LGC Forensics

Setting standards in forensic science

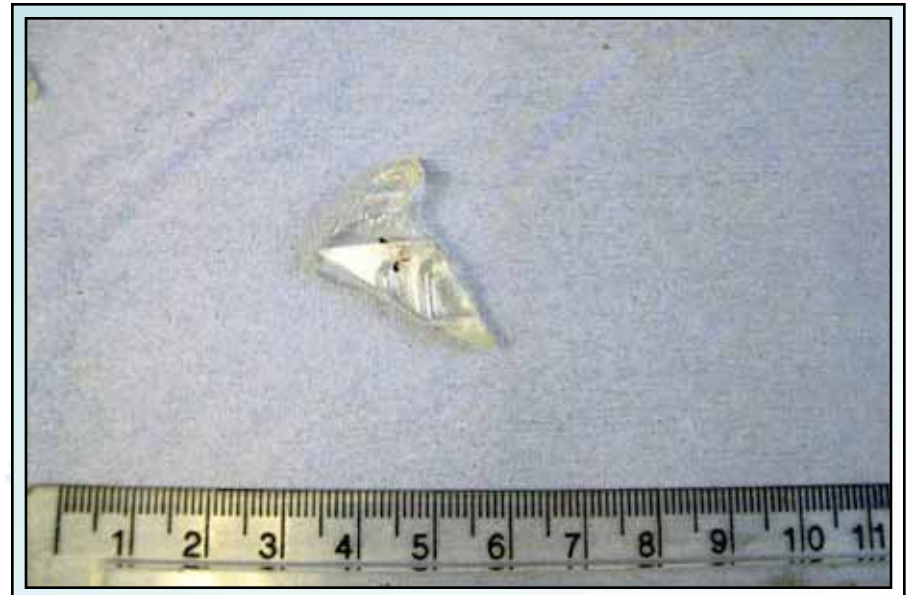# The Interpretation of Glass Evidence within a 'Select' Population

An Incident of an Assault with a Broken Bottle in a Prison

Tom Geddes

innovative · pioneering · innovative · responsive · accurate · reliable
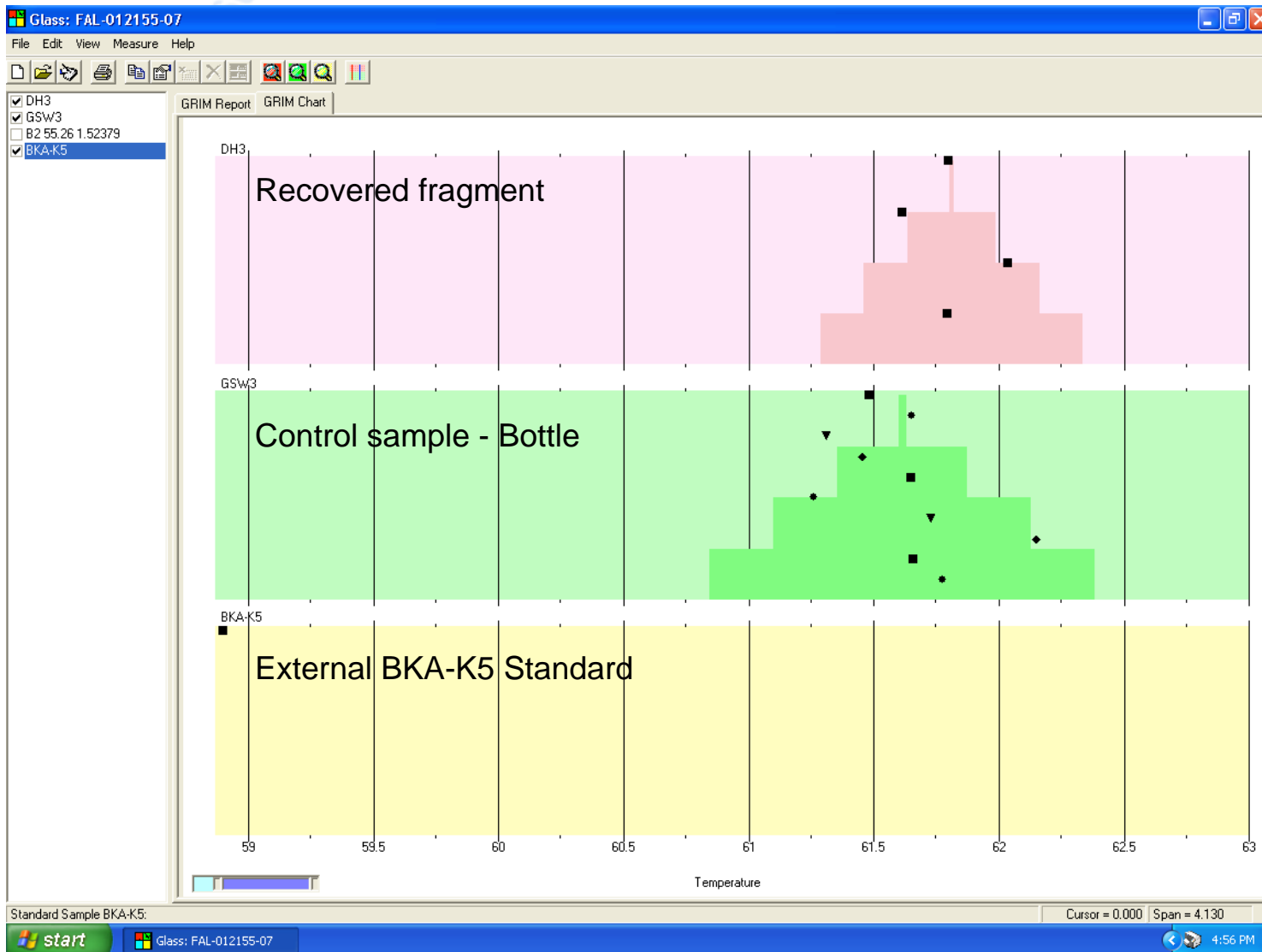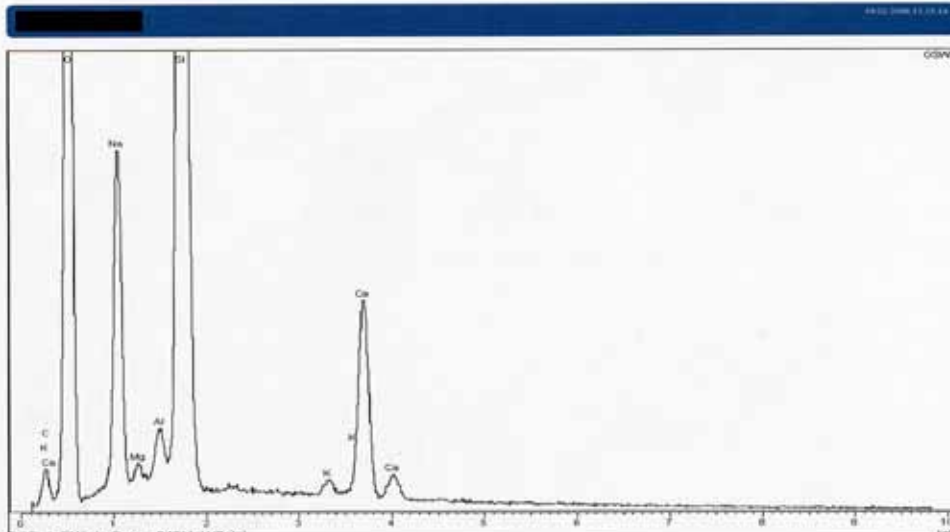
Recovered bottle glass

Encona Hot Pepper Sauce

Refractive index measurement

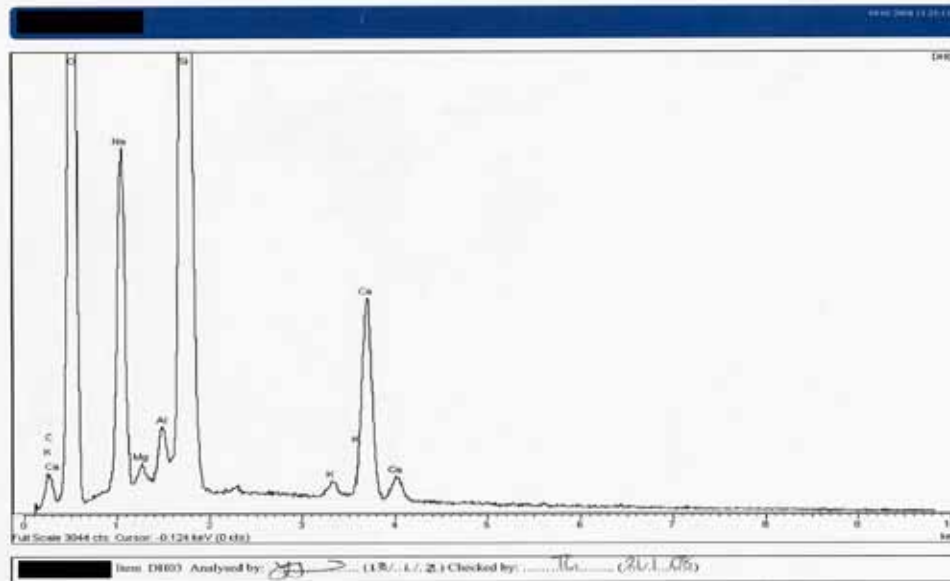# SEM/MPA Analysis

Control sample - bottle

Recovered fragment

Source Level Propositions

- The matching glass fragment originated from the broken bottle
- The matching glass fragment did not originate from the broken bottle. The fragment originated from some other, unrelated source.

Activity Level Propositions

- Mr X smashed the bottle.

- Mr X did not smash the bottle

Evidential scale

LR	Verbal scale
1	Inconclusive
2-10	Limited scientific support
10-100	Moderate scientific support
100-1,000	Moderately strong scientific support
1,000-10,000	Strong scientific support
10,000+	Very strong scientific support

Source level calculation

LGC Forensics
Setting standards in forensic science

$$LR = \frac{(G-1)!}{G!} \ \frac{1}{f}$$

G = Number of groups of glass

f = frequency of occurrence of matching glass.

Prison Shop Inventory

Robertson Strawberry Jam 227g	£0.89
Stute Diabetic Jam 430g	£1.68
Robertsons Lemon Curd 326g	£1.20
H.S Pure Clear Honey 454g	£2.79
Heinz Tomato Ketchup 460g	£1.34
H.S Brown Sauce 490g	£0.85
H.S Salad Cream 440g	£0.79
H.S Mayonnaise 500ml	£1.46
Hellmans May 200g	£1.12
H.S Mint Sauce 186g	£0.52
L&P Worcester Sauce 150ml	£1.08
Encona Hot Pepper Sauce 142ml	£0.89

Activity Level Propositions

•Mr X was in close proximity when the bottle smashed.

•Mr X was not in close proximity when the bottle smashed.

- Mr X smashed the bottle.

- Mr X did not smash the bottle

Activity level calculation

$$LR = \frac{(G-1)!}{G!} \; \frac{P_{G-1}}{P_G} \; \frac{T}{f.\,S}$$

G = Number of groups of glass.

P = Probability of the presence of a particular number of groups of glass.

S = Probability of finding a group fragments of this size.

T = Probability of transfer, persistence and recovery
    of the group of glass fragments.

f = Frequency of occurrence of matching glass.

Evett IW and Buckleton JS. The Interpretation of Glass Evidence. A Practical Approach.
Journal of the Forensic Science Society 1990; 30(4):215-233

Population Surveys

LGC Forensics
Setting standards in forensic science

Number of groups of glass per individual

Distribution of the size of groups of fragments

Number of groups found

Number of fragments per group

McQuillan & Edgar – Upper and lower clothing combined

Lambert, Satterthwaite and Harrison - Upper and lower clothing combined

McQuillan & Edgar – Upper clothing only

Lambert, Satterthwaite and Harrison - Upper and lower clothing combined
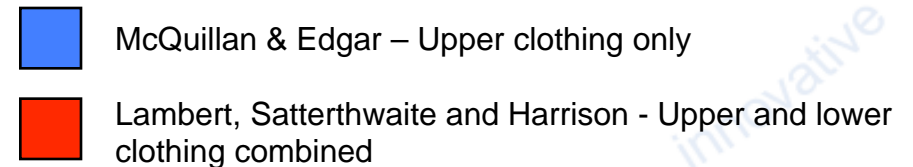
SA Coulson, AB Gummer, CM Triggs and JS Buckleton. Glass on clothing and shoes of members of the general population and people suspected of breaking crimes. Science & Justice; 2001;41;39-48

Activity level calculation

$$LR = \frac{(G-1)!}{G!} \quad \frac{P_{G-1}}{P_G} \quad \frac{T}{f.\,S}$$

G = Number of groups of glass.
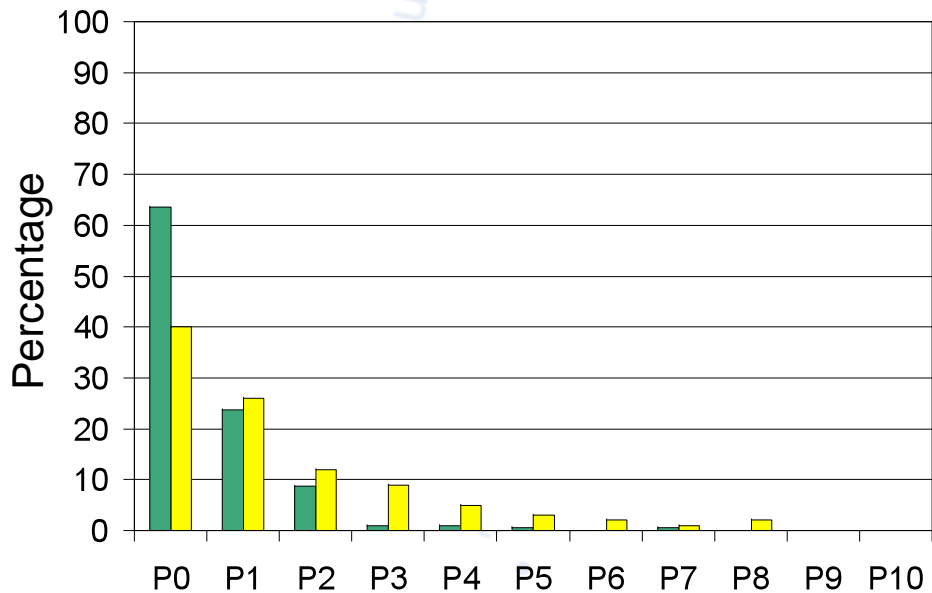P = Probability of the presence of a particular number of groups of glass.
S = Probability of finding a group fragments of this size.
T = Probability of transfer, persistence and recovery
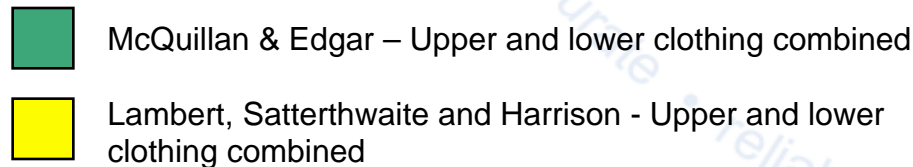   of the group of glass fragments.
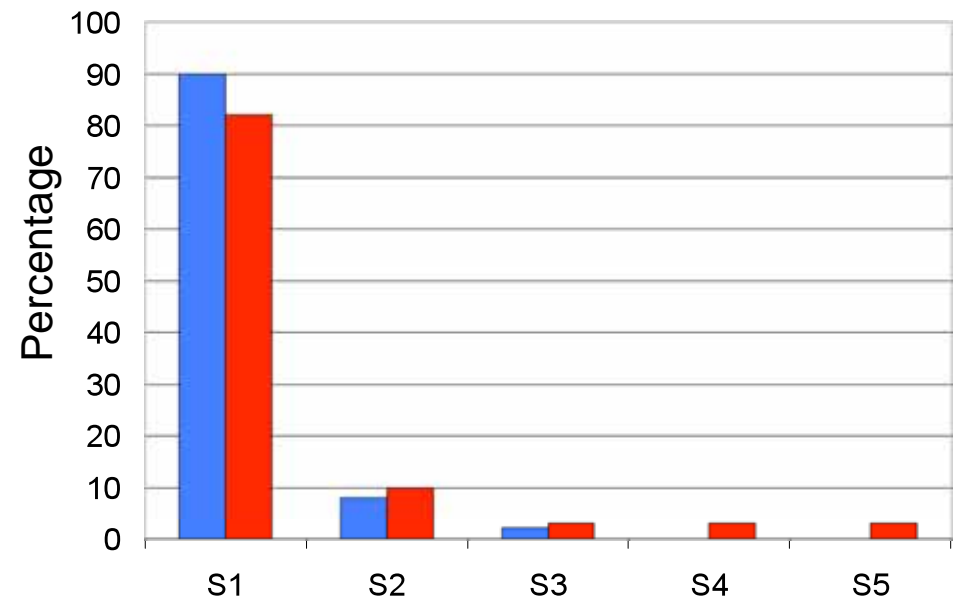f = frequency of occurrence of matching glass.

Evett IW and Buckleton JS. The Interpretation of Glass Evidence. A Practical Approach.
Journal of the Forensic Science Society 1990; 30(4):215-233

Transfer and Persistence

Conclusion

"In my opinion, my findings provide some support for the proposition that the glass fragment originated from the broken bottle. However, I am unable to quantify my findings."

Acknowledgments

- *Dr Tina Lovelock*

- *Rachel Hewetson*

- *LGC Forensics Marks and Trace Team*