
A Guide to Forensic Geology International Union of Geological Sciences (IUGS) Initiative on Forensic Geology (IFG)

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1 Introduction

- Since about 2002, there have been at least 14 international meetings on forensic geology. Numerous books, scientific papers, conference proceedings and magazine articles have also been published. Forensic Geology has experienced a ‘renaissance’ in recent years. It has expanded, diversified, and is now better appreciated throughout the world within both ‘geology’ and ‘policing/law enforcement’.
- Although there are now several publications on ‘forensic geology’ there still does not exist an international document on this subject endorsed by the ‘user community’.
- The International Union of Geological Sciences (IUGS) is one of the largest and most active non-governmental scientific organizations in the world.
- Founded in 1961, IUGS is a member of the International Council of Science.
- IUGS promotes and encourages the study of geological problems of world-wide significance.
- IUGS supports and facilitates international and interdisciplinary co-operation in geology.
- Various ‘Commissions’ exist under IUGS, for example the ‘*Commission on Geosciences for Environmental Management (GEM)*.’
- In 2006, the Geological Society of London Forensic Geoscience Group (FGG) became established, to help promote and develop forensic geology.
- Following on from the success of FGG, IUGS approached Laurance Donnelly (LJD) in 2008 to consider setting up an international ‘*Working Group on Forensic Geology*’ under GEM.
- The IUGS-GEM, Working Group on Forensic Geology was formalised at the IUGS-GEM annual general meeting in Montevideo, Uruguay, in October 2009.
- The Geoforensic International Network (GIN) was established in 2009-2010 as part of the IUGS-GEM, Working Group on Forensic Geology.
- A proposal for GIN to produce a document called, ‘*A Guide to Forensic Geology*’ was presented to IUGS-GEM at the IUGS-GEM annual general meeting in Namibia, in October 2010.
- IUGS-GEM accepted the proposal for GIN to produce, ‘*A Guide to Forensic Geology*’.
- In February 2011, at UNESCO headquarters in Paris, IUGS approved the ‘Initiative on Forensic Geology’ which is now developing the document ‘*A Guide to Forensic Geology*’.

2 Aim and Objectives

- The aim of the IUGS Initiative on Forensic Geology (IFG) ‘*to develop forensic geology internationally and promote its applications*’.
- An objective of the IUGS IFG is to produce a document called, ‘*A Guide to Forensic Geology*’.
- ‘*A Guide to Forensic Geology*’ will be written and endorsed by technical specialists, comprising geologists, geoscientists, associated scientists and selected police/law enforcement representatives. These will be actively or ‘recently’ engaged in research and/or operational cases throughout the world in the multi-disciplinary field of forensic geology.
- ‘*A Guide to Forensic Geology*’ is not aimed at providing protocols or information on best practise. Instead it is envisaged that this document will be of value to those currently

working within the field of forensic geology and to those who may be considering working within or in association with forensic geologists.

- Specific objectives of '*A Guide to Forensic Geology*' (also known from here after as '*the Guide*') are to:
 1. Provide an introduction and overview of forensic geology.
 2. Summarise the historical and recent developments of forensic geology.
 3. Provide information on the basic principles of forensic geology.
 4. Provide guidance on geological (trace) evidence.
 5. Provide guidance on search.
 6. Draw attention to some of the technical, logistical, operational and professional aspect of forensic geology and the challenges ahead.

3 Authorship and Contributors

- Authors and contributors will be assigned to write specific sections of 'the Guide'.
- Authors and contributors will be 'IUGS-GEM, GIN Members' or may be assigned by IUGS-GEM, GIN to write a specific section or sections of 'the Guide'.
- Authors and contributors are requested to make the first draft submissions **by the end of December 2011**.
- 'Author(s)' will be the principal specialist responsible for the submission of a chapter or section of 'the Guide'.
- 'Contributors' may assist the Author(s) by providing; data, information, cases, figures, photographs or by undertaking reviews and/or peer reviews.
- All submissions must be in English.
- The style and use of English for each submission is not important and this stage as each submission will be edited into a consistent style.
- Submission must **NOT** be written in conventional 'academic' or 'technical' style (eg. for a conference paper or scientific journal paper). Instead, **submissions must be written in the style of a user friendly guide**.
- It is recommended for the submissions to be written in the style of the following:
 1. UK Police, National Policing Improvements Agency, Doctrines
 2. SWGMAT (USA)
 3. CAFSS (Australia)

- Authors and contributors must assume the reader has only a 'basic' geological knowledge.
- Technical terminology or 'jargon' must be limited where possible.
- Technical and scientific terms must be explained in the text or, preferably, submitted as a 'Glossary'.
- References must be up to date, obtainable (in the public domain) and relevant.
- Appendices must be used to explain more complex theories, principles and procedures that are not included in, but are referred to in, the main text.
- Permissions must be obtained for the reproduction and publication of any data, information, photographs, operational cases, etc.

4 Publication

- Publication of ‘the Guide’ may be possible via IUGS and/or The Geological Society of London (to be confirmed).

5 Scope

- The scope and contents of ‘the Guide’ are provided in the table below.
- This is a working draft document and it is likely to change and evolve following consultations with IUGS-GEM and GIN members and as the project evolves and develops.

6 Target Audience

- ‘The Guide’ is aimed to provide information on the different aspects of forensic geology in policing and law enforcement.
- ‘The Guide’ is not aimed at being the definitive document on forensic geology. However, it is envisaged that this document, produced independently and impartially, may be of value to the following:

Primary:

- (a) Forensic Geologists
- (b) Geologists/Geoscientists

Secondary:

- (a) Police
- (b) Law Enforcement
- (c) Military
- (d) Academia/universities
- (e) Students
- (f) Solicitors/lawyers & judges
- (g) Forensic scientists

- GIN Members are requested to add their initials to the section(s) they wish to contribute (see table at the end of the scope) and to return the table to Laurance Donnelly (see sections 14 and 15).

7 Funding

- ‘A Guide to Forensic Geology’ will be written by voluntary contributions from IUGS-GEM, GIN members.
- Authors, contributors and/or their organisations may be named in the final published version of ‘the Guide’. This will require the author/contributor to obtain permissions and approvals from their respective organisation/company/university/police force.
- All contributions will be voluntarily and non-contractual.
- Approval for each author/contributor will be approved by the GIN Steering Group Committee.
- Sources of funding are currently being sought and GIN Members will be kept informed if any funds are secured. However, if no funding is found the document will still be produced based

on the authors voluntarily contributions. Any publication costs or other associated costs will be discussed with IUGS-GEM and the publishers.

- If funding is provided, IUGS-GEM and GIN Steering Group Committee Members will be consulted to discuss the most appropriate use of any monies.

8 Peer Review

- *'A Guide to Forensic Geology'* will be peer reviewed before its publication.
- Appropriate Peer Reviewers are currently being decided.
- GIN Members are requested to submit the names of potential Peer Reviewers.

9 Drivers and Key Stakeholders

- Forensic geologists throughout the world working in; academia, consultancy or operationally based and some police/law enforcement officers seem to generally agree that a single document providing information and general guidance on forensic geology, written and endorsed by technical forensic geology specialists and some operationally based police officers, will be of value to the user community.
- Examples giving supportive views from within 'the Police' include the following:

a) *'Professional practice needs to be underpinned by the development of standard protocols, agreed methods, proficiency testing and appropriate training. In order to achieve a momentum towards these goals it may be useful to consider following the example of other criminalistic groups and establish an international scientific working group'*

Prof James Robertson (formerly National Manager Forensics and data Centres, Australian Federal Police, now University of Canberra, Australia and IUGS-GEM, GIN Steering Group Committee Member (presented at 2nd Soil Forensic Conference, Edinburgh, 2007, published in Ritz, Dawson & Miller 2009, page 11).

b) *'Geoforensics has been in a void but is now an emerging discipline and can bring significant benefits to policing'*

Prof Mark Harrison, MBE (formerly UK National Police Search Advisor, National Policing Improvements Agency now Australian Federal Police and IUGS-GEM, GIN Steering Group Committee Member (published in 'Police Professional', 25th September 2008, page 20).

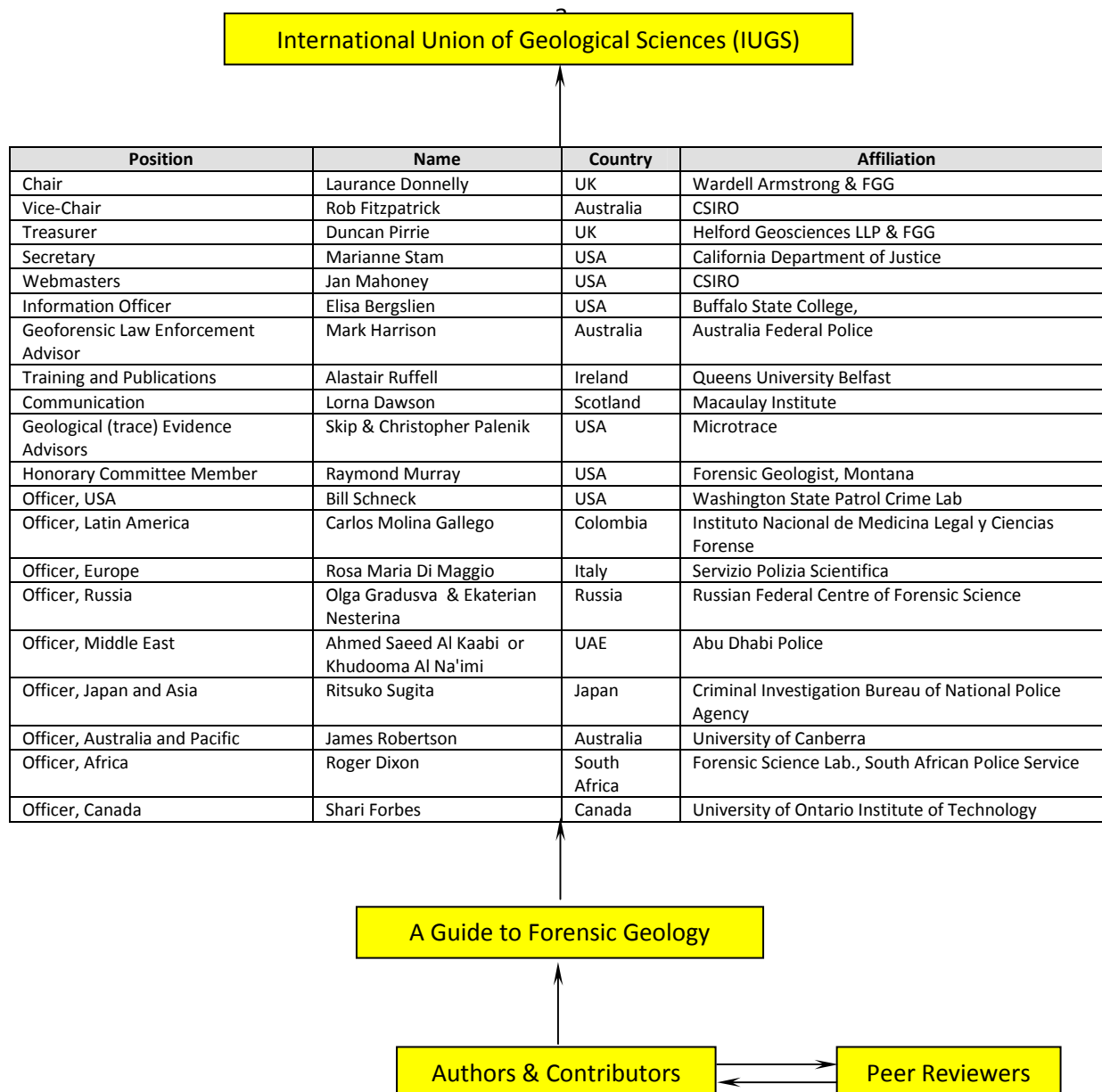
- IUGS-GEM, GIN represents an international Working Group on Forensics Geology. It is envisaged that; *'A Guide to Forensic Geology'* will make a positive contribution to forensic geology and some areas of policing/law enforcement.

10 Output

- The output will be a guidance document with supportive appendices, which provide the details on specific aspects of forensic geology.

11 Management of 'the Guide' and Reporting

- The production of the document will be managed by the IUGS IFG Committee and the reporting structure will be as follows:



Continued....

12 Contacts

- Further information on 'A Guide to Forensic Geology' may be obtained from the following committee members:

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13 Web site

- The International Union of Geological Sciences, Initiative on Forensic Geology, web site may be found at the following:

<http://forensicgeologyinternational.org/>

<http://forensicgeologyinternational.com/>

Note: This is a draft working document, it will evolve and change.

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14 Draft Programme

- The draft programme is as follows:

Main Task & Key Stages [#]	Dec 2010	Jan 2011	Dec 2011	April 2012	Aug 2012	Dec 2012	April 2013	June 2013	Dec 2013	TBC
Author/contributors assigned										
Author/contributors approval by IUGS IFG										
Deadline authors first submission										
Feedback to authors from IUGS IFG and revision submitted										
Working Draft presented IGC 2012 for discussion										
Draft to be finalised										
Deadline for comments on Draft										
Pre-publication copy submitted to IUGS/GSL for review										
Final document and handover to IUGS/GSL for publication										
Translations (if required) & publication										

Note: The programme is a working draft and it will be subjected to change and modifications

Continued.....



15 A Guide to Forensic Geology: Draft Scope, Report Structure, Authors and Contributors

- IUGS IFG members are requested to add initials in the 'Author(s) and Contributors' column and return to LJD

Chapter	Description	Author(s) and Contributors*
	Contents	LJD
	Preface	LJD
	Objectives	LJD, MH
	Acknowledgements	LJD
1	Introduction	
1.1	Overview of forensic geology	LJD
1.2	Background to project	LJD
1.3	Establishment of IUGS-GEM GIN	LJD
1.4	What is forensic geology	RM, LJD
1.5	Forensic geology & law enforcement	RM, LJD
2	Historical Review of Forensic Geology	
2.1	1700-1900	RM, CMM
2.2	1900-1950	RM, CMM
2.3	1950-2000	RM, CMM, EN, OG
2.4	2000 onwards	LJD, RM, CMM, EN, OG
2.5	Global perspective	LJD, RM, CMM
2.6	Sources of information (eg. books, CAFSS, NPJA, SWGMAT)	LJD, AR
3	Fundamental Principles of Forensic Geology	
3.1	Mineralogy	CP, SP, EN, OG, DP
3.2	Petrology	CP, SP, DP
3.3	Sedimentology	DP
3.4	Pedology (soils)	LD, RMD, EN, OG
3.5	Weathering and alteration	RS
3.5	Stratigraphy	DP
3.6	Classification of minerals, rocks and soils	CP, SP, EN, OG, DP
3.7	Micro-palaeontology	DP, MS
3.8	Hydrogeology	
3.9	Geomorphology	AR
3.10	Geochemistry	RMD, CMM
3.11	Geophysics	DN, LJD, AR
3.12	Sources of geological data and information	LJD, AR, JM
4	Geological Evidence	
4.1	Macro samples	AR, DP
4.2	Micro samples	SP, CP, BS, DP
4.3	Collection methods	MS, DP, JM
4.4	Crime scene investigation and examination	MS, DP, JM
4.5	Conventional geological analysis	MS, DP
4.6	Rock analysis	LD, EN, OG
4.6	Materials analysis	AR
4.7	Fossil and microfossil analysis	MS
4.8	Mining and mineral fraud	MS, CMM, RD
4.9	Engineering geology & geotechnical	DR
4.10	Analysis of non-mineral particles	BS
4.11	Evaluation and interpretation	DP, RMD
4.12	Limitations of soil & mineral analysis	DP, RMD
5	Methods & Techniques for Geological Evidence	

5.1	Colour and colourimetrics	LD
5.2	Texture and pH	CMM
5.2	Polarised light microscopy (PLM)	LD, SF
5.3	Scanning electron microscope (SEM)	LD
5.4	X-Ray diffraction (XRD)	LD
5.5	Field portable X-Ray Fluorescence (FPXRF)	EB
5.5	Plasma spectroscopy	AG (HE)
5.6	Raman spectroscopy	AG (HE)
5.7	Fourier transform infrared spectroscopy (FTIR)	LD
5.8	Physical analysis (eg. grain size, density, etc)	RMD
5.9	Thermogravimetry	RMD, DP
5.10	Cathodoluminescence	RMD
5.11	QemSCAN	DP
5.12	Isotopes	
5.13	Ecology (Botany, Palynology, Mycology, Zoology)	PW, DH
5.14	Geostatistics and GIS	JM, LD, EN, OG
5.15	Sampling	PW
6	Search for Burials	
6.1	Historical overview	LJD, MH, DR, AR
6.2	The law enforcement perspective	LJD, MH, DR, AR
6.3	The forensic geologists perspective	LJD, MH, DR, AR
6.4	Working with police officers (SIO, CSM, CSI, PoISA)	LJD, MH, DR, AR
6.5	Working with forensic geologists	LJD, MH, DR, AR
6.6	Burial philosophy (victim disposal)	LJD, MH, DR, AR
6.7	Briefing and debriefing	LJD, MH, DR, AR
6.8	Search objectives	LJD, MH, DR, AR
6.9	Search scale, phases, planning, design & types	LJD, MH, DR, AR
6.10	Systematic standard operational procedures (SOP)	LJD, MH, DR, Ar
6.11	Effective communication	LJD, MH, DR, AR
6.12	Dealing with the media, psychics, public and family	LJD, MH, DR, AR
6.13	Management and logistics	LJD, MH, DR, AR
6.14	Risk Assessments	LJD, MH, DR, AR
7	Methods and Techniques in Search	
7.1	Desk study and review	LJD, DR, AR
7.2	Conceptual geological model	LJD, DR, AR
7.3	Influence of geology of human decomposition &	SF
7.4	Diggability and excavability	LJD, MH, DR, AR
7.5	Visual observation	LJD, PW
7.6	RAG colour coded maps	LJD, MH, DR, AR
7.7	Geological and geomorphological mapping	LJD, AR, DR, AR
7.8	Winthrop theory	LJD, MH, DR, AR
7.9	Conventional air photography	LJD, MH, AR, DR, AR
7.10	Satellite imagery	LJD, MH, AR, DR, AR
7.11	Intrusive methods (probing, trenching)	LJD, MH, AR, DR, AR
7.12	Cadaver dogs (victim recovery dogs)	LJD, MG, MH, DR, AR
7.13	Geophysics	LJD, DR, AR, SF, MF
7.14	Hydrogeology, hydrochemistry and groundwater	AR
7.15	Volatile organic compounds	AV, LJD, DR, SF
7.16	Geochemistry	
7.17	Isotopes	
7.18	Role of other specialists (ecology, botany, palynology, mycology, zoology, archaeology, anthropology)	PW, DH, LJD, MH
7.19		AR, MH, GE, MF
7.20	Underwater searches	PW, RF



	Recording and recovery of finds	
8	Legal and Professional Aspects of Forensic Geology	
8.1	Links with related disciplines (eg. archaeology)	LJD, MH, PW
8.2	Chain of custody	PW, AR, EN, OG
8.3	Police and judicial structure	AR, PW, EN, OG
8.4	Presenting evidence in court	AR, DP, EN, OG
8.5	Ethical standards and integrity	LJD, AR, DP, JR, EN, OG, ARe, JS AR, JR, EN, OG, ARe, JS
8.6	Regulation & accreditation	
8.7	Other guidelines (eg. NPIA, SWGMAT, CAFSS)	BS, RF, JR, CMM, EN, OG
9	Cases in Forensic Geology <i>Selected cases will be included, authors are requested to submit cases for consideration</i>	All
10	Summary of Country Experiences in Forensic Geology <i>A brief summary, for each country, on the history of, and recent developments in forensic geology</i>	All
	References	LJD
	Appendices	LJD
	List of Abbreviations	LJD
	Glossary	LJD
	Index	LJD

15 IUGS IFG Actions

- **IUGS IFG Committee Members and Contributors are requested to:**
 1. Add their initials and name to the tables above and below and return to LJD.
 2. Contact LJD if circumstances change and you are not able to provide the above information.
 3. Suggest any new or missing items?
 4. IUGS IFG Committee Members and Contributors may change/alter the headings and sub-headings (as provided in the table above) for their submissions, based on their professional judgements.
 5. In the event a technical specialist cannot provide information for any section of the proposed 'Guide' this will be substituted by the inclusion of information from published sources such as books, papers and conference proceedings).
 6. **Please consider carefully your email replies and avoid excessive email traffic. Where possible avoid messages to the entire GIN Network.**
 7. **Do not email direct police/law enforcement officers unless you have permission to do so.**

Table showing the Principal Authors & Contributors

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