



**INITIATIVE ON FORENSIC GEOLOGY**

**INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)**

**INITIATIVE ON FORENSIC GEOLOGY (IFG)**

**Annual Report 2011**

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**INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)  
INITIATIVE ON FORENSIC GEOLOGY (IFG)**

**Annual Report 2011**

**PREPARED BY:**

Laurance Donnelly Chair  
Duncan Pirrie Treasurer (Financial Sections)

**CHECKED BY:**

Rob Fitzpatrick Vice-chair  
Marianne Stam Secretary  
Duncan Pirrie Treasurer  
Alastair Ruffell Training & Publications

**APPROVED BY IUGS-IFG COMMITTEE:**

Laurance Donnelly Raymond Murray  
Rob Fitzpatrick Bill Schneck  
Duncan Pirrie Carlos Molina Gallego  
Marianne Stam Rosa Maria Di Maggio  
Jan Mahoney Olga Gradusva  
Elisa Bergslien Ekaterina Nesterina  
Mark Harrison Ahmed Saeed Al Kaabi  
Jodi Webb Ritsuko Sugita  
Alastair Ruffell James Robertson  
Lorna Dawson Roger Dixon  
Skip Palenik Shari Forbes  
Christopher Palenik

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**INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)  
INITIATIVE ON FORENSIC GEOLOGY (IFG)  
ANNUAL REPORT FOR 2011**

**1 TITLE OF CONSTITUENT BODY**

Initiative on Forensic Geology (IFG)

**2 OVERALL OBJECTIVES**

**2.1 Mission Statement**

IUGS-IFG seeks to; 'to develop forensic geology internationally and promote its applications'.

**2.2 Goals**

The principal objectives of the IUGS-IFG are to:

1. Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
2. Promote international meetings, seminars, conferences and training;
3. Develop a 'Committee' to act as principal advisers, collaborators and active participants;
4. Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
5. Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
6. Produce a document endorsed by the Committee to be called '*A Guide to Forensic Geology*'.

**3 ROLE WITHIN IUGS SCIENCE POLICY**

**3.1 Background**

Although the documented history of forensic geology can be traced to the latter half of the 19<sup>th</sup> Century, in the past ten years or so have there been significant interests and developments in the multidisciplinary fields of forensic geology throughout the world.

Since about the millennium there have been at least 25 international meetings, conferences and seminars on or including different aspect of forensic geology. Furthermore, at least 5 books have been published on the subject and numerous technical papers in scientific journals, conference proceedings, magazines and newspapers.

The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG) was officially launched during the 62nd Executive Committee Meeting of the IUGS, which was held at UNESCO headquarters, in Paris, France, on 22nd February 2011.

### 3.2 Main Approach

IUGS-IFG aims to raise the global awareness of forensic geology by holding meetings and conferences, promoting research, teaching, training and the operational deployment of forensic geologists. This will be achieved consistent with the broad objectives of IUGS as follows:

- **Capacity building.** By raising levels of awareness, knowledge and providing information about forensic geology;
- **Technology transfer.** The actual improvement in skill sets; and
- **Outreach.** Educating and informing the police and law enforcement organisations and the 'general public' about forensic geology.

IUGS-IFG currently is planning to provide capacity building, technology transfer and outreach events in different parts of the world over the next 3-5 years.

## 4 ORGANIZATION

IUGS-IFG has established a committee to manage and develop the working group. This comprises representatives from major geographical regions of the world to give global coverage. It includes specialists and experts from academia, industry, consultancy, operationally based geologists, the police, law enforcement agencies and forensic organisations. The structure of the committee is given in Figure 1 and Table 1, below:

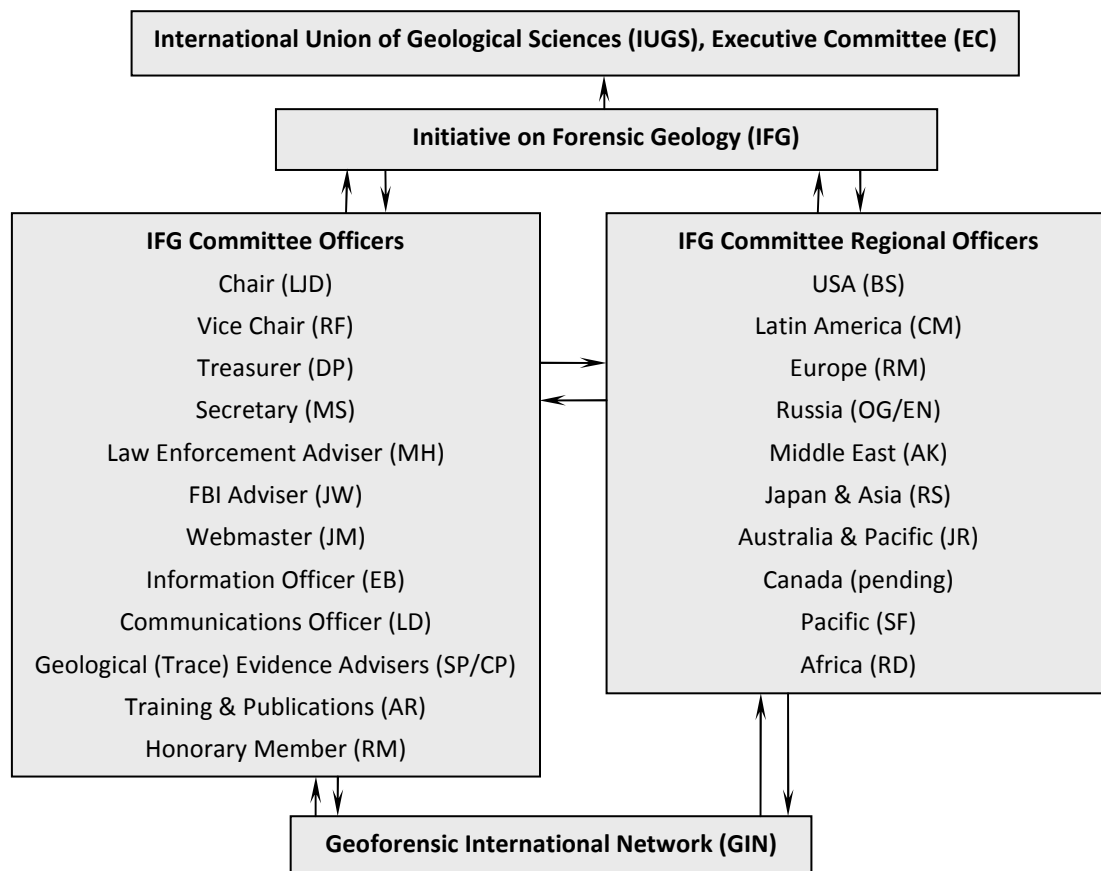


Figure 1. The general structure of IUGS-IFG Committee

Position	Name	Country	Affiliation
Chair	Laurance Donnelly	UK	Wardell Armstrong & FGG
Vice Chair	Rob Fitzpatrick	Australia	CSIRO
Treasurer	Duncan Pirrie	UK	Helford Geosciences LLP & FGG
Secretary	Marianne Stam	USA	California Department of Justice
Webmaster	Jan Mahoney	USA	CSIRO
Information Officer	Elisa Bergslien	USA	Buffalo State College
Geoforensic Law Enforcement Adviser	Mark Harrison	Australia	Australian Federal Police
FBI Adviser	Jodi Webb	USA	Federal Bureau of Investigation (FBI)
Training and Publications	Alastair Ruffell	Ireland	Queens University Belfast & FGG
Communications Officer	Lorna Dawson	Scotland	James Hutton Institute
Geological (Trace) Evidence Advisers	Skip & Christopher Palenik	USA	Microtrace
Honorary Committee Member	Raymond Murray	USA	Forensic Geologist, Montana
Officer, USA	Bill Schneck	USA	Washington State Patrol Crime Lab
Officer, Latin America	Carlos Molina Gallego	Colombia	Instituto Nacional de Medicina Legal y Ciencias Forense
Officer, Europe	Rosa Maria Di Maggio	Italy	Servizio Polizia Scientifica
Officer, Russia	Olga Gradusva & Ekaterian Nesterina	Russia	Russian Federal Centre of Forensic Science
Officer, Middle East	Ahmed Saeed Al Kaabi	UAE	Abu Dhabi Police
Officer, Japan and Asia	Ritsuko Sugita	Japan	Criminal Investigation Bureau of National Police Agency
Officer, Australia	James Robertson	Australia	University of Canberra
Officer, Africa	Roger Dixon	South Africa	Forensic Science Lab., South African Police Service
Officer, Pacific	Shari Forbes	Hawaii	Chaminade University of Honolulu
Officer, Canada	Pending	Canada	Pending

Table 1. IUGS-IFG committee members in 2011 and their professional affiliations

## 5 EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

As with all IUGS initiatives, the success of the Initiative is dependent upon the support provided by the geological community. Support for IUGS-IFG has been provided by both individuals and their employers allowing the participation within the Initiative as either Committee Officers or as Regional Officers. The in-kind value of this support is considerable. We estimate that the Committee Officers have put in approximately 100 person days in the last year establishing IFG. In addition, 18 members of the IFG attended the inaugural meeting in Rome, which, when travel time is considered, represents approximately 72 person days input. The value of this in-kind support is difficult to quantify, but we have been fortunate in bringing together the leading forensic geologists worldwide; and a commercial value to the time spent on the IFG to date would be in excess of £80,000 UK sterling equivalent.

In addition, participation in the IFG inaugural meeting was met directly by some of the participants' employers with a value of approximately £10,000 UK sterling equivalent. Furthermore, by allowing the Officers to participate the IFG has received the support of: commercial companies (Wardell Armstrong (UK), Helford Geoscience (UK), Microtrace (USA)); police/law enforcement agencies (California Department of Justice (USA), Federal Bureau of Investigation (USA), Australian Federal Police, Washington State Patrol, Abu Dhabi Police, Russian Federal Centre of Forensic Science, Criminal Investigation Bureau, National Policing Agency (Japan), South African Police Service, Servizio Polizia Scientifica (Italy)) and Universities and Research Institutes (CSIRO (Australia), Buffalo State College (USA), Queens University Belfast (UK), James Hutton Institute (UK), University of Canberra, Chaminade University of Honolulu, Hawaii)).

## 6 INTERACTION WITH OTHER INTERNATIONAL PROJECTS

IUGS-IFG and its committee members have interacted with the following organisations and proposed events:

- INTERPOL Symposium, Lyon, France, 2010-2011;
- Geological Society of London, Forensic Geoscience Group (FGG), 2010-2011;
- GeoNZ2010, Forensic & Evidential Geology Session, New Zealand, 2010-2011;
- Geological Congress, Medellin, Colombia, 2011;
- Collaboration with the USA Scientific Working Group-Geological Materials (SWGGE), 2011;
- Collaboration with CSIRO, Australia, to produce standards guidelines in geological trace evidence collection, sampling and analysis, 2011;
- Collaboration with the UK National Policing Improvements Agency (NPIA), 2011;
- Collaboration with the UK Home Office, Centre for Applied Science & Technology (CAST) (formerly the Home Office Scientific Development Branch), 2011;
- Geological Society of London and Home Office, regarding regulation and accreditation in forensic sciences and forensic geology, 2011;
- 4<sup>th</sup> Soil Forensics International Conference, the Hague, Netherlands, 2012;
- The 34<sup>th</sup> International Geological Congress, Brisbane, 2012;
- Forensic Geology Training with the Australian Federal Police, 2012;
- Geological Association of Canada Conference, Newfoundland, 2012;
- The 2<sup>nd</sup> Ibero Latin American Conference on Forensic Geology, Brasil, 2013;



## 7 CHIEF ACCOMPLISHMENTS FOR 2011

### 7.1 Objectives for 2011

The primary objectives of IUGS-IFG for 2011 were as follows:

- Establish a committee to include global representatives;
- Set up a bank account;
- Establish a web site for the management of the IUGS Forensic Geology Task Group;
- Hold an inaugural meeting to formally launch IFG;
- Produce a flier on IUGS-IFG; and
- Design a logo.

### 7.2 Bank Account

The IUGS-IFG bank account has been approved and established, some of the details for this account are as follows:

- **Account Name:** IUGS Forensic Geology
- **Bank:** National Westminster Plc
- **Branch:** Falmouth Branch, 29-30 Market Street, Falmouth, Cornwall, TR11 3AH, UK
- **IUGS IFG Treasurer:** Duncan Pirrie
- **IUGS IFG Signatories:** Duncan Pirrie, Laurance Donnelly, Alastair Ruffell

### 7.3 Web site

The IUGS-IFG web site is fully operational and is based at Buffalo State University where it is managed by Elisa Bergslien. The web site addresses is: *forensicgeologyinternational.org* and/or *forensicgeologyinternational.com*

### 7.4 Inaugural Meeting in Rome

On 18-19 September 2011, the IUGS-IFG and its newly formed committee members became formally established and launched at an inaugural meeting in Rome, Italy. The IUGS-IFG meeting in Rome were as attended by 18 committee members from around the world. It was a highly successful event organized by Rosa Maria Di Maggio, (Servizio Polizia Scientifica, Roma and IUGS-IFG Officer for Europe) and Laurance Donnelly (Chair, IUGS-IFG). The inaugural meeting in Rome enabled the aims and objectives of the working group to become established and a future working plan was formalised. The meetings were followed by the delivery of a series of 'outreach' lectures on different aspects of forensic geology, given by members of IFG, at Roma Tre University.

### 7.5 Flier

The draft version of the IUGS-IFG flier has been circulated to committee members and this is expected to be made available for global circulation in 2012.

## **7.6 Logo**

IUGS-IFG is in the process of designing a logo. A short list of 6 different logo designs were discussed in Rome and the final version is expected in 2012.

## **7.7 Geoforensic International Network (GIN)**

As part of IUGS-IFG, the *Geoforensic International Network (GIN)* became formalised. GIN brings together forensic geologists, geoscientists, related specialists and selected police/law enforcement officers to help guide and steer the global developments of forensic geology. Currently, there are approximately 70 selected members from about 30 countries.

## **7.8 INTERPOL**

In October 2010, two IUGS-IFG committee members attended the INTERPOL, 16th International Forensic Science Symposium, in Lyon, France. The meeting resulted in a possible collaboration between IUGS-IFG and INTERPOL. This may now involve alternate year updates of the forensic geology portion of the INTERPOL biennial publication on forensic science.

## **7.9 A Guide to Forensic Geology**

IUGS-IFG committee members have supported and endorsed the production of a document to be called, '*A Guide to Forensic Geology*'. This aims to provide general information and guidance on the practical applications of forensic geology. This guide is envisaged to be of value to geologists, forensic scientists and police/law enforcement officers that currently are or may potentially become engaged in forensic geology. It will be written by forensic geologists and selected specialists from consultancy, academia, the police and law enforcement and it will be subjected to internal and external peer review. It is expected to take between 3-5 years for completion. Publication is likely to be via IUGS/The Geological Society of London (to be confirmed).

## **7.10 Competence, Regulation and Code of Conduct**

IUGS-IFG has begun to address the complex issues of competency and regulation in forensic geology and will develop a code-of-conduct. This has been facilitated by collaboration with the UK Home Office and the Geological Society of London.

## **7.11 Collaboration with the Police and Law Enforcement**

IUGS-IFG has assigned to the committee experienced police officers, forensic scientists and geologists who currently work with the police and law enforcement agencies. These include; California Department of Justice, Federal Bureau of Investigation, Australian Federal Police, Washington State Patrol, Abu Dhabi Police, Russian Federal Centre of Forensic Science, Criminal Investigation Bureau, National Policing Agency (Japan), South African Police Service, Servizio Polizia Scientifica and UK Home Office, Centre for Applied Science and Technology (CAST). Furthermore, in 2012 a representative from the British Police, National Policing Improvements Agency (NPIA) is expected to become affiliated to IUGS-IFG. The roles of these members are to help guide and steer the group and provide practicable advice and assistance as well as to assist with training and development needs.

### **7.12 Forensic Geology in Spain**

In September 2011, the Board of the Spanish Association of Geologist (ICOG) recognised the value of Forensic Geology and agreed to support the IUGS Initiative on Forensic Geology ([http://www.icog.es/\\_portal/noticias/noticias.asp?bid=2032&ini=1](http://www.icog.es/_portal/noticias/noticias.asp?bid=2032&ini=1)). Spanish forensic geologists are willing to organize a lecture on Forensic Geology in 2012 at the Instituto Universitario de Investigación en Ciencias Policiales. They have invited some members of IUGS-IFG to hold a series of 'outreach' lectures on Forensic Geology.

### **7.13 Criminal and Environmental Forensics**

In 2011, the scope of IUGS-IFG was expanded to include not only forensic geology relevant to policing but also as criminal and environmental forensics, for example; pollution, contamination, illegal tipping, minerals and precious metals fraud. Roger Dixon, a geologist with the Forensic Science Laboratory, South African Police Service, was assigned to the committee as the officer for Africa.

Three members of the IUGS-IFG committee have been given approval from the Geological Society of London to produce a special publication on criminal and environmental forensics.

### **7.14 Sub-groups**

IUGS-IFG members have started discussion on the possible setting up of sub-groups to develop guidance and advice for specific areas of forensic geology. Current topics have included underwater search capabilities and airborne surveys.

### **7.15 Global Geoforensic Support**

Although IUGS-IFG was not set up to directly support operational police and forensic investigations, some members of the committee and GIN were contacted by the police to advise on searches and other serious crimes. In these situations IFG and GIN members were able to very quickly locate forensic geologists around the world with specialist knowledge to assist with a particular case. Examples included the provision of general advice and information for ground searches for graves in the UK, Europe, South America, Ukraine, Australia and Northern Ireland and advice on mineralisation found on human bones in Colombia.

## **8 MAIN PRODUCTS IN 2011**

IUGS-IFG main products in 2011 include the following:

- Establishment of web site;
- Production of flier (pending);
- Holding of an inaugural meeting in Rome;
- Formalisation of the Geoforensic International Network (GIN); and
- Throughout 2011, IUGS-IFG published a number of scientific papers, conference papers, magazine and newspaper articles to promote and develop IUGS-IFG. Some of these are available on the IUGS-IFG web site.

## 9 MAIN PROBLEMS ENCOUNTERED IN 2011

### 9.1 Finance

Locating sufficient funding to bring together 18 committee members from around the world to hold the first inaugural meeting proved to be challenging. Fortunately, other sources of funding including support in-kind from corporate organisations and committee members' personal funds enabled IUGS-IFG to achieve a successful first year. These funds proved to be an important financial resource in addition to the critically important core funding provided by IUGS.

### 9.2 Confidentiality

Since IUGS-IFG routinely collaborate with senior police and law enforcement officers IFG needs to determine a method for the secure exchange of information and contact details. One solution being examined is to develop a secure link on the group's website that is password protected.

## 10 SUMMARY OF EXPENDITURES IN 2011

The income and expenditure on the account is summarised in Table 2. Most of the costs incurred have been related to the inaugural meeting of the IFG in Rome. As the bank account is held in the UK the income and expenditure is shown in £ sterling. As of the 15<sup>th</sup> December 2011 there is an unspent balance of £868.28.

IUGS Initiative on Forensic Geology Income & Expenditure		
Credit	\$(USD)	£(Sterling)
IUGS	15,000.00	9116.9
<b>Debits</b>		
15/09/2011	C Gallego expenses Rome	1069.10
26/09/2011	D Pirrie hotel meeting costs	1181.71
07/10/2011	D Pirrie expenses Rome	263.73
18/10/2011	A Ruffell expenses Rome	200.20
18/10/2011	L Dawson expenses Rome	354.84
18/10/2011	S Palenik expenses Rome	1021.38
18/10/2011	M Stam expenses Rome	1050.80
18/10/2011	W Schneck expenses Rome	769.24
18/10/2011	R Fitzpatrick expenses Rome	643.10
19/10/2011	L Donnelly expenses Rome	234.98
31/10/2011	R Dixon expenses Rome	408.94
31/10/2011	E Bergslien expenses Rome	938.77
21/11/2011	Bank charges international payments	111.83
		8248.62
<b>Balance 15/12/11</b>		<b>868.28</b>

Table 2. Summary (in £ Sterling) of income and expenditure for 2011

## **11 WORK PLAN FOR NEXT YEAR (2012)**

### **11.1 Principal Objectives**

The principal IUGS-IFG objectives for 2012 were discussed at the inaugural meeting in Rome and are currently considered to be as follows:

- Participate in the Forensic Geoscience Symposium at the 34<sup>th</sup> International Geological Congress, Brisbane (IGC2012), Australia (August 2012);
- Provide training and knowledge transfer for the Australian Federal Police (August 2012);
- Provide a series of outreach lectures on different aspects of Forensic Geology at the Geological Association of Canada (GAC), Annual Meeting, St. John, Newfoundland, (May 2012);
- Collaborate with the Geological Society of London, Forensic Geoscience Group (FGG) and provide a series of outreach lectures at the 4<sup>th</sup> International Soil Forensics conference, the Hague, Netherlands (August 2012);
- Commence the planning and writing of '*A Guide to Forensic Geology*'; and
- Produce a publication for Episodes on 'Forensic Geology'.

The above events are to be organised by nominated IUGS-IFG committee members and overseen by the Chair and Vice Chair.

### **11.2 Longer Term Objectives**

In 2012, the planning for events in 2013 and beyond will also take place and these may include the following:

- The possibility of holding a series of capacity building, technology transfer and outreach training programmes with the Brazilian Federal Police as part of the 2<sup>nd</sup> Ibero Latin American Conference on Forensic Geology; and
- Possible technology transfer and outreach events (to be confirmed) with the Royal Canadian Mounted Police, Ontario Provincial Police (OPP) Emergency Response Team (PERT) and the police and forensic institutions in the United Arab Emirates (Abu Dhabi), South Africa (Johannesburg) and Russia (Moscow).

## **12 CRITICAL MILESTONES**

Critical milestones to date have included the following:

- Establishment of an international IUGS-IFG Committee;
- Establishment of the IUGS-IFG web site;
- Agreement for IUGS-IFG participation in IGC2012; and
- Agreement to hold training with the Australian Federal Police in 2012.

### **12.1 What are the major issues facing the current leadership of the organization?**

The principal challenge facing the leadership of IUGS-IFG is the availability and sustainability of funding. The funding received from IUGS is critical for the survival and growth of this international working group.

### **12.2 Planned publications in Episodes or through the IUGS website**

IUGS-IFG plans to submit in 2012 an article(s) on forensic geology for publication in 'Episodes' or the web site. This is likely to provide an overview of forensic geology and an update on the global status of forensic geology and 'recent' developments.

### **12.3 Planned participation in the next IGC**

At IGC 2012 in Brisbane in 2012, FGG plans to participate a Forensic Geology session, which is a tremendous achievement for forensic geosciences and a fantastic opportunity to promote and raise awareness of forensic geology. The convenor is Rob Fitzpatrick (Australia, and IUGS-IFG Vice Chair) and the co-convenors are Laurance Donnelly (UK, IUGS-IFG Chair) and Dallas Mildenhall (New Zealand, IUGS-IFG Geoforensic International Network).

### **12.4 Training with the Australian Federal Police (AFP)**

As part of IGC 2012, training in Forensic Geology is proposed to be delivered with the Australian Federal Police (AFP). This will be organised by Prof Mark Harrison, MBE (AFP Search Adviser & IUGS-IFG Law Enforcement Adviser), James Robertson (IUGS-IFG officer for Australia), Robert Fitzpatrick and Laurance Donnelly.

## **13 ANTICIPATED RESULTS TO BE ACHIEVED FOR 2012**

The main expected results for 2012 are as follows:

- Update and of the IUGS-IFG web site;
- Representation at IGC 2012 in Brisbane;
- Deliver training to AFP in Australia;
- Possible representation at GAC in Canada (depending on finance);
- Possible representation at 3rd Soil Forensic conference in the Hague, Netherlands; and
- Draft outline of '*A Guide to Forensic Geology*'.

## **14 BUDGET FOR 2012**

IUGS-IFG are planning on a wide range of events during 2012, including the GAC meeting in Newfoundland Canada and IGC in Brisbane, Australia and associated training events with the Australian Federal Police.

Most of the funding would be required to allow key members of the initiative to attend the identified meetings and to be able to deliver the identified training programmes.

We would request that we can "roll forward" the current balance of £868.28 (£UK sterling), to enable the early purchase of air tickets. We also anticipate expenditure on the production and distribution of fliers and possibly the web site within 2012.

We would request \$USD 15,000 funding for 2012.

In addition, IUGS-IFG would request an additional \$1000USD, if possible, to assist with the printing, issuing and global distribution of a flier on Forensic Geology.

#### 14.1 Potential Funding Sources

In the fullness of time we anticipate that the IUGS-IFG may evolve, into a self sustainable international group, which would financially be self supporting through payment of membership subscriptions by different categories of members (student, associate etc).

With the planned delivery of training programmes in 2012, we aim that any such events should at least break even or generate a small surplus. The requested funding and any surplus generated through training will be used to support the other activities of the Initiative. We also intend targeting specialised companies providing equipment etc., used in forensic geoscience for potential sponsorship.

#### 15 REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS

Not applicable

#### 16 OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2012-2017)

The 5 years plan for IUGS-IFG is still in the processes of being develop but may broadly be as summarised in Table 3.

Year	General objectives
2011	<ul style="list-style-type: none"> <li>• Establishment of IUGS-IFG committee, web-site and bank account;</li> <li>• Inaugural meeting in Rome; and</li> <li>• Identification of key objectives.</li> </ul>
2012	<ul style="list-style-type: none"> <li>• Development of web-site;</li> <li>• Start writing, 'A Guide to Forensic Geology';</li> <li>• Representation at ICG2012;</li> <li>• Training for the Australian Federal Police;</li> <li>• Representation at Geological Association of Canada, Newfoundland;</li> <li>• Representation at 4<sup>th</sup> Soil Forensic Conference, the Hague, Netherlands;</li> <li>• Issue IUGS-IFG flier; and</li> <li>• Issue IUGS-IFG logo.</li> </ul>
2013	<ul style="list-style-type: none"> <li>• Training in Forensic Geology for the Brazilian Federal Police;</li> <li>• Representation at 2<sup>nd</sup> Ibero Latin American Conference of Forensic Geology; and</li> <li>• Progress development of, 'A Guide to Forensic Geology', issue of draft and start internal</li> </ul>

	peer review process.
2014	<ul style="list-style-type: none"><li>• Training in Forensic Geology in Moscow, UAE or South Africa;</li><li>• Complete internal and external peer review of, 'A Guide to Forensic Geology';</li><li>• Incorporate internal peer review comments for 'A Guide to Forensic Geology'.</li></ul>
2015	<ul style="list-style-type: none"><li>• Deliver training in Forensic Geology (location to be confirmed);</li><li>• Complete external peer review and publication of, 'A Guide to Forensic Geology';</li><li>• Meeting of IUGS-IFG Committee to identify future of IFG and possible evolution of the group.</li></ul>

Table 3. General summary of the possible five year plan for IUGS-IFG (this is subjected to change and requires verification by IUGS-IFG committee members)

## 17 SUGGESTIONS FOR IMPROVEMENT OF IUGS ACTIVITIES

*Not Applicable*

## 18 COMMENTS

IUGS-IFG has been successful in drawing together geologists, forensic scientists, selected police and law enforcement officers and other geoscientists from around the world, to develop for the first time a formal task group to promote forensic geology both as a science and profession.

## 19 SUBMITTED BY

**Name (of persons preparing form, please print):**

Dr Laurance Donnelly, *BSc (Hons), PhD, CGeol, CSci, EurGeol, FGS, FGSA*

**Position:** Chair

**Date:** 23<sup>rd</sup> December 2011

**Address:** Wardell Armstrong LLP, 2 The Avenue, Leigh, Greater Manchester, WN7 1ES, UK

**Phone:** +44 (0) 1942 260 101 and +44 (0) 7970 038 236

**Fax:** +44 (0) 01942 261 754

**E-mail:** [ldonnelly@wardell-armstrong.com](mailto:ldonnelly@wardell-armstrong.com)

**Web:** [forensicgeologyinternational.com](http://forensicgeologyinternational.com) or [forensicgeologyinternational.org](http://forensicgeologyinternational.org)

**Signature:**

*Laurance John Donnelly*

**Name (of persons preparing form, please print):**

Dr Duncan Pirrie *BSc (Hons), PhD, EurGeol, FGS*

**Position:** Treasurer

**Date:** 23<sup>rd</sup> December 2011

**Address:** Helford Geoscience LLP, Menallack Farm, Treverva, Penryn, Cornwall, TR10 9BP, UK

**Phone:** +44 (0) 07721 656 028

**E-mail:** [dpirrie@helfordgeoscience.co.uk](mailto:dpirrie@helfordgeoscience.co.uk)

**Web:** [forensicgeologyinternational.com](http://forensicgeologyinternational.com) or [forensicgeologyinternational.org](http://forensicgeologyinternational.org)

**Signature:**

*Duncan Pirrie*



## 20 PHOTOGRAPHS



**Photograph 1:** IUGS IFG committee members at the IFG inaugural meeting, held in Rome, 18-19 September 2011



**Photograph 2:** Laurance Donnelly (Chair, IUGS IFG) presents to Rosa Maria di Maggio (Servizio Polizia Scientifica, Roma, Italy & IUGS IFG Officer for Europe) a plaque in recognition of her organising the IUGS-IFG inaugural meeting in Rome, Italy, 18-19 September 2011.