Wallingford Software

WALLRUS VERSION 1.2 BETA TRIALS

D. M. Delaplace and A.J. Brown
Wallingford Software, Hydraulics Research

Presented at the WaPUG Autumn Meeting, Scarborough, November 1989

1. INTRODUCTION AND BACKGROUND

WALLRUS was launched in August 1988 as the international and enhanced replacement of MicroWASSP.   Improved runoff modelling, free surface backwater, spatially varying rainfall, and other new options for the micro user, soon made it attractive for MicroWASSP users to upgrade to WALLRUS.
However, early versions (1.0 August 88 and 1.1 January 89) contained some errors that had evaded the Wallingford Software testing programme. At the 1989 Spring meetings of WaPUG the suggestion was made that the more extensive testing planned for version 1.2 should be done with the participation of the WaPUG committee.   After an explanation of the testing procedure that Wallingford Software follow, this paper attempts to record the beta testing programme for WALLRUS 1.2, and ends with comments on our testing and release policy in the light of this experience.

2. THE TESTING PROCEDURE

In common with most software houses, Wallingford Software undertakes to test any of its new products in a structured fashion which has two main phases:

- **Alpha test** is the in-house testing, normally given to someone not directly involved with the development of the software;

- **Beta test** follows, whereby the software is offered to knowledgeable users who apply it under ordinary operational conditions.

While testing goes on, the software must be "frozen", i.e. no changes must be made to it.

2.1 Alpha Testing

All software developers hope that their product is error- or bug-free, and modern development techniques do allow for thorough testing of separate modules of any program. Nevertheless, the fact of life is that bugs get through.
The alpha testing phase is meant to catch as many of these remaining bugs as possible, by putting the **complete** package through the test.

The Testers
Alpha testers are normally unconnected to the development team lest they suffer from the blind spots people close to a major endeavour often suffer from. We thus try to involve at least two people, one a

2.2 Beta Testing

By this point, the software is assumed to be functional and sufficiently reliable to be handled by the intended users. However, Beta Testing differs from Alpha testing in that it aims to test the package "in anger", under normal day-to-day utilization, rather than test each detail of its operation. The aim of Beta testing is to try out the resilience and convenience of the product, as well as trap a few more "bugs".

The Testers
The main requirement of the Beta testers is that they should use the software for its purpose, i.e. as an engineering tool in real studies. Thus they should have a relevant project to apply the software to, within the duration of the test.
Ideally, they should also be sufficiently keen for the package and well-disposed towards us to accept a product half-way through its testing phase. For WALLRUS we turned to the WaPUG committee, and an number of other experienced MicroWASSP users. This was complemented by HR's own Urban Drainage Modelling section led by Richard Kellagher.

Duration
This a balance between the need to release the software as soon as possible, and allowing enough time to let the package be applied to as many situations as possible. Again, the complexity of the software is a factor. In the case of WALLRUS 1.2 we allowed one month but had to extend it to six weeks.

What the test covers
Unlike Alpha testing, there is no clear list of aspects to cover in the testing. The aim is merely to let the software be tried "in anger", for real. From this, we expect feedback on-
- **robustness**: an assessment of how well the software stands up to use under pressure;
- **reliability**: are the answers given by the software sound? Are the manual instructions correct?
- **user-friendliness**: a comment on how easy users find the package is to operate;
- **suitability**: are users satisfied that the software performs what they expect of it?

Review
The same review mechanism applies to the Beta test phase as to the Alpha test. Sections 4 and 5 present the main lines of the testing report for WALLRUS 1.2, whilst the logistics of organising the Beta trials is the subject of Section 3.

Summary of comments reported to Wallingford Software during the WALLRUS version 1.2 Beta test period.

1.Comment - The required extension for a Dry Weather Flow hydrograph file is not given in the manual.

Action - The manual was updated to include full information of Dry Weather Flow hydrograph files.

2.Comment - If a PCD file was used with the new data convert option included in WALLRUS the program failed unless the data records above the rainfall information were removed.

Action - The manual was amended to include information on deleting the data records above the rainfall information in the PCD file which is required before the files are run through the convert option.

3.Comment - There is no check on Rainfall Event data (RED) files.

Action - A check of Rainfall information will be included in version 1.3.

4.Comment - What is the file extension needed for input discharge hydrograph files, HYQ or QIN?

Action - Manual amended to stress the use of the QIN extension for input discharge hydrograph files.

5.Comment - When plotting results both the observed and predicted data have the description P.

Action - WALLRUS was amended to include the ability to label observed flows with an O. This information was also included in the new manual and a technical update sheet supplied with the release.

6.Comment - The Simulation option in WALLRUS can only run one event at any one time and cannot run multiple events.

Action - True. WALLRUS version 1.3 is being amended to allow batch operation. Also clarification of this feature was included in the technical update sheet.

7.Comment - A Warning message in Simulation Part 1 states that 49 additional manholes is too many.

Action - This is only a warning message. The maximum number of additional manholes allowed is the same as in WASSP 99. Information on this warning was supplied in the technical update sheet produced with the release of WALLRUS.

17.Comment - The use of the RAIN key in the Rainfall generator is unclear.

Action - Information on the correct use of the RAIN key was supplied as a technical update sheet to all users on release.

18.Comment - The RED file has no indication of the return period of the event being used other than the user defined title.

Action - It is planned to include this option in the next release of WALLRUS.

19.Comment - The graph plotting option truncates plots when the number of values to plot for each hydrograph exceeds 480.

Action - 480 values is the maximum number of values that can be plotted for each hydrograph at present. We are looking at ways of increasing this for the next release.

20.Comment - Each time Simulation Part 2 is run the gauge pipes need to be selected. This can prove to be tedious if a large system is being modelled.

Action - A method of saving the gauge pipes when they have been selected and then re-loaded on subsequent runs has been developed and will be included in the next release of WALLRUS.

21.Comment - Instabilities occur when using backwater flags, showing oscillation and heavy surcharge where none should exist.

Action - When backwater flags are being used the system being modelled must include some dry weather flow to stop the oscillations. If at least 2 or 3 1/s of dry weather flow is included at the top of each system then the problem is eliminated. Detailed information of this subject was included in the technical note supplied with the release of WALLRUS.

22.Comment - The user is unable to enter a 5 second timestep to the SSD file when using the Data Capture and Edit program.

Action - This problem was fixed for WALLRUS version 1.2.

23.Comment - The problem that existed with level bifurcations in version 1.1 have been cured.

24.Comment - The new Data Conversion option was widely regarded as being a significant addition to the package. Users found that it saved a great amount of time converting data and was easy to use.

25.Comment - Problems with the SCS model, limiting discharges, maximum water levels for pipes below datum and calculation of flow in trapezoidal channels that existed in version 1.1 have now been rectified.

4. CONCLUSIONS

The experience gained in organising the WALLRUS 1. Beta trials, and sifting through the findings, has been extremely valuable to us at Wallingford Software.

It is clear that the involvement of a relatively large number of testers means that confidence in the final released version is that much greater, even though a sizeable proportion of testers have yet to report to us. This advantage is offset by the administrative overhead of collating and synthesizing many reports. In this case the balance was about right, we believe.

The encouragement and involvement of the WaPUG committee has contributed decisively to the success of this Beta test, in that we immediately had experienced users who are as keen as we are to ensure that our urban drainage package is as reliable as possible.

Looking back at the launch of WALLRUS 1.0 and 1.1, it must be admitted that the alpha testing carried out at those stages was not successful enough to catch the irritating "bugs" that affected those releases. As a result we have tightened our procedures for testing to ensure that the steps outlined in Section 2 are followed more rigorously.

As far as continued software support is concerned, we have now introduced a standard form to facilitate communication between our user support team and the software support engineers. Briefly, any query concerning WALLRUS or any of our software is first received by the User Support desk. Any claim of software malfunction has to be thoroughly checked to ensure that data or user errors are not to blame.

If a suspected error is confirmed at that stage, the software support team are advised immediately and the "bug" is listed in a special book. Software Support enquiries centre on the source code, and when the bug has been discovered, an appropriate amendment (called a "patch") is carried out on the version of the software destined for the next release.

User Support's role is then to advise the user on ways of circumventing the problem, and if the error is likely to affect a significant number of other users, a specific Technical Note is then issued to all users.

Finally, we are now actively preparing the framework of thorough and formal quality assurance procedures that will operate right from the start of development of software. In due course we shall present these procedures in support of applications for certification of our software, by the British Standards and by European/International bodies.

2.3 **WALLRUS Beta trials - A. Brown - HRL**

D.R. Prebble - Shepway D.C.

if pipes have large numbers of intermediate manholes, when a model is heavily simplified, numerous warning messages appear in the print-out. Could they be suppressed?

Ans: Yes, but other users have said they want them in the print-out. We will look into making it optional.

R. Ashley - Dundee Institute of Technology

1. Is there any information on the degree of complexity of beta testers systems?
2. Has there been a change in the use of junction cards?

Ans: 1. We understand a number of systems were very complicated.
2. There has been no change from how junction cards are used in WASSP.

Nick Orman - WRc

There is a problem in WASSP-CHK - if an error message indicates that junction cards are listed the wrong way round, rest assured they are the right way round!

A.R. Eadon - Severn Trent Water

Much discussion has been undertaken by the WAPUG Committee regarding the actual input of measured area information into the SSD, particularly inputting impermeable areas directly instead of having to express them as percentages. Alternatively users might just want to input PIMP. Has this been taken up?

Ans: It is too fundamental a change for WALLRUS v 1.3 - we will include it in WALLRUS 2, a year/18 months away.

A.R.Eadon

(Addressing all delegates). It is up to you as users, if you feel strongly about this, let HRL and the WaPUG Committee know.

Dr. D. Balmforth - Sheffield City Polytechnic

Will WALLRUS 2 be written in a different language to improve speed?

Ans: No, we will probably stick with compiled Fortran.