The Republic of Kenya

**Ministry of Water and Irrigation**

**WATER SECTOR REFORM SECRETARIAT**

# Audit and verification of data collected through the Rapid Assessment of Water Services

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Water Sector Reform Programme

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# 1. Background

The GoK is in the process of restructuring the water sector in accordance with the Water Act 2002. Once the restructuring is complete water and sewerage services are to be provided by Water Services Providers contracted by Water Service Boards. The process for the transfer of the management and operations of water services to the Water Service Boards envisaged, among other activities, a countrywide rapid assessment of schemes, services and facilities.

A data form was developed, discussed and approved for use for data collection and rapid assessment of the existing water supply and sewerage schemes. Data collectors, which included divisional water officers, inspectors and O&M operators, were trained in a series of one-day courses on the data collection process and entry of data.

The process was to include data collection and filling of datasheets by the divisional water officers; data verification by the district water officers; and validation by an external consultant.

This report contains the findings of the external consultant contracted to validate the datasheets submitted. The Consultant was to

- Develop a methodology for validating the collected data
- Define an acceptable representative sample of schemes to be validated
- Carry out validation and quality check on data collected with respect to the defined sample
- Make a report including recommendations for improvement of the data collected

The external Consultant was fielded during the month of July 2005 for a period of three weeks.

# 2. Valuation methodology

The methodology of the valuation process included two separate but interlinked approaches:

- Quantitative desk study to establish the credibility of key parameters inputted to the datasheets
- Qualitative field study to evaluate the process of data collection and assessment undertaken in the field by divisional water officers

Finally, the conclusions garnered from the desk study and field study was to be merged into practical recommendations with regard to the validity of the data contained in the datasheets and by extension the GIS database.

# 3. The Quantitative Desk Study

## 3.1 General

A total of 3728 forms had been filled and keyed in to the database. The entire database is contained in 10 separate matching .xls files for the ten chapters of the data sheet. This included over 70,000 cells.

Analysis of the data revealed:

- 27 independent sewage schemes
- 7 combined water and sewage schemes
- 3694 independent water schemes (including 225 that were not defined but were assumed to be water)

Thus the data was collected for 34 sewage schemes and 3701 water schemes.

The study indicated that 57 schemes were defined as Stalled Schemes, while an additional 145 were not defined as either stalled or operational.

## 3.2 Rapid quantitative evaluation of key parameters defining water supply systems

Some key indicators were selected as criteria for evaluation of the quality of information recorded on the datasheets. These included:

- Water abstracted in cum/month
- Population served by water supply system
- Per capita water abstracted in cubic meters per month per person
- Per capita storage capacity in cubic meters per person served
- Percent of water abstracted billed

All these are considered to be key parameters for describing, establishing orders of magnitude and assessing of water supply schemes.

The data recorded for these above parameters was analyzed in an attempt to determine its reliability.

**Water abstracted in cum/month** A total of 849 schemes (23%) did not record an estimate of the volume of water abstracted.

**Population served by the scheme** A total of 1189 schemes (32%) did not record an estimate of the population served by the water supply scheme.

**Per capita abstraction of water** Assuming minimum water requirement of 20 lpd (litres per person per day) and a maximum of 200 lpd and assuming efficiency ranging from 20% to 80% the range of water abstracted per month would range from 0.75 to 30.00 cum per month. This is an extremely broad range. Nevertheless, 452 schemes were found to have recorded information that resulted in an assessment that the per capita abstraction of water was below the minimum supply of 0.75 cum per person per month and 120 schemes recorded data that indicated that the

per capita abstraction of water by the scheme was higher than the maximum supply of 30 cum per person per month.

**Thus, of the total 3728 schemes, 849 were unable to assess the water abstracted, 1189 were unable to assess the population served and 572 made erroneous assessments of the water abstracted and /or population served leaving a total of only 1117, or 30% of the datasheets. Erroneous or no recording of these two parameters in 2611 (70%) datasheets clearly indicates gross misunderstanding of how to assess these two key parameters of water supply systems.**

**Per capita water storage** Many water supply schemes have storage capacity to offset the difference between supply/demand curves. It is assumed that schemes may have storage capacity ranging from 2 – 48 hours of storage volume. For analysis the storage capacity in cum was divided by the population served. It was found that 29 projects had storage capacity of less than 2 hours and 265 schemes recorded a storage exceeding 2 days (48 hours) per person. It is assumed that many errors were made in converting the various modes of storage units and that for many more schemes the storage recorded on the datasheets was erroneous.

**Ratio of water billed** The ratio of water billed through both metered and un-metered connections to the volume of water abstracted was analyzed. It was assumed that this may range from 20% to 70%. It was found that 74 data sheets reported billing higher than abstraction; 12 data sheets reported billing 80%-99% of abstraction; 26 data sheets reported billing less than 20% of abstraction. In additional 1641 data sheets did not report any billing.

After superimposing the results it was found that only 22 data sheets recorded quantitative assessment of water abstracted, population served, storage volume and water billed that fell within an acceptable range. It was therefore decided not to analyze further key indicators as it became obvious that the majority of the datasheets had either left key data blank or had assessed it erroneously.

The initial rapid quantitative evaluation of key parameters defining water supply systems desk study indicated that there may be some serious flaws in the resultant datasheets of the Rapid Assessment of Water Services. The desk study revealed some major flaws that indicated that key parameters defining a water supply system could not be accurately assessed by the persons filling the data sheets. Further analysis was therefore undertaken to try and establish whether there were some parameters entered in the datasheet that could be salvaged.

## 3.3 Evaluation of baseline data identifying and defining status of water supply systems

The second phase of the desk study attempted to evaluate the quality of basic data included in the broad identification of water schemes and definition of their current status. The approach was to peruse the database and clearly distinguish/advice on parameters that could be collected by the surveyors (Divisional Water Officers) and what could not realistically be collected by them. Further analysis was therefore, conducted to establish the validity of basic data reported on the water supply schemes.

This included all information that identified and broadly defined the water schemes. Typically, this information required no more than copying information, which may be readily available or which has already been reported elsewhere. This included information that did not require quantification or assessment. This included such information as Name of Scheme; Division; District; Province; WSB; Services provided; Type of scheme; Owner; Contact Person; Operator and others.

When checking names of schemes it was found that about 1.5% had double listings. For example: Little Nzoia; Lodwar; Log-Log; Makuyu Sub Loc; Maseno; Maseno University; Makre Girls Centre; Mbogoni; Merigwet; Mfamboni; Mt. Kutai Spring; Mutethia.

When checking codes it was found that 29 had 6 digit codes; 2049 had 7 digit codes; 1614 had 8 digit codes and 36 had 9 digit codes.

When checking the Assets file it was found that 97.4% had valid information with only 98 schemes (2.6%) not recording the owner; district; WAB; Scheme code; or scheme number.

Despite the shortcomings, it was concluded that the basic informative data that identifies and defines the water supply schemes may be 95% correct.

# 4. The qualitative field interviews

## 4.1 General

A qualitative assessment was embarked upon to conduct field interviews with a sample of officers that had actually collected the data and had actually filled the datasheets. The purpose of the interviews was to establish the process and procedures undertaken by the field officers for data collection, quantification and assessment prior to filling in the data sheets. Two WSBs were selected for review - Lake Victoria North WSB and Tana WSB. A check-list of topics was prepared for structured interviews with the officers. This is presented in Annex I.

The officers, largely comprising divisional water officers, who undertook the actual field assessment and data coclletion were interviewed. Some District Water Officers too were interviewed to determine the process, if any, undertaken to countercheck and verify the filled datasheets.

A total of 21 interviews were conducted, 10 in Lake Victoria North WSB, 1 in Northern WSB and 11 in Tana WSB. The 21 officers interviewed had completed filling of about 300 datasheets for schemes in 17 districts. An additional 80 schemes had been visited by the same divisional water officers but datasheets were not filled for these as they did not meet the criteria. This sample of 21 officers in 17 districts, covering almost 300 datasheets represents 8% of all datasheets filled and therefore may be considered to be a statistically representative sample.

Each divisional water officer had visited an average of 14 schemes (range from 1-50) over a period ranging from two weeks to three months. Most had been trained in one-day workshops

and most felt that the workshops were adequate. Some commented that not enough time had been allotted to dry-run filling of the datasheet forms.

Most divisional officers were able to allocate 1-4 days per scheme/datasheet but one claimed to have completed 4-5 sheets per day (filling 50 datasheets over a 10 day period). The officers invariably felt that the time allocated per scheme was too short. Common difficulties included making and keeping appointments with the committees operating the community schemes and finding people who were conversant with the scheme parameters. Often this required more than one visit to the site. It became apparent that the combination of transport problems and finding the scheme owners linked with the pressure to complete the rapid assessment in a short time resulted in less than optimal results. Many officers admitted that due to these difficulties they were forced to either guesstimate the parameters or to leave key cells blank. They all felt that they could have done better with adequate transport, longer period of time to complete each sheet and longer period of time for completing the entire rapid assessment.

All divisional officers claimed to have visited all the sites. However, some remarked that as they were in their own division, which they know well and therefore, felt that they did not have to visit all the schemes. This of course has resulted in questionable assessment. Only one officer aroused some suspicion that he had not set foot outside the office and the sheets were filled in their entirety in the confines of the office.

Some remarked that owners of private water supply systems and community water supply systems did not encourage their visits and were suspicious of the motives behind the rapid assessment exercise. Others were unable to obtain good quality information either due to communities being suspicious or not having the information available, which affected mainly the financial data. Others remarked that the information obtained from the committees may have been biased due to their hope of receiving funding for improvement of their water supply.

Much valuable information was lost due to the structure of the datasheet that did not enable insertion of comments or methodology. For example, a large scheme such as Little Nzoia initially served some 150,000 people in three districts. It currently is all but obsolete, serving less than 400 households. It was not possible to reflect this on the datasheet and the person filling the sheet did not know whether to use the initial data or the current status with the resultant datasheet clearly reflecting this confusion.

GPS readings were completed by GPS trained officers three months after most of the datasheets had been completed and required returning to the schemes. A few divisional officers used this opportune, return visit to update the datasheets and to improve the information contained. One noteworthy officer showed initiative and utilized the capabilities of the GPS trained officer as district hydrologist to assist in filling out the datasheet and to estimate flows and volumes in addition to completing the GPS readings.

## 4.2 The datasheets

The information on the datasheets was to include three different sets of information:

- Identification and broad definition of the status of the schemes

- Quantitative data about the physical/engineering parameters describing schemes
- Assessment of key scheme parameters and status

The basic information identifying and defining the schemes included names and codes that identify the water supply system, sorting of schemes by ownership (public, private), type (community, GoK, institutional); water source (surface water, groundwater) and current status (operational, stalled).

The quantitative information included pipe lengths and diameters, pump capacities, storage volumes, budget required for rehabilitation and current financial data such as quantities of water billed and actual current financial figures. The datasheet clearly indicated the dimensions to be used (cum; mm; km; 000KSh;) for each cell.

Assessment required the person filling the sheets to evaluate the physical status of the schemes; assess area covered by schemes; assess population within the area covered; assess the population served by the scheme; and assess the volume of water abstracted. It also required assessing volumes of water treated, stored and billed.

## 4.3 Verification

Counterchecking and verification was to be done by the District Water Officer. Few if any conducted any verification. None attempted to countercheck and few photocopied the datasheets for their records, mainly due to perceived budgetary constraints. One, however, did go to the field to assess the data in the forms. Each District Water Officer handled upward of 200 forms and due to the pressure from HQs to deliver the forms quickly they did not feel obliged to allocate time for verification. Therefore, most District Water Officers simply countersigned the datasheets without any counterchecking or verification and subsequently, sent the forms to HQs.

It is noteworthy, that one district did show initiative in establishing a methodology for counterchecking. The datasheets had been filled by four divisional water officers. Before handing these over to the District Water Officer they distributed the filled datasheets to each other for checking. Thus, each officer counterchecked the work of his peer. This was the only district that attempted any form of counterchecking.

Finally, it could be concluded that the role played by the District Water Officers was limited to no more than logistical coordination of work done in its entirety by the Divisional Water Officers.

## 4.4 Assessment of quality of data inputted

### 4.4.1 Identification and definition of schemes

Most of the data required for the basic identification and definition of the schemes was straightforward and readily accessible. Some difficulties encountered were schemes that had changed hands. For example schemes that had been initially established by communities, later operated by GoK and finally handed over once again to communities. Other difficulties were

rural community schemes that supplied water to institutions such as schools hospitals or factories. Another problem encountered was schemes that crossed district boundaries. For example during the visit to Lugari District it was found that they had prepared a datasheet for Little Nzoia water supply scheme. Similarly a datasheet was prepared for the same project in Uasin Gishu District.

Overall, the basic identification and definition of the schemes may be considered to be valid.

#### 4.4.2 Quantitative data

The quantitative data required by the datasheet included parameters that required:

- Actual measurement
- Conversion to dimensions required by the datasheet

Pipeline lengths, storage tank volumes are all physical parameters that may be measured in the field. Few divisional water officers, if any made actual physical measurements. Most physical quantitative parameters were guesstimated by looking at the object and estimating its size, or by asking the owners/operators what is the size. Very little if any confirmation was done by use of measuring tape or by pacing distances. Thus, most of the quantitative data included in the datasheets was included based on extremely flimsy sources (word of mouth, design reports) and most of this was not confirmed by the officers conducting the survey. Only two officers reported carrying a tape measure to the field.

Quantifying the volume of storage tanks may be used as an example. Most officers recorded the storage volume stated by the owner/operators of the schemes; others relied on their own experience to estimate storage volumes by "looking" at the tank; yet others "estimated" the diameter of the tank, and it's height to "calculate" the volume. Only, one officer confirmed storage tank volume by **measuring the perimeter of the storage tank, its' height and the wall thickness**. This simple procedure occupied the officer only briefly and did not add significantly to the time allotted for filling the forms.

One would have expected standard guidelines for handling of the quantitative data required in the datasheet and some training time allotted to this. Furthermore, the datasheet may contain cells for the basic measurements taken leaving the actual calculations to be completed later by the software. Thus, all data inputted would be objective and including less personal biases.

Data on pipe lengths was obtained mainly from the owner/operators. These gave the information in:

- Meters
- Kilometers
- Number of pipe sections

Before inputting the information to the datasheet the divisional officers were to convert it to kilometers. Many overlooked this and admitted that they inputted information that was off by orders of magnitude.

Similarly, storage volume may be given in litres, gallons, cum etc. The datasheets required data units to be cum and hence requiring conversion in some instances. However, this was not always done and consequently some school water supply schemes with a storage tank of 100,000 litres, was recorded without conversion. This is interpreted by the database to be a storage capacity of 100,000 cum resulting in gross distortion of the data.

Pump capacities were confused between gallon per minute, litres per second and cubic meters per hour. Other data requested was to be recorded in cubic meters per month. Most of the divisional water officers overlooked this requirement. The District Water Officers did not take any measures to assess the orders of magnitude to determine whether the data inputted, made sense nor did they guide their divisional water officers in the correct modes for conversion of units.

Recording the proposed investment in upgrading the water supply systems was to be in 000 KSh. Some officers overlooked this and recorded the information which they had collected in KSh. Thus the distortion in investments in some cases is by three orders of magnitude (!).

Note that the column heading in the datasheets keyed in is 0000KSh. This is even more confusing. Did the officers at HQs keying in the data divide all by ten or is there a mistake in the column heading?

### 4.4.3 Assessment

A major part of the exercise included assessment. However, most of the divisional water officers were not qualified and had not been trained in assessment practices and procedures. Also, there were no guidelines forthcoming to assist the divisional water officers in assessment methodologies to enable filling the cells that required assessment. Furthermore, the exercise was defined as “rapid” which did not enable effecting adequate assessment procedures. In fact, there may be a contradiction in terms between “rapid” and “assessment”. An assessment to be useful, should not be “rapid” and a “rapid” exercise could only collect basic data some of which may be used later for “assessment”.

The officers conducting the “rapid assessment” should therefore be commended on their attempts to assess the water supply schemes and to fill the prescribed cells. The interviews with the officers revealed that invariably they had difficulty in establishing the parameters that required assessment. Many different approaches evolved but most were unable to fill the cells and preferred to leave them blank, which was the best option.

In reviewing the datasheets it was found that the difficulties in assessment of the **total water abstracted** and the **population served** proved to be insurmountable. A total of 849 datasheets did not contain an assessment of the water abstracted and a total of 1189 datasheets did not contain an assessment of the population served. Furthermore an additional 572 datasheets contained assessment of the two factors which was obviously wrong (see analysis in chapter 3). Thus, 70% of the datasheets were unable to assess these two most basic parameters.

It may therefore be concluded that assessment could not be validated and the data contained in the assessment cells must be rejected.

# 5. Recommendations

## 5.1 General

Recommendations for accepting or rejecting the information contained in the datasheets differ for the three data categories:

- Identification and broad definition of the schemes
- Quantitative data describing physical/engineering parameters of the schemes
- Assessment of scheme parameters and status

**a) The data contained under identification and definition of the schemes may be accepted after some verification.**

**b) The data contained in the quantitative parameters describing the physical system on-the-ground may be accepted after further counterchecking by the District Water Officers. These must be held accountable for their signatures on the datasheets.**

**c) The data contained in the cells that required assessment must be rejected outright. The current data inputted is misleading and should be deleted from the database immediately.**

It is recommended that assessment be conducted as a separate exercise involving officers with higher qualifications but only after clear guidelines have been established for assessment methodology.

Therefore the "rapid assessment" should be renamed "rapid survey" as finally it shall not contain assessed data, only hard facts.

## 5.2 Detailed Recommendations

Detailed recommendations are as follows:

**Rapid survey – scheme identification and status**

1. Revise the datasheet to contain only the following queries:
   - Name of Scheme
   - Division
   - District
   - Province
   - Water board
   - Type of Scheme (rural, urban, institutional, combined rural-institutional)
   - Asset owner (public, private)
   - Contact person

- Institutional (public hospital, private hospital, public school, private school, coffee factory, prison, military, university campus, other)
- Status (operational, partially operational, stalled)
- Source of water (groundwater, surface water)
- Name of source or sources
- Abstraction/authorization/borehole number
- GPS readings (source)
- Mode of abstraction (gravity; pumped)
- Operating hours per day
- Treatment (yes; no)
- Date scheme became operational
- Age of scheme in years
- Date rehabilitation including provision for schemes that have undergone more than one rehabilitation
- For Community Water Supply - Number of currently registered members; Current number of members of community water supply paid last month (not applicable for institutions)
- For Urban Water Supply - Number of registered connections (metered, flat rate, kiosks); Amount of water billed last month; Total billing last month in KSh; Total collection last month in KSh.
- Signature
- Data Verified by

Cutoff point should be community schemes supplying water for more than 100 households or institutions supplying to more than 250 consumers.

2. Send rapid survey data sheets back to the District Water Officers to countercheck the data inputted, and to complete the missing data. The Officers must be sensitized to understand that they are accountable for the validity of data which they have reported. Furthermore they are to ensure that only one datasheet is presented per scheme.
3. Key in the corrected and completed data.
4. Establish new, separate databases (or provide functions for "filters" accordingly) to include all of the above listed columns as follows:
   - Urban water supply schemes (including institutions and sewage where applicable)
   - Community (rural) water supply schemes
   - Institutions water supply schemes
   - Privates schemes (largely boreholes) put up by private investors
   - Sewage collection, treatment and disposal schemes

**Rapid survey – quantitative data**

1. Design a supplementary datasheet based on the current datasheet and containing the following quantitative data describing the physical/engineering parameters of the schemes:

- Number of operational pumping sets
- Pump capacities (in cubic meters per hour)
- Raw water pipelines (length in kilometers; diameter in millimeters)
- Capacity of water treatment (in cubic meters per hour)
- Total current treated water output (in cubic meters per hour)
- Primary distribution pipelines over 100 mm (in kilometers and millimeters)
- Secondary distribution pipelines 50 mm – 100 mm (in kilometers and millimeters)
- Total storage capacity (in cubic meters)
- Assessment condition of water supply schemes: source works; raw water pipelines; treatment facilities; pumps and dosing pumps; electrical installations; primary distribution system; secondary distribution system; storage tanks; master meters; secondary distribution (good, fair, bad, obsolete)
- Assessment condition of sewage system: collection system; sewage treatment plant; mechanical installations – treatment; sewage pumping stations; electrical installations

2. Send data sheets back to the District Water Officers to re-establish the physical parameters of the schemes, to countercheck the data inputted, and to complete the missing data. The District Water Officers must be sensitized to appreciate and understand that they accountable for the validity of data which they have reported.
3. Key in the corrected and completed data to the newly established databases.

**Assessment**

1. Establish WSB based teams consisting of hydrologist, hydro-geologist, and water engineer to conduct the assessment. The assessment should include the following elements:
   - Verification of engineering parameters of the water supply system (length of pipes and diameters, volume of storage, pump capacities, treatment capacities, chemicals supplied)
   - Assessment of physical condition of the various elements of the water supply (source, raw water pipeline, treatment plant, pumps, electrical installations, distribution system, storage facilities)
   - Estimate technical performance of schemes - capacities and volumes (volume of raw water abstracted, volume of raw water treated, volume of water billed, area served by scheme, population of area served by scheme, population served by scheme; volume unaccounted for water)
   - Plans for extension of schemes already in motion (status, funded by, estimated costs, expected results
   - Financial performance (billing for current month; revenue collected for current month; breakdown of expenditures for current month)
2. The WSB based assessment teams should over a period of one year cover all the districts within the WSB. At each district they should be accompanied by the District Water Officer to verify the initial data collected and inputted in the Rapid Survey (above) and to complete assessment of the water supply and sewage schemes.

3. Following the completion of the Assessment of Water Services the information will be verified by the WSPO of each WSB before forwarding to Nairobi HQs for keying in to the national water database.
4. Finally the data assembled during the Rapid Survey and additional data assembled during Assessment should be audited by an independent consultant before inclusion in the database and releasing it for use.

The recommendations therefore suggest a re-run of the entire process again but in two clear steps:

1. Rapid Survey
2. Assessment.

Since most of the data under the first part (rapid survey and physical quantification) is already in the GIS database, it may be appropriate to delete/expunge all areas to do with the second part (assessment) from the database. This would be followed by a detailed verification of the remainder (comprising scheme identification, status and quantitative data) which would be achieved by sending the data back to the DWOs through the respective WSBs.

Assessment would be done as an entirely separate exercise putting to good use the database established following the completion of the rapid survey (scheme identification, status and quantitative data).

# ANNEX I: CHECK-LIST FOR FIELD INTERVIEWS

I. General

1) Were you trained in filling the data sheets
2) How many data sheets did you fill?
3) Describe the process of filling the data sheet
4) What sources did you use?
5) Did you visit the site?
6) Were you assisted by anyone in filling in the data sheet?
7) Which were the most difficult queries to answer?
8) How did you handle the difficult queries?
9) Was the training well done?

II. Water Supply

1) Did you visit the source of water?
2) How did you determine the permit number?
3) Did they have an annual abstraction permit?
4) How did you determine the technical parameters?
5) How did you determine pipe lengths?
6) Are you aware that lengths are in kms and diameters in mm?
7) How did you determine treatment volumes – output in cum/d?
8) How did you determine storage capacity?
9) Are you aware that dimensions are in cum?
10) How did you determine operating hours?
11) If operating hours change how was this reflected in the way you filled the data sheet?

III. Sewage

1) Are there any sewage schemes in your area?
2) If yes, how did you collect info for sewage?
3) Did you visit the sewage works? treatment plant?
4) How did you determine capacity of sewage plant?
5) Current inflow?

IV. Assessment condition of system

1) How did you assess condition of system?
2) Did you physically visit the various components of the system to determine condition?

V. Plans for expansion/rehabilitation

1) What is the source of information?
2) Were you aware that cost of expansion was to be listed in ‘000 KSh?

VI. Customer base (*note that this contains some of the most important queries*)

1) Who filled in the cell for district populations?
2) What sources were used for district population?
3) How did you estimate the area covered by the scheme?
4) How did you estimate the population within the area?
5) How did you estimate the population served?
6) Where did you verify the number of connections? metered? flat rate? kiosks?
7) How did you estimate the volume of water abstracted?
8) How did you estimate the volume of water treated?
9) How did you estimate the volume of water billed?
10) Were you aware that the dimensions are in cum per month?
11) How did you determine kgs of chemicals used? Were invoices made available?
12) If change of chemical quantities over time how did you capture this in the data sheet?

VII. Organization

1) What was the source of information about the number of workers?
2) How was the information verified?

VIII. Financial Performance

1) How was the data collected? verified?
2) Who does the monthly summaries?

IX. Signatures

1) Did you sign for someone else who collected the data? part of the data?
2) Did you verify data input by someone else?
3) How did you verify?

# ANNEX II: SUMMARY OF FIELD INTERVIEWS

**Interview with Eng. Oduori, DWO Lugalo District**. Little Nzoia water supply scheme was built in the 60s covering three districts and serving an estimated population of 150,000. The scheme has deteriorated and currently only 395 consumers in Lugalo District are served by the scheme. Nevertheless the datasheet reports 4409 consumers. The source and head-works are in Uasin Gishu District. The consumers are billed a flat rate of KSh200 per month. The total monthly billing was estimated by the DWO to be KSh 80,000 per month. Claims system has extremely high water losses although the datasheet claims only 13% losses (billing versus abstraction).

**Interview with B.K. Cheboswonyi, DWO Uasin Gishu District** Data collection was done during the rain season. He arrived at the district after the training had been completed. They were to visit upwards of 50-60 projects in six divisions and each division sent their divisional water officer for training. Tarbo division had only 10 projects. They did not make use of files or other data at the district water office but relied entirely on the data collected during interviews with the owner/operators of the water supply schemes. As he was new to the district he felt that he could not adequately countercheck the data inputted to the datasheets. Furthermore many sheets were prepared for self-help schemes that had no files. He therefore opted to countersign the datasheets without any checking or verification. He did contact the District Statistical Officer for information on the district population. He could not explain why Little Nzoia was submitted by both Uasin Gishu and Lugalo districts although it was clear that the system was being operated by the Lugalo water office.

**Interview with Kimanga Mutua, DWO Laikipia** He was trained in the Isiolo workshop plus 7 divisional water officers along with officers from Isiolo, Moyale and Marsabit. Training was inadequate missing GPS training. The GPS training came only three months later. Data collection and filling of datasheets started only after the budget presented at the Isiolo workshop was approved and funds had been given during another workshop held in November. The DWO allocated his four vehicles to the task. These were juggled amongst the 7 divisional water officers during November and December 2005. The entire exercise took three weeks. Very few of the schemes have any documentation. Everything was based on the knowledge at the Divisional level. There were no design reports or 'as-made' drawings. A total of 202 datasheets were prepared. Of these only one (Doldol Water Project) was a GoK project and the rest were private and institutional. He was unable to countercheck these as they were too many and there was pressure to send them to headquarters. Ol'Mosran were returned for corrections and filing in of missing information. Not all the divisional officers were conversant with filing the forms.

**Interview with Eng. Mureithi, DWO Meru Central District and Galole Kinthi, Deputy DWO** Many schemes were not visited or covered by the datasheets. Many are listed but there are many more active that are not listed. He is unable to assess the percent of schemes covered by the datasheets completed. The Water rights Section has over 1000 schemes listed for Meru Central however, only some 250 were assessed and datasheets were filled for these. He estimates that at least another 250 may qualify for inclusion. The datasheets were filled by ten divisional water officers. Each filled the datasheets for his own division. The exercise took one month. His

entire contribution was to countersign the datasheets without counterchecking or verification and to send them to Nairobi with a forwarding letter.

The interviews with the divisional water officers that had collected the data and filled the datasheets is presented in the following sheets.

# ANNEX III: PEOPLE MET

**GTZ**

1) Ralf Wegener, GTZ Water Sector Coordinator
2) Milgo Malequin, GTZ WSS Expert

**Lake Victoria North Water Service Board**

1) Diru Magomere, Chief Executive Officer, Lake Victoria North WSB
2) Bernard Wanyonyi, Water Services Provider Officer, Lake Victoria North WSB
3) B.K. Cheboswony, District Water Officer, Uasin Gishu District
4) Oyaro Kenyoru, Operation & Maintenance, North Nandi District
5) Agnes Kosgei, Divisional Water Officer, Kesses Division, Uasin Gishu District
6) Daniel Chebii, Senior Inspector Water O&M, Marakwet District
7) Julius Korir, Senior Inspector Water O&M, Marakwet District
8) Benson Kowala, Divisional Water Officer, Cherengani Division, Trans Nzoia District
9) Kephas Olwal, Divisional Water Officer, Kaptama Division, Mt Elgon District
10) Crescent Wandera, Divisional Water Officer Kanduyi Division, Bungoma District
11) Elam Imbogo, Divisional Water Officer, Nambale Division, Busia District
12) George Obiero, Divisional Water Officer, Navakholo Division, Kakamega District
13) Albert Kulunda, Divisional Water Officer, Shinyalu Division, Kakamega District

**Central Water Service Board**

1) Kibaki, Chief Executive Officer, Tana WSB
2) Irari, Tana WSB
3) Nyaga, Water Services Provider Officer, Tana WSB
4) Claudius Kareithi, Tana WSB DWO Nyeri District
5) Ms. J. W. Kihumba, Div. WO, Tetu-Thegenege Division, Nyeri District
6) DWO, Kirinyaga District
7) Mr. J. Ireri, Div. WO, Central Division, Kirinyaga District
8) Ms. Gladys Githaka, Deputy Div. WO, Central Division, Kirinyaga District
9) Muriethi, District Water Officer, Meru Central District
10) Muriithi, DWO Embu District

11) Ms. L. W. Maina, Div. WO, Central Division, Embu District
12) Ms. F. Githinji, Div. WO, Runyenjes Division, Embu District
13) Mr. Njogu, Div. WO, Kyeni Division, Embu District
14) DWO Siakago
15) Samwel Kamua, Inspector Ground Water, Mbeere District
16) Mr. Kathinja, Divisional Water Officer, Kahuro division, Muranga
17) Galole Kinthi, Deputy District Water Officer, Meru Central District
18) Julian Mbaya, Divisional Water Officer, Mwembe Division, Meru Central District
19) Martin Mwirigi, Divisional Water Officer Meru West Division, Meru South District
20) P.N. Mwai, District Water Officer Maragua District
21) Iruku, Divisional Water Officer, Kandara Division, Maragua District

**Northern Water Services Board**

1) Kimanga Mutua, District Water Officer, Laikipia District
2) Japhet Magiri, Divisional Water Officer, Central Division, Laikipia District

# ANNEX IV: ITENERARY OF FIELD TRIP

**Lake Victoria North WSB**

1. Kakamega District
2. Busia District
3. Bungoma District
4. Mt. Elgon District
5. Lugari District
6. Trans Nzoia District
7. Marakwet District
8. Uasin Gishu District
9. Nandi North District

**Tana Water Services Board**

10. Nyeri District
11. Kirinyaga District
12. Embu District
13. Mbeere District
14. Meru Central District
15. Meru South District
16. Muranga District
17. Maragua District

**Northern Water Services Board**

18. Laikipia District

# ANNEX V: DATA-SHEET FOR RAPID ASSESSMENT OF WATER SERVICES