

## **CHAPTER 7**

# **WUA DATABASE DESIGN**

## CHAPTER 7 : WUA DATABASE DESIGN

### 7.1 Design of WUA Database

#### 7.1.1 Objectives and Basic Design Concept

##### (1) Objectives

The WUA database should store information on the present condition of WUA, detailed information of WUA, information about member of WUA, management and administration of WUA, the collection and usage of ISF, and other information.

The database should be so designed that information can be inspected and used, so that it is not simply a data repository. Its design, therefore, must take into account the needs of those who will wish to use it in the future. It is, however, not always possible to design a system which will satisfy everybody.

The expected functions of WUA Database are as follows.

Expected Functions of Database

Administration Level	Expected Functions (Usage of Database)
Central & Provincial Levels	<ul style="list-style-type: none"> <li>- Assess the achievement of the turnover program</li> <li>- Identify, and possibly analyze, the problems of the turnover program</li> <li>- Assess the conditions of ISF collection</li> </ul>
District Levels	<ul style="list-style-type: none"> <li>- Assess the achievement of the turnover program</li> <li>- Identify the problems of the turnover program</li> <li>- Obtain basic information of individual WUAs</li> <li>- Identify the problems of the individual WUAs</li> <li>- Ascertain the present condition of irrigation facilities, and system of the individual WUAs</li> <li>- Easy operation of data renewal</li> <li>- Assess the conditions of ISF collection</li> </ul>

##### (2) Basic concept of WUA-Database design

Recently, office software which considers EUC (end user computing) has become popular. EUC means that the end users of the database can modify the data, by themselves, to suit their own requirements. This requires that the database is designed with basic functions and is able to support EUC .

The WUA Database design was based on the following concepts :

- *Database design shall be based on the user's demands.*
- *It is assumed it will be updated annually,*
- *It should be simply constructed and should function simply, allowing easy operation and easy data processing.*
- *Data shall be as compact as possible*
- *The selected database application should be capable of being improved and upsized in the future*

##### (3) Selection of Software for the WUA Database

Various database products are available, and several of them, so called the de facto standard, are used currently. It is possible to select a database application which is capable of being improved in the future, and which can be used by many engineers. A number of alternatives are compared below:

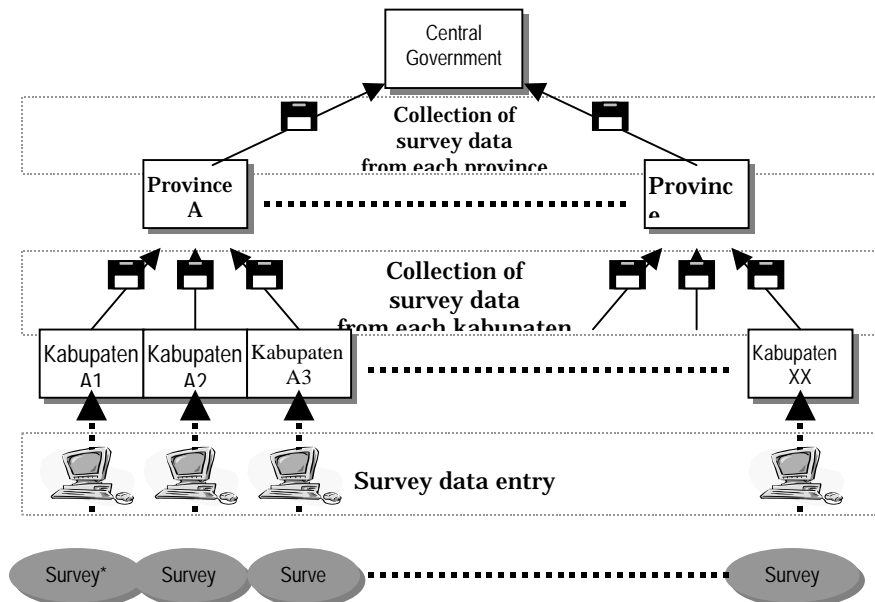
No	Product Name	Description
1	Microsoft Access	A comparatively cheap product, particularly suited to small volumes of data. The application is easily developed and can be customized using Microsoft Visual Basic, which is used throughout the world. Upsizing is comparatively easy, too.
2	Microsoft SQL Server	Compare it with Microsoft Access, and altitude and high-speed processing are possible a product is appraised as higher rank of access. Additionally, it can be upsized from Microsoft Access, but it means that an exclusive server machine becomes necessary.
3	Oracle	The product's reliability is very height. However, product's needs the high technical knowledge of operator comparing with Microsoft Access, Microsoft SQL Server, and other products. And, ite needs an exclusive server
4	DB2	The product that was more popular during the times of a large-sized computer. However, there are several parts lacking for the general-purpose usage. And, an exclusive server machine becomes necessary, too.

It is considered that Microsoft Access 2000 would be appropriate for the WUA database, it can be used on many computers, does not require a special server machine, can easily be expanded or upsized and is relatively cheap.

### 7.1.2 Flow of Preparation and Data Collection

#### (1) General Flow of Data Collection and Usage

It is necessary to input the survey results into a database. There is, however, a large amount of data, and data preparation at the provincial or the central government level might be difficult. It is also difficult for government agencies below the Kabupaten level given the poor availability of computers at this level. It is, therefore, recommended that data compilation should be done at Kabupaten level: these databases will be combined at the provincial level, and then again they will be summarized at the central government level. Data collection sheets which will be surveyed by *Ranten Dinas* level were prepared and some datasheets are shown in Fig. 7.1.3. WUA Database must be capable of importing and exporting data if it is to perform the functions mentioned below:



\*Questionnaires to be completed by the provincial government officers in the field are shown in Annex

Flow of preparation and collection of data

(2) Function of WUA Database

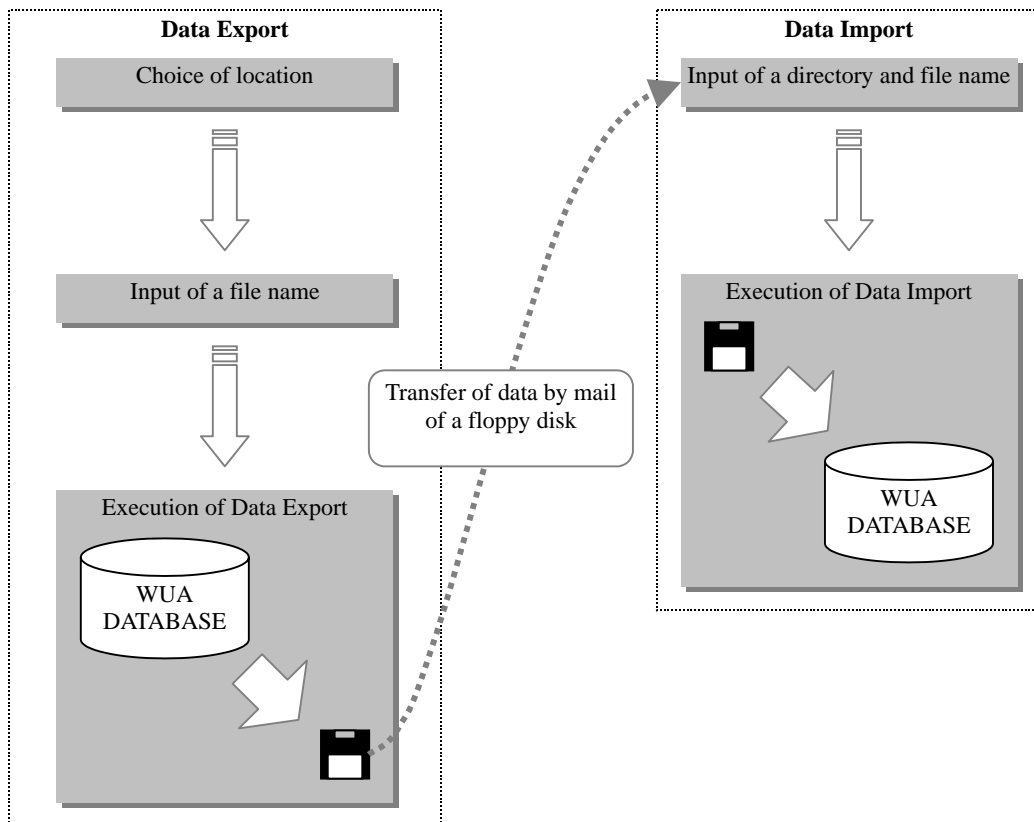
1) Inspection function of a database

In the case where an irrigation scheme comprises more than one WUA, the entire unit WUAs will be identified as being inter-related. When a WUA is selected, its structural information will be displayed. (as show it in Fig 7.1.1 and 2)

2) Operation of WUA Database

The operation of the database is divided into two processes. They are firstly, the input of survey data and secondly the revision of the recorded information. As large volumes of data are involved, the initial data input and its subsequent revision have been done using spreadsheets. Data importing and exporting is a difficult process, sometime causing the complete destruction of a database. It is therefore, important that the process be simple and safe.

The function of output data (Data Export) will be proceeded by selecting a target range and output file and directory name. On the other hand, the function to import the data (Data Import), can be done only by setting file name and directory. (ref. the following figure)



Flow of import and export of data

The following hardware and software is required for the operation of the WUA Database System:

Personal Computer		Software	
<b>CPU :</b>	Pentium(133MHz) or higher	<b>OS :</b>	Windows 98 or higher
<b>Memory :</b>	32MB RAM or higher	<b>Database :</b>	Microsoft Access 2000(included Microsoft Office 2000 professional)

### 7.1.3 WUA Database Design

Categories and items stored on the database are shown as follows: more details are shown in Annex:

List of WUA Database

Category	Items
<b>WUA_General</b>	1) P3A_Status 2) P3A_Federation 3) P3A_Federation_Member
<b>Irrigation_Scheme</b>	1) Irrigation_scheme 2) Tertiary_irrigation_drainage_system
<b>ISF</b>	1) P3A_ISF
<b>Management and Guidance for empowering the existing WUA</b>	1) P3A_Training 2) P3A_Evaluation
<b>Irrigation Management</b>	1) P3A_Identification 2) P3A_History 3) P3A_Land 4) P3A_Institutional_structur 5) P3A_Organisation 6) P3A_Fees 7) P3A_Function_Water_Distribution 8) P3A_Maintenance_practice 9) P3A_Activity_Meeting 10) P3A_Sanctions 11) P3A_Unit_Production 12) P3A_Management_Administration 13) Government_Role
<b>Food crops agriculture in paddy field</b>	1) P3A_Technical_Aspects 2) P3A_Pests_Diseases 3) P3A_Costs_Production
<b>Food crops agricultural activities</b>	1) P3A_Agricultural_Activities
<b>Farming activities for perennial crops (Fruits trees)</b>	1) P3A_Perennial_crops 2) P3A_Agricultural_business 3) P3A_Crop_Yield
<b>Farming activities for Animal husbandry</b>	1) P3A_Livestock 2) P3A_Managing_animal 3) P3A_Livestock_Food 4) P3A_Cost_Value_livestock_activity
<b>Water management and conservation</b>	1) P3A_Water_management
<b>Institutional aspect and farmer's perception</b>	1) P3A_Institutional_aspect
<b>Off-farm income</b>	1) P3A_Off_Farm_Income

### 7.1.4 WUA Database Operation

An operation manual is given in Annex I

## 7.2 WUA Database Verification through Provincial Demonstrations

### 7.2.1 Database Demonstration in the Study Provinces

#### (1) Technical transfer to newly assigned counterpart

The designed WUA database was examined by inputting data collected during the WUA questionnaire survey in Phase I. Its design was then adjusted by JICA Study Team during Phase I Study. It is not, however, sure that the persons to whom the programs were handed over and who were trained to run the program can continue their duties under the new organization. As stated in the Minutes of Meeting on Progress Report (1), the transfer of the WUA database to the new organization and new counterpart in charge was conducted during Phase II Field Study period.

#### (2) Provincial and Kabupaten Demonstrations

In order to verify the applicability and adaptability of the database, explanations and demonstrations of the database were conducted in five Study Provinces. Before conducting the demonstration, the operation manual of the database, as shown in Interim Report Annex-J, was translated into Indonesian by the Study Team. Also the copy of database together with data input sheets and manual were prepared on Compact Disk (CD) ROM for the demonstration and trial in each province and kabupaten office; these were handed over to each office by the Study Team. The explanation and demonstration were mainly targeted at provincial officials of Dinas Pengairan, such as O&M, WUA or Data processing sections as a Training of Trainers approach. Discussions on the database operation and applicability were held among the participants. Details of the Province and Kabupaten where the database was demonstrated by a system engineer of JICA Study Team and counterpart are as follows:

Province	Place/Office	Person in charge	No. of Participants	Date, 2001
West Sumatra	Provincial O&M Section	Mr. Helmi Ibrahim, Chief of P3A	10	Apr. 19
West Java	Provincial P3A Section	Ms. Suliyanti, DPUP Chief of P3A Mr. Dany staff DPUP P3A	8	Feb. 14
	Kabupaten Bandung	Mr. Dayat, Chief of KDPU Pengairan Mr. Warsa, staff	4	Feb. 15
DI. Yogyakarta	Provincial PTGA Section	Mr. Erwin, PM of Proyek Irrigasi Yogya. Mr. Darson, Chief of PTGA	8	Mar. 7
	Kabupaten Kulon Progo	Mr. Sarjono, staff agriculture service Kabupaten - No computer available -	13	Mar. 8
East Java	Provincial BAPPEDA	Mr. Aries, staff BAPPEDA Mr. Echrom, staff DPUP	5	Mar. 28
NTB	Provincial O&M Section	Mr. Surana, DPUP chief of P3A - no computer available	11	Mar. 30/31

### 7.2.2 Poor Information Technology Infrastructure

Indonesia is said to be one of the countries in Asia where IT is less well developed. Through visiting provincial and kabupaten office in the Study Area to demonstrate the WUA database, it was evident that the IT infrastructure at the regional government level is very poor. As shown the table above, several provincial or kabupaten public work section have no computer for the database or there are no CD drivers available in the office. Also most of regional government offices can not communicate between each other by internet; sometimes even communication by facsimile is difficult between kabupaten dinas. Even in the central government offices, few computers, often installed under a project, are used except as word processors for official letters. Therefore, before full operation of the national database such as WUA database, considerable investment for the development IT

infrastructure will be required.

### **7.3 Trial Operation of WUA Database in Kabupaten Bandung**

#### **7.3.1 Data Collection of WUA Database in Kecamatan**

##### **(1) Selection of Pilot Kabupaten and Kecamatan for the Trial**

Together with database design, the data collection sheets on WUA were prepared during Phase I Study, in Indonesian. Using these sheets, the trial data collection was conducted to confirm the applicability for the regional government officials.

The JICA Study Team decided to make trial operation of the database in West Java because of easiness of communication and accessibility from Jakarta. After discussion and consultation with provincial PU Pengairan, kabupaten Bandung, Kecamatan Ciparay, was selected for the trial operation because of the reasonable availability of computers, hardware and skilled operators.

##### **(2) Data collection in Kecamatan Ciparay**

Based on the collaboration with Pengairan juru pengamat staff of Seksi Ciparay, 47 WUAs' data within 22 DIs were collected for seven items only, as a pilot trial, in accordance with the data collection sheets prepared in April 2001.

#### **7.3.2 Data Input Trial in Kabupaten Bandung**

Based on the WUA data collected on the data collection sheets by the field officers, data input into the database was conducted in the *Dinas Pengairan* office of Kabupaten Bandung on April 27, 2001.

#### **7.3.3 Results of Trial**

Based on the results of trial, the following points emerged:

- 1) All officials understood the requirement of the WUA database
- 2) Database is too complicated
- 3) Many data items are difficult to collect especially those concerning landholdings and agriculture,
- 4) Many items are already included or overlap with existing simple data base of WUA
- 5) The database importing and exporting function are most favorable for future use of monitoring and evaluation
- 6) Many data input item formats, especially on the data selected amongst the preset answers, should be modified, according to site conditions

#### **7.3.4 Modification of Data Collection sheets and Database Program**

After the field trial and discussions with regional government officials, it is evident that many items within the Indonesian version of the data collection sheets, and some parts of program, need to be modified. These are listed in Annex J. These were subsequently modified or corrected by the Study Team System Engineer. The modified database program and data collection sheets, on CD, will be distributed during the Study period, through the counterparts

### **7.4 Operation of WUA Database**

#### **7.4.1 Appointment of Government Officials for Database Operation and Monitoring**

Government officials in charge of WUA database should be assigned at central, provincial and kabupaten level. They should be trained, based on the request by central government officials. Periodic

up-dating should be conducted by the central government officials. The kabupaten databases should be compiled at provincial level, whilst the provincial databases would be compiled at the central level. The recommended section in charge for WUA database operation and management at each level are as follows

Central government	KIMPLASWIL	Directorate of Water Resource Management
Provincial government	Dinas Pengairan	P3A management Section
Kabupaten government	Dinas Pengairan	P3A management Section

#### **7.4.2 Development of Computerization**

As stated above, hardware for database operation, computer and peripherals, should be up-graded in all central and regional government offices. In parallel with hardware development, training of operators should be implemented.

#### **7.4.3 Periodic Data Renewal**

After the initial WUA data are installed in the database, periodic maintenance and updating should be conducted by regional government officials. It is recommended to update every year, the same as the present simple database are renewed every year as an annual report of activities.



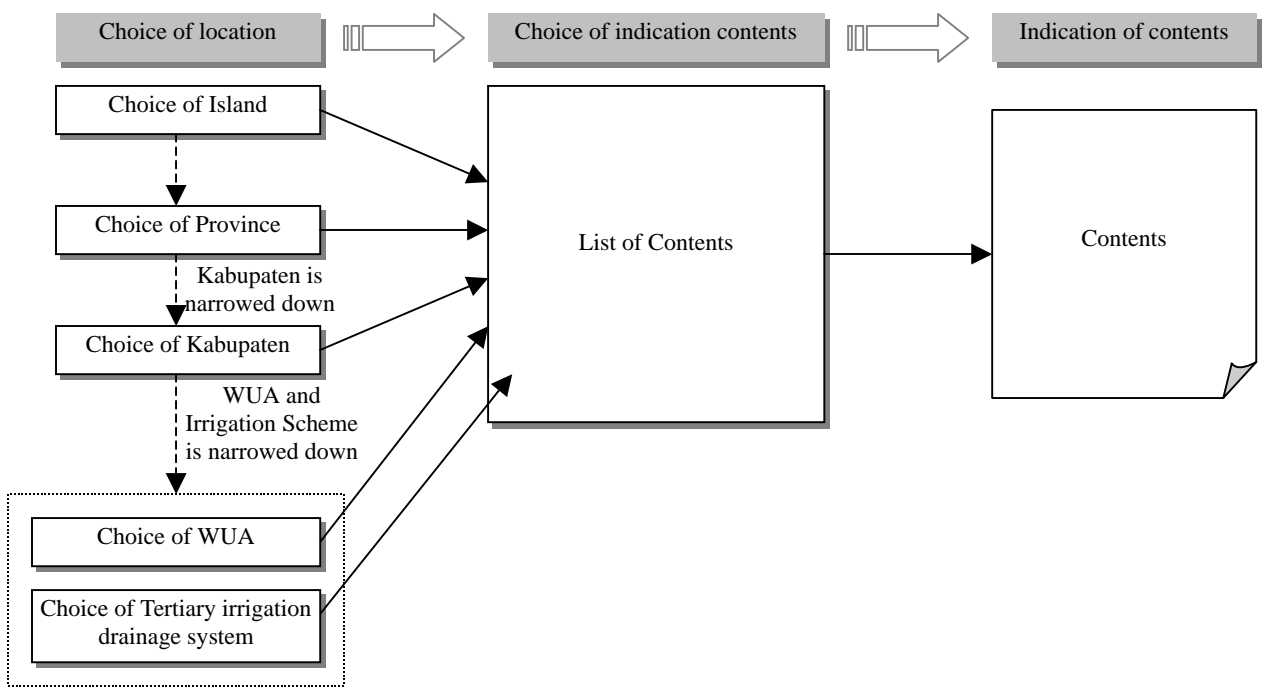


Fig. 7.1.1 Procedure of Contents Inspection

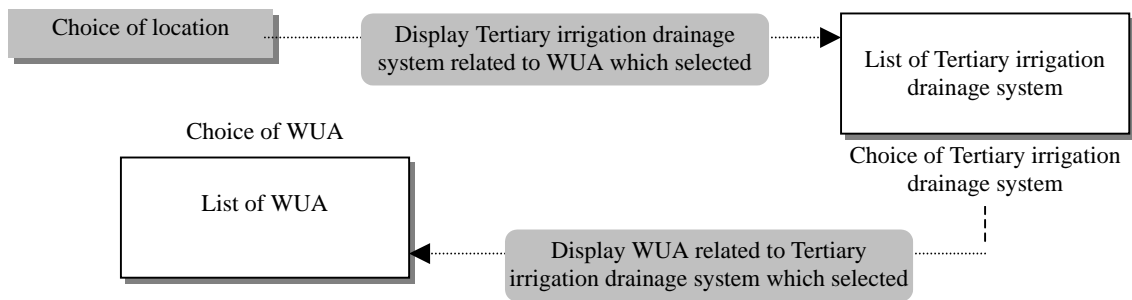


Fig. 7.1.2 Indication of WUA and Tertiary and Irrigation Drainage System Concerned

WUA/ Tertiary irrigation drainage system that the location includes irigasi (P3A)

Pulau Jawa  
 Propinsi D.I. Yogyakarta  
 Kabupaten Gunung Kidul

Irigasi (89)  
 340000335 SP.PI JIMBUNGAN  
 340000336 BON PAING  
 340000338 PUCUNG II  
 340000339 KANUTAN  
 340000340 SRITEN  
 340000341 WATI I ANCIPI

P3A (5)  
 3-02-21-27 Sari Tirtomulyo A  
 3-02-20-25  
 3-02-20-26  
 3-02-21-28 Sedyo Makmur  
 3-02-22-29 Sido Maju

sasaran: kabupaten = Gunung Kidul

**STATUS DAN KINERJA P3A**  
 Latar Belakang dan Informasi Umum P3A  
 Kelembagaan P3A  
 Sistem Pengaturan Air yang Lama  
 Pola Tanam dan Penggunaan Lahan P3A  
 Struktur Kelembagaan

Rencana irigasi  
 Sistem Pembuangan Air Petak Irigasi

Part to decide indication

Preview Button:  
Display by a formal style, by choice

Page 1

**Latar Belakang dan Informasi Umum P3A**

Propinsi D.I. Yogyakarta

Nama Kabupaten	Jenis P3A	Nama P3A	Luas (Ha)	Kelas	Lokasi /Salinitas	Asas/air	Tanggal Pembentukan	Jumlah Anagat	Jumlah Waduk	Petak Irigasi	Jumlah P3A dalam Desa	Jumlah Desa dalam P3A
Gunung Kidul	3-02-20-25		18,00	ID		I	12-Dec-99	18	18	2	5	1
	3-02-20-26		5,00	ID		I	00-Jan-00	14	14	2	10	2
	3-02-21-27	Sari Tirtomulyo A	38,00	SB	hulu	A	15-Sep-95	243	24	4	14	3
	3-02-21-28	Sedyo Makmur	43,00	BB	teguh	A	13-Sep-95	262	65	4	18	4
	3-02-22-29	Sido Maju	24,10	BB	hulu	A	24-May-95	150	0	1	22	5
	<b>Total of Gunung Kidul</b>		<b>128,10</b>					<b>687</b>	<b>121</b>	<b>13</b>		
Kulon Progo	3-04-40-45	Lestari	39,00	ST		I	00-Jan-00	105	4	105	1	1
	3-04-40-46	Sumber Rejeki	189,00	ST		I	00-Jan-00			3	5	2
	3-04-42-47	Tiro Aji	48,00	SB	hulu	A	25-Apr-93	491	0	5	7	3
	3-04-43-48	Guguh Rukun	81,00	SB	teguh	A	12-Apr-96	470	130	6	12	5
	3-04-44-49	Gemah Ripah	640,00	SB	hulu	A	26-Mar-93	302	0	3	13	6
	<b>Total of Kulon Progo</b>		<b>411,00</b>					<b>1.368</b>	<b>134</b>	<b>122</b>		
Sleman	3-03-30-35	Pancoran Ringin	25,00	ST		A	1980	100	0	4	2	4
	3-03-30-36	Araung Mino	38,00	BB		A	01-Mar-00	48	4	3	4	5
	3-03-31-37	Guguh Rukun	35,00	ST		A	1998	80	0	1	5	6
	3-03-33-38	Tirta Mulya		ID		A	1996			8	7	7
	3-03-33-39	Tirta Maro	60,00	ST		I	00-Jan-00				8	8
	<b>Total of Sleman</b>		<b>158,00</b>					<b>228</b>	<b>4</b>	<b>16</b>		
Bantul	3-01-10-13	Sedyo Makmur	48,02	B	hulu	A	11-Dec-95	246	0	11	2	1

Fig 7.1.3 Example of WUA Database