HARWELL bulletin

No. 77/3 28 January 1977

NUCLEAR WASTE DISPOSAL

There has been a great deal of public comment during the last month or so on the joint research programme on nuclear waste disposal being undertaken by the Environmental Services Group led by Dr. Frank Feates in Chemical Engineering Division and the Institute of Geological Sciences.

Some details about this work were given in HARWELL bulletin No. 76/38 of 3 December 1976 when the start of the programme was reported. Further information is given below so that readers can assess press reports against a background of fact.

Background

It is the AEA's intention to convert long lived fission product waste (at present stored as liquid) into blocks of solid glass-like material encased in steel, ie the FINGAL/HARVEST process. The solid blocks will be stored under supervision for some years before permanent isolation from man's immediate environment. Research on where and how to dispose satisfactorily of the glass blocks is going on in many countries and is the subject of international collaboration. The HARWELL/IGS programme is part of an EEC study within which it will examine the safety of underground isolation of solid waste in hard rock formations.

The HARWELL/IGS Programme

The hard rock formations selected for study have never been examined in the detail now required. No information has been collected about their structure or behaviour at depths between 1000 and 3000 feet. The joint study will look at the fracture struture, water permeability and stress characteristics of the rocks over a period of about ten years. There is not likely to be a need for final disposal until about ten years after that, ie in the 1990s.

Under the FINGAL/HARVEST research project, the solidified glass waste has been rigorously tested for insolubility and resistance to very high doses of radiation. However, still more research is needed: for instance, in the unlikely event that water should reach the glassified waste we need to satisfy ourselves that any tendency to dissolve will be so low that it could give rise to no health risk, and that the very long time it would take to diffuse back into man's environment would introduce yet another safety factor. We also need to study the effects of heat on the stability of rocks and to analyse in detail the earthquake records of any region likely to be selected. However, it is worth bearing in mind that the rock structures proposed for investigation have existed undisturbed for many millions of years, and the probability of a cataclysm while the waste remains hazardous is so remote as to be virtually insignificant. It is rather like saying that something which has been stable for a year is unlikely to remain stable for one more minute.

The areas in which the HARWELL/IGS team will be carrying out preliminary surveys include parts of the Western Highlands and Islands, the Southern Uplands of Scotland and Northern England. If and when an apparently suitable area is found, the next step will be to make trial drillings to study the rock at depths of a thousand feet or more. This will involve the drilling of about a dozen holes, each 4" in diameter, into a rock mass extending over several miles.

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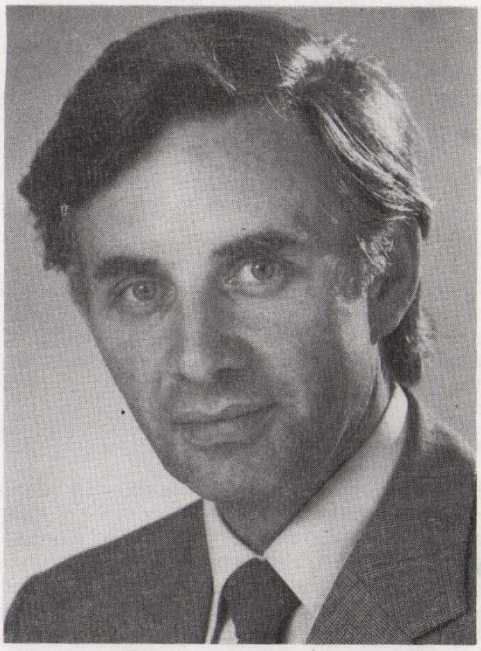


SEAS APPOINTS NEW PRESIDENT

Bob McLatchie of Computer Science & Systems Division has been elected President of SEAS (SHARE European Association), the IBM User Group for larger machine customers in Europe, the Middle East and Africa. He took office on 1 January 1977 for a two year term. The retiring President is Dr. C.J.M. Aarts of the University of Nijmegen in the Netherlands.

Since graduating from the University of Glasgow in 1959, Mr. McLatchie has been engaged on various kinds of computing work at Harwell. He is now Leader of the System Support Group, responsible for the development of system software on the central computer.

SITE EMERGENCY EXERCISE - advance notice

Provisional arrangements are being made for a Site Emergency Exercise to be held on Wednesday, 30 March, 1977. Entrances will be closed and movement around the site will be restricted to personnel involved in the exercise. Organisers of events to take place at Harwell are asked to avoid this date where possible.

A more detailed notice will appear shortly before the exercise takes place.

NUTMAQ ON SHOW

The Industrial Physics Group of Nuclear Physics Division received a visit on 20 January from about 20 people with mining interests from different parts of the world. They were in England to attend the International Symposium on Geology, Mining and Extractive Processing of Uranium with special reference to Europe.

The delegates who visited HARWELL included Mr. Alan Pegg representing GEC-Elliot Process Instruments Ltd., the company licensed by HARWELL to manufacture and market the Gamma Survey Meter developed by the NUTMAQ project. The visitors later travelled to Cornwall to try out this and another NUTMAQ instrument, the 4-channel Gamma spectrometer.

The photograph shows Mr. Pegg (right) with Mr. Malcolm Aston of NUTMAQ (left) discussing the Gamma Survey Meter with a delegate from New York. The picture was taken at the exhibition run in association with the Symposium which attracted around 200 delegates. Both the symposium and the exhibition were organised by the Institution of Mining and Metallurgy and held in London.

NUCLEAR WASTE DISPOSAL (contd.)

There is no risk of contaminating surface or underground water resources. No radioactive waste will be involved at any stage of the research programme. Wildlife will be disturbed far less than by Forestry Commission activities in the same areas and no noise, smell or other nuisance will result.

Parallel Studies

Eventual isolation of nuclear wastes in hard rock is only one of several alternatives under active consideration with our colleagues in Europe and the United States. Research work on disposal of solid waste into the deep ocean floor and isolation in salt or clay deposits is now well under way and it will be at least ten years before our research is far enough advanced to select any one as preferable to the others.

A one-page leaflet giving the main points to be remembered about nuclear waste disposal is being prepared by Public Relations Group. It is designed as a companion sheet to "Nuclear Power - Do You Know?", and copies will be available from Mrs. Pat Ferguson, Extn. 2439.

CHP PLANS FOR THE WEST END

Britain's first public supply heat and power plant of a size comparable with those increasingly common in Scandinavia and continental EEC countries may be built on the site of the old Battersea A power station in London, now being dismantled.

Combined heat and power schemes, under the right circumstances, can almost double the efficiency with which fuel is used, and are likely to form an increasingly important component of future generating policy. Alternatives for the future Battersea site, however, also include a gas turbine generator intended to help meet peak loads, and a conventional power station of perhaps double the size of the old 243 megawatt station.

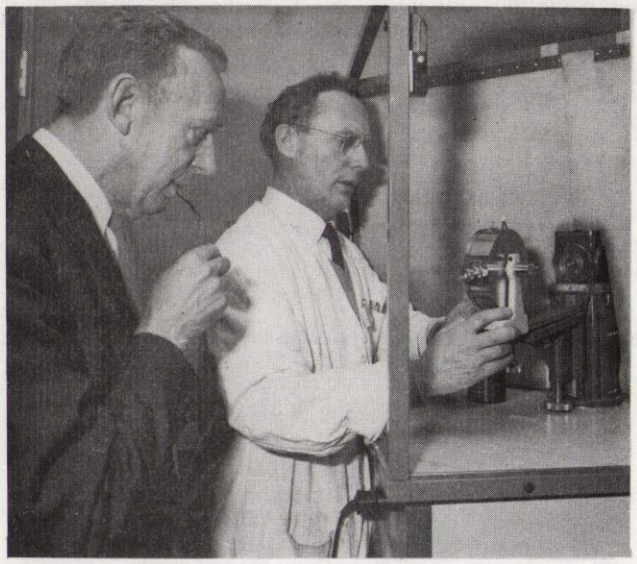
According to preliminary studies the Battersea area, including the West End of London, might usefully employ reject heat of up to 900 megawatts - suggesting that a power station of around 300 megawatts electrical output would be suitable. Steam distribution, however, would require the driving of steam pipes 3 metres in diameter under Hyde Park. ('The Guardian' 24 January)

DAILY MIRROR, *Tuesday, January 18, 1977*

'If it was a gasworks we would be worried'

This reprint from the 'Daily Mirror' seems to sum up the message contained in the Guardian leading article of Friday 7 January 1977 "Safety first, last, and in between" (as described in last week's bulletin).

Copies of the complete article are still available from Pat Ferguson, Public Relations, Extension 2439.



SAFETY OF X-RAY DIFFRACTION EQUIPMENT

Mr. E.G. Weatherly, HM Senior Inspector of Health and Safety for Ionising Radiation, recently visited Mr. Chris Sampson of Materials Physics Division to discuss safety devices for shutters on X-ray diffraction equipment.

Most commercial devices presently available do not meet the recommendations set down in the New Health and Safety at Work Act. The 'Sampson/Harwell' shutters, designed to fit on the tube shields in the X-ray laboratory used by the Neutron Beam Applications Group in M.P.D. are the only ones presently on the market which satisfy the new code.

Harwell has already supplied the shutters to several industrial X-ray users, and in the photo Mr. Sampson is showing one of the shutters to Mr. Weatherly (left).

ONE-DAY SEMINAR AT HARWELL

On March 8 a one-day seminar on 'Basic Aspects of Corrosion Science' will be held in the Large Conference Room, Building 220. It is being organised by Dr. A.E. Hughes and Dr. A.J. Tench, the Project Coordinating Officers for the underlying areas 'Surface and Corrosion Science'.

The object of the meeting is to have a series of 20-30 minute presentations of research in progress, focussing attention on a scientific discussion of corrosion mechanisms and some of the techniques which are being used at HARWELL in their study. Time will be available for discussion. The meeting will be graded 'Not For Publication'.

The following people have agreed to speak on their work, and a detailed programme will be circulated in due course.

Dr. J.E. Antill	MDD
Dr. A.N. Pritchard	MDD
Dr. A. Atkinson	MDD
Dr. J. Riviere	MDD
Dr. A.J. Tench	Chem.
Dr. A.M. Stoneham	TP
Dr. R. Thompson	App.Chem.
Dr. A.G. Duncan	Chem.Eng.
Dr. G. Dearnaley	NPD
Dr. G. Longworth	NPD
Dr. J.A. Cairns	Met.

Division Heads are requested to nominate staff who wish to attend the seminar. Since scientific discussion is the objective, we would suggest that in the first instance nominations be confined to staff with qualifications and background appropriate to their participation in a normal scientific meeting. Nominations should be sent to Dr. A.E. Hughes by February 18 at the latest so that the necessary arrangements can be made and programmes circulated.

MAKING "MOTION PICTURES" OF AN OPERATING REACTOR'S CORE

Scientists from Argonne, the Hanford Engineering Development Laboratory and Los Alamos National Laboratory have found a way to make "motion pictures" of the core of an operating nuclear reactor. In a recent test at Argonne's Transient Reactor Test' (TREAT) Facility, an experimental fuel pin from. Hanford was subjected to a routine safety test, during which it was exposed intentionally to such high reactor power that it overheated and melted. Then, using a technique developed at Los Alamos, a slot in the reactor's side was equipped with three "pinholes". Neutrons given off by the fuel pin streamed through the pinholes and were focused onto a "scintillator" screen, which gives off tiny flashes of light when struck by neutrons. Specially equipped television cameras then photographed the screen, creating a motion picture of how the fuel behaved during meltdown.

The next step will be to build a "coded aperture" device that will aim 15 pinholes at a single target to allow three-dimensional examination of the fuel pin. If such a device is developed, one will be installed in TREAT and another in the Safety Test Facility that is proposed for construction at Argonne-West. ('Argonne News', January 1977)

REACTOR SHUTDOWN - February

DIDO: 6-10 February PLUTO: 20-24 February

DIARY OF EVENTS

Applied Chemistry Division Colloquium*	Mr. J.D. Hughes (Applied Electrochemistry Group)	'High Strength Carbon Fibre Composites'	1977 Wednesday 2 February at 9.00 a.m. Large Conference Room, Bldg. 220.24

*COMMERCIAL - IN CONFIDENCE: Green K6 passes must be shown for admittance to this lecture

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Computer Sciences and Systems Division	Dr. I.S. Duff	'The new Harwell sparse linear equation solver MA28'	Thursday 3 February at 2.15 p.m. Ed. & Training Centre
Metallurgy Division	Dr. M.J. Makin	'Void Swelling Studies with the High Voltage Microscope'	Wednesday 9 February at 3.30 p.m. Conference Room, Bldg. 551
Materials Development Division Colloquium	Dr. A. Atkinson	'The Nitridation of Silicon'	Thursday 10 February at 2.00 p.m. Bldg. 552
Nuclear Physics Division Colloquium	Dr. R.D. Smith (Risley)	'Present Status of Fast Reactor Development'	Thursday 10 February at 3.30 p.m. Conference Room, H.8
Chemistry Division Colloquium	Dr. J.P. Charlesworth	'A.C. losses in multifilamentary superconductors'	Wednesday 16 February at 9.00 a.m. Large Conference Room, Bldg. 220.24

EVENT AT CULHAM LABORATORY

Culham Laboratory Colloquium	Prof. J.M. Cassels (Liverpool)	'Cascade Energy'	Friday 11 February at 11.00 a.m. Main Lecture Theatre, Culham Laboratory

EVENT AT RUTHERFORD LABORATORY

NIMROD Lecture Series	W. de Boer (DESY)	'Latest Results from DORIS'	Monday 31 January at 11.30 a.m. R.22 Lecture Theatre

OUTSIDE EVENTS

University of Oxford	Dr. S. Aarseth (Cambridge)	'Computer Simulation of the Expanding Universe'	Tuesday 8 February at 4.30 p.m. Dept. of Astrophysics, South Parks Road, Oxford
University of Reading	Dr. R.J. Bell (NPL, Teddington)	'Aspects of the Vibrational Modes of Amorphous Solids'	Monday 7 February at 5.00 p.m. Small Lecture Theatre, J.J. Thomson Physics Lab., Whiteknights, Reading
Inst. of Mechanical Engineers	Discussion	'A Fail-safe approach to pressure vessel design'	Wednesday 2 February at 6.00 p.m. Applied Mechanics Group, IME, 1 Birdcage Walk, London SW1
Imperial College	Prof. I. Fells (University of Newcastle-upon-Tyne)	'Is Energy Planning Possible'	Monday 14 February at 3.45 p.m. (Tea at 3.30 p.m.) Dept. Chem. Eng. and Chem. Technology), Prince Consort Road, London
Inst. of Electrical Engineers	Colloquium	'Electron Emission'	Wednesday 2 February at 10.30 a.m. IEE, Savoy Place, London WC2

All wishing to attend must register: forms available from the Secretary, IEE, Savoy Place, London WC2

Inst. of Electrical Engineers	Rear Admiral L.S. Bryson and John Alvey (Royal Navy)	'The Electron Rules the Waves'	Thursday 3 February at 7.00 p.m. IEE, Savoy Place, London WC2

Applications for tickets to the Secretary, IEE, Savoy Place, London, quoting ref. (LC) and enclosing a s.a.e.

Inst. of Electrical Engineers	Prof. J. Brown (Imperial College)	'Speculations on Antennas'	Wednesday 9 February at 5.30 p.m. (Tea at 5.00 p.m.) IEE, Savoy Place, London WC2

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