AUDIO RECORDING
FORENSIC EXAMINATION
REPORT

AFS Ref:	**0012137/CCJC**
Instructing Client	**Cardiff Civil Justice Centre**
Forensic Investigator	**Mr Paul Baker**
Date of Report completed	**27/07/17.**
Case file:	**Kirk-v-SW Police** **BS614159**

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Mansfield, UK

P. Baker

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1 Introduction

1.1 Purpose of this report

The aim of this report is to provide a detailed audio continuity analysis in reference to the procedures performed in the analysis and to document all findings.

1.2 The audio forensic examiner.

Forensic Audio Examiner:

The audio forensic examiner and co-author of this report is Mr P. Baker who is a qualified audio engineer and audio forensic specialist with over 30 years of professional experience in the audio and voice industry. Mr P. Baker holds a City & Guilds in Engineering and gained his AAC accreditation in audio engineering in 1986 in Melbourne Australia. Mr P. Baker has also studied voice and speech production with voice analyst coach Ms E. Guerra. Throughout his years of experience Mr P. Baker has worked on a professional level within the audio production industry for TV networks, recording studios and on location recordings working with sound, the voice and acoustics. As joint business partner and founder of Audio Forensic Services his key roles over the past eight years as business partner have included: audio expert, audio voice analysis, voice and speech acoustics, audio forensics analysis, dialogue deciphering, audio enhancement and audio transcriptions. Mr Paul Baker has 17 years experience independently assisting courts, prosecution, defence solicitors, established companies, business and corporate organisations worldwide in the field of audio forensics.

1.3 Audio Forensic Services

Audio Forensic Services are experts in the areas of audio forensics, voice forensics and audio production services. We offer an impartial, independent and specialised service to both defence and prosecution. We also adhere to a strict non-disclosure policy in relation to all case files worked on and abide by the ACPO guide-lines and the Data Protection Act 1998.

1.4 Specific Instructions

Mr Paul Baker of Audio Forensic Services has been instructed by HHJ Seys Llewellyn QC on the following:

(A) Give opinion upon the following:

(i) The integrity of the tape as to whether it has been edited or otherwise interfered with.

(ii) Whether or not the tape is the master tape, the working copy of the master tape, or a copy of the master tape/working copy of Mr Kirk's copy.

(B) Prepare and provide:

(i) A full transcript of the contents of the audio tape.

(ii) Three CD's containing copies of the audio tape.

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The following material (See Fig 1) has been provided by the Cardiff Civil Justice Centre for the audio continuity analysis:

Item No.	Evidence ID:	Duration:
1.	An audio cassette tape. The outer label states as follows: *Offence: Sus Theft.* *Time Start: 10:55 – Finish 11:40.* *Tape Reference: DA/1955/93/1.* *Person Interviewed: Mr Morris Kirk.* *Interviewing Officer: P. Thomas.* *Department Station: "D".* *Rank: DL – No: 3052 – Division: D.* The cassette tape label states the following: *Tape Ref No: DA/1955/93/1.* *Name: M #(word pencilled out) Kirk* *IC90 – Interview cassette.* *South Wales Police.*	00:45:20.779 "45 minutes and 20 seconds"

Fig 1

1.5 Equipment and Software used in the audio analysis process:

Equipment used: Behringer Eurodesk MX 9000 48/24 channel mixing console, Beyer dynamic DT150 Headphones, Mackie MR8 MK2 studio speakers, Tascam 202MKv cassette deck.
Computer: Windows 7 Professional 64 bit SP1 based operating system.
Audio analysis software: Sony Soundforge Pro version 11.0 (build 272), iZotope RX2 Advanced spectrogram, DC Forensics version 10.

2 Audio Continuity Analysis

2.1 Procedures conducted by Mr P. Baker:

The following procedures were conducted on the recording:

A) *Physical inspection of the audio cassette's leader tape and ribbon:* I have inspected the audio cassettes leader tape strips and the audio cassette tapes ribbon of which were found to be in good condition. I physically inspected the entire audio cassette ribbon for any signs of splicing* (*see appendices) or tampering and none were detected. The audio cassette tape was *not* presented to me within a sealed evidence bag and therefore I am unable to ascertain whether the audio cassette is a master copy or a working copy other than the physical condition of the cassette ribbon. The cassette ribbon contained some stretch ripples in the mid section of the recording. Ripples in a cassette tape are generally caused by the user playing back a specific section repeatedly; this would therefore in my opinion indicate support that the cassette is a working copy. However, I have no documented evidence of whether the cassette was a working copy or a master copy. The audio cassette tape housing is labelled "South Wales Police – IC90 interview cassette (see Photograph DSC_0351).

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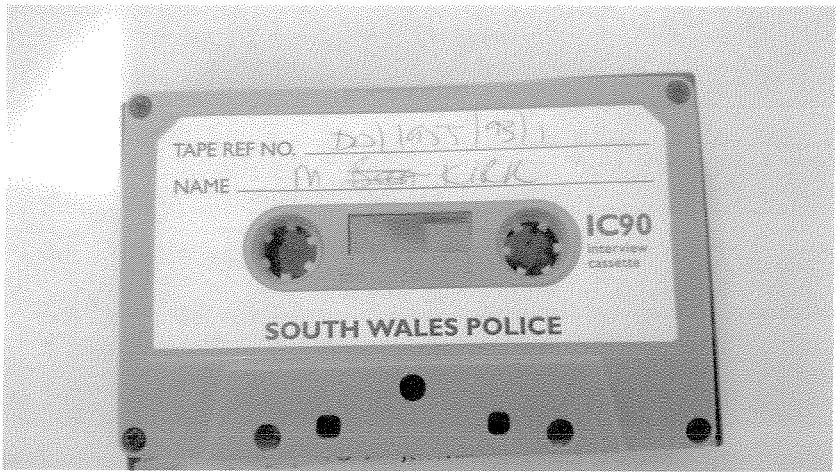

(DSC_0351)

B) Transfer procedures and digital storage:
While listening and playing the audio cassette in real-time through the AFS lab's Tascam 202MKv cassette deck, I simultaneously recorded a digital copy of the entire recording through the use of Sony Soundforge Pro 11 software. The recorded material was 45 minutes and 20 seconds in total duration and a stereo recording of which consisted of one channel being the interview dialogue and the second channel used to record the automated speaking clock. Having worked with numerous amounts of Police audio cassette interview recordings, it is standard practice for the audio evidence to be recorded in such a way. Once the evidence recording was digitally transferred I labelled the transferred audio file "ASF_1" and saved the file as a stereo 44.1Hz – 16 bit digital recording. For the purpose of performing a transcription of the recorded interview dialogue on the said recording I produced a second copy of the said recording and removed the channel containing the speaking clock through the use of the Sony Soundforge Pro 11 software. This recording I have labelled "AFS_1_enhanced_mono" and saved the file as a mono 44.1Hz – 16 bit digital recording. The said two digital recordings were then stored by me on our lab computer "LAB1-PC" in an encrypted folder.

C) The recording listened to in it's entirety to determine whether there was present any discontinuity in the dialogue or background noise artefacts:
I have listened to the said recording in its entirety. I have found there to be three sections of the recording of which have audible drop outs (rapid reduction of volume) accompanied by a click sound. The said mentioned sections are at 00:02:51.409, 00:31:04.00 and 00:35:17.241 of which consists of a drop in the channels recording level; however either side of the click sound occurrence the dialogue and environmental frequency hums remain consistent.
The recorded Police interview channel and speaking clock channel, throughout these said sections have continuous audible dialogue/clock and environmental frequency hums. Therefore, the said three sections suggest electronic recording faults and a very low support for them to be associated with editing or tampering. The dialogue and conversation contained within the said entire recording indicates in my opinion continuity.

*D) Inspection of the recording through a *spectrogram (*see appendices) by the use of iZotope RX2 Advanced software for any signs of tampering, rearranging or editing.*
I have inspected the entire recording through the use of the iZotope RX software and no areas of the said recording indicate any manual tampering or editing.
Therefore, in my opinion based on the evidential material presented, there is very low

support of the dropout sections mentioned in section (C) of this report being manual edit points or sections that has been physically tampered with in any way.

*E) Analyse the *spectral frequencies present through the iZotope RX software's spectrograph then report on the continuity vs discontinuity. (*spectral frequencies relate to wave pattern frequency peak signals and can highlight the presence of continuous hums and buzzes within the recording. This therefore can indicate whether a section of a recording indicates a post production overlay or edit).*

On the Police interview channel pre and post the audio drop out sections mentioned in section (C) of this report, continuous frequency hums are present at 50hz, 220hz, 504hz, 626hz, 9,852hz and 15,444hz.

When examining the speaking clock channel pre and post the audio drop out sections mentioned within section (C) of this report, continuous frequency hums are present at 270hz, 875hz, 1,171hz, 1,428hz, 1,773hz, 2,714hz, 3,021hz & 15,517hz.

2.2: Mr P. Baker Test Results

In my professional opinion having conducted industry standard tests and investigations on the said recording, I have found there to be no indication of tampering, editing or re-arranging present neither within the evidential cassette recording's material composition nor to the material's standard manufactured construction of the housing and tape ribbon.

The audio discontinuity support scale of the said recording therefore in my opinion is a "very low support" that the said recording has been tampered with, edited or rearranged.

The audio discontinuity support scale is rated on the following five scales:

Very high support (The probability of discontinuity indicates an exceptionally high support of tampering, editing or rearranging).

High support (The probability of discontinuity indicates a high support of tampering, editing or rearranging).

Inconclusive support (The probability of discontinuity indicates an inconclusive support of any tampering, editing or rearranging as a clear examination cannot be obtained).

Low support (The probability of discontinuity indicates a low support of tampering, editing or rearranging).

Very Low support (The probability of discontinuity indicates an exceptionally very low support of tampering, editing or rearranging).

2.3: Final Note:

I can also confirm that I have carried out this work independently, objectively and impartially and the results I have clearly indicated in this report are of my own professional opinion. In legal/criminal cases I undertake work for both prosecution and defence. I have been consulted as an independent expert in approximately 400 case files in the UK, Ireland, Europe and Asia Pacific regions with court attendance in both the UK and international case files.

All my procedures, findings and this report have been fully quality control checked by my colleague Ms E Guerra.

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3 Appendices

3.1 Glossary of terms and terminology

Artefact sound particles: A distortion in sound or a change in the velocity of sound.

Audio Wave Pattern: This shows the length, frequency and amplitude of a sound recording pattern.

Auditory: The process of hearing or listening.

Decibel (db): A decibel or its abbreviation dB is a measurement of loudness that ranges from the threshold of hearing, 0dB.

Formants: A formant is a concentration of acoustic energy around a particular frequency in the speech wave.

Hertz: Hertz (Hz) simply means once per second. In audio terms, it is used to measure the frequency of a sound to characterise its pitch. A 100 Hz sound wave is a signal that repeats 100 times per second. Humans can normally hear sound between 20 Hz and 20,000 Hz.

Spectrogram: A spectrogram image could be described as an x-ray of a voice pattern or sound pattern.

Splicing: To physically cut or join together lengths of audio tape.

Witness Statement

(CJ Act 1967, s.9 MC Act 1980, ss.5A (3)(A) and 5B, MC Rules 1981, r.70)

Statement of Mr Paul Baker

Age if under 18: _**Over 18..** (if over 18 insert `over 18').

Occupation: **Audio Expert & Senior Audio Engineer**

My audio continuity report consisting of ...**6**....pages (excluding appendices and witness statement) is true to the best of my knowledge and belief and I make it knowing that, if it is tendered in evidence, I shall be liable to prosecution if I have wilfully stated in it anything which I know to be false or do not believe to be true. I present with this report a direct digital transfer copy on CD of the South Wales Police Morris John Kirk interview cassette recording of which I have titled: AFS_1.wav and an enhanced version of the said recording titled: AFS_1_enhanced_mono.wav. I can confirm that I have not altered, edited or re-arranged any of the spoken dialogue on the said recording. The enhancement I performed was solely to remove the speaking clock channel and remove noise cloaking the dialogues intelligibility. I also present with my audio continuity report dated 27.07.2017 a twenty page transcription of the entire intelligible, spoken dialogue on the South Wales Police Morris John Kirk interview tape.

Dated the ...27th Day of ...July....2017

Signature .....