Newsletter December - March 2010

Issue No. 22

IGI News

The Nominations Committee has produced a list of the following Candidates to stand for election at the 2010 AGM which will be held on May 26th in the Geological Survey of Ireland.

Additional nominations may be made in writing signed by 2 members in good standing and consented to by the nominee and delivered to the Secretary by the 9th of April, 2010.

BOARD EXECUTIVE

President	EurGeol Dr John Kelly PGeo
Vice President	EurGeol Dr Deirdre Lewis PGeo
Secretary	EurGeol Mr Gerry Stanley PGeo
Treasurer	EurGeol Mr Morgan Burke PGeo

BOARD MEMBERS

EurGeol Mr Barry Balding PGeo
EurGeol Mr Andy Bowden PGeo
EurGeol Ms Mary Carter PGeo
EurGeol Dr Jonathan Derham PGeo
EurGeol Ms Marie Fleming PGeo

Young Scientist's Expo 2010

Geology Rocks!
Reaching out to Ireland's young scientists

Geology Rocks! – this was the message that rang out loud and clear at the BT Young Scientist and Technology Exhibition in Dublin in January 2010. As the final act of the International Year of Planet Earth initiative a geoscience stand incorporating personnel and props from several different organisations was a central feature of the Exhibition's Eco-zone.

The geoscience exhibit aimed to communicate to the students (and their teachers and parents) the varied nature of geology in an interesting and engaging way. It sought to demonstrate the importance and relevance of geology and geologists, what Planet Earth is all about and how it impacts on our everyday lives. Considering that the Young Scientist Exhibition is the leading schools' science showcase in the country with an attendance of 30,000, it was an excellent opportunity for the geoscience sector to reach out to the youth of Ireland.

Stand Design
In an excellent example of organisations in the geoscience sector acting in robust partnership, GSI co-ordinated the stand with enthusiastic assistance from the Irish Geological Association, Dublin Institute for Advanced Studies (DIAS), the National Museum of Ireland, Petroleum Affairs Division (PAD) of the Department of Communications, Energy & Natural Resources and Trinity College. Integrating several organisations into one large exhibit stand was no easy task. It was decided that the central messages of the stand had to be neutral, and not organisation-specific. The stand carried the title *"Understanding Planet Earth"* and the over-riding message was that the rocks around us are central to everything we do on earth and need to be studied and understood. The design of the stand employed a uniform "earthy" green-blue colour scheme, with posters representing the work of each organisation involved. Staff manning the stand wore a neutral t-shirt communicating both the title of the stand and the message *"Geology rocks!"* The 12 metre wide stand was one of the busiest stands across the entire exhibition.

Stand Props
The stand availed of a range of props to generate traffic. Foremost among them was a "Minerals for Living" Challenge. This competition was almost constantly swamped by excited, giddy students, trying to link colourful minerals in a glass display case with the appropriate product in everyday use that was displayed on

the wall behind the case. All entrants received a t-shirt (while stocks lasted!) or other merchandise such as

recyclable pens or rulers. Other props that generated a lot of comment and attention included rock core samples with traces of oil, a working seismometer and a cast replica of part of the Valentia Tetrapod Trackway (the fossilized footprints of a four footed animal from 385 million years ago!).

Affirmation
For many stand visitors it was their first time to speak with a practising geologist. They talked about everything from oil to dinosaurs, from gold to caves. Yet, it was very much a two-way street – it was readily apparent that stand personnel found the exhibition to be very inspirational, with the hordes of stand visitors re-igniting their own enthusiasm in their work in the field of geology.

Enda Gallagher, GSI

EU Directives Seminar

The IGI will be hosting a EU Directives Seminar on May 12th in Horse & Jockey. Further details will be available on the IGI's website at www.igi.ie

The Irish Geological Association (IGA)

The IGA is almost 50 year old and over the years has hosted hundreds of the field trips and lectures that constitute its core activity. Recent highlights have been a joint IGA-IAEG field trip to the Isle of Man led by John Morris, and a New Year Lecture by Iain Stewart who has hosted the TV show *Earth-The Power of the Planet.* Other events include occasional courses such as the amazing one on sand directed by Bettie Higgs, and the more social Members' Nights and AGM.

Forthcoming lectures include a one by Barry Long on *Diamond geology, an overview* to be held in GSI on Wednesday 31st. March at 8pm and a one by Matthew Parkes (Natural History Museum) entitled *Mad about Meteorites* also in GSI on Wed. 14th April at 8pm. Our next field trip will be a weekend trip to the Dingle area, Co. Kerry, led by Dr. Bettie Higgs on the 14-16th May.

For many years the IGA has been involved with the Irish Geological Research Meeting (IGRM) held this year in the Ulster Museum in Belfast. This meeting was a most successful mix of papers on geology, palaeontology, geophysics, the Tellus project and many other interesting topics. The IGA presented a prize of €250 for the best student presentation to Milo Barham, NUI Galway, for his stunning paper on *Stable isotopes and the Carboniferous Glaciation, no evidence for rapid deterioration at the Viséan/Serpukhovian boundary.* The IGA also sponsored one the two public lectures run in conjunction with the IGRM; Mike Baillie, QUB, gave a controversial lecture on *How a perfectly rational scientist came to believe comets could be dangerous.*

Milo Barham, NUI Galway receiving his award for best student presentation

Susan Pyne, /IGA Vice-President

International Association of Hydrogeologists (Irish Group) Annual Conference

Annual Conference – 20th and 21st April 2010, Tullamore, Co. Offaly.

"Groundwater in the Hydrological Cycle – Pressures and Protection"

In this 30th Year Anniversary of the Annual IAH Conference, we look at "groundwater in the hydrological cycle - pressures & protection". The two day event will start by looking into how water recharges our aquifers through thick glacial overburden and then will move on to look at how groundwater flows through the many different rock types that Ireland possesses including karst limestone, poorly productive bedrock and sand and gravel systems. The second half of Day 1 will explore how groundwater discharges through surface water systems, groundwater dependent ecosystems and in extreme cases through flooding events. Finally, Day 1 will draw to a close by looking at the diffuse agricultural and industrial point sources of contamination that can affect this precious resource and the implications of the Environmental Liability Directive for groundwater protection.

Day 2 will start by looking at the new measures that are available to protect groundwater including legal, source protection zones and recent EPA guidance. The conference will close by looking at the impact that climate change is and may have on groundwater resources in Ireland and globally.

Evening entertainment will be provided on the first night of the conference at a local venue and is included in the registration fee.

We look forward to welcoming you to celebrate the 30th Anniversary on 20th and 21st of April 2010!

Irish Mining and Quarrying Society AGM

Difficult Trading Conditions for Quarrying
- Irish Mining and Quarrying Society AGM -

Speaking at the AGM of the Irish Mining and Quarrying Society (IMQS) in Dublin last night, Seán Finlay, President, said: "While the mining industry enjoyed a reasonable year, these are most difficult trading conditions for the quarrying sector. Output from quarrying has declined over 60% since 2007.

While the National Development Plan has of necessity been severely curtailed, the IMQS supports the well publicised initiative of the Construction Industry Council (CIC) which calls for investment in critical infrastructure by pension funds. A recent report by Davy Stockbrokers suggests that despite our recent economic boom which saw per capita income reach European levels, our investment in technological capacity and physical infrastructure is still lacking. The CIC proposals, which are supported by trade unions, represent an opportunity to remedy this deficit."

The IMQS, which is the independent society for individuals involved in the Minerals Industry in Ireland, held its AGM on the 25th of February in the Spa Hotel, Lucan, Co Dublin.

Mr Finlay added: "Considering this decline in output, the IMQS is proud to have maintained and improved its services in the last very difficult year, with only a slight disimprovement in the financial outcome. This reflects well on our Council and staff."

During 2009 the IMQS had a number of achievements. Corporate membership increased from 2 to 7 members. The society successfully extended its cooperation with similar vocational and professional bodies, while providing a range of relevant and informative events for members. Joint events included a major seminar on planning issues (jointly with the Irish Concrete Federation); a quarry safety seminar (jointly with the ICF, CIF, AIT and the Health & Safety Authority); an evening lecture on available geological databases (jointly with the International Association of Hydrogeologists); and an international conference on the reporting of mineral resources and reserves (jointly with the Institute of Geologists of Ireland).

Mr Finlay welcomed PJ O'Donnell of Pat O'Donnell & Co. Plant Hire as incoming Vice President, and thanked Les Sanderson for his work as Vice President over the previous year. He also welcomed the appointment of Siobhan Tinnelly, a Senior Scientist with TOBIN Consulting Engineers, as Honorary Secretary; Carol Sanderson as Executive Secretary; and Mike Lowther, former Mine Superintendent of the Galmoy Mine, to Council.

Mr Finlay continued:
"We look forward to working with this team to achieve our objectives for 2010. These include driving new membership, improving membership services, and continuing the professional development of members while strengthening our relationship with similar bodies in the sector, through joint informative and innovative events. We also plan to initiate an awards system for exceptional performance in the sector, which will enhance the standing of the industry and those who serve it."

About the Irish Mining and Quarrying Society

The Irish Mining and Quarrying Society (IMQS) is the independent society for people involved in all aspects of the Minerals Industry in Ireland. The society was founded in 1958 to promote, safeguard and represent the best interests of the natural resources and extractive industries in Ireland

and the people who work in it, with a strong emphasis on environmental performance.

The membership is drawn from all sectors of the industry, ranging from exploration geologist to equipment suppliers. It has a unique role in the country as a forum for contact between the different branches of the industry, enabling it to reflect the industry views in a co-ordinated manner and is recognised as a significant representational body with over 300 full Society members at present.

Sean Finlay, IMQS President

Geophysical Evening Lecture

Applications of Geophysical Methods in Hydrogeological Investigations

The Geophysical Association of Ireland (GAI) in association with The International Association of Hydrogeologists (IAH Irish Group) and The Geological Survey of Ireland (GSI) hosted an evening lecture by Prof. Dr. Hans Jürgen Voigt on 2nd March entitled Applications of Geophysical Methods in Hydrogeological Investigations. Prof. Voigt is from the Brandenburg University of Technology, Cottbus where he is the professor of Environmental Geology.

Prof. Voigt introduced his book 'Environmental Geology - Handbook of Field Methods and Case Studies' co-written by Klaus Knödel and Gerhard Lange and edited by the Federal Institute for Geosciences and Natural Resources (Germany). He also discussed recommendations and guidelines for geophysical investigations, surface geophysical methods and focused much of his talk on the use of downhole and push probe (CPT) geophysics in hydrogeological investigations.

The meeting was well attended and well received by all. Following the talk Prof. Voigt kindly presented a copy of his book to the president of the GAI, EurGeol Yvonne O'Connell PGeo.

Yvonne O'Connell, GAI President

Geophysical Investigations

Guidelines for Near Surface Engineering & Environmental Geophysical Investigations in Ireland

A long held goal of the Geophysical Association of Ireland (GAI) has been to compile a set of guidelines for engineering and environmental geophysical investigations in Ireland. The GAI feels that it is essential that an appropriate structure be put in place for geophysical survey design and implementation. Furthermore it is essential that the personnel involved have the appropriate qualifications, skills and specialist experience.

To address these issues, the GAI set up its 'Guidelines Working Group' early in 2009. The group comprises Peter O'Connor (Chair) PGeo EurGeol (APEX Geoservices Ltd.), Barry Balding PGeo EurGeol (Golder Associates), Dr. Shane Donohue (UCD), Dr. Paul Gibson (NUIM), Dr. James Hodgson PGeo (Waterwise Environmental), Hartmut Krahn (Minerex), Yvonne O'Connell PGeo EurGeol (APEX Geoservices Ltd.), Graham Reid (BRG) and Dr. Ruth Staunton PGeo EurGeol (RPS).

The aims of the GAI guidelines are to provide consistent guidance to end users (engineer, geologist, etc.) regarding the best approach to a particular application (e.g. karst, soft ground, excavation) and to allow proper specifications and tender documents to be drawn up. The guidelines will cover topics that are relevant to engineering, environmental, hydrogeological, geotechnical, aggregate resource, landfill, structural, utility detection and agricultural projects. The agreed methodology and specification will be based on the resolution of the methods seen against the background and experience of using geophysics in Ireland. The use of the guidelines will give a cost saving and added value to projects.

The guidelines will be reviewed by a consultative committee made up of representatives from associations whose members have an interest in using geophysics. The GAI hope to publish the guidelines in late 2010 or early 2011. For any queries please contact the GAI through the website www.GAI.ie

Yvonne O'Connell, GAI President

Imperial College London – Engineering Geology Reunion

In 1910 Dr Herbert Lapworth presented a series of 10 lectures on Engineering Geology to students at Imperial College London. This marked the beginning of 100 years of continuous teaching of the subject at the College.

To celebrate this milestone, a reunion is scheduled to take place on Saturday 10 July 2010. All Engineering Geology graduates are invited to attend, so please save the date in your diaries to return for this special occasion.

The programme will include sessions on how the course has changed throughout its life, reminiscences from past graduates, the impact of engineering geologists

internationally and concludes with a gala dinner.

If you are interested in finding out more about this event, including information of when booking becomes available, please register your interest online or contact Rosie Tipples on +44 (0)20 7594 8606 or at rosemary.tipples@imperial.ac.uk.

All alumni who graduated with Engineering Geology in their degree title are invited to attend so please inform colleagues or friends who may no longer be in touch with the College of the plans.

Quarrying in Ireland

Interview questions supplied to Mr. Shane Bennet by Irish Times Researcher June 2008.

Mr. Shane Bennet is a consulting hydrogeologist and has operated S.M. Bennet & Co. Ltd. *Hydrogeological & Environmental Engineers* since 1996. He provides consulting services to both quarry operators and objector groups. He holds a BSc in Geology and an MSc in Geophysics. Former employers include the Geological Survey of Ireland, Zenith Exploration (United States), Geraghty & Miller (United States) and K.T. Cullen & Co. (Ireland).

1. What is the general standard of quarrying in Ireland?

Across the spectrum I would regard the extractive industry in Ireland as being of a high standard. Although my own overseas quarry experience is limited to the US, Ireland and Zimbabwe, the indications are that the current standards here are equivalent to best practice in 1st world countries. From a health and safety perspective there are strict controls and the record appears to speak for itself. Both the EPA's license requirements and the extractive industry's guidelines are thorough and draw on international standards.

2. What is the impact on landscape?

Quarries in Ireland that extract unconsolidated material and/or rock are open cast. As a consequence they all have some impact on the landscape. The degree of impact will depend on a multitude of factors such as visibility, size, depth and the local topography. One of the largest quarries in the country is located in relatively level ground north of Drogheda but is not particularly visible to the motorist or casual observer. Those at Cloghrenan in Carlow and in Achill are smaller upland quarries but are quite visible. During the working life of a quarry one has to accept that there will be an impact on the landscape. In my own opinion an important issue is whether the impact is temporary or permanent.
If there were functional land uses prior to the quarry then, unless a worked-out quarry can be rehabilitated back into functionality, such land use is lost to this island's land bank. Motorways and railways encroach to a greater degree on the national land bank but become an asset in themselves. In my opinion an abandoned non-rehabilitated quarry is undesirable. If the land had a previous aqricultural function then a return to such use would be the optimum end use. Any EIS should give careful consideration to quarry life and ultimate end use. An obligatory foreclosure fund or bond tailored to facilitate a functional and satisfactory end use would be a useful addition to the planning process. This could provide a degree of assurance to local communities potentially affected by proposed quarries.

3. What is the impact on Water Table?

If a quarry extracts below the water table accompanied by dewatering there will inevitably be an impact on the water table. Conventional techniques are to discharge pumped water to the nearest surface water body. This can have secondary and undesirable impacts. However by re-introducing the water back into the ground around the perimeter the impact of dewatering can be greatly reduced.
Suspended sediment can cause a problem with both types of discharge but we are fortunate to have good engineers and hydrogeologists to provide solutions on such matters.
Notwithstanding the apparent reduction in demand for extracted materials in recent times, an increase in extractive depths below water table has been sought in recent years. Exhausted sand and gravel quarries become rock quarries and rock quarries become deeper. In my professional opinion the creation of an unnaturally deep vertically-sided water body is not desirable In lowland topography and serious thought must be given to re-incorporating quarries seamlessly back into the landscape. Our land bank is relatively limited and often there is no feasible restoration method for worked out deep quarries. A depth survey of local lakes and natural topographical features can be used to define a reasonable depth for extraction. Combine this with suitable grading of the water table margins and a water feature of natural proportions can be created. In low ground this could limit extraction to a single 15 metre bench but this would appear preferable to deep underwater gorges. Some of the Welsh slate quarries and the granite quarries north of Boston bear witness to this and in certain cases have become sinister dumping grounds.

4. Is Ireland worse off than other countries?

No, I definitely don't think so. Visit Hwange in Zimbabwe or the limestone quarries in Florida. Our demographics and relatively small land bank don't favour over-exploitation. I believe there is a deep-felt respect for landscape and heritage in this country. It is difficult to get the balance right especially in times of prosperity and demand but collective common sense generally prevails. The lore and love of the land runs deep in the countryside and landowners are generally good custodians. However it has been tempting in recent years for landowners to sell off a site or two and even larger chunks. Sometimes the

possibility of a quarry being sited on agricultural land is not considered by the vendor. This can have implications for surrounding land value.

5 What are the alternatives?

It must be recognised that this country needs the materials that the quarry industry provides. Roads, rail ballast, concrete products, gravel, headstones, cement, paving and numerous other products are much in demand. Quarries provide considerable employment and supply a valuable resource.

One possible alternative is to import such materials but this is not a desirable option. Direct employment is lost and the subsidiary industries also suffer. There would be fewer opportunities in Ireland for consultants, planners, hauliers and other dependent sectors. Our exports are also reduced placing a greater strain on the economy.
Near shore marine dredging is another possibility at least in respect of unconsolidated sediments. However there are inherent limitations when trying to maintain segregation of sand, silt, clay and/or gravel in suspension. Desalination of the raw material is also essential and our offshore environment is naturally inhospitable. The economics and technical limitations appear to favour land based operations at the present.
Recycling of waste materials such as demolition rubble and old road surfacing is another possibility. However this is already taking place to a significant extent and there are only sufficient quantities to make up a fraction of the demand.
In my opinion the most practical and beneficial sources of raw materials remain our own land-based natural resources. These should continue to be extracted and supplied by our quarry industry. However as stakeholders we must demand that the industry evolves by reducing its permanent impact on our landscape

Carbon Capture and Storage

Bridging the transition from fossil fuels to renewables

The Geosciences Committee of the Royal Irish Academy[1] recently hosted a conference entitled '***Carbon Capture & Storage: bridging the transition from fossil fuels to renewables***' at Dublin Castle on March 10-11th. The following summarises the key elements discussed.

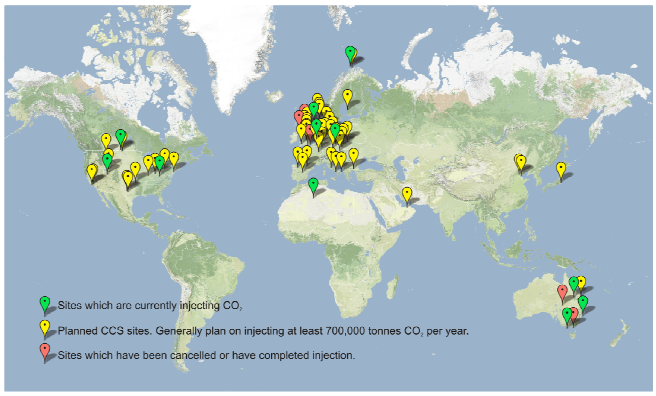
Following introductory welcomes, the European context for Carbon Capture & Storage (CCS) was set by **Mr. Scott Brockett**, Senior Policy Officer with DG Environment at the European Commission. The CCS Directive 2009/31/EC is a key instrument in European climate policy and targets of stabilising greenhouse gas (GHG) atmospheric concentrations at 450pmm to avoid catastrophic temperature rises. The Directive must be transposed into member state law by June 2011. It is hoped that the European Energy Programme for Recovery, together with the 'NER 300' mechanism will support and stimulate demonstration stage CCS projects. **Ken Macken** of EPA gave a stark summary of Ireland's performance in terms of our soaring GHG emissions, although there has been some levelling off due to recent economic decline. It is anticipated that the latter gains however, have been largely wiped out during the cold winter of 2009-10. Our total national emissions of 67.44Mt (2008) exceed our targets by 3.73 Mt after emissions trading allowances have been taken out of the equation under the Emissions Trading Scheme (ETS) – and are anticipated to continue rising to 2020. Ireland has spent €110 million in purchasing carbon credits and is likely to send c. €0.5 billion in the years to 2020. This is 'dead money' to the country and of no value in stimulating Irish enterprise. The challenge to reduce our emissions, particularly in energy, agriculture and transport, is enormous, but CCS would allow our major point source emittors to reduce their CO_2 emissions very significantly.
Prof. Eoin Lewis of SEI presented Ireland's policy response and commitments to use CCS as a bridging mechanism in reducing our GHG emissions in the wider context of decarbonisation of our economy. Significantly, he presented cost scenarios and was emphatic that CCS, with increased energy efficiencies, could represent a cost effective mechanism to abate our emissions bill. **Dr. John Morris** gave an overview of CCS activities in Ireland in the context of leading edge CCS developments internationally. He presented the results of the recent study, led by Aurum/TNO, of the potential for CCS in the onshore Clare basin, which concluded that the onshore section of the Ross Sandstone Formation is insufficiently porous and permeable, as well as being too shallow, for possible storage of Moneypoint emissions. He also commented on research in Oman which suggests that carbonation of peridotite (high Mg) can allow CO_2 storage in ophiolite complexes.

The conference then discussed the various strategies and techniques for capture of CO_2, by far the most expensive element of the capture-transport-storage chain. While capture of CO_2 is well advanced in the chemical industry, but it remains to be seen whether pre-combustion, post-combustion or oxy-fuelling will become the favoured technologies of the power industry.

Pat Naughton, ESB's Power Generation's Strategy & Sustainability Manager, commented on the need to decarbonise the power sector, while maintaining cost-effectiveness and security of energy supply, central to any economy. ESB is actively seeking to achieve these aims, and key to this will be definition of safe long-term geological storage sites. Mr Naughton commented that there needs to be worldwide political commitment to CCS,

[1] http://www.ria.ie/Our-Work/Committees/Committees-for-Science/Geosciences.aspx

given that China emits the equivalent CO_2 of 4,700 Moneypoints, with a new power station being added weekly. He also commented significantly that the ESB was going to bide its time in determining which capture technology may be adopted as the most cost effective in the Irish context, while continuing to engage in research and development projects in CCS. **Dr Robert Finlay**, University of Illinois, presented a very succinct paper on recent advances in developing a 1Mt CO_2 storage facility at Decatur into the 155,000 km^2 Mt Simon Arkose saline aquifer in the Illinois Basin. Critically, the sandstone's porosity of 8%, with its primary heterogeneous channel systems and good vertical and lateral permeabilities, allow migration of the stored CO_2 below an impermeable shale cap rock. Collaboration with partners and, critically, pro-active public engagement policies have allowed development of a 3 year injection pilot project through the environmental and planning process. **Dr Stuart Hazeldene** of University of Edinburgh presented an overview of the UK North Sea's significant CO_2 storage potential (with its 63 oilfields, 11 gas fields and 30 condensate fields, many of which are reaching end of life). A number of studies have been conducted, but he commented that the effective porosities used to estimate capacity (40% in hydrocarbon fields; 2% in saline aquifers) are too generic, thus leading to huge technical and economic uncertainties, if power companies are to commit to CCS. It is clear that each site will require specific modelling prior to injection. Many of the North Sea fields are also too small to absorb the likely volumes of CO_2 to be captured along the UK east coast; thus significant research into near shore saline aquifer storage will be requisite. Given that the whole CCS chain is potentially so enormous in the European context, the need for international collaboration was stressed by **Dr Emile Elewaut** of TNO in developing a North Sea Master Plan and an agreed transnational regulatory framework, particularly where depleted gas fields with (potentially leaky) abandoned wells are involved. CCS may be competing with other energies such as deep geothermal heat sources or offshore wind farms, fisheries and other sectors, thus integration is critical.

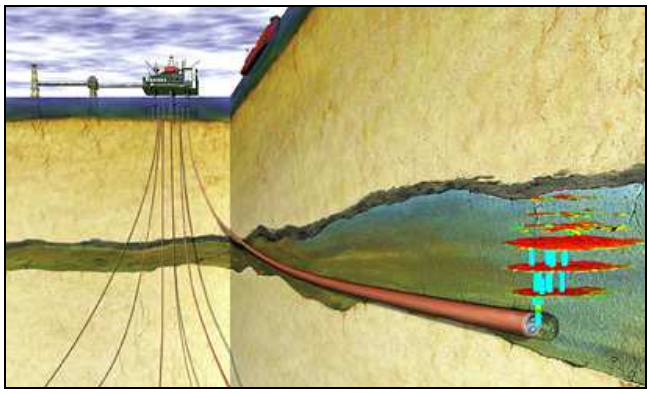


CO_2 Storage – State-of-the-Art

Map compliments of Dr Kris Piessens, Geological Survey of Belgium/ EFG Panel of CCS Experts

The regulatory and economic aspects of CCS present a complex, evolving field, with advances in CCS adoption depending on the price of carbon, a newly traded 'commodity' internationally. The European Emissions Trading System (ETS) through its EU emission allowance (EUA) is leading the world in this area, by setting a price on 40% of its industrial emissions. In mid-2008, the traded price was forecast to be €40/t CO_2, the supposed price required to ensure the successful policy acceleration of making CCS the new-entrant technology of choice for power generators by 2020. By early 2010, the price was languishing at €11/t, but forecast to rise to €15-16/t during the year. **Richard Vernon** of SLR Consulting summarised the Irish regulatory and business environment for CCS, reviewing the role of policy and potential participants in our relatively small market, as well as possibilities for collaboration with our near neighbours in the UK in the East Irish Sea Basin. CCS in the Irish context may be more attractive than in other economies, given the relatively high cost of non-CCS conventional electricity in the Republic. The UK expects an increase of 2-4% in energy prices to fund CCS development projects – would the Irish consumer accept this? **Prof. Frank Convery** commented that Ireland, by combining ETS and Carbon Tax, was taking bold moves to drive reductions in its emissions, but policy decisions to abandon a carbon tax five years ago, meant that we have lost out those years of valuing carbon. Critically, companies that successfully store carbon geologically will not have to buy allowances to cover their emissions; thus CCS may become more attractive as the price of carbon strengthens.

John Barry of Shell confirmed that Shell is firmly in the business of supporting CCS projects and presented a range of techno-economic scenarios and blueprints which are being considered at highest levels. Public financial support, as well as industrial expertise, will be critical to get the first fully commercial CCS projects off the ground. Early lessons must be shared, given the global urgency to reduce emissions by 20% by 2020, but the commercial gap between the cost of CCS and the CO_2 price must be adjusted to get sufficient numbers of CCS-ready installations up and running to achieve this target. A very interesting perspective on the Chinese power sector and its own moves towards effective capture technologies was presented by **Donnchadh Irish** of ESB International. The challenge is enormous as China develops economically, generating 10% of world emissions in 1990 but 20% by 2006, and growing. Huge focus is now on energy efficiencies and renewables, as well as CCS. **Dr Andy Chadwick**, head of CCS research at BGS, presented an excellent overview of the ongoing measurement, monitoring and verification (MMV) of Statoil's *Sleipner* CCS project and advances in monitoring the plume since 1996. The modelled behaviour of the 12Mt stored CO_2 and the actual behaviour are slightly discordant, but what has been proven is that repeated time lapse seismics, seabed and gravity monitoring allow cumulative CO_2 monitoring of the storage site (geomechanics, poroperm, caprock, seismicity etc), which is stabilising with time. This is critical for public acceptance and the Sleipner project continues to build confidence in CCS and reassurance for the international regulatory and geological communities.

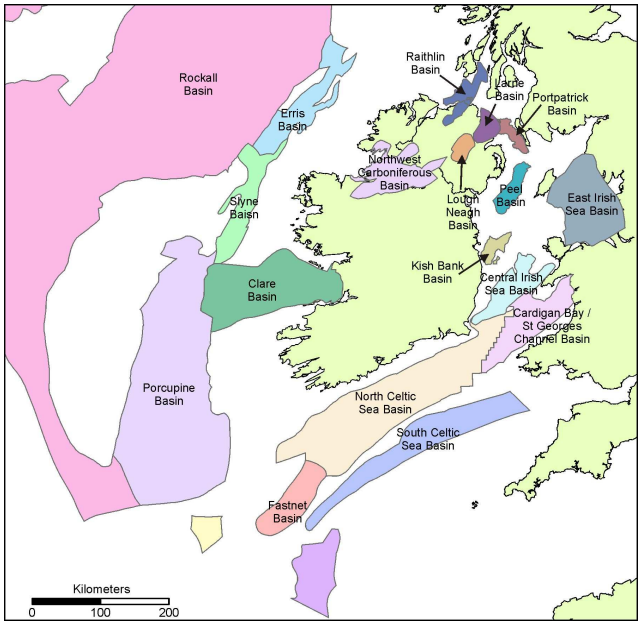


Sleipner: CO_2 Storage in the Utsira Formation, North Sea – Norway (Statoil)

Prof. Chris Bean of UCD presented a very interesting paper on the use of seismic techniques to monitor supercritical CO_2 at depth in storage sites. Changes in seismic reflectivities and expected arrival times in these multiphase CO_2 fluids allow prediction of expected amplitudes and arrival times of seismic reflections from the boundary of CO_2 and resident fluids in the aquifer. These can be compared with field seismic data observations to interpret likely fluid substitution. However, seismic wave attenuation and pressure-related rock matrix changes may impact on interpretation of time lapse monitoring data. The UCD work is addressing seismic wave attenuation and 3D poro-elastic simulations to resolve these interactions. This, integrated with new continuous seismic monitoring techniques, may also allow a more cost-effective means of long term monitoring of CO_2 site behaviour. **Mr. Peter Croker** of Petroleum Affairs Division of DCENR, building on the SEI/ EPA regional assessment study for CO_2 storage in Ireland conducted in 2008[2], presented some very interesting new considerations of potential storage sites offshore Ireland, particularly in (i) Eocene nummulitic sandstones and (ii) Spanish Point, both in the north Porcupine Basin; and (iii) the Greensand A aquifer and (iv) Upper Jurassic Sandstone aquifer, both in the North Celtic Sea.

The EU CCS Directive in June 2011 establishes a legal framework for geological storage. Regulation of the multi-disciplinary CCS chain, however, presents a challenging new area for regulators in Ireland and elsewhere. **Mr Michael Tutty** of the CER pointed to the complex array of areas to be regulated: carbon accounting, environmental impacts, risk assessments for public health, groundwater quality, potential for leakage, as well as the full economic regulation which must take place. The capture and transport elements can be regulated under existing regulations, but new measures must be developed for storage sites.

[2] http://www.sei.ie/Publications/Emerging_Technologies (Report by SLR/BOC/BGS/CO2CRC, 2008)



Potential geological storage basins, island of Ireland

It is expected that monitoring will have to continue actively for at least 30 years beyond closure, with ongoing passive monitoring for hundreds of years post-closure. Realistically, once a site has been permitted and operated to full compliance such that closure is fully certified at end-of-life, then the State must take on the role of long term monitoring. How this will all be coordinated and paid for presents a challenge for 'Ireland Inc', and may also have long term impacts on competitiveness and costs of energy. Richard Tol of ESRI presented an interesting assessment of the economics of CCS in an Irish context. Four scenarios for replacement of Moneypoint, our largest point source CO_2 emittor, post 2025, were considered: coal, coal with CCS, gas and nuclear, respectively. He concluded that coal with CCS was one of the least economically preferred options. **Dr. David Reiner**, of University of Cambridge, presented some interesting data on public perceptions of CCS and sources of local and national opposition to CCS internationally. Most concerns focus on safety, property values, competition with renewables, impact on e.g. tourism opportunities in an area and 'why here? It is absolutely critical to consult meaningfully with communities well in advance of developing a CCS project at a given site, and working with schools, focus groups and community actors to demystify the entire process can pay long term dividends (while not necessarily guaranteeing project delivery). Critically, most people do not trust project developers, while independent scientists and NGOs are more readily trusted than either the private sector or government (see www.communicationnearco2.eu).

Finally, the conference was closed out by **Mr. Bob Hanna**, Chief technical Officer (Energy) at DCENR. Mr Hanna reflected on the Government's Energy White Paper 2007-2020, which envisaged commercial clean coal power generation by 2020. He thus emphasised that we were not talking about 'if CCS', rather 'when CCS', as it poses a means by which Ireland can address its emissions reduction

targets and provide short to medium term security of energy supply. He mentioned the work of the current Inter-departmental Task Force on CCS and the potential for collaboration with the UK on the East Irish Sea Basin.

In the early evening of Thursday 11th, a public debate, co-hosted by the Royal Irish Academy and the Irish Times was held at Dublin Castle. **Jeff Chapman** of the CCS Association and **Stephan Singer** of the World Wildlife Fund debated the pros and cons of CCS, ably chaired by Dick Ahlstrom, Science Editor with the Irish Times. The public presence comprised NGOs, general interests and industry participants and a lively debate ensued. Most agreed that CCS presents an effective bridging strategy in the transition from fossil fuels, but not at the expense of investment in renewables and should not allow us to 'rest on our laurels' in reducing emissions.

What an integrated CCS platform of the future might look like….

compliments of Dr Kris Piessens, Geological Survey of Belgium/ EFG Panel of CCS Experts

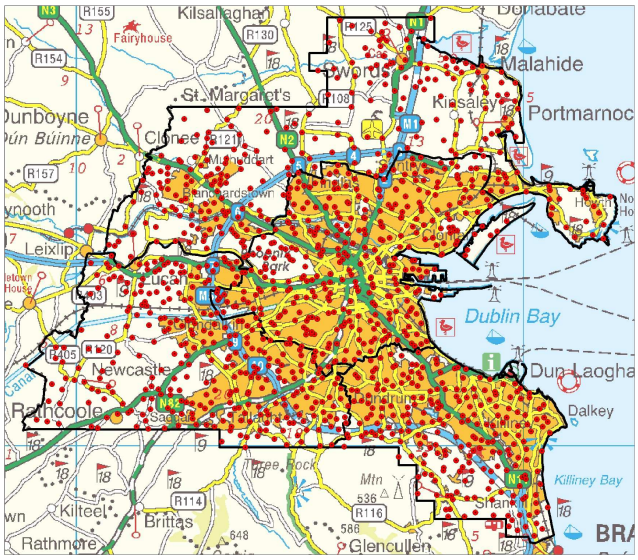
This was an excellent conference and commenced the valuable process of public debate on carbon capture, transport and geological storage in Ireland.

EurGeol. Dr Deirdre Lewis, P.Geo.
Technical Director, SLR Consulting
Board Member IGI / Member of RIA Geosciences Committee

Dublin SURGE Project Soil Urban Geochemistry

October saw the completion of the fieldwork phase of a first-ever baseline study of soil quality in Dublin. The Dublin SURGE Project sets out to establish geochemical baselines of metals and organic chemicals in Dublin soils. The project will provide information on soil chemistry in the urban environment relevant to human health, land-use planning and urban regeneration. It will also allow us to identify and quantify human impact on soils in urban areas through comparison with the rural soil baseline geochemistry of the surrounding countryside.

The Geological Survey of Ireland (GSI), with the support of the Norwegian Geological Survey (NGU), is co-ordinating the survey and the fieldwork phase is now complete. 1065 soil samples have been collected and have been prepared for laboratory analysis. All four local authorities in the greater Dublin area support the project and the vast majority of samples were taken from areas that are publicly accessible (e.g. public parks and school grounds). The EPA and Teagasc have also expressed support for the initiative. The results of the survey will be publicly available by early 2011.



European Partnership

Eighty per cent of the European population lives in cites. Most cities have well-established monitoring systems for air and water, while soils have received comparatively little attention. To remedy this, a consortium of European Geological Surveys has initiated an Urban Geochemistry Project to investigate the chemical make-up of urban soil in European cities. GSI has lobbied successfully to have Dublin included in the first phase of the project. This is a very significant outcome for Ireland since no baseline geochemical information of any significance exists for Irish urban environments, whilst many European cities have been developing such databases in the past decade.

The first phase of this Euro-wide project will involve mapping soils in 10 selected cities across Europe for a wide range of potentially harmful chemicals (e.g. heavy metals such as lead, arsenic, cadmium, chromium, and organic compounds such as polychlorinated biphenyls – PCBs) which may pose risks to human health. The Dublin study is part-funded under the NDP, and by NGU, as part of what is a wider EuroGeoSurveys study.

Fieldwork Programme

1065 soil samples were collected to characterise the spatial variation in soil quality over an area of some 600 sq. km in the greater Dublin area. The sampling was carried out by teams of trained personnel from NGU. NGU has already carried out very successful soil sampling surveys of its

cities. Survey teams worked off carefully planned and mapped schedules and in accordance with agreed sampling procedures. At each sample site, GPS coordinates and field observations were recorded and two digital photographs were taken (a general landscape shot of the surrounding environment and a site photograph showing details of soil texture).

Interpretation & Results

The surface soil samples will be analysed for inorganic elements at the geochemical laboratories of NGU in the coming months. Further tests for organic compounds are underway at a commercial laboratory. It is critical that the samples from all cities in the study are analysed at these particular labs as one of the primary aims of the project is to provide environmental geochemical data that are harmonised and interoperable. In this way the soil quality from city to city can be compared objectively. A Geographic Information System map database, currently under development at GSI, will be used to gather, display and interpret data from the Dublin SURGE project. Analytical data will be statistically processed and digital geochemical maps of all elements will be produced. The data will be freely available to municipal authorities and other stakeholders.

Benefits of SURGE

It is hoped that the study will have benefits in the following areas:

- Establishing baselines for environmental monitoring;
- Identifying city areas possibly in need of environmental remediation;
- Assisting authorities in setting soil environmental standards for Irish cities;
- Contributing to more informed urban planning for both brownfield redevelopment of inner city areas and suburban development.
- Assisting in compliance with EU Directives (Soil and Water) and national legislation protecting groundwater, soils, habitats etc.
- Contributing to a better scientific understanding of pollutant accumulation and transport in urban soil environments.

Further information is available at www.gsi.ie/surge

Mairead Glennon, Ray Scanlon, Pat O'Connor, Enda Gallagher, GSI

Congratulations

New Professional Members in 2010

Congratulations are extended to the following candidate who has been awarded IGI affiliation as Professional Geologist in 2010.

PGeo Matthew Rhys Eynon

In addition, the IGI welcomes the following new Member in Training for 2010:

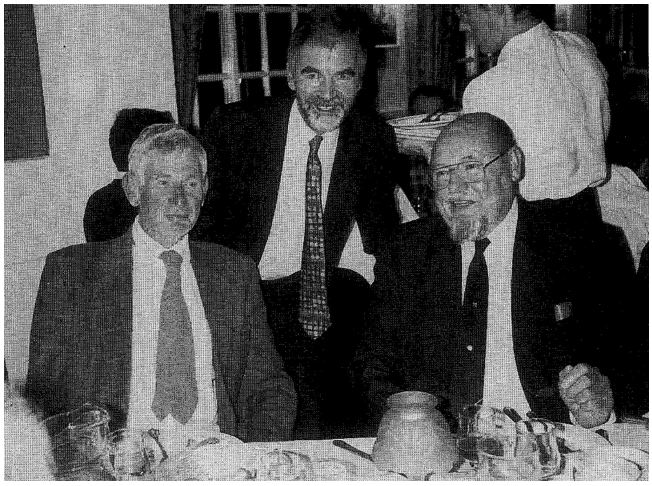
MIT Marcus Casey

IGI Website – News, Events, Training Courses and Employment Opportunities

We encourage members to visit the IGI's website at www.igi.ie for up-to-date information on news, events and training courses. If members have activities or positions they wish to advertise they are encouraged to send them in to admin@igi.ie. We also invite all members to forward items of news or general interest. Geological photos are also welcome.

Cyril Williams

Long serving Director of the Geological Survey of Ireland



Picture reproduced from "North from the Hook", showing Murrogh OBrien, Peadar McArdle and Cyril Williams.

The geological community in Ireland lost one of its most respected and influential members with the death of Cyril Williams on the 4th January, 2009. Cyril was Director of the Geological Survey of Ireland from 1967 to 1987, a service only narrowly exceeded by one other Director. Cyril was a geologist of outstanding international experience and service. During his twenty years as Director of the GSI he transformed the Survey, which had been neglected and run-down over many years, into a modern, confident and internationally-respected organisation.

Cyril was born in Durban, South Africa in 1922 and studied geology in Cape Town University. After a break for military service in World War II, flying many missions in the Mediterranean theatre, his first professional work was contract mapping for the Geological Survey of South Africa, an experience which led on to his life-long involvement with national geological surveys around the world. He then served with geological surveys in Uganda, in Mauritius and in the New Hebrides before returning to the Uganda Survey where he was Commissioner for Mines and the Geological Survey from 1962-67. He was awarded the OBE in 1969 for his services to geology and mining in Uganda.

Mainly as a consequence of the revival of the Irish metal mining industry with the discovery of the Tynagh Mine in 1963, the Irish Government recognised the need to revive the Geological Survey of Ireland as a source of expert, independent advice in relation to national mineral, oil and development issues. Thus the then vacant post of Director was widely advertised around the world. Cyril Williams, with his knowledge and practical experience of the international mining industry and proven record in the establishment and direction of national geological surveys, was appointed to the post in 1967.

The GSI was then a technical division within the Department of Industry and Commerce and Cyril's first task was to submit to that Department an ambitious and comprehensive plan for the revival and expansion of the GSI to meet the needs of the nation for practical, applied specialist advice to Government, to industry and to the public in relation to all aspects of the earth resources of Ireland.

The approval of this revival plan allowed an expanded, multi-disciplinary team of new geologists to be recruited and through the 70's and 80's the GSI became again a dynamic productive organisation under Cyril Williams' leadership. The Geological Survey of Ireland reclaimed its place at the centre of national developments in many fields of the practical earth sciences, including the licencing and promotion of the booming mining and mineral exploration activity, the establishment of a legal and regulatory framework for the nascent offshore oil and gas exploration developments, ensuring the effective but sustainable development of Ireland's groundwater resources, building national databases of integrated sub-surface information so valuable to the infrastructural developments of the 90's.

A priority for the revitalised and enlarged survey was to renew and expand the basic knowledge of Ireland's geology, through field mapping, data gathering, collation and interpretation so that all publications and advice emanating from the Survey would be of the highest quality possible.

The revolution of plate tectonics in the earth sciences of the mid-1960's had come from the seabed discoveries in the world's oceans. Cyril had seen at first hand the manifestation of ocean dynamics in the New Hebrides. He also recognised the importance to island nations with no onshore hydrocarbon resources of the potential for offshore oil and gas and other marine resources. He therefore advocated to Government the need for Ireland to have detailed knowledge of the form and geology of its offshore territorial waters as a vital national interest. He established a marine geology capability in the survey early in his directorship which over the years led to the major National Seabed Survey managed by the GSI.

With Cyril William's international background and perspectives, he also encouraged and empowered the Survey to become involved in wider, international geoscience issues; for example, Survey staff provided important technical input to the series of Law of the Sea Conferences that set international agreements on marine law and resources.

The growth of the Geological Survey through the 70's and 80's led to it outgrowing its historical headquarters at 14 Hume Street. A major achievement of Cyril Williams' later

career was leading the designing and negotiating the building of a new headquarters, with appropriate modern facilities, for the GSI on the Beggars Bush Barracks site which it still occupies.

Cyril and Margaret Williams retired in 1987 to Ogenelloe in County Clare above Lough Derg to a house which he enjoyed renovating with his many practical skills, welcoming and entertaining many visitors from around Ireland and abroad and sailing on the Shannon waterways. He never retired, however, from his love of the earth and its rocks and debated and wrote till the end on the volcanoes of Africa and the wider world.

Cyril Edward Williams, OBE, MRIA, BA, MA, PhD: born November 9th, 1922; died January 4th, 2009

This article originally appeared in The Irish Times on 31st January 2009. The IGI gratefully acknowledges the permission granted by The Irish Times to reproduce the obituary.

Murrogh OBrien

Visionary geologist helped to develop mining industry

Murrogh OBrien: MURROGH OBRIEN, who has died aged 89, was a former director of the Geological Survey of Ireland and later became general manager and chief executive of Tara Exploration and Development Company.

He consistently, and ultimately persuasively, argued that Ireland had potential mineral wealth, an idea that defied conventional wisdom. Undaunted, he continued to argue his case, and his theories and encouragement led to much exploration activity, the resultant discovery of Tynagh mines and the birth of modern mining in Ireland.

Seán Finlay, president of the Irish Mining and Quarrying Society, paying tribute to OBrien's "visionary work", highlighted his contribution to the knowledge and understanding of mineral deposits in Ireland and his leading role in developing the mining industry.

Gordon L Herries Davies in his historical study, *North from the Hook – 150 Years of the Geological Survey of Ireland* , wrote that OBrien had made "himself, the survey, and Ireland, familiar to economic geologists from all corners of our globe", and cited his "outstanding work" in championing exploration.

While working for the survey, he was also responsible for the geological investigations that resulted in the choice of Turlough Hill in Co Wicklow for the ESB's pumped storage facility, and for the location of the now landmark chimneys of the Poolbeg Ringsend power generating station (there were foundation problems due to the deeply eroded channel of the river Liffey).

Born in Parteen-a-Lax, Parteen, Co Clare, in 1919, Murrogh OBrien was one of three children of Hugh MV and Margaret OBrien, Foynes Island. Educated at home until the age of 10, he was then sent to Newtown School in Waterford. He took a year off school to work as a stores clerk and timekeeper during the construction of the Foynes reinforced concrete jetty in the mid-1930s.

This sparked his interest in engineering, which he went on to study at Trinity College, Dublin. He graduated in 1941, and afterwards continued his studies at the Royal School of Mines, London University. He secured a first-class degree in mine geology and a BSc.

Working for Mianraí Teoranta at the Avoca mines in Wicklow as an engineer and mine geologist, he met Suzanne (Zsuzska) Karolyi from Budapest, who was in Ireland to improve her English. They married in June 1945.

In 1952 he became director of the Geological Survey of Ireland. His primary interest was in geology applied to mineral exploration and as a base for agricultural soil maps. Headhunted by Tara Exploration and Development, he was in 1964 appointed general manager. Driven by his insights and work, the company found the Navan zinc and lead ore body in 1970, the biggest lead and zinc deposit in Europe.

Expanding his horizons, OBrien applied his scientific knowledge to a new area when the first "Sputnik" was launched in 1957. As "Mooncharter" he wrote a series of articles for the Evening Press newspaper predicting the paths of the early satellites and manned spaceships through the night sky over Ireland. The articles were illustrated by his hand-drawn diagrams.

In retirement he returned to Foynes Island, while continuing to work on a consultancy basis. For his own pleasure and enjoyment, over a 30-year period he made drawings of the ships that docked at Foynes port. He also documented the ships' cargoes, provenance and destinations.

The drawings reflect Foynes' role in the economy of the region, while the cargoes mirrored changing times. They show the importance of barytes and beef exports, and the need for fuel oil, animal feed and fertilizer imports.

The construction of the Aughinish alumina plant, the largest building site in Europe in the early 1980s, is seen through the procession of ships to the Aughinish jetty. The colourful drawings also depict national regattas, visits by *Asgard II* , Irish Lights and Naval Service vessels, and the return in his flying boat of Captain Blair, husband of Maureen O'Hara, in 1976.

The 900 drawings are now in the National Library of Ireland. Ornithology was another interest. He took part in bird counts and contributed to breeding and winter bird atlases.

In 1968 OBrien was one of the first people to leave Czechoslovakia after the Russians invaded. He had been attending an international geological conference in Prague, and hearing of the invasion jumped into his rented car and

headed for the German border. He drove past Russian tank columns with a map of Europe highlighting Ireland stuck to the inside of his windscreen.

He was proud of his OBrien ancestors, going back to Brian Boru. A great-grandson of the patriot William Smith O'Brien, he was a nephew of the famous sailor Conor OBrien, the first yachtsman to circumnavigate the globe south of both the Cape of Good Hope and Cape Horn. An honorary fellow of the Institution of Mining and Metallurgy, he was in 1958 a founding member of the Irish Mining and Quarrying Society and subsequently twice president of the society.

He is survived by his wife Suzanne, son Stephen, daughters Sylvia, Iseult and Charlotte, and 12 grandchildren; his son Colm predeceased him.

Murrogh Vere OBrien: born December 15th, 1919; died September 13th, 2009

This article originally appeared in The Irish Times on 3rd October 2009. The IGI gratefully acknowledges the permission granted by The Irish Times to reproduce the obituary.

Brecan Mooney

Brecan Mooney was born in Carren in Co. Clare in 1978. He was the youngest of five children of Brian and Noreen with three older sisters and one older brother in the family.

A lover of the outdoors and nature from his early years he would make his way to school through the country side, helped his father in the Burren Perfumery and got summer work at the Buren Display Centre. He went to secondary school in Jarlots in Tuam where his education and keen interests in geography, history and sport took shape. He was also influenced by the presence of the UCG Burren Research Centre which was located near his home and interaction with the environment was reinforced by his hobbies such as bee keeping and hill walking.

In 1996 he went to Trinity College Dublin and studied geology as part of his earth science degree and was well known in College for his academic, social and political activities. Apparently after brief involvement in Fianna Fail, he joined Fine Gael but despite his love of Michael Collins decided to start the first Sinn Fein party in the college.

Never afraid of hard work, to supplement his income in Dublin he nearly always had one part time job and sometimes two, including super-market cashier and night time telephone call centre operator. Life was never dull with Brecan and always eventful. He graduated with an honours degree in Geology in 2002 and after doing an M.A. in Computing decided to do some global travel. He ventured to Fiji, Australia, Mira Mar and Peru amongst other places and like all good geologists would return with treasures in the forms of stones and rocks from his adventures.

He joined WYG in 2004 and after a year and a half in Dublin he moved to the Cork office where his confidence and ability to deliver a range of environmental skills was very beneficial to an expanding office. He was seconded full time to Gamma as the on-site scientist for an eight month period during the construction phase of the Tynah Power Plant in Co. Galway. As well as the scientific side of the work Brecan excelled on the social side getting on very with his Turkish colleagues, other contractors and the regulator. He then returned to the Cork office of WYG and continued to grow and develop as a professional environmental consultant.

His keen interest in geology and its applications resulted in him doing a masters degree in exploring the Geothermal Potential of North Cork with NUI Cork, which at the time of his tragic accident he was in the process of writing up. He was a PGeo member of the IGI and treasurer of the Geothermal Association of Ireland.

Always active and involved in both his academic work and social life Brecan was one of those unique larger than life characters who's strong voice and clear laugh could be heard across whatever space he occupied. He had a natural ability to get on with everyone, was great craic, made friends quickly and was always remembered by people he met. He loved the Burren, the environment and his dedication to his work and interest in geology was always to the fore. A spiritual person with a deep rooted love of Ireland, Clare and his family he will be forever missed by his many friends and colleagues.

Darragh Musgrave, White Young Green