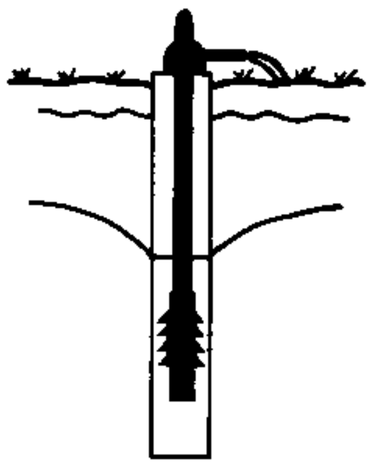
ISSN 0790 7753

THE GSI GROUNDWATER NEWSLETTER



NUACHTÁN SCREAMHUISCE SGÉ

- *Exploration*
- *Management*
- *Pollution*
- *News from abroad*
- *Development*
- *Quality*
- *Reviews*
- *Opinion Forum*

- *Taiscéalaíocht*
- *Bainistíocht*
- *Truailliú*
- *Nuacht idirnáisiúnta*
- *Forbairt*
- *Cáilíocht*
- *Athbhreithniú*
- *Tuairimí*

Published by the Geological Survey of Ireland.
Beggars Bush, Haddington Rd.,
Dublin 4. ☎ (01) 609511

Edited by: Donal Daly.

Foilsithe ag an Suirbhéireachta Gheolaíochta Éireann.
Tor an Bhacaigh, Bóthar Hadington,
Baile Átha Cliath 4. ☎ (01) 609511

No. 17. November, 1990

IN THIS ISSUE

Donal Daly, Geological Survey of Ireland

GROUNDWATER QUALITY

Wells and Springs in Sligo, late Summer 1990

As in many other parts of the country, here in Sligo we experienced a very dry period at the end of Spring and well into the Summer. High rainfall in July brought water levels up just enough to avert a shortage of water. There were a great number of problems of water quality however, and this problem was at its worst in late July/early August. We had a number of calls from householders who were using wells and springs for domestic supply. The main problems were contamination by high levels of iron, manganese and E.coli., although the consumers of well water are rarely aware that E.coli is present. People complained of four main problems:

1) Clothes coming out of automatic washing machines were stained by brown and black marks.
2) Drinking water did not taste good.
3) Children were affected by mysterious stomach bugs.
4) Tea had a metallic scum on the surface.

In cases where the washing of clothes was a problem, the most usual quality problem was the presence of iron and/or manganese. In some cases this contamination was in isolation from the presence of E.coli., and this type of problem was normally traced back to the making and storage of silage nearby. In one case a well which was supplying a number of houses had 0.8 mg/l manganese and 0.4 mg/l iron. There were no Total Coliforms and no E.coli. in this well. In many cases in the past the presence of E.coli. was reported (wrongly) as being associated with the making of silage. (Wells which have been contaminated by silage effluent will not necessarily show the presence of enteric bacteria. The exception of course will be in cases where farmyard manure is used to keep the silage cover in place. This practice is becoming less common.)

Some complaints were received about the palatability of well water for direct drinking. Again, iron and manganese were involved, sometimes in association with E.coli., and sometimes not. In cases where the water seemed fine except when tea was made, the presence of manganese seemed to be consistently the problem. Concentrations of only 0.3mg/l were high enough to cause this problem, while the same concentration did not give rise to problems with detergents or if the water was taken directly without boiling.

The Pollution Control Laboratory received some reports that children

were being affected by stomach bugs. Invariably, E. coli. and other coliforms were found in the wells when such reports were made. Sources of this type of contamination were traced to nearby slurry storage, or recent landspreading of farmyard slurry. On-site septic tanks were also a source of such contamination. This problem seemed worst at the time when the prolonged period of dry weather ended and was followed by a number of days of heavy rain and increased runoff. This may have been due to the flushing effect of contaminated surface water into the underlying groundwater. As the month of August progressed, and the weather became more settled, the numbers of undesirable bacteria in the wells was seen to be reduced somewhat, although a small number of wells did not respond to the drier weather in such a predictable fashion.

The main lessons learned this summer in relation to the protection of wells are as follows:

a) If silage is being made, then the effluent should be collected in a properly constructed tank and subsequently spread on land or else fed to farm animals. One farmer in this area fed the entire production of silage effluent from his 100 tonne silage pit to his cattle; and they loved it!

b) Slurry pits and tanks should not be located close to wells. They should never be allowed to overflow.
Slurry should be spread on land evenly and at approved rates. The local Pollution Officer will advise on the proper rates of application in any given area.

c) In summertime, cattle also get thirsty. For this reason it is very wise to fence off open wells so that cattle cannot contaminate them. Some very good open wells are ruined by cattle coming into them to drink during dry weather.

d) Well-heads should be properly constructed and maintained. Failure to do this could result in contaminated surface water getting into the well.

e) Septic tanks and associated soakpits/percolation areas should be examined to ensure that they are not a threat to nearby wells. A properly functioning septic tank should be desludged from time to time. Summer and autumn is a good time to do this job - it should not be left until wintertime.

Frank Clinton, Sligo County Council.

Water Quality of Private Water Supplies in County Wexford

The quality of drinking water being supplied by local authorities has received much media attention recently. But, what of private supplies? The figure of 50% unsatisfactory wells in some areas has been mentioned. Is this true nationally or are certain counties e.g. Carlow, Kildare and Sligo skewing the statistics due to special problems caused by the hydrogeology peculiar to a limestone area? If a random selection of wells in Co. Wexford were tested would 50% of them fail to comply with the Drinking Water Regulations 1988?

A scientific survey to answer this question is impossible due to inadequate staffing and resources. However, in common with other environmental health departments, we have been testing private water supplies to food premises, nursing homes and schools. Therefore, for the purpose of this article, the results obtained from testing the above premises over recent years in the mid-Wexford area have been examined.

Data on 30 wells were used and almost all of these were considered satisfactory by their owners prior to testing. 28 wells and 2 springs systems were tested.

Results

(i) Out of 30 supplies 9 complied in every way with the regulations. Of those 3 were above the guide level for nitrates but well below the maximum admissable concentration.

(ii) 11 of the wells were too acid with the pH less than 6. This is a problem which has not been pursued due to the feeling that this is more a disdvantage from a plumbing point of view than a health risk and other more serious problems have taken precedence. However, in the long term should individuals be forced to install pH regulation apparatus or should Wexford County Council be asked to apply for a derogation for small private supplies under the European directive? Boreholes being used for public supplies in adjacent areas are also too acid and pH regulation has not been installed for these systems since 1988.

(iii)1 school well had an iron and manganese problem which means the water has a metallic taste and stains sanitary ware brown and black.

(iv) 14 supplies failed their first bacteriological test. 7 had coliforms and 7 had E.coli.

(v) 20 supplies failed a bacteriological test at some stage.

(vi) 7 wells, which were bacteriologically contaminated, had nitrate levels greater than the E.C. guide level.

Discussion

What do the above results mean with regard to drinking water quality? The spring sources were not sufficiently protected from surface contamination and experienced low levels of intermittent pollution. These situations would have proved difficult to resolve as both had over a mile of distribution system to maintain. Therefore, one owner chose treatment and is now also exploring the possibility of a borehole source and the other person connected to the public mains which was located nearby.

Of the 28 wells none were perfectly protected from surface runoff contamination on the first inspection. Some people have since rectified this as a precaution, even if their results were good. Even though a diagram is supplied it usually takes 2 to 3 visits to get the wellhead properly covered and then disinfected. From an examination of both the wells and the analyses it would appear that only 2 wells out of the 30 supplies are contaminated by sources other than surface runoff.

Two proprietors who are using water treatment plants are having maintenance problems and have received no training with regard to the

operation or maintenance of these plants. Service by the companies selling the equipment seems to be nil and proprietors seem to wish they would run automatically and forever.

The results of the survey have a limited value in that not all supplies have been sampled at the times of the year when they are most likely to give problems i.e. February and September. However, as more data becomes available, problem wells could be concentrated on more and those contaminated merely due to surface runoff contamination can be sealed up satisfactorily.

Conclusions

If the above is taken as a random selection of private water supplies it may be concluded that:-

a) Some people don't even know where their well is, especially if it is not in the pumphouse.
b) Very few people know how to cover in a wellhead so that it is protected from surface contamination and those that do know never get around to it until their E.H.O. writes to them to tell them their water is not potable and that they have to cover in the top of their well to cure the problem.
c) Very few people consider the location of their wells in relation to septic tanks, percolation areas, leaking sewers, grease traps, yard washings or rubbish heaps. They definitely do not worry about their neighbours' wells in this regard.
d) Very few people consider having their well tested every one to four years depending on whether they are for commercial or domestic use.
e) No one knows where to get their well tested. Indeed this is a problem since most environmental health departments only test wells which serve commercial premises or which are causing problems. Lack of staffing and resources dictate this approach. Surely all owners of private supplies should be encouraged to test their drinking water even if a charge for this has to be introduced to provide funding for such a venture. There are very few private accredited laboratories available countrywide capable of doing this testing and/or providing a comprehensive advisory service for those with problems. It is noticable that some building societies are asking for test results here in Co. Wexford in recent months from applicants for mortgages of old houses.
f) Everybody assumes that if there is a water supply it must be alright. Not even proprietors buying food premises check out the water supply.

What could be done?

1. An education programme aimed at the general public could be launched nationwide
2. E.H.O.'s could examine the data they already have in their filing cabinets to see if they can spot any local trends or problems. Having done that they could determine what is needed and press for staffing and resources to implement a comprehensive plan to improve drinking water quality in their area.

The problem outlined for the mid-Wexford area cannot be unique. Results for North Co. Wexford and South Co. Wexford are similar. Most problems can be overcome but it takes a lot of time and effort on the part of the local E.H.O.

Anne Deacon, South Eastern Health Board.

TOXIC WASTES IN EUROPE - PARLIAMENT, PEOPLE, POLITICS, PROBLEMS AND POTENTIAL.

2 - Parliament

In this second article in the series on 'Toxic Wastes in Europe' I will examine the input of the European Parliament to the management of the wastes. I use the term 'Parliament' loosely since the enactment of legislation at a European level is primarily the concern of the Council of Ministers, with the Parliament itself having a relatively limited role.

A Council Directive, which is the main form of action used by the European Community to achieve objectives, empowers the Community to define objectives, standards and procedures but allows the member states some flexibility in the way in which the Directive is implemented. To date over 120 Directives relating to the environment have been adopted. In the area of toxic wastes there are approximately 15 Directives that are of direct and indirect relevance and summaries and copies of most of these may be found in reference 1 below.

The Directives of particular interest to us are 75/442 and 78/319 dealing with Waste[2] and Toxic and Dangerous Waste[3] respectively. Directive 75/442 is a framework Directive in that it establishes the criteria by which member states should control the disposal of wastes at a national rather than a local level. Directive 78/319 on Toxic and Dangerous Waste falls within the framework of Directive 75/442 and lays down criteria for the supervision and handling of toxic wastes. A major drawback of both these Directives is that they do not define disposal standards in a unified way within the European Community. The lack of adequate disposal standards has particular ramifications in the context of the open market of 1992. Without common disposal standards there is the danger of a free-for-all in the toxic waste disposal industry.

> ... A controlled, cooperative and innovative waste business at Community level will not only be beneficial to the achievement of the urgent goal of environmental protection. With sums of ECU running into the tens or hundreds of billions, waste business is an important factor in the economy.[4]

The European Commission has made proposals for updating both Directive 75/442 and 78/319. The proposed Directive[5] amending 75/442, if enacted, will be a framework Directive and will ensure consistent implementation with more precise definitions of waste handling. The proposed Directive specifies the means by which recycling and reuse are to be promoted and commits member states to the development of low waste technologies. The proposed Directive on hazardous waste[6] if implemented will completely supercede Directive 78/319. It will be wider and more comprehensive and will lay down precise definitions to ensure consistent implementation of handling, transport, storage, record keeping and disposal. An element of major concern in the new Directive is that it appears to prohibit the co-disposal of hazardous wastes with domestic wastes. If this is so it will create difficulties for those Irish Local Authorities that have availed of or plan to avail of Government grants to develop co-disposal facilities. This element of the proposed Directive is being examined at present. It is expected that these two Directives will be enacted by the end of 1991.

The enactment of adequate legislation is obviously vital to the management of toxic wastes but what is the record of member states in implementing the legislation? Table 1 provides information on cases of default concerning Directive 78/319.

Table 1
Cases of default Concerning Directive 78/319 on Toxic and Danerous Waste[7]

Obligations Laid Down	Countries Defaulting
Promote the prevention and recycling of waste	Belgium, Ireland and United Kingdom
Draw up and review plans for waste disposal	Belgium, France, Italy and United Kingdom
Ensure that waste carries a specific identification form	Belgium, France
List and identify types of waste in each storage site	All member states (except The Netherlands, Germany, Denmark and perhaps France)
Draw up a triannual report	All member states

It must be pointed out that the report that the table is drawn from dates from 1987 and that the position may well be improved by now. This is certainly the case here in Ireland where the provision of grants to encourage recycling, announced in early 1989, should ensure that we are no longer defaulting on this element of the Directive. Those countries with a poor track record on environmental issues are going to come under increasing public pressure to put their houses in order. In Belgium and the U.K., both of which have defaulted on a number of obligations under the Directive on Toxic and Dangerous Waste, the Green Party experienced substantial increases in their share of the vote in the last European Parliament elections in 1989. I will return to the question of Politics and People in the next article in the series.

References

1. Commission of the European Communities (1987) European Community Legislation 1967-1987. V.3: Chemicals and Waste. Document No. X1/989/87.
2. Council Directive 75/442 on Waste. OJ No. L 194.39-41.
3. Council Directive 78/319 on Toxic and Dangerous Waste. OJ No. L 84.43-48.
4. European Parliament - Committee on Energy, Research and Technology STOA Project (1989) Science and Technological Options Assessment on 'Hazardous Waste Management Beyond 1992'. English version. European Parliament L-2929, Luxembourg.
5. Commission of the European Communities (1988) Proposal for a Council Directive amending Directive 75/442 on waste. OJ No. C 295/3-7.
6. Commission of the European Communities (1988) Proposal for a Council Directive on hazardous waste. OJ No. C 295/8-16.
7. European Parliament - Committee on the Environment, Public Health and Consumer Protection (1987) Report on the waste disposal industry and old dumps. Document A2-31/86.

Richard Thorn, Sligo RTC.

Corrigendum

The sentence immediately following Table 1 in the first article on 'toxic wastes in Europe' should have read 'In terms of the national share of the hazardous waste arisings, West Germany is by far the largest producer at 18 x 10^6 tonnes.....'

REVIEWS

SEMINAR "Environmental Impact of Landspreading of Wastes". Teagasc. Johnstown Castle. 30-31st May 1990.

The environmental aspects of the landspreading of wastes, particularly farmyard wastes and wastes from agri-industries, are becoming increasingly important for local authorities. The research being undertaken by Teagasc and reported on in this seminar is providing answers to some of the issues. I have given below notes and comments on the papers that are particularly relevant to those interested in groundwater.

"Management of Wastes to Prevent Leaching of Nitrates" by Marie Sherwood.

Problems with nitrate leaching may occur where the soils have a low clay content and are shallow, where there is a high density of cereal growing and where there is low rainfall. Marie Sherwood gives the following general guidelines as a code of good practice:

i) Total nitrogan (N.) applied should not exceed 300kg N/ha/year.
ii) Try to match the applications to grass growth potential.
iii) Not more than 100kg N/ha should be applied in any single application between mid July and 1st September.
iv) Not more than 80kg N/ha should be applied in the period 1st September - 31st December.
vi) No applications in autumn to heavily fertilized grazed grass.
vii) If concentrations of nitrate in groundwater are high, farmyard wastes should be spread only in the growing season.

Marie Sherwood concludes that "overall, Ireland has relatively few nitrate problems because of high rainfall, relatively few free-draining soils, low acreage of cereals, low overall fertilizer nitrogen use and weather conditions conducive to volatilisation of ammonia".

"Properties of Different Grades of Soiled Water and Strategies for Safe Disposal" by Michael Ryan

This paper presented valuable data on the composition of soiled water including the seasonal variations. For instance the total nitrogen content in soiled water from a dairy unit varied from 88mg/l N in winter to 225mg/l N in summer and the Coliform levels varied from 400,000 to 800,000/100ml. The potential to pollute groundwater is obvious - high nitrate levels are likely in areas of free-draining soils and subsoils if the dirty water is applied in excessive quantities, particularly in winter; and pollution by faecal bacteria is likely beneath farmyards in free-draining areas where the bedrock is close to ground surface. I am concerned about the use of rain guns to dispose of soiled water as, in my experience, they are used on many farms in winter in free-draining areas and are not moved regularly. Consequently uptake of nitrogen by crops is minimal and migration of nitrate into groundwater is highly likely.

"Hydraulic Aspects of Land Application of Liquid Agricultural Wastes" by John Mulqueen.

John Mulqueen gave a concise introduction to a variety of hydraulic considerations - soil texture, porosity, structure and hydraulic conductivity etc - and discussed their relationship to soiled water and slurry disposal. He recommended that any area should only be spray

irrigated for one day within a 3 week rotation to prevent too much build up of strained particles and overloading with chemical nutrients and to allow the soil to dry out and microbial decomposition to take place.

"Farm Building and Farmyard Design" by Sean Regan

This was a very practical paper dealing with aspects of farmyard design such as: managing clean water; reducing effluent volumes; silage pit defects and repairs; dirty water collection, storage and disposal; slurry management and building design. A Waste Management Study, which examined 572 farms, showed that 50% of concrete silos were defective. Poor control of soiled water was a problem on up to one third of farms. Direct discharge of dungstead seepage, dairy washings and dirty yard runoff to surface water was observed in at least 25% of dairy farms. Although much useful information was given on farmyards, one aspect that did not receive sufficient attention, in my view, was the need to carry out a site investigation and an assessment of the geology and hydrogeology before designing a new farmyard or changes to an old farmyard. Compare two situations: firstly, in an area of thick low permeability boulder clay and, secondly, an area with less than 2-3m of sand and gravel overlying karstified limestone. In the former situation the main pollution risk is to surface water whereas the latter it is to groundwater. There are many other possible geological situations, and the farmyard design needs to take them into account. For instance it may be necessary to keep collection tanks above ground surface in situations where limestone bedrock is close to the ground surface.

Other papers covered slurry handling equipment to reduce odour and ammonia emissions; use of soil surveys; problems with phosphorus; and organic micropollutants in soil.

Discussion

My own views on the landspreading of wastes, particularly agricultural wastes are as follows:

1. Landspreading of wastes generally has a greater environmental impact on surface water than groundwater. Leakage of effluent and soiled water from farmyards generally poses a greater risk to groundwater than landspreading.
2. The soil and subsoil are excellent and cost-effective media for treating and attenuating pollutants, provided they are not overloaded either hydraulically or with nutrients. Dispersal of the effluent is crucial as it enables plant uptake of nutrients and dilution of the pollutants.
3. Where there are 1-2m+ of soil and subsoil and the water level is over 1-2m b.g.l.:
   a) The impact of landspreading on groundwater is not likely to be significant, provided the wastes are not spread in excessive quantities and not spread during the non-growing season.
   b) The main and usually only problem constituent for groundwater is nitrate. Phosphorus is not a problem.
   c) Spreading should take place preferably in spring and early summer so that the nitrate is utilised by crops.
   d) The spreading or injection of blood should not cause significant problems to groundwater except in areas where the nitrate levels in water are already high.
   e) In view of the quantities of waste generated by piggeries, spreading may cause localised plumes of groundwater contaminated by high nitrates.

f) Localised pollution problems - mainly high in nitrates - are likely to arise in areas with free-draining subsoils where dirty water is pumped for long periods, often from rainguns, onto small areas of land. In some instances high iron and manganese levels in groundwater may result.

4. Disposal of wastes in soakage pits, quarries and gravel pits is not advisable.
5. Landspreading near swallow holes and sinking streams and on rock outcrops should be avoided. Bacterial pollution has arisen in the West of Ireland in these situations.

Donal Daly, Geological Survey of Ireland.

David Burdon Commemoration Lecture "Land Use Planning and Groundwater Protection in Czechoslovakia " by Dr. Jaroslav Vrba, at University College Galway 26th September 1990.

Since World War II, the social and economic development of Czechoslovakia has led to major groundwater problems, in particular the pollution of integranular aquifers. Diffuse nitrate pollution of shallow vulnerable aquifers with inorganic fertilisers is the most serious human impact on groundwater quality in Czechoslovakia. This together with increasing demands for water has led to the long-term planning, development and management of water resources. The state water management plan adopted by the government has as its principle objective the development of groundwater protection and quality conservation for the benefit of the health of present and future generations.

The groundwater protection programme includes identification and risk assessment of pollution sources, groundwater quality monitoring, study of transport and transformation processes of nitrogen compounds, pollutant transport modelling, legal and legislative aspects and health implications of groundwater pollution.

Detailed groundwater monitoring is a necessity for the adequate description and protection of groundwater systems. In Czechslovakia regional and national groundwater quality monitoring systems are in operation. The national system comprises of three sub-networks which include shallow aquifers, deep aquifers (greater than 100m) and springs. The frequency of sampling is twice yearly for shallow aquifers and springs and yearly for deep aquifers. Compressed gas injection and suction methods are employed for sample recovery. Comprehensive chemical and biological analyses are carried out on samples.

Dr. Vrba stressed the importance of avoiding sample mixing, particularly in deeper aquifers because hydrochemical stratification can

occur resulting in misleading results if one mixed sample is taken. Therefore, it is necessary to take samples at different discrete depths.

The regional groundwater quality programme is employed in areas where there is high intensity farming (150-160kg N/ha) and productive, vulnerable, shallow, unconfined, fluvioglacial aquifers. Dr. Vrba discussed one such area-the Middle Elbe region in Bohemia. Monitoring of the area and vertical distribution of nitrates and other chemical species is carried out in this region four times per year. Over thirty years there has been a twofold increase in nitrate concentrations in groundwater and an eightfold increase in the use of inorganic fertilisers in the region. However in wells and well fields surrounded by protection zones the increase has been much less dramatic (i.e. 33% as opposed to 200% outside protection zones). The percentage of water supply systems that do not meet the drinking water standards has increased from 9% in 1968 to 17% in 1978.

The quick response of aquifers to natural and human impacts means that mutual optimisation of agricultural activities and groundwater protection may lead to a rapid restoration of the system. In these shallow aquifer systems vertical hydrochemical zonation with respect to nitrate is common. Increased nitrate concentration mostly occurs in the upper oxidative levels rather than the deeper levels. In cases such as these the lower part of the aquifer may be suitable for water abstraction provided groundwater flow is horizontal and the quantities pumped are low.

Dr. Vrba also emphasised the importance of analysing the transport and transformation processes of fertilisers in the unsaturated zone. The type and amount of fertiliser, time of application and crop type profoundly influence these processes. Rotational cropping rather than monocultural methods and the use of organic rather than inorganic fertilisers have minimised the impacts on groundwater systems in the area.

In conclusion, Dr. Vrba stated that where water supplies depend on irreplacable groundwater resources then less intensive agricultural production and control over all farming activities is important.

Richard Henderson, Sligo RTC.

COLLOQUIUM

The 1st Environmental Researchers Colloquium will be held at Sligo RTC on 11th, 12th and 13th January 1990. For further information contact Richard Thorn, Sligo RTC (Tel. No. (071)43261)

PUBLICATIONS

The Annual Sherkin Island Marine Station Conferences

Each year Matt Murphy organises an environmental conference in Cork which is attended by engineers, scientists, county councillors and representatives of environmental groups. This has become one of the most important environmental conferences organised in this country. As most of the speakers are from continental Europe, Britain and the U.S.A., we can learn from the mistakes and research findings of other countries. The 1990 Conference was entitled "Sewage Disposal: Where do we stand?". The topics for previous years were as follows:

1987 Lake, River and Coastal Pollution - Can it be contained?
1988 Domestic and Industrial Wastes
1989 Can Industry and the Environment live together?

The proceedings can be purchased for £21 each from Matt Murphy, Sherkin Island Marine Station, Co. Cork. (Ph. 028-20187).

Editor

THE GEOLOGY OF THE LIMERICK BASIN

A New Geological Map from the Geological Survey

The Geological Survey has recently published a compilation geological map of the Limerick Basin. The map covers most of County Limerick, but also covers small parts of Counties Tipperary, Cork and Clare. The map is approx 113cm x 71cm (including cross-section), is in full colour and is on a scale of one inch to a mile (1:63,360).

The compilation is based on the work of the Geological Survey, on work carried out at a number of Universities and on data contained in mineral exploration company reports which were lodged with the Geological Survey as part of the requirements of mineral prospecting licences issued to the companies. A summary account of the geology is provided with the map.

Copies of the map are available from Publication Sales, Geological Survey of Ireland, Beggars Bush, Haddington Road, Dublin 4. The price of £10 will include postage if the map can be folded, but if a rolled copy is required, post and packaging would be an extra £1.50.

The map is also available as part of a major compilation of exploration company data which includes maps showing borehole locations, geochemical and geophysical anomalies, mineral localities etc. - in all, a portfolio of twelve maps and a report with appendices which give a brief exploration history of each individual prospecting licence in the area. The full report and twelve maps are available at a price of £40. (P+P: Ireland, UK - £4; Elsewhere £6).

John Pyne, Geological Survey of Ireland.

I.A.H. (IRISH BRANCH) NEWS

Annual General Meeting

The Irish Branch of the Irish Association of Hydrogeologists (IAH) held their annual general meeting (AGM) at the Geological Survey, Beggars Bush on the evening of Tuesday 5th of November.

The elected incoming committee is as follows:

President:	Bob Aldwell, Geological Survey of Ireland. Tel. No. (01) 609511
Secretary:	Shane O'Neill, E.R.A. Tel No. (01) 766187
Treasurer:	Kieran O'Dwyer, K.T. Cullen Hydrogeological and Environmental Services. Tel. No. (01) 697082
Portlaoise Meeting Secretary:	Richard Thorn, Sligo R.T.C. Tel. No. (071) 43261.

The committee would welcome suggestions for topics or subjects that could be addressed, both at committee level, and more importantly, by the IAH as whole. These can be sent to any of the above but preferably to The Secretary.

Shane O'Neill, Secretary IAH

I.A.H. Technical Meetings

These are held at the Geological Survey of Ireland on the 1st Tuesday of every month (apart from the summer months) at 5.30 p.m. They usually are informal discussion meetings although occasional lectures will be held. The future topics, dates and speakers are as follows:

8th January:	"The application of remote sensing to hydrogeology in Ireland". Introduced by David Ball, E.R.A.
5th February:	"Leaking underground storage tanks (LUST's)" Introduced by Shane Moore-Bennett, K.T. Cullen Hydrogeological and Environmental Services and Jack O'Sullivan, Environmental Management Associates.
8th March:	"Economics of groundwater-based heat pumps". Speaker to be announced.

For further information contact either Kevin Cullen (Tel. No. (01)697082 or Donal Daly (Tel. No. (01)609511).

Editor

PEOPLE IN GROUNDWATER

Catherine Coxon.

Dr. Catherine Coxon has been appointed a lecturer in the Environmental Sciences Unit at T.C.D. Catherine has for several years been the Secretary of the International Association of Hydrogeologists (Irish Branch). Her appointment as a lecturer at T.C.D. represents significant progress in the groundwater research area. We look foreward to the results of her work (and to many items from her in the Newsletter!).

Ray Flynn

Mr. Ray Flynn, who has just completed an M.Sc. in Hydrogeology at Birmingham University, has joined Environmental Resources Analysis Ltd. (E.R.A.) as a hydrogeologist. Ray is a geology graduate from T.C.D.

Suzanne O'Sullivan

Ms. Suzanne O'Sullivan, who has worked with Kevin Cullen, Patrick Johnston Associates and more recently Eolas, has now joined E.R.A. as a hydrogeologist.

Louise Woods

Ms Louise Woods, who has just completed an M.Sc. in Hydrogeology at University College London, has joined K.T. Cullen as a hydrogeologist. Louise is a geology graduate from T.C.D.

Hubert Henry

Dr. Hubert Henry, who recently completed a Ph.D. thesis entitled "An Evaluation of Septic Tank Effluent Movement in Soil and Groundwater Systems" at Sligo R.T.C., has jointed the Peat Research Centre, Bord na Mona.

Editor
