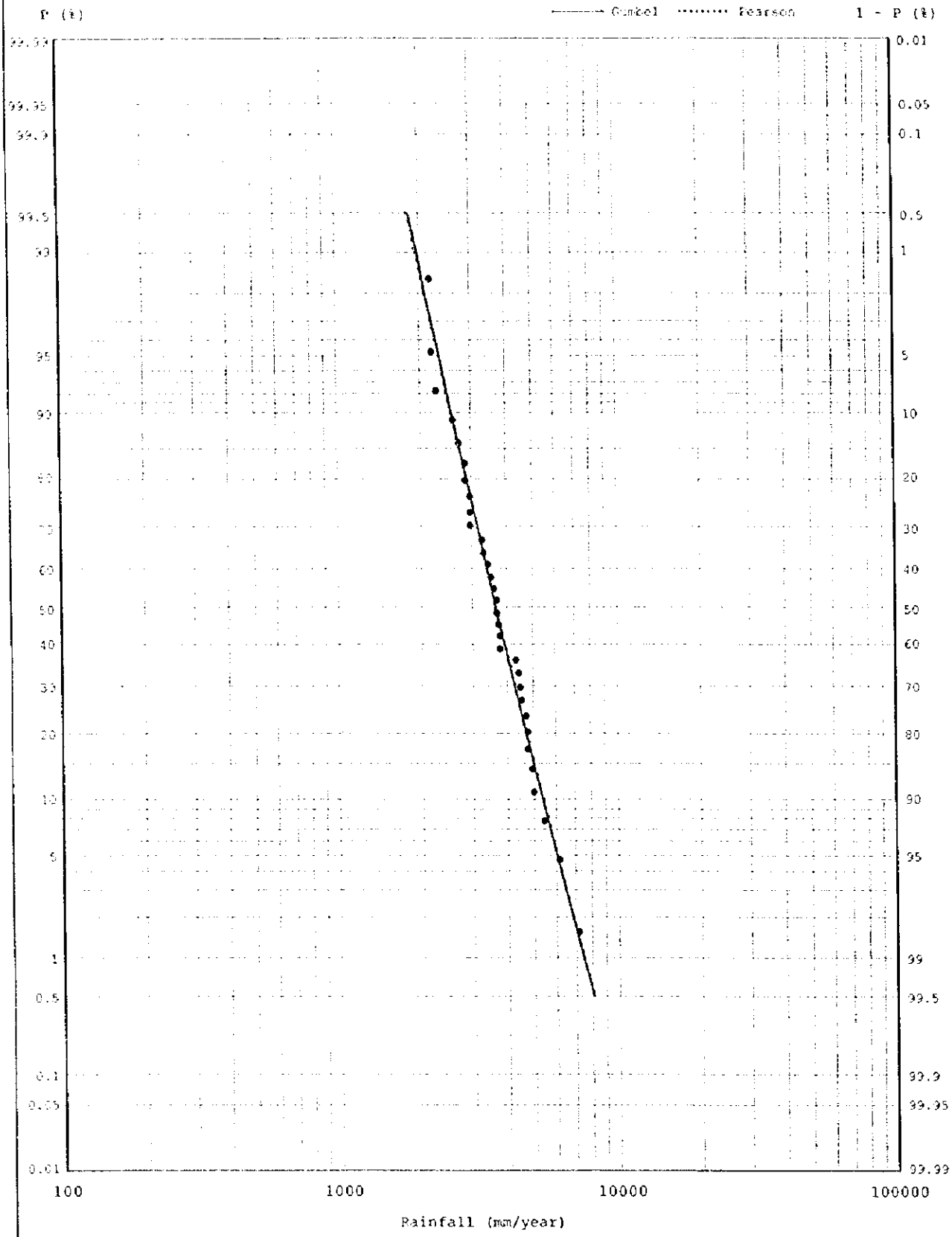


Figure K-37 FLOW OF SCREEN IMAGE ON PROBABILITY CALCULATION



P (%)	99.5	99	98	96	90	80	50	20	10	4	2	1	0.5
T (year)	1.005	1.01	1.02	1.04	1.11	1.25	2	5	10	25	50	100	200
Gumbel	1845	1970	2115	2289	2588	2908	3659	4670	5340	6186	6814	7436	8057
Pearson	1803	1926	2071	2248	2556	2889	3673	4705	5372	6202	6812	7421	8030

Figure K-38 EXAMPLE OF STANDARD OUTPUT FROM PROBABILITY CALCULATION

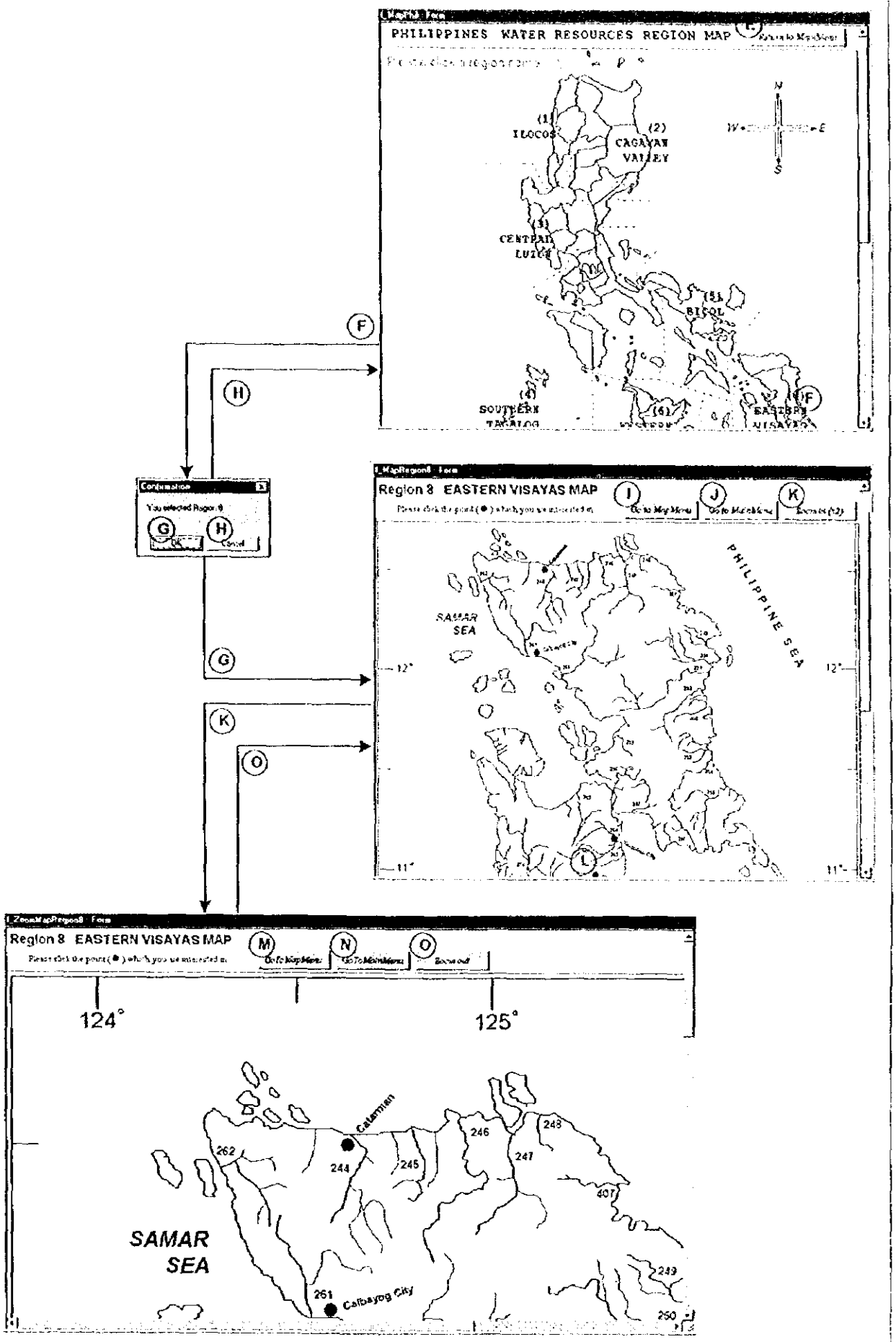


Figure K-39 FLOW OF MONITOR SCREEN IMAGE ON THE RETRIEVAL USING PHILIPPINES MAP