THE URBAN TRANSPORTATION OF IRRADIATED FUEL

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Foreword by Ken Livingstone, Leader of the Greater London Council

The GLC's concern about the transportation of spent nuclear fuel through its densely populated areas dates back to 1980, when members of all parties expressed their concern about the lack of information on safety questions. The Conference held in London in April 1983, of which this book is a record, was therefore a culmination of the Council's concern and a desire to address the issues, which transcended party boundaries.

I am grateful to those eminent speakers who took part, and the conference organisers, who endeavoured to provide the public with a wide spectrum of views on the subject, both scientific and psychological. Thanks are also due to the many people who attended and contributed to the debate, which formed such an important feature of this Conference. The questions and fears which they expressed are included in this account of the proceedings, as they rightly should, thus fulfilling one of the aims of the conference to be a medium of two-way information flow.

In November 1983, six months after our Conference highlighted, amongst other potential dangers, the very real deficiencies of tests on flasks, and in particular the use of scale models or computer modelling to simulate an accident, the CEGB have announced that they will now stage full-scale tests. They are also withdrawing from service a faulty design of Magnox flask. At the same time the Inspector presiding over the Inquiry into the proposal to build a pressurised water reactor at Sizewell announced the appointment of an additional assessor to advise on matters concerning the transport of irradiated nuclear fuel.

The legitimate fears of Londoners cannot be swept aside, and therefore I hope that this book will serve to better inform both the regulatory authorities of the nature of these fears, and the population of London, and indeed of other cities, of the way in which some of

these problems are addressed. The final aim must be to remove any perceived potential threat from our cities, and I hope this book is a significant step in that direction.

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Notes on the Contributors

Robert Barker is now a part-time consultant on transportation matters, having recently retired from the US NRC and IAEA where he had been in charge of the Agency's international transport safety programme since 1979. He has been directly involved with the transportation of radioactive material since the early 1950s, compiling the first Los Alamos Monitors Handbook in 1953. From 1954 he worked for both the IAEA and US AEC and was personally involved in the development of both US and International Standards. In the 1970s he prepared several environmental impact statements on transportation to and from nuclear power reactors. He is an engineer and health physicist by training.

Marcel J. Berthier has been employed in the French Ministry of the Interior since 1977, where he has been concerned with peacetime nuclear matters. Within this Ministry, the Civil Security directorate has been responsible for the setting up of arrangements in the departments for the storage and transport of nuclear and combustible materials. Marcel Berthier has engaged in work for international organisations including the International Atomic Energy Agency (IAEA). He has made on-site studies of the solutions appertaining to these problems in many countries. His work currently involves the encouragement and coordination in France of the use of radiological response equipment, training of fire officers and keeping responsible 'Securité Civile' departments informed. He divides his time equally between the transport of radioactive materials and control of their efficient routing.

Jean-Claude Charrault was born in 1932. He graduated from the Ecole Centrale des Arts et Manufacture de Paris in 1957 and in 1958 joined the French Commissariat à l'Energie Atomique. In 1960 he became Directorate-General for Research of EURATOM and since 1971 has worked for the Commission of the European Communities as Head of Division (Nuclear Policy).

Roger Clarke has worked actively in the radiological protection field for 14 years, firstly as a research scientist carrying out work on the environmental and biological effects of radiation. In 1978 he joined the National Radiological Protection Board to head its Assessments Department and in 1983 became Board Secretary. Dr Clarke has published widely in the open literature on the topics of health effects of radiation, assessment of the consequences of routine and accidental releases of radioactive material and emergency planning. He is a consultant to the United Nations in the field of effects of atomic radiation, acts as an independent Expert for the Commission of the European Communities and is a member of a number of international committees concerned with radiological protection.

Richard Clutterbuck has a Cambridge MA in Mechanical Sciences and a London PhD in Politics. He served in the Royal Engineers for 35 years, retiring as a major-general in 1972 and is now Reader in Political Conflict at Exeter University. He participated as an engineer in the nuclear trials on Christmas Island in 1958. He is a director of Control Risks Ltd which specialises in international security against terrorism. He has written nine books, of which the most recent are *Kidnap and Ransom* (1978), *Britain in Agony* (1980), and *The Media and Potential Violence* (1983).

Tony Cox is a Director of Technica Ltd, and has an overall responsibility for the company's scientific and engineering work in addition to leading specific projects in the areas of hazard-analysis and risk-assessment. He is internationally known for his work on the subject of vapour-cloud dispersion. His main current interest is in the development of hazard-analysis techniques for more general and practical application. He graduated from Cambridge with first-class honours in Mechanical Sciences and then carried out research into air pollution in the Department of Mathematics, Imperial College, London, for which he was awarded a PhD. He is a Chartered Engineer, Member of the Institute of Energy, and Fellow of the Royal Meteorological Society.

Commander Cree joined the Metropolitan Police in 1958 and has served in various parts of London. From May 1980 to October 1983 he was in charge of a number of branches at New Scotland Yard including that which dealt with planning for major incidents and the coordination of policing for public-order events. During his period at New Scotland Yard he was involved in the planning for policing the Royal Wedding in 1981, the visits of the Pope and the President of the USA

in 1982. He left New Scotland Yard on 3 October 1983 to take command of a district based at Southwark.

Brian Evason graduated in Civil Engineering from Southampton University in 1969. He joined Taylor Woodrow Construction Ltd and worked in various civil engineering capacities until 1976, including work on feasibility and design studies for concrete oil-platforms for the North Sea and elsewhere. He then transferred to a department specialising in problems outside the common experiences of the profession, particularly structural dynamics. His special interest is the response to impact of concrete structures, in developing a fuller understanding of the behaviour and finding reliable methods of prediction. He presented a paper on the subject to the 6th SMIRT Conference (Paris 1981).

Lord Flowers was appointed Rector of The Imperial College of Science and Technology in 1973 following six years as Chairman of the Science Research Council. He is Chairman of the Committee of Vice Chancellors and Principals. He is a theoretical physicist who spent much of his early career at UKAEA Harwell. He is probably best known as past Chairman of Computer Board for Universities and Research Councils (1966–70), Royal Commission on Environmental Pollution (1973–6), Standing Commission on Energy and the Environment (1978–81) and the University of London Working Party on the Future of Medical and Dental Teaching Resources (1979–80). He was President of the European Science Foundation from 1974–80. He is a Fellow of the Royal Society, holder of numerous honorary degrees and fellowships and an Officier de la Légion d'Honneur. He is a Member of the House of Lords Select Committee on Science and Technology.

David Hall has been the Director of the Town and Country Planning Association since 1967. He is a chartered town planner and has held senior posts in English local government. He is Chairman of the Council for Urban Studies Centres and a Board Member of the Habitat International Council. He was visiting professor to the Centre for Metropolitan Planning and Research, Baltimore, in 1975 and consultant to the Quebec government in 1978. He has lectured and broadcast extensively in Britain and overseas, and is the author of numerous articles on planning matters. He has a specialist interest in the decision-making process for large projects such as nuclear power stations.

Peter Jacques is the Secretary of the TUC's Social Insurance and Industrial Welfare Committee and head of the TUC's Social Insurance and Industrial Welfare Department. He is a TUC member of the Health and Safety Commission, a member of the Industrial Injuries Advisory Council, and a member of the Social Security Advisory Committee. He was also a member of the Royal Commission on the National Health Service. Within the TUC he is responsible for social security and related collective bargaining on issues such as occupational pensions, NHS spending and industrial relations, health and safety at work, legal services and environmental policy.

Robert M. Jefferson is manager of the Transportation Technology Center at Sandia National Laboratories in Albuquerque, New Mexico, USA, whose activities are devoted to research and development addressing the transportation of radioactive materials. This Department of Energy-funded activity is responsible for technical evaluation of shipping systems, development of new materials and technology, testing, risk assessment, evaluation of institutional considerations, and information collection and dissemination. In addition to his full-time duties at Sandia, Robert Jefferson was an adjunct professor of nuclear engineering at the University of New Mexico for 16 years. Additional professional background includes work on radiation effects, reactor design, and operational responsibility for a range of reactors, accelerators and other radiation-producing devices.

Professor Terence R. Lee has been Head of the Department of Psychology at the University of Surrey since 1971 and was pro-Vice Chancellor at the same University from 1977 to 1981. He studied psychology at Magdalene College, Cambridge, gained a first degree in 1949 and a PhD in 1954 and he then held posts at the universities of Exeter, St Andrews and Dundee. His publications include *The Perception of Risk* (Royal Society, 1982), *The Public's Perceptions of Risk and The Question of Irrationality* (Royal Society, 1981), *Psychology and the Environment* (Methuen, 1976), and *Psychology and the Built Environment* (with D. V. Canter, Architectural Press, 1974).

Charles E. MacDonald is Chief of the Transportation Certification Branch, US Nuclear Regulatory Commission, Washington DC. He worked for the US Merchant Marine Academy in 1956 and was employed by the Combustion Engineering Inc. for mechanical design of pressurized water reactors and radiological safety from 1956 to 1963, with 2 years unrelated experience in the US Navy. From 1963 he

was employed by the US Atomic Energy Commission and the US Nuclear Regulatory Commission in the regulation of the nuclear industry. Since 1972 he has been responsible for the review and approval of applications for the packaging of radioactive material. He is active in the American National Standards Institute and American Society of Mechanical Engineers for the development of standards for the safety of transport of radioactive materials.

Gordon MacKerron is a Fellow of the Energy Programme at the Science Policy Research Unit, University of Sussex. With a background in economics and project evaluation, he has worked since 1978 on issues of energy policy and economics, specialising on the UK and international experience of electricity use and nuclear power. He has published a number of papers in this area and was an adviser to the Monopolies Commission in its investigation of the CEGB (1980/1). He also appeared as a witness at the Sizewell Inquiry for the Electricity Consumers' Council.

Harbans L. Malhotra is an International Fire Protection Consultant; he is Chairman of the Committee on Fire Resistance Tests for both the BSI and ISO, and Chairman of the RILEN Coordination Group, and UK Representative on the General Council. He retired in 1983 from the Fire Research Station after thirty-two years as their Senior Principal Scientific Officer and head of the Building and Structures Division. He has specialised in research into the properties of materials, particularly of concrete, at high temperatures and into the behaviour of structures in fire. He is a member of the Concrete Society and the Institute of Structural Engineers Committee on Fire.

Fred Millar, PhD, is Director of the Nuclear and Hazardous Materials Transportation Project of the Environmental Policy Institute. He has testified before the US Congress and numerous state and local legislative bodies, has helped to initiate two national level lawsuits against the US Nuclear Regulatory Commission (NRC) on nuclear waste transport and has led the lobbying effort that forced the NRC to reveal the rail and highway routes for spent fuel shipments. His research has provided citizens' groups all over the US with information on safety problems and legal issues. He assisted state attorneys-general in New York and Ohio in their lawsuits against the federal attempt to override local and state laws regulating nuclear transportation. Prior to joining EPI he was a professor of sociology and a consultant to the Ohio Public Interest Campaign.

Raymund O'Sullivan joined the Department of Transport in 1969 and since 1981 has held the post of Transport Radiological Adviser to the Secretary of State, and Head of the Radioactive Materials Transport Division.

David W. Pearce is Professor of Political Economy at University College London. He is the author or editor of eighteen books including *Cost-Benefit Analysis* (Macmillan), *Environmental Economics* (Longman), *Social Projects Appraisal* (with C. A. Nash) (Macmillan), and *Decision-Making for Energy Futures: a Case Study of the Windscale Inquiry* (Macmillan). He has produced some 100 articles in learned journals, is on the editorial board of six journals, has acted as a consultant to OECD, Commission of the European Communities, ECE (Geneva), the World Bank and the Governments of Egypt and Thailand. He is a member of the National Radiological Protection Board. Married with two children, David Pearce lives in Bedford.

Dr Marvin Resnikoff is an international expert in nuclear fuel reprocessing and waste management. He is currently staff scientist and co-director of the Sierra Club Radioactive Waste Campaign. As Project Director at the Council on Economic Priorities he authored the study 'The Next Nuclear Gamble' which details the hazard of transporting nuclear fuel and outlines safer options. He has served as a consultant to the New York Attorney-General on transportation of irradiated fuel and to the Illinois Attorney-General on the expansion of spent fuel tools. He was also part of an international team of experts reviewing plans to locate a reprocessing and waste disposal operation in West Germany. He is a graduate of the University of Michigan with a PhD in theoretical physics.

Morris Rosen is Director of Division of Nuclear Safety, Safety Standards Program, Advisory Services, Radiological Protection. His most relevant past experience includes years at the IAEA, one year as IAEA expert in Korea and 8 years as Chief Accident Analyst for the US Nuclear Regulatory Commission. He worked for 5 years at General Electric, in design of nuclear systems, and 5 years Construction Engineering in design of nuclear power plants.

Leonard Solon is Director of the New York City Health Department Bureau for Radiation Control, and associate professor in the Department of Environmental Medicine of the New York University Medical Centre. He is a co-patentee of the laser photocauteriser employed in the treatment of ocular disorders such as detached retina, and

co-inventor of a method of powering laser devices using nuclear energy sources. He is certified as a health physicist by the American Board of Health Physics. He was previously Assistant Chief and then Chief of the Radiation Branch of the United States Atomic Energy Commission Health and Safety Laboratory. He was also a member of the Technical Consultants Panel of the Atomic Energy Commission, Division of Military Application.

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Des Wilson is Chairman of Friends of the Earth and of CLEAR, the Campaign for Lead-Free Air, he is also on the Board of SHELTER, the national campaign for the homeless.

Brian Wynne is currently leader of a project on institutional settings and environmental policies at the International Institute for Applied Systems Analysis, Laxenburg, Austria. He normally teaches science and technology policy at Lancaster University, and is the author of several publications on risk assessment and sociology of science, including a recent book, *Rationality and Ritual: The Windscale Inquiry and Nuclear Decisions in Britain*.