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*Yard House, Basingstoke, RG21 7NX*

**Re: Seema Misra**

**Technical expert's report to the Court prepared by Charles Alastair  
McLachlan, a Director of Amsphere Consulting Ltd.**

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London EC3M 4BY  
England

*This report contains 42 pages*

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I have done the following to the report:

- a) Removed the embedded PDFs from the appendices since they made the doc too big for easy emailing
- b) Added comments as revisions (like this) throughout the document.
- c) Where the comment is highlighted in yellow (like this), then it is a comment on the content
- d) Where it is not highlighted, then it is an attempt to correct a typo.
- e) Where it is highlighted in cyan (like this) then it indicates some further analysis that I need to do.
- f) I've commented on the appendices as to whether or not they are referenced and their relevance. In particular there are some appendices that are much too big to be of any use in this form. It is only sensible to look at the underlying data using a tool such as Excel. I've also tried to indicate whether or not I accept or understand the derivation of the data in the appendices.

Further comments added in a different colour when comparing with the version sent on 7/10 which I don't have in Word.

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## **1 Introduction**

### **1.1 Background to the Horizon system**

1.1.1 Accounting systems are usually designed around a ‘double entry’ booking keeping principle. The double entry book keeping principle means that for every entry into the system there is an equal and opposite entry that should maintain the ‘balance’ between the accounts.

1.1.2 So, for example, if somebody at the till sells a stamp for £1 paid in cash then the stock account would be reduced by £1 value of stock and the cash on hand account would be increased by £1 – overall the balance between the accounts would be unchanged.

1.1.3 As part of the process of financial control, it would be normal for the value of stamps to be physically counted and recorded (stock value) and the value of cash on hand physically counted and recorded (cash value) and these two values compared (‘reconciled’) to what is recorded in the accounting system.

1.1.4 The sub post office uses specialised terminals to conduct business using the Horizon system. This activity is recorded in messages of two types – transaction messages and event messages. The messages are transmitted to and from the Horizon data centre managed by Fujitsu.

1.1.5 The Horizon system developed and managed by Fujitsu is integrated to a number of other systems controlled by Post Office Ltd (POL) and various 3<sup>rd</sup> parties (for example, the Driver Vehicle Licensing Agency (DVLA),



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merchants services providers for debit card services (such as Link no. Link is used for Banking which is different from a Debit card process) highlighted text now removed and E-Top Up for mobile phone credit). This full set of systems and the operational processes supporting them, I will refer to as **the Post Office Limited Operating Environment**

1.2 Hypothetical issues with the Horizon system

1.3 I'm concerned about such hypotheses being included in the introduction without any justification. I don't believe that the later part of the document does justify these and so having this here is planting a false impression on the reader.

1.4 New intro para added:

1.5 In order to properly consider the issues that could arise from a computer system such as the Horizon system in the context of the operation of a sub post office, there are three hypotheses which I will seek to test in my report.

1.5.1 The User Interface gives rise to incorrect data entry: poor user experience design and inadequately user experience testing can give rise to poor data entry quality. I would dispute that this is the case for Horizon. There was extensive work done to ensure that the User Interface was intuitive and easy to use. I accept that such terms are subjective though. In cases that users are working under pressure, insufficiently trained or are using a system presented in a language different from their first language the problems of data entry can be exacerbated.

1.5.2 The Horizon system fails to properly process transactions: accounting systems are usually carefully designed to ensure that accounts balance after each "double entry" transaction. Horizon is designed to do just that. In particular,

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a database technology referred to as ‘two-phase’ commit is used to ensure that either both entries or neither entry is recorded on the system. We do indeed use such technologies. However in a distributed environment with multiple systems it is not possible to handle all failure scenarios through 2-phase commit mechanisms. What has to be included in the design is what happens when the outcome of a 2-phase commit is indeterminate and Horizon’s design does that.

1.1.3 Having re-read this I can perhaps simplify my statement.

1.1.4 External systems across the wider Post Office Limited Operating Environment provide incorrect externally entered information to the Horizon accounts through system or operator error outside Horizon. Not quite sure what this is about.

1.1.5 New text added:

1.1.6 For example, incorrect transaction corrections are submitted from the central systems for acceptance by the sub post master.

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## 2 Summary of findings

### 2.1 Introduction

My findings are subject to certain limitations in the manner in which I was able to pursue my investigations and which may have impacted my ability to provide a complete picture.

#### 2.1.1 Reliance on Fujitsu

For my understanding of the Horizon system and the manner in which it is integrated into the full Post Office Limited Operating Environment, I am completely reliant on the information provided by Gareth Jenkins of Fujitsu. Gareth Jenkins has provided every possible assistance subject, however, at all times to the instructions of his employers and Post Office Ltd.

It should be noted that Fujitsu were originally contracted to design, build and operate the Horizon system and continue to manage and develop the system under contract to Post Office Ltd. In addition, I understand that Fujitsu have recently been awarded a contract by the Post Office Ltd to operate, manage and develop other systems in the Post Office Limited Operating Environment.

2.2 Although Gareth Jenkins was able to explain the various interfaces to Horizon vis-à-vis the Post Office Limited Operating Environment, he was not able to comment on its operation. Not sure what is meant here. I don't recall making such a statement. I certainly said that I can't comment on any system in the POL domain that are outside of Horizon and that my remit was purely to do with Horizon, so if that is what is meant then fine. See Appendix A Horizon Architecture Diagrams Provided by Gareth Jenkins of Fujitsu.

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2.3 This now reads:

- 2.4 Although Gareth Jenkins was able to explain the various interfaces to Horizon vis-à-vis the Post Office Limited Operating Environment, he was not able to comment on the POL domain outside Horizon and indeed his remit was purely with respect to Horizon. See Appendix A Horizon Architecture Diagrams Provided by Gareth Jenkins of Fujitsu.

#### 2.4.1 Independent investigation

The Post Office provided no opportunity for independent investigation of the operation of the Horizon system under test conditions or using video observation in a live environment.

The Post Office provided no opportunity to observe and review the training of sub post masters.

The Post Office provided no opportunity to examine the logs of defects, change requests and outstanding known issues for the Horizon system.

The Post Office provided no opportunity to understand and review the systems and processes in the Post Office Limited Operating Environment outside Horizon that could give rise to transactions in Horizon. In particular:

- It was not possible to examine the process for introducing Transaction Corrections that can give rise to changes in the cash that Horizon records at the branch. However there is a process by which a Branch can discuss Transaction Corrections and by accepting a Transaction Correction into the Branch accounts (which is when it may affect the Cash position) they are indicating that they accept the change as being required.
- It was not possible to examine the processes for Remittances (the movement of cash and stock) into and out of the branch that changes the cash and stock that Horizon records at the branch. What aspect of remittances are you



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concerned about? All remittances are processed at the Branch by the Branch users and so the financial effect is accepted by them. There is no need to understand the external mechanisms associated with remittances to see what is happening in the Branch accounts.

- It was not possible to examine the processes for revaluing foreign currency which could change the value of cash held at the branch. Revaluation of currency doesn't affect the cash position. It purely affects the notional value of the Foreign Currency as it is reported in the accounts, but has no impact on the Cash (sterling) position. It's only impact might be on the liability of the postmaster for any currency that is subsequently lost (which would need to be repaid at the current value). Not that revaluation can be positive or negative.
- It was not possible to examine the processes of reconciliation conducted by the Post Office that could give rise to Transaction Corrections. As stated earlier this is not really relevant since any Transaction Corrections will have been accepted by the User into the Branch accounts and should not be accepted if not understood. Accepting a Transaction Correction implicitly means taking responsibility for that in accounting terms.

#### 2.4.2 Opportunities for reconciliation

In the normal process of investigating the consistent operation of a system, I would expect to examine the end to end trail of paper vouchers, transaction files, log files and other electronic records across the Post Office Limited Operating Environment.

The Horizon system has been designed to operate as an accounting system and therefore is designed to ensure that for every set of credits there is a matching set of debits. In the set of transaction files I have been provided this design constraint is

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met. However, the only way to determine whether it is the correct set of credits or debts is to reconcile the Horizon transaction with externally held records. In a typical banking environment this would typically be a set of paper vouchers (debit slips, paying in slips, cheques, etc.) recorded at the counter as the transaction was conducted. These vouchers may be hand written or may be printed out at the counter terminal. The cashier can then ensure that their till is balanced at the end of the shift and, if for example a cheque has been entered for the wrong value, deal with the matter immediately.

Unfortunately, the Horizon system has not been designed to automatically provide these vouchers and it does not appear that Post Office counter staffs are trained to ensure they retain them. It has not been possible, therefore, to reconcile the Horizon branch records to the actual transaction undertaken over the counter in the branch. It was not a requirement for Horizon to produce such vouchers and in fact there were specific requirements from POL regarding transaction times that preclude printing such records. My experience as a user of Retail systems (such as supermarkets) is that such vouchers are not normally generated there either.

## 2.5 Problems of data entry at sub post office.

### 2.5.1 Incorrectly calibrated touch screen

The Horizon system provides a touch screen for data entry. If when you 'touch' the screen the screen does not respond properly it may be because the screen has not properly calibrated the position of the 'touch' to the representation of the button on the screen. The logs provided by Dunks show that Misra asked for guidance on how to re-calibrate the screen on at least one occasion.

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If this gave rise to incorrect entry of cash amounts then this would explain discrepancies. The Horizon system does not record the recalibration of the touch screen as a system event so it is not possible to identify how frequently individual screens were re-calibrated. I'm not quite sure how a misaligned touch screen would result in discrepancies. I accept that buttons activated may not be those actually selected, but I'm not sure under what circumstances this would result in a financial discrepancy.

The Horizon system does not automatically provide a voucher (i.e. a printed slip) to be retained at the counter for every transaction so it is not easy for the cashier to identify such data entry errors either immediately on entry or when seeking to balance the till at the end of the day.

The Post Office have not provided us with an opportunity to record the use of a system in a sub post office experiencing problems.

For all of these reasons it has not been possible to assess the impact of poor screen calibration on data entry.

#### 2.5.2 Poor User Interface Design

Poor user interface design can contribute to poor data entry quality and user errors.

I don't believe there is any reason to say that the UI for Horizon is poor. All this is saying is that POL have not allowed a review of the UI.

The Post Office have not provided us with an opportunity to conduct a user interface design audit or record the use of a system in a sub post office experiencing problems.

#### 2.5.3 Use of the FASTCASH button

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One of the features of the Horizon branch terminals is that it is possible to complete a transaction by use of the 'Fast Cash' button. When the 'Fast Cash' button is pressed, the value of the basket of items being transacted is added up and then any payment by debit card, cheque or whatever is accounted for. The outstanding balance is automatically calculated and treated as an over the counter cash payment and then 'clears the basket' (i.e. completes the transaction and makes the terminal ready for the next transaction).

It was anticipated that counter staff would use the 'Fast Cash' button as a matter of habit on every transaction in order to clear the basket. The Horizon system does not log whether the basket is cleared using the 'Fast Cash' button or some other method.

Both Jenkins and myself recognised that there could be circumstances in which a debit card transaction was not authorised but (either because the printer was not working or because of force of habit) the counter still cleared the basket using the 'Fast Cash' button. The result would be that the Horizon system recorded the receipt of an amount of cash over the counter covering the whole outstanding balance. I accept that this is possible. However my analysis of all the significant Debit Card transactions that were either declined or failed shows that this scenario did not occur.

The effect of this would be to create a cash discrepancy (shortfall) in the till.

I have identified a number of transactions for which the 'Fast Cash' button could have given rise to such a discrepancy (see Appendix B and items in *italics* in the highlighted sections). Ref changed to App I

The total value of these transactions is £7,544.09. I have considered Jenkins report (see Appendix B) and believe that he may have overlooked the transaction of £7,000 on 11-Jan-07 at the bottom of Page 5 of the document 'Transactions Associated With Rejected Cards' in Appendix I for which I was unable to find a reversal. I've



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checked this one out again. In that case the transaction was paid for by Cheque (ie case 1 in my email) and not cash and so the user must have been aware that the Debit Card transaction had failed in order to ask for a cheque. Even supposing the Cheque button was pressed in error for Fast cash, then there would have been a discrepancy in the value of cheques and there is no evidence of such discrepancies.

Irrespective of the facts in relation to the transaction of £7,000, in my opinion the relevance of the 'Fast Cash' button in this matter is:

- the 'Fast Cash' button is demonstrated to be a source of data entry error (the reversals confirm this). I don't agree with that. On what grounds do you say that? The fact that there are reversals is due to the fact that some transactions cannot be abandoned and need to be settled and reversed. This was a specific requirement on Horizon from Post Office Ltd.
- the specific circumstances relating to rejected card transactions give rise to a relatively small value of possible discrepancies during the 13 month period for which records have been provided compared to the total discrepancy found in the audit.
- there may be other circumstances in which the use of the 'Fast Cash' button gives rise to discrepancies which have not been identified or investigated because I was unable to record the live operation of the use of the Horizon system in a sub post office.

#### 2.5.4 Insufficient training

The activities of a sub post office more properly correspond to those of a retail bank branch rather than a retailer of stamps and postal services. (A cursory review of Appendix H shows a transaction throughput of £48m recorded in the Horizon

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transaction logs in a 13 month period for example). The Post Office were unable to provide a definitive set of training materials, learning goals and competence assessments which would make it possible to understand the extent to which Misra was adequately trained and properly understood how to conduct the operations of a sub post office.

However, an examination of the transaction and event logs provided by Fujitsu from 1 Dec 06 – 31 Dec 07 shows that:

- The Declared Branch position had discrepancies vis-à-vis the Horizon totals at the end of almost every period.
- The Variance Checks conducted to reconcile the branch position vis-à-vis Horizon showed a discrepancy on the vast majority of occasions ranging from 18 pence to more than £11,000.

Such a consistent and pervasive failure to ensure that the tills balanced on a daily basis can be explained by:

- a) Theft and/or fraud that the Post Office failed to investigate for at least 13 months
- b) Inability of individual branch counter staff to operate properly
- c) Inability of the sub post mistress to train/manage staff and/or conduct end of day processes.
- d) Persistent system failure
- e) I would suggest that small discrepancies are to be expected in such an environment due to mistakes in giving change etc. My understanding is that Post Office investigators expect such small discrepancies in normal operation.

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I have not been able to conduct the kind of investigation which would exclude persistent system failure.

## 2.6 Problems with Horizon

### 2.6.1 The Calendar Square, Falkirk Problem

Jenkins provides a summary of the problem first identified in proceedings relating to a sub post office in Calendar Square, Falkirk. (see Appendix C). Unfortunately, as Jenkins acknowledges, we have not been provided the transactions for the period prior to March 2006 when we may have been able to independently determine whether this was an issue for West Byfleet between 30/06/2005 and the bug fix to Horizon provided in March 2006. Jenkins confirms that the implementation of the Horizon system at West Byfleet, where each counter terminal is managed as a separate “stock unit” rather than all the terminals being pooled, is precisely the circumstances which could give rise to the ‘Calendar Square’ problem. The focus on the investigation has been on the losses in the 13 month period from Dec 2006 to Dec 2007 and so this hypothesis is an irrelevance.

As far as the Calendar Square problem applies in relation to West Byfleet, in my opinion:

- It demonstrates that there have been faults with the Horizon system which give rise to discrepancies that can cause losses. It is not reasonable to exclude the possibility of system problems when considering a case such as Misra. I dispute that. It was clear from the Events generated at the time in Calendar Square that there was a problem. No such events have been seen in West Byfleet in the period in question and so cannot be responsible for the losses in that period.

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- I am unable to determine whether the Calendar Square problem contributed to the discrepancies at West Byfleet because the Post Office have not provided the relevant transactions and event logs.

#### 2.6.2 The travellers cheque stock problem

The Horizon system is used to record the stock of travellers cheques held by the sub post office and account for the transactions when they are sold or encashed. In one of my branch visits I was shown a sequence of actions that demonstrated how the Horizon system reported on the stock of travellers cheques in a manner that was completely confusing and misleading.

Take the example of 10 travellers cheques of value USD 100 at the beginning of the day. If you run a stock report it will show 10 x USD TC 100 which corresponds to a value of USD 1,000. This is incorrect. The stock report will show that a stock of 1000 USD Travellers Cheques are held. The stock report doesn't distinguish between the denominations of the Travellers Cheques.

A customer comes in and purchases one travellers cheque at USD100 and pays for it using a debit card. This will be reflected as selling 100 USD Travellers Cheques.

If you then run a stock report it will show -90 x USD TC 100 which corresponds to a value of USD -9,000. This is incorrect. A Stock report at this point will show 900 USD Travellers Cheques held.

In other words, the report has treated deducted the USD 100 from the travellers cheque item count of 10 to get -90. Clearly you can't hold a negative stock of a physical item such as a travellers cheque so the report is both meaningless and completely misleading.

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I discussed this with Jenkins and he acknowledge that this is a known feature of Horizon and that the Post Office have not instructed Fujitsu to change the system to produce a meaningful stock report. I am not aware of having discussed this issue at all with Charles. A scenario similar to this appears in the report that Charles produced associated with a separate case (Rinkfield) and as a result of that I did some experiments on Horizon and refuted the scenario described (as I have done above). I have passed a report on that to POL, but not discussed it with Charles. I'm not aware of any issue with Travellers Cheques, but do accept that in some cases the info may be slightly misleading but it is not as blatantly incorrect as described above. Jenkins assured me that the Horizon system properly accounted for the travellers cheques in the end of day process but I had no opportunity to test whether this was true.

In my opinion, this stock report could give rise to counter staff or sub post masters seeking to correct the perceived problem through manual adjustments leading to real discrepancies. Given the above, then this is irrelevant.

## 2.7 System problems from beyond Horizon

### 2.7.1 Transaction Corrections

The Post Office Limited Operating Environment encompasses a large number of systems that use outputs from the Horizon system to conduct other processes to support Post Office operations. It is from these systems that Transaction Corrections arise.

Consider this hypothetical example by way of illustration:

At the Post Office counter a cheque was encashed for £50 and a cash payment to a customer of £50 was recorded on the system. However, as a result of the clearing



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process and various reconciliation processes, the face value for the cheque is identified as £5. This gives rise to a cash discrepancy of £45 which the branch would be expected to make up. A Transaction Correction would be issued to the branch for them to acknowledge and the branch accounts would be updated.

Both myself and Jenkins considered whether Transaction Corrections could be a source of the branch discrepancies. Jenkins limited his examination to Transaction Corrections to credit/debit card and banking transactions and identified relevant Transaction Corrections to the value of £1,840 (Appendix G). I have take a slightly wider scope of transactions of interest which have a total absolute value of £ - 19,257.21 and absolute value of £ 82,918.35 (Appendix J). I'll look at that in more detail. I've not had time to do that yet. Note that I did not limit my examination as described, but I do accept that I ignored requests for Evidence.

Jenkins acknowledges in his e-mail that he is unable to comment on the integrity of the processes used by Post Office Limited to create Transaction Corrections or the operating processes used to generate them. Agreed.

Unfortunately, the Post Office failed to make anybody available to discuss the operation of the Post Office Limited Operating Environment and the reconciliations, error rates, controls and internal audit processes used to ensure integrity.

In my opinion, the value of the Transaction Corrections identified by Jenkins or the transactions of interest identified by myself is not the issue. What is clear is that Transaction Corrections are generated from outside Horizon. We have no evidence as to whether or not:

- a) The Transaction Corrections are of the correct value
- b) Some Transaction Corrections should be applied at all

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c) Some Transaction Corrections are omitted

The Post Office seek to address concerns (a) and (b) by providing the sub post master with an opportunity to 'request evidence' (i.e. challenge) a Transaction Correction. There is no record of Misra requesting evidence in the transactions provided between 1 Dec 06 and 31 Dec 07. I'll re-check this. See also earlier comments on this. Note that I have found some Requests for Evidence (ie challenges), but need to do some further analysis to come up with a complete list.

Highlighted bit replaced by:

In fact the sub post master is required to explicitly 'accept' the Transaction Correction in order for it to be applied to the branch accounts. The Post Office seek to address concerns (a) and (b) by providing the sub post master with an opportunity to 'request evidence' (i.e. challenge) a Transaction Correction. In my analysis I was unable to find evidence that Misra did 'request evidence' in the transactions provided between 1 Dec 06 and 31 Dec 07 although I understand from Jenkins that there are some such requests during her tenure at West Byfleet.

However, as discussed above, the Horizon system does not automatically provide the paper vouchers that would support a dispute over a transaction at the branch.

Further, this process does not address the possibility (c) that some necessary Transaction Corrections are omitted.

Jenkins appears to assume that the limited value of the Transaction Corrections he has identified means that they cannot explain the discrepancy in the Misra case. He overlooks the possibilities that:

- The values are incorrect
- There are missing Transaction Corrections which would reduce the cash balance expected by the Horizon system (i.e. be in favour of Misra).

I accept that this is possible and so POL need to address this point.

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In my opinion, we have insufficient evidence to exclude incorrect or missing Transaction Corrections as a contributing factor to the discrepancies in the Misra case.

#### 2.7.2 Remittances

The systems supporting the movement of cash and stock to and from the sub post office are integrated into Horizon through Remittance transactions (colloquially referred to as Rems). There is no suggestion in this case that there were problems with the operation of the Remittance system. However, it should be noted that I am currently instructed in other cases in which the defendant suggests that the system gives rise to incorrect cash balances being recorded on the branch system. The Post Office have not, at this stage, provided me with an opportunity to investigate these claims. **In what way is this relevant?**

New Para:

Again the Post Office requires the sub post master to 'accept' remittances through scanning pouch labels and acknowledging the affirming the count of the contents of the pouches.

It is worth noting that Jenkins has analysed the transactions and identified a pattern or remittance transactions which is consistent with Misra's statement that she declared cash held in remittance pouches in the safe which was not actually present.

**Isn't this an indication of guilt?**

Following now has a title "Reproducing the problems"

2.7.3 If the potential source of the incorrect transaction processing can be identified then it would be helpful to be able to reproduce the problems under controlled test conditions in a consistent and reproducible manner. This would require



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the assistance of Fujitsu in providing access to the test environments maintained in support of the Horizon system.

2.1.4 What incorrect transaction processing is referred to here?

2.1.5 Note that the Horizon system has now been replaced by the HNG-X system and Horizon is in the process of being decommissioned and so there are no longer any Horizon test systems.

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### 3 Conclusions

- 3.1 It is evident that trial balances (Variance Checks) and period balances (Branch declarations) showed a continuous pattern of discrepancies through out the period for which transactions were provided. It appears that no action was taken by the Post Office to investigate these discrepancies or to ensure that Misra was competent to prevent them from arising. Instead, Misra removed an employee under suspicion of theft and implemented independent stock units for each counter. Neither action appears to have resolved the issue. I don't believe that all the detailed information upon which this observation is based is visible to POL and so they are unable to monitor such things. My understanding is that it is the sub-postmaster's responsibility to do such monitoring.
- 3.2 The possibility that problems with screen calibration and the use of the 'fast cash' button contributed to the discrepancies at West Byfleet has not been excluded by the investigations of Jenkins and myself. However, it is difficult to demonstrate that they are of a magnitude to explain the full amount of the discrepancy. I don't believe that these are relevant, but can't 100% rule them out. As stated they certainly don't account for the full extent of losses.
- 3.3 The Horizon system has had problems in the past as acknowledged by Jenkins in relation to Calendar Square. Unfortunately, the Post Office has not provided us with the opportunity to independently assess the possible impact on West Byfleet nor have they provided a list of known defects in Horizon. The 'travellers cheque' problem is an illustration of the known defects we independently identified but Jenkins confirmed that Fujitsu maintain a full list which has not been released. I dispute the Travellers Cheque "issue" as indicated previously.

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3.4 The Horizon system is a component of the full Post Office Operating Environment. Other elements of this environment can result in changes to the cash balances recorded at the branch. Both Transaction Corrections and Remittances will act in this way. Jenkins was unable to provide any opinion as to the integrity of these systems and I was provided with no opportunity to investigate them. The Post Office has provided no evidence as the integrity of these systems and the processes used to manage them. I would say that any faults in these systems are irrelevant to the Branch accounts and hence the losses.

3.5 New Section Added:

## **4 Points of difference between Charles McLachlan and Gareth Jenkins**

### **4.1 Introduction**

3.6 I submitted my draft report to Gareth Jenkins, the expert from Fujitsu instructed by the Post Office for his review on 1<sup>st</sup> October 2010. We then had an opportunity to discuss points of fact and opinion over the phone. Jenkins was able to advise me of some errors of fact based on his extensive understanding of the Horizon system which I have not sought to dispute and I have incorporated corrections arising from these errors into this final report. Jenkins also indicated some areas where he held a different opinion and this section seeks to set out explicitly where our opinions differ side by side. I am relying on his annotations to my draft report to faithfully represent his position for the convenience of the court. I apologise if, any of the individuals items I have inadvertently misrepresented him or omitted comments of importance.

3.7 4.2 In relation to 2.2.1 Transaction Corrections, Jenkins is of the view that because the Sub Post Master accepts the Transaction Corrections and has an opportunity to raise issues for correction this is not relevant to the case. In my view, if Transaction Corrections are incorrect or omitted then it is necessary for the Sub Post Master to be able to have the evidence and training to contest them. The fact that there is a process for Transaction Corrections means that data entry errors are recognised as occurring. The Horizon system does not automatically provide the evidence (in the form of vouchers) to enable the Sub Post Master to easily raise or contest Transaction Corrections. Nor have the Post Office provided evidence that demonstrates that the training of Misra equipped her to deal with Transaction Corrections effectively.

4.3 In relation to 2.2.1 Remittances, Jenkins is of the view that because the Sub Post Master accepts the Remittances and has an opportunity to raise issues for correction this is not relevant to the case. In my view, there is testimony from other Sub Post

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Masters that the end to end Remittance process introduces incorrect data into Horizon, and, because I have had no opportunity to investigate this, I am unable to exclude this as a source of problems at West Byfleet..

4.4 In relation to 2.2.1 'revaluing foreign currency', Jenkins advises that this will not affect the cash position in the Horizon and therefore this is not relevant to the case. His explanation is compelling and I am happy to accept that this is not an issue at West Byfleet despite being unable to make an independent examination.

- 3.8 4.5 In relation to 2.2.1 'processes of reconciliation', the difference of opinion at 4.2 applies.

4.6 In relation to 2.2.2 'vouchers' Jenkins notes that the automatic production of vouchers was never a requirement for Horizon and in fact the requirement for transaction times specifically precluded printing such records. He also points out that in a retail environment (e.g. supermarket) such vouchers are not generated either. In my opinion, the volume and type of transactions at the sub post office counter, is more closely comparable to a retail bank counter where such vouchers are part of the controls operating at each till.

4.7 In relation to 2.3.1 incorrectly calibration of touch screens, Jenkins states: "I accept that buttons activated may not be those actually selected but I'm not sure under what circumstances this would result in a financial discrepancy". In my opinion, there is a possibility that the wrong numeric value was recorded or the wrong product type. Clearly recording an incorrect numeric value could immediately give rise to a financial discrepancy if the cash taken over the counter was different from the amount recorded on the system.

- 3.9 4.8 In relation to 2.3.2 'poor user interface design', Jenkins states "I don't believe there is any reason to say that the UI for Horizon is poor. All this is saying is that Post Office Ltd has not allowed a review of the UI". In discussion, Jenkins also referred to his understanding that the UI was tested as part of the original development process and that usability is a matter of opinion. In my opinion, the fact that there is a Transaction Correction process suggests that there are problems with data entry and in my experience these arise from poor training or poor user interface design. The usability of User Interfaces can be stringently assessed against a number of well established, research based criteria and also testing in user trials. Usability is not just 'a matter of opinion', but rather a matter of expert opinion derived from such assessment and trials.

- 3.10 4.9 In relation to 2.3.3 'FASTCASH button', Jenkins accepts that the 'Fast Cash' button could give rise to the error that I have identified. However, he states that his analysis of all Debit Card transactions over £1,000 fails to identify any scenario in which the 'Fast Cash' button could have given rise to a discrepancy. Jenkins has now reviewed the transaction for £7,000 that I suggested he may have overlooked and he has identified that it was paid for by Cheque and asserts that the user must have been aware that the Debit Card transaction

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failed in order to ask for a cheque. He suggests that even supposing the Cheque button was pressed in error for Fast cash, then there would have been a discrepancy in the value of cheques and there is no evidence of such discrepancies. I have not had an opportunity to full explore the implications of Jenkins statement about the pressing of the Cheque button in error. I have not been able to examine the user interface and identify how easy it would be to make this data entry error. However, I would assume that discrepancies in the value of cheques would need to be picked up by the Transaction Correction process, which, as I have already explained, neither Jenkins nor myself can offer any assurance on.

- 3.11 4.10 In relation to 2.3.4 ‘insufficient training’, Jenkins suggests that small discrepancies are to be expected in such an environment due to mistakes in giving change etc. He states his understanding that Post Office investigators expect such small discrepancies in normal operation. I accept Jenkins view in relation to ‘small discrepancies’. It appears to me that the frequency and magnitude of the discrepancies far exceeds a layman’s view of ‘small discrepancies’. I have asked Jeffrey Davidson, Forensic Accountant at Horwarth Clark Whitehill, to specifically comment on this matter.

4.11 In relation to 2.4.1 ‘the Calendar Square, Falkirk Problem’, Jenkins specifically disputes my statement “It demonstrates that there have been faults with the Horizon system which give rise to discrepancies that can cause losses. It is not reasonable to exclude the possibility of system problems when considering a case such as Misra” as follows “I dispute that. It was clear from the Events generated at the time in Calendar Square that there was a problem. No such events have been seen in West Byfleet in the period in question and so cannot be responsible for the losses in that period.” In my opinion, it is vitally important to have established that the Horizon system can give rise to faults that cause discrepancies in the Branch Accounts. The position of the Post Office investigator that I interviewed at West Byfleet was that they did not, as a matter of policy, consider system problems as a possible explanation for discrepancies. With the very limited opportunity for independent investigation and the reliance on Fujitsu for all disclosure, I would re-iterate my opinion that “it is not reasonable to exclude the possibility of system problems when considering a case such as Misra”.

- 3.12 4.12 In relation to 2.4.2 ‘the travellers cheque stock problem’ Jenkins states: “I am not aware of having discussed this issue at all with Charles. A scenario similar to this appears in the report that Charles produced associated with a separate case (Rinkfield) and as a result of that I did some experiments on Horizon and refuted the scenario described. I have passed a report on that to POL, but not discussed it with Charles. I’m not aware of any issue with Travellers Cheques, but do accept that in some cases the info may be slightly misleading but it is not as blatantly incorrect as described above.” Jenkins has kindly provided me with this report and the relevant section is at 3.1 (1) in the document which I have attached at Appendix M Rinkfield report. This describes fully Jenkins understanding of how Travellers Cheques are handled by Horizon.

3.13



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4.13 In relation to 2.5.1 Transaction Corrections, Jenkins has agreed to look at the wider scope of transactions that I examined and also to check for "Requests for Evidence" in the records to provide a complete list.

- 3.14 4.14 In relation to 2.5.3 'reproducing the problems', Jenkins states: "the Horizon system has now been replaced by the HNG-X system and Horizon is in the process of being decommissioned and so there are no longer any Horizon test systems". My understanding is that this was not the case when I submitted my first preliminary report establishing the requirements for disclosure from the Post Office.

4.15 In relation to 3.1 'variance check', Jenkins states "I don't believe that all the detailed information upon which this observation is based is visible to Post Office Limited and so they are unable to monitor such things. My understanding is that it is the sub-postmaster's responsibility to do such monitoring." My understanding from Jenkins is that all Horizon data is passed to the Post Office central systems and to their data warehouse. In principle, therefore, this information would be available to the Post Office should they choose to report on it. Certainly the information is collected by the Horizon system as per the specification of Post Office Limited. As I have stated before, I do not believe that the Horizon system adequately provides the vouchers that support an effective reconciliation on a daily basis that will enable the sub post master to monitor such things Misra has admitted that she was well aware of the discrepancies.

4.16 In relation to 3.2 Screen Calibration I believe that we concur: Jenkins states "I don't believe that these are relevant, but can't 100% rule them out. As stated they certainly don't account for the full extent of losses."

- 3.15 4.17 In relation to 3.3 'the travellers cheque problem' Jenkins re-iterates: "I dispute the Travellers Cheque "issue" as indicated previously."

4.18 In relation to 3.4 'the full Post Office Operating Environment' Jenkins states: "I would say that any faults in these systems are irrelevant to the Branch accounts and hence the losses." In my opinion, this position is only sustainable if:

- a) Every necessary, externally introduced transaction (i.e. Transaction Corrections and Remittances) is correctly entered. OR
- 3.16 b) The sub post master has the training and capability to challenge and resolve missing or incorrectly introduced transactions. The fact that Horizon provides the opportunity for the sub post master to 'request evidence' in relation to transaction corrections and that I have interviewed other sub post masters that have identified and have had withdrawn transaction corrections suggests that a) is the case. In my opinion, the lack of consistent printing of vouchers from Horizon also means that b) is not the case. The evidence relating to Misra's training is complete.

3.17

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## **4 Terms of Reference**

### **4.1 Instructions**

4.1.1 I am Charles Alastair McLachlan, a Director of Amsphere Consulting Limited. London, England specialising in information technology consulting. I have been instructed in this matter by Coomber Rich Solicitors, on behalf of their client, Seema Misra, (“the Defendant”) to assist the court in this matter of alleged fraudulent accounting in providing expert evidence on the matters posed at 1.1.3 (4.1.3?) hereunder.

4.1.2 The allegations arose from the discrepancy between the transactions as recorded in the Horizon system provided by Post Office Counters Ltd through a service agreement with Fujitsu and the cash on hand at the defendant’s Post Office branch.

4.1.3 I was instructed to consider:

- a. The defendant’s claim that the discrepancy was due to defects in the Horizon system?

### **4.2 Qualifications**

4.2.1 I have been working in the software industry since my first job at the age of 17 writing software analysing the results from a particle accelerator for the UK Atomic Energy Authority

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4.2.2 I obtained an M.A in Computer Science from Cambridge University matriculating in 1979.

4.2.3 I developed software for environmental control systems for a company on the Cambridge Science Park while at university.

4.2.4 I was retained by Cambridge University to do undergraduate teaching for three years.

4.2.5 After University, I worked for the company of the Emeritus Professor of Computer Science at Imperial College (and founder of IBM UK Hursley Laboratories), developing PC multi-tasking office automation software. As the company transitioned to IT consulting, I advised HP on their Unix Strategy and looked at the potential for hosting Inmos parallel processors in PC environments. I also built an extensive financial performance analysis system for the Building Society industry.

4.2.6 In 1987, I become the founding partner of CMJP Associates which delivered software development services to a wide range of clients using PC and Client-Server technologies.

4.2.7 A number of these projects included the development of accounting modules and work for the financial services industry including SG Warburg, GNI (of the London International Financial Futures Exchange LIFFE).

4.2.8 In 1991 I established a partnership for CMJP Associates to provide expert advice to the Client Server Centre of Excellence.



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- 4.2.9 In July 1993 I became the founding Technical Director of Infonet Systems. Infonet Systems focused on building leading edge object oriented Client-Server solutions. Its first success was the delivery of a complete front office trading platform of financial derivatives (repos and bonds) in four weeks. This was the first NT based client server trading desk in the City of London. While at Infonet, I developed the Object Oriented Just In Time software development methodology.
- 4.2.10 In December 1996, I was recruited by the European headquarters of emerging internet service provider UUNet (shortly to become part of MCI Worldcom), to advise on IP billing and customer provisioning systems. A key element of the assignment was to undertake a critical review of the implementation and customisation of the GEAC Smartstream ERP solution by Arthur Andersen Business Consulting.
- 4.2.11 In August 1997 I was recruited by Arthur Andersen Business Consulting to provide technology leadership for the new Advanced Technology division. Over the next five years, I became the international thought leader in the building of software related services that underpinned the development of Andersen's New Media and eBusiness practice. This was recognised by election to partnership in 2000.
- 4.2.12 Early identification of the crucial role for **Java** technologies and '**just in time**' business and technology development methods, positioned the emerging Business Consulting (BC) division for rapid growth on the Internet wave to become 9th globally by Q3 2001. Achievements during this period cover:

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4.2.13 *Major systems delivery projects* The software development related service revenues were the **fastest growing** area of the fastest growing global consulting organization between 1997 and 2002. My team delivered marquee projects for key clients including: launch of **Sky.com**, **TimeOut.com**, **myTravel.com**, **Cendant's** Move.co.uk, pan-European systems for **Budget-Rent-a-Car**. I was also engaged as a technical delivery expert for major new systems types including on-line trading exchanges, high throughput customer services systems, on-line transaction processing systems and content management systems.

4.2.14 *Solution Development:* I provided technology leadership for the development of key **global solutions** for BC including: eStrategy, **eBusiness**, Content Management, Experience Design, Component Based Development, **Business Architecture**, Enterprise Integration, Datawarehouse, Technical Architecture, **Active Intelligence™**, Anti-Money Laundering, Telco Fraud Protection.

4.2.15 I was the recognized methodology and risk management expert for software related technology solutions across Andersen.

4.2.16 I worked closely with the Computer Risk Management practice in the Andersen Audit practice to perform technical due diligence, project risk reviews and advise on project recovery.

4.2.17 *Capability Development* One of my key strengths was the recruitment, training, development and motivation of deeply technical teams to perform successfully in a 'Big 4' consulting environment.

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4.2.18 Operating first as the founding director of Andersen's **Global Software Engineering Centre of Excellence** and then as a member of the **Global Advanced Technology Advisory Team**, I became one of a small number of newly appointed partners building the **technology integration** skills at the heart of BC's growth strategy.

4.2.19 I provided technical leadership for the development of the core component based **rapid implementation methodology** and acted as the expert for methodologies built on this foundation including **eBusiness**, **eMarketplace**, Content Management, Datawarehouse, Business Architecture, **Enterprise Integration** and **Customer Management**.

4.2.20 Other achievements include implementation of the first successful **Knowledge Management** Capability Maturity Model for the UK practice; establishing a **global virtual community** of 2,000 software developers; developing alliance relationships with **BEA**, **Microsoft**, **Sun** and a variety of specialist technology providers; sponsorship of Computing for Business MSc at **Imperial College**, development of four technology training courses for global roll-out; delivery of a **technology competency model** for all practitioners globally.

4.2.21 I am currently working as an IT and Technology Risk consultant as a Director of Amsphere Consulting Limited.

4.2.22 Recent assignments include:

- Advisor to board of advisor to board of satellite Broadband Interactive start-up

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- Recovery of failing project at Big '4' consulting firm
- Associate editor Butler Group, the IT strategy consulting information service company.
- Design and implementation of delivery risk management system for an off-shore software development company
- Project delivery for an applications management business
- Report on XML related integration and data quality risk for JP Morgan-Chase
- Expert witness including cross examination in an ICC Arbitration between 3 national banks and an international provider of banking accounting software
- Expert witness in a High Court action relating to the quality of software testing between an international mobile telephone operator and an established mobile telephony systems integrator.
- Expert advisor in action between Geographical Information Systems provider and off-shore software development services provider.
- Expert advisor in action between an SAP systems integrator and a provider of insurance policies for household goods
- Instructed in relation to 5 other cases relating to Post Office sub postmasters or mistresses.

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4.2.23 I am a former Director of UCL Consultants (founded by University College London) which is responsible for providing professional consulting services from members of UCL.

4.2.24 I am a Partner of the Transformation Development Partnership LLP.

4.2.25 I was appointed Visiting Professor of Software Enterprise at University College London in 2005.

4.2.26 I have worked with IT organisations of all scales from small businesses to international global organisations.

4.2.27 I mentor small businesses owners through the Academy for Chief Executives and lecture on the MBA programme at the University of Kent.

#### 4.3 Confidentiality

4.3.1 This report is strictly private and confidential and has been prepared at the request of Coomber Rich Solicitors on behalf of their client, for the Court.

#### 4.4 Legal and factual issues

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4.4.1 This report should not be read as expressing any opinion on factual matters which depend on disputed testimony of the witnesses of fact, or legal issues. It, however, inevitably reflects my understanding of the position.

#### 4.5 Sources of information

4.5.1 In preparing my report, I have read and considered the following documents:

- a. Summary of facts prepared in accordance with Rule 21.3(1)(b) of the Criminal Procedure Rules 2005;
- b. The Indictment – The Queen v Seema Misra;
- c. Witness statement of Keith Noverre 8<sup>th</sup> January 2009;
- d. Witness statement of Elaine Ridge 9<sup>th</sup> January 2009;
- e. Witness statement of Lisa Jane Allen 12<sup>th</sup> January 2009;
- f. Witness statement of Adrian Morris 6<sup>th</sup> January 2009;
- g. Witness statement of Jon Longman 29<sup>th</sup> May 2009;
- h. Witness statement of Javed Salim Bidiwala 13<sup>th</sup> April 2006
- i. The statement under Section 9 of the Criminal Justice Act 1967 of John Kidd
- j. The Audit of Post Office ® West Byfleet branch, FAD 126023 – Action Plan Appendix A Is this a correct reference?
- k. The Witness statement of Andrew Paul Dunks 24<sup>th</sup> June 2009

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- l. The exhibits provided running from pages 1-35 insofar as the copies provided are legible.
- m. Various witness statements by Gareth Jenkins of Fujitsu
- n. Various e-mails and documents provided by Gareth Jenkins of Fujitsu
- o. Visits to three separate sub post offices with an opportunity to interview the staff
- p. The Horizon transactions and Events for West Byfleet from 1<sup>st</sup> December 2006 – 31<sup>st</sup> December 2007 provided by Fujitsu.

#### 4.6 The scope of my work

- 4.6.1 I report as an expert witness, not as a witness of fact. I have reviewed the documentation provided to me. I have not undertaken an operational review of the software solution Horizon system nor have I had access to any system documentation or test data relating to the Horizon system and the associated Post Office Ltd systems.

#### 4.7 Independence

- 4.7.1 I have prepared an independent and objective report addressed to the Court. I have had no previous involvement with the Defendant. I have no previous involvement with Coomber Rich Solicitors.
- 4.7.2 Amsphere's fees in this case are not dependent on the result of the proceedings in this matter.

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#### 4.8 My duties to the Court

- 4.8.1 I understand that my overriding duty is to the Court, both in preparing reports and in giving oral evidence. I have complied and will continue to comply with that duty.
- 4.8.2 I have set out in my report what I understand from those instructing me to be the questions in respect of which my opinions as an expert are required.
- 4.8.3 I have done my best, in preparing this report, to be accurate and complete. I have mentioned all matters that I regard as relevant to the opinions I have expressed. All of the matters on which I have expressed an opinion lie within my field of expertise.
- 4.8.4 I have drawn to the attention of the Court to all matters, of which I am aware, which might adversely affect my opinion.
- 4.8.5 Wherever I have no personal knowledge, I have indicated the source of factual information.
- 4.8.6 I have not included anything in this report that has been suggested to me by anyone, including the lawyers instructing me, without forming my own independent view of the matter.
- 4.8.7 Where in my view, there is a range of reasonable opinion, I have indicated the extent of that range in the report



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- 4.8.8 At the time of signing the report I consider it to be complete and accurate. I will notify those instructing me if, for any reason, I subsequently consider that the report requires any correction or qualification.
- 4.8.9 I understand that this report will be the evidence that I will give under oath, subject to any correction or qualification I may make before swearing to its veracity.
- 4.8.10 I have included in this report a statement setting out the substance of all facts and instructions given to me, which are material to the opinions expressed in this report or upon which those opinions are based.
- 4.8.11 I confirm that insofar as the facts stated in my report are within my own knowledge I have made clear which they are, and I believe them to be true, and the opinions that I have expressed represent my true and complete professional opinion.

Professor Charles McLachlan  
Amsphere Consulting Ltd  
90 Fenchurch Street  
London, EC3M 4BY  
England

Thursday, 30 September 2010

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## **5 Appendix A**

### **5.1 Horizon Architecture Diagrams Provided by Gareth Jenkins of Fujitsu**

I'm happy that this is what I sent Charles and have no comments about it.

Referenced at 2.2.

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## **6 Appendix B**

### **6.1 Jenkins review of failed transactions for FASTCASH errors**

I confirm that this was an email I sent and have nothing further to add to it.

Referenced from 2.3.3

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## **7 Appendix C**

### **7.1 Summary of Calendar Square Falkirk Problem.**

I confirm that this was an email I sent and have nothing further to add to it.

Referenced from 2.4.1.

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## **8 Appendix D**

### **8.1 Gareth Jenkins Comments on Transaction Corrections**

I confirm that this was an email I sent and have nothing further to add to it.

Note that this is not explicitly referenced in the report.



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## **9 Appendix E**

### **9.1 Gareth Jenkins information to assist in interpreting Horizon Transactions and Events**

I confirm that this was an email I sent and have nothing further to add to it.

Note that this is not explicitly referenced in the report.

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## 10 Appendix F

10.1 Sample Horizon Transaction logs provided by Fujitsu 1 to 31 Dec 06

This appears to be a print out of one of the detailed transaction spreadsheets provided. It is 2629 pages long!

Note that this is not explicitly referenced in the report.

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## 11 Appendix G

11.1 Sample Horizon Event logs provided by Fujitsu 1 to 31 Dec 07

This appears to be a print out of one of the detailed events spreadsheets provided. It is 189 pages long!

Referenced from 2.5.1.

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## 12 Appendix H

### 12.1 Absolute Totals of Activity By Product Number

I assume that this has been produced from the raw spreadsheets. Not sure what benefit it has and I've not attempted to check it is accurate.

Referenced from 2.3.4.

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## 13 Appendix I

### 13.1 Card Product Ids

This appears to be an attempt to identify Products associated with Debit card Payments. However some of these Product represent Banking Transactions (though there are many other banking products not in this list) and some aren't even real products, but dummy products used for internal system controls.

I'm not clear what the purpose of this appendix is.

Note that this is not explicitly referenced in the report.

### 13.2 Transaction Associated With Reject Cards

I'm not clear on what basis these transactions have been selected. In order to check this through I would like to have this info in spreadsheet form.

Referenced from 2.3.3

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## 14 Appendix J

### 14.1 Summary of Transactions of Interest

Again, I don't understand why these transactions have been selected and what their relevance is (other than the total absolute value is close to the amount "lost").

Referenced from 2.5.1.



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## 15 Appendix K

### 15.1 Horizon Events without Report Printed

This appears to be a subset of the events (similar to App G, but having removed the “Report printed / Previewed” events (which is normally about 80% of events). It is 255 pages long and not very readable as a pdf.

Note that this is not explicitly referenced in the report.

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## 16 Appendix L

### 16.1 Declared Discrepancies.

This appears to be an extract of all Discrepancy transactions from the detailed logs together with a chart plotting them by date.

Note that this is not explicitly referenced in the report.

### 16.2 Variance Check Analysis

This appears to be an analysis of the Variance Check events. It is 38 pages long.

Note that this is not explicitly referenced in the report.