WITN09870200

Witness Name: Gerald Barnes

Statement No.: WITN09870200

Dated: 19 December 2023

POST OFFICE HORIZON IT INQUIRY

SECOND WITNESS STATEMENT OF GERALD BARNES

I, *MR GERALD BARNES*, will say as follows:

INTRODUCTION

1. As noted in my first witness statement dated 30 August 2023, I am currently employed by Fujitsu Services Limited ("**Fujitsu**") as a Software Developer, a position I have held since 1998.

2. This second witness statement is made to assist the Post Office Horizon IT Inquiry (the "**Inquiry**") with the matters set out in the Rule 9 Requests provided to Fujitsu on 16 June 2023 and 31 July 2023 (together, the "**Requests**"), to the extent I have or had direct knowledge of such matters. As with my first witness statement, this witness statement relates to my work in Fujitsu's audit team and the processes relating to audit queries (also known as Audit Retrieval Queries or "**ARQs**").

3. The nature and potential significance of the matters set out in this statement came to light on 6 December 2023, and there is an ongoing operational investigation with which I am assisting. In order to bring this matter to the

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attention of the Inquiry as soon as possible, this statement was drafted with assistance from Morrison Foerster, the recognised legal representatives for Fujitsu in the Inquiry, in a limited timeframe. It may be necessary to further supplement the information provided in this statement, as my knowledge and understanding of the issues develop.

4. Where I have referred to documents to assist my preparation of responses to the Requests, the URNs of the relevant documents are set out in this statement.

BACKGROUND

5. In the Requests, the Inquiry asked me to confirm whether I was aware of any incidents where an audit log (whether an ARQ log, a log produced by RQuery or XQuilla, detail from the ARQ interface or equivalent) had been provided to Post Office Limited ("**POL**") or Royal Mail for court or disciplinary proceedings or in an investigation relating to a postmaster, manager or assistant that was, or may have been, unreliable. As noted in paragraph 26 of my first witness statement, I understand 'ARQ log' to refer to the data provided by Fujitsu to POL in response to ARQ requests that sought data from the audit servers, which would be presented on a Microsoft Excel spreadsheet ("**ARQ Spreadsheet**").

6. As I explained in paragraph 27 of my first witness statement, during my time at Fujitsu, I was not personally involved in responding to ARQs submitted by POL Fujitsu in relation to investigations, court proceedings, or disciplinary proceedings against postmasters, managers or assistants. To assist the Inquiry, at paragraphs 27 to 38 of my first witness statement, I set out details of

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any incidents or issues relating to the accuracy of ARQ data that I was aware of at that time.

7. Since providing my first witness statement, I have become aware of an incident where Fujitsu provided POL an ARQ Spreadsheet in relation to an ongoing appeal by the postmaster of the Apex Corner branch (with Financial Accounting Division or "**FAD**" code 097005) ("**Apex Corner**"), and this ARQ Spreadsheet was unreliable ("**Apex Corner Incident**").

8. Due to my background, knowledge, and experience working in the audit team at Fujitsu, I have been involved in investigating the Apex Corner Incident. I have helped to identify the cause of the Apex Corner Incident, which I will refer to as the "**ARQ Extraction Issue**" in this statement. I am currently working with other technical and operational staff within Fujitsu's Post Office Account team ("**POA**") to (i) understand the extent and impact of the ARQ Extraction Issue (as far as possible), and (ii) developing a solution to rectify it.

THE APEX CORNER INCIDENT

9. On 14 November 2023, I was informed by members of Fujitsu's legal team and Morrison Foerster that a series of ARQ Spreadsheets were provided by Fujitsu to POL in response to an ARQ request from POL dated 11 August 2023 relating to Apex Corner ("**Apex Corner Request**"). It was explained to me that:

   a. the Apex Corner Request related to an ongoing appeal by the former postmaster of Apex Corner, which was before the Court of Appeal;

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b. in the Apex Corner Request, POL had requested transaction data relating to Apex Corner for a number of months, which included the months of March and April 2008 (FUJ00234826);

c. Fujitsu had provided POL a number of ARQ Spreadsheets in response to the Apex Corner Request, with separate ARQ Spreadsheets for each month of transaction data requested by POL, including an ARQ Spreadsheet for transactions in March 2008 ("**March 2008 ARQ Spreadsheet**") and April 2008 ("**April 2008 ARQ Spreadsheet**");

d. as part of the appeal proceedings, the former postmaster had provided a girocheque report dated 10 April 2008 (FUJ00234827), which listed 13 transactions that did not appear in any of the ARQ Spreadsheets Fujitsu provided POL in response to the Apex Corner Request ("**13 Missing Transactions**");

e. it had been identified from relevant Peaks, a Known Error Log (KEL) and Operational Correction Requests (OCRs) that:

   i. the 13 Missing Transactions, which had taken place in March 2008, had been "marooned" on the counter at Apex Corner together with a large number of other transactions in 2008;

   ii. consequently, in April 2008, the Software Support Centre ("**SSC**") had manually reinserted these "marooned" transactions into the correspondence servers relating to the earlier version of the Horizon system (known as "**Legacy Horizon**"); and

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iii. these "marooned" transactions were reinserted into the correspondence using a virtual counter ID (i.e., a counter that did not exist at the branch, which was used to identify that they had been reinserted by the SSC).

INVESTIGATION INTO THE APEX CORNER INCIDENT

10. I was asked to investigate the Apex Corner Incident as part of a team of technical and other operational staff in POA to understand:

    a. why the 13 Missing Transactions did not appear in the March 2008 ARQ Spreadsheet or April 2008 ARQ Spreadsheet; and

    b. the extent and impact of the ARQ Extraction Issue, including whether it impacted (i) ARQ data extractions that had been undertaken in relation to other branches, (ii) Legacy Horizon, Horizon Online (including "**HNGx**"), or both,

    (the "**Investigation**")

11. The investigation team includes John Simpkins (Team Leader, SSC), Farzin Denbali (Security Operations Manager, POA) and Steve Browell (Service Operations and Strategy Manager, POA).

AUDIT AND ARQ PROCESSES RELATING TO THE APEX CORNER INCIDENT

12. To assist the Inquiry to understand why the Apex Corner Incident occurred, I set out below my understanding of (i) how transactions in Legacy Horizon were transmitted from the branch counter to the audit archive ("**Legacy Audit Process**"), and (ii) the ARQ process that was applied in relation to the Apex Corner Request, which has been in place since around 2009 ("**Horizon Online**

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ARQ Process"). In setting out my understanding of these processes, I have highlighted what happened in relation to the Apex Corner Incident.

13. My explanation below is based on my knowledge and experience working in the audit team as well as my involvement in the Investigation. As I explained in paragraph 7, 14 and 18 of my first witness statement, I have limited experience and knowledge regarding the systems and processes relating to audit and ARQs in relation to Legacy Horizon, however, I have learned more about these systems and processes as a result of my involvement in the Investigation.

The Legacy Audit Process

14. I understand that the process in which transactions made at the counter in Legacy Horizon were transmitted and stored in the audit archive was designed to operate as follows:

    a. Riposte messages, including transaction messages, would first be written to the Riposte message store on the local counter at the Post Office branch and attributed a Riposte message date (among other things). For example, the Riposte message date for a transaction message was the date that the transaction took place at the counter ("**Transaction Date**"). To create a back-up, these messages were replicated locally to (i) other counters in the branch (if the branch had multiple counters), or (ii) a "mirror disk" physically contained in the counter (if the branch only had a single counter).

    b. Periodically, Riposte messages would then be sent from the counter to the correspondence servers in the data centres. This was done periodically because Legacy Horizon was primarily an offline system.

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Branches were assigned to one of four "clusters", which refers to a group of FAD codes, and messages from branches would feed into one of these clusters at the correspondence server level. Once at the correspondence server level, an audit harvester would write the messages from these clusters into Transaction Management Service files ("**TMS Files**") (i.e., only messages within the same cluster at the correspondence server level would be written in the same TMS File). The TMS Files would also be labelled with a cluster identifier and date/time.

c. The TMS Files would then be gathered and copied to the audit server. A cyclic gatherer program would take the TMS Files from the correspondence server and copy them to the audit server, keeping the same cluster identifier and date/time.

d. The gathered TMS Files would then be sealed by the application of an "MD5 checksum" and put onto a storage device (for example, Centera). The TMS File was considered stored on the audit archive on the date it was sealed ("**Seal Date**"). The Seal Date and name of the file (which included the name of the cluster) ("**Audit Filename**") were recorded on a "**Sealer Database**".

15. What I have described above is the process, as I understand it, that should have taken place to store counter data onto the audit archive. I understand that due to an issue with the counter at Apex Corner:

a. the 13 Missing Transactions, which had Transaction Dates in March 2008, were not sealed in TMS Files in the audit archive until April 2008 because the transactions were reinserted by the SSC in April 2008; and

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b. as a result of this delay, the 13 Missing Transactions had Transaction Dates in March 2008, however, the transactions were contained in TMS Files with a Seal Date in April 2008.

The Horizon Online ARQ Process

16. Fujitsu uses a software application called "**AEClient**" to retrieve data from the audit archive. AEClient is run on physical terminals known as Audit Workstations (AUW), which members of Fujitsu's audit and security teams use to perform the retrieval. The Horizon Online ARQ process operates as follows:

a. A cluster look-up database is used to identify the details of the cluster where messages from the relevant branch FAD code and ARQ request date range are stored.

b. The Sealer Database is then used to identify and retrieve the sealed TMS Files from the audit archive relating to the ARQ request by searching for (i) the cluster relating to the relevant branch FAD code across the Audit Filenames, and (ii) date range (known as the "**Retrieval Range**") according to the Seal Date, which is typically a calendar month. As I explained in my first witness statement at paragraph 25(d), when the audit team performs audit retrievals, it allows extra days in the Retrieval Range to allow for TMS Files that were gathered late. For example, when responding to an ARQ request for the month of March, a Retrieval Range of 1 March to 2 April (inclusive) will be used to allow for TMS Files containing transactions that took place on 31 March, which were not gathered until 1 April.

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c. The Query Manager service, which is a separate application controlled by the AEClient, then queries each of the sealed TMS Files that have been retrieved from the audit archive and filters the messages contained within them according to (i) the relevant branch FAD code, and (ii) Riposte message date (e.g., the Transaction Date), which is typically entered as a date range ("**Filter Range**") of a calendar month. The Query Manager service also undertakes automatic checks to identify any gaps and duplicates in the Riposte messages within the Filter Range. Each message has a unique and ascending identifier known as the "Num" attribute, which the Query Manager service uses to undertake these checks.

d. The Query Manager service then generates a single XML file, which contains data relating to all of the messages (e.g., transactions and events messages) that meet the filtering criteria applied (i.e., branch FAD code and Riposte message date).

e. The XML file is then queried using a query language known as "FLWOR" (pronounced "flower") for specific information and data. Where the ARQ request is for details of transactions, the FLWOR query is used to identify and extract Riposte transaction messages by returning all messages that have any value for two Riposte message attributes: "EPOSSTransaction/ProductNo" and "TxnData/Start/Date". The identified transaction messages are then put into a new XML file ("**Output XML File**"). The Output XML File will only contain the Riposte message

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attributes that are specified in the FLWOR query, which include, Transaction Date, Mode, Session ID and Transaction ID.

f. The AEClient then uses the Output XML File to produce the ARQ Spreadsheet.

17. My understanding is that the security team would identify gaps and duplicates in messages through automatic checks, and occasionally identify that whole days of messages were missing at the end of an ARQ Spreadsheet following a manual review of the spreadsheet. This would sometimes be drawn to my attention by the security team, who would ask me to investigate the gaps and find the missing messages by extending the Retrieval Range of the ARQ while keeping the Filter Range the same.

18. My understanding is that the process I have described at paragraph 16 in this statement was followed for the Apex Corner Request. As part of my work on the Investigation, I helped to determine that the 13 Missing Transactions were not presented on the ARQ Spreadsheets provided in response to the Apex Corner Request because of how the Horizon Online ARQ Process operates in certain circumstances, which I set out below at paragraph 21. In summary, the Apex Corner Incident occurred because:

a. when the Horizon Online ARQ Process was applied to the Apex Corner Request, the Sealer Database was used to identify and retrieve sealed TMS Files for March 2008 and April 2008 (among other months);

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b. as noted above at paragraph 15, the 13 Missing Transactions, which had Transaction Dates in March 2008, were contained in sealed TMS Files with a Seal Date in April 2008;

c. when processing the ARQ request, the Query Manager service was used to filter:

   i. the sealed TMS Files for March 2008 for transactions with a Transaction Date in March 2008; and

   ii. the sealed TMS Files for April 2008 for transactions with a Transaction Date in April 2008;

d. consequently, the 13 Missing Transactions were not captured by the Query Manager service during the filtering process noted at paragraph 16(c).

19. In order for the 13 Missing Transactions to be retrieved and presented on an ARQ Spreadsheet, I identified that the Query Manager service needed to query the TMS Files that were sealed in April 2008 and filter these files for transactions with a Transaction Date in March 2008.

20. Once this revised query was applied, the 13 Missing Transactions were retrieved and presented on an ARQ Spreadsheet and the automatic checks noted at 16(c) identified gaps in the messages that had been reinserted by the SSC on the virtual counter. At this stage, I am not sure why there were gaps in relation to these messages and the Investigation is ongoing in this regard.

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EXTENT AND IMPACT OF THE ARQ EXTRACTION ISSUE

21. Based on the Investigation so far, in general terms, my understanding is that the ARQ Extraction Issue can occur in the following circumstances:

    a. there is a delay between (i) the date that a transaction was carried out at a branch, and (ii) the date the TMS File containing the transaction was sealed in the audit archive;

    b. the delay is caused by error or fault (e.g., counter hardware failures, a fault with the sealer, network connectivity problems), which leads to transaction messages that took place in month "A" being stored in the audit archive in TMS Files that are sealed in month "B" (e.g., in the Apex Corner Incident, the SSC reinserted the 13 Missing Transactions (and others) using a virtual counter ID);

    c. an ARQ request is received requesting data for the branch including in relation to month "A";

    d. the current Horizon Online ARQ Process is followed to respond to the ARQ request, and the sealed TMS Files relating to the branch for month "B" are not searched for transactions that took place in month "A"; and

    e. the automatic checks, noted at paragraph 16(c) above, fail to identify any gaps in the transaction messages that would indicate the transaction is missing.

22. The Apex Corner Incident has shown that the current Horizon Online ARQ Process has a flaw because transactions in Legacy Horizon for one month can be stored in the audit archive in the following month, such that the additional

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days allowed in the Retrieval Range are not enough to capture all relevant TMS Files that were sealed late. As a result, Fujitsu is modifying the process to allow three months in the Retrieval Range (i.e., the date range applied to retrieve TMS Files). Hence it will retrieve up to 2 months of lately sealed or inserted messages.

23. As I explain above at paragraphs 8, 10 and 11, I am currently working with other technical and operational staff in POA to understand the extent and impact of the ARQ Extraction Issue, including in relation to Legacy Horizon and Horizon Online. I will endeavour to provide further information to the Inquiry as I learn more about the issue.

Statement of Truth

I believe the content of this statement to be true.

Signed: GRO

Dated: 19 December 2023

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INDEX TO THE SECOND WITNESS STATEMENT OF GERALD BARNES

Exhibit No.	Description	Control Number	URN
1.	Girocheque report dated 10 April 2008	POINQ0240969F	FUJ00234827
2.	ARQ Spreadsheet relating to Apex Corner provided to POL on 4 September 2023	POINQ0240968F	FUJ00234826