The Redfern Inquiry

into human tissue analysis in UK nuclear facilities

Volume 2: Summary

HC 571-II

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for

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Contents

Introduction

1 In early 2007, it came to light that between about 1961 and 1992 organs had been removed at post mortem examinations of nuclear workers and subjected to radiochemical analysis at Sellafield. On 18 April 2007, the Rt Hon Alistair Darling MP, then Secretary of State for Trade and Industry, announced to the House of Commons that he had established a confidential inquiry, to be chaired by Michael Redfern QC. Its Terms of Reference were *"to enquire into the circumstances in which, between 1961 and 1992, organs/tissue were removed from 65 individuals, and were sent to and analysed at Sellafield"*; Mr Darling indicated that he expected the Inquiry to investigate analyses performed not only at Sellafield, for the United Kingdom Atomic Energy Authority (UKAEA) and British Nuclear Fuels Limited (BNFL), but also at Harwell and other UKAEA sites. He asked the inquiry to consider whether the Atomic Weapons Establishment (AWE) had been involved in any similar analyses.

2 The Inquiry's early investigations indicated that the National Radiological Protection Board (NRPB) and the Medical Research Council (MRC) had also been involved; that radiochemical analysis had taken place before 1961; and that it was necessary to investigate the part played by the hospitals in which the post mortem examinations had been performed. The Terms of Reference were therefore broadened *"to enquire into the circumstances in which, from 1955, organs/tissue were removed from individuals at NHS or other facilities, and sent to and analysed at nuclear laboratory facilities"*.

3 Although many potentially important witnesses had died before its institution, the Inquiry was able to undertake a detailed investigation and is satisfied that it has succeeded in producing a full and fair report. This summary provides a précis of the results of its investigations; a full understanding of events spread over almost 40 years and beginning more than half a century ago can be gained only from the Report itself.

Science

4 The nuclear industry, whether military or civilian, requires the handling and processing of radioactive elements. The radioactivity emitted poses a danger to the health of nuclear workers and it was realised from a very early stage that the workers' exposure to these elements should be monitored to protect their health and safety.

5 Such monitoring, however, posed difficulties. The chief elements involved, uranium and plutonium, emit radiation in the form of alpha particles. These heavy, charged particles travel for only very short distances and if emitted by atoms which have been taken into the body, by inhalation or ingestion, do not emerge through the skin. It is therefore not possible to use external counters to assess exposure and so techniques were devised for assaying the minute quantities of uranium and, in particular, plutonium which were excreted in the urine of individuals who had been exposed to those elements. An equation was derived which allowed the body burden to be calculated from the results of that urinalysis.

6 Those working in the field of radiological protection remained concerned that the equation, known as the Langham formula after the scientist on whose work in the 1950s it was based, over-estimated the body burden of plutonium as much as ten-fold. The only way in which this concern could be addressed was to assay the plutonium content of the body after death (or, if not the whole body, of those organs such as lungs, liver and bone in which plutonium was known to be concentrated) and to compare that figure with the estimate derived from urinalysis during life. This was one of the scientific aims of the post mortem work undertaken at Sellafield. Radiochemical analysis, by which plutonium was assayed, involved the complete destruction of the organ, which was converted to ash in a furnace and then dissolved in acid. It was a complex process, requiring considerable skill, expertise, facilities, equipment and time.

7 Other research considered by the Inquiry had different scientific objectives.

- A series of studies conducted by the MRC and the UKAEA investigated levels of strontium-90, an element produced in nuclear explosions and present in the atmosphere as a result of nuclear weapons testing, in human bone taken at random from members of the public, both adults and, especially, children.
- A separate series of studies conducted by the NRPB compared levels of plutonium in individuals who lived near but did not work in nuclear installations with those in randomly chosen members of the public who had lived elsewhere.
- The AWE conducted a little research but was principally concerned with using the analytical results to defend itself against litigation in which it was alleged that the fatal illnesses of former employees had been caused by exposure to radiation (such defence was an important motive for the UKAEA and BNFL as well).

Law and Guidance

8 The main role of the coroner is to investigate violent or unnatural deaths, or deaths which are sudden and whose cause is unknown. His duties are defined and constrained by statute: at the time of the events under consideration, these were the Coroners Acts 1887 and 1988, the Coroners (Amendment) Act 1926 and the Coroners Rules 1953 and 1984. In the course of his investigations, the coroner may request that a post mortem examination of the body be performed; in the majority of cases, the post mortem provides enough information for him to certify the death. In other cases, however, further investigation may be required, in which case the coroner holds an inquest.

9 Post mortem examinations are of two types: those which are undertaken with the agreement of the deceased himself before his death or of his relatives, known as hospital post mortems, and those which are done at the request of the coroner. Permission from the relatives is not required for a coronial post mortem, which can take place even against their wishes. The purpose of a coronial post mortem is limited to determining the cause of death, in order to assist the coroner in performing his duty. A hospital post mortem may be wider in scope, including a search for other illnesses and an examination of the effects and side-effects of any treatment which had been given.

10 Parts of the body – tissue samples or whole organs – may be removed at post mortem examination of either type for medical education, treatment or research if permission has been given by the deceased or his relatives and, in the case of a coronial post mortem, by the coroner. The need for consent for a hospital post mortem or for the removal of organs for research purposes derives from the provisions of the Human Tissue Act 1961 (now superseded by the Human Tissue Act 2004). Without such permission, body parts may be removed at a coronial post mortem only if the pathologist performing it believes that their examination may shed light on the cause of death. If a pathologist does remove organs in that belief, he must keep them for as long as the coroner considers appropriate.

11 If a coroner wants part of the body to be subjected to a particularly detailed or complex test (described in the legislation as a "special examination"), he may ask that it be done only after he has decided to hold an inquest. Radiochemical analysis of organs would constitute a special examination.

12 It is a long-established principle of English law that there is no property in a human body: nobody may be said to own it and the right to decide what happens to it vests in the person lawfully in possession of it. It is seldom difficult in practice to determine who is lawfully in possession of a body.

13 The Inquiry found that pathologists' ignorance of the legal provisions under which they performed their work was profound. There was a general lack of appreciation of the more limited nature of a coronial post mortem examination; a perception that consent for a hospital post mortem included permission to remove organs for education and research; and a belief that organs could be taken at coronial post mortem for purposes unrelated to determining the cause of death.

British Nuclear Fuels Limited

14 BNFL was created in 1971 from the production group of the UKAEA, comprising sites at Risley, Capenhurst, Sellafield, Chapelcross and Springfields. The Sellafield site is now managed by a separate company, Sellafield Limited (SL).

15 Between 1960 and 1991, organs were taken at post mortem for analysis from 64 former Sellafield workers, of whom 42 were still employed there when they died. Not all had been occupationally exposed to plutonium. In addition, organs taken from 12 workers from other nuclear sites (Springfields, Capenhurst, Dounreay and Aldermaston) were analysed at or at the request of Sellafield, giving a total cohort of 76.

Dr Schofield

16 The driving force behind the post mortem work at Sellafield was Dr Geoffrey Schofield. Dr Schofield was appointed Medical Officer at Sellafield (then part of the UKAEA) in 1958 and remained there until his sudden death in 1985. He was promoted on several occasions, reaching the post of BNFL Company Chief Medical Officer (CCMO) in 1979. He was allowed considerable freedom to undertake research and, although as CCMO he reported directly to BNFL's Deputy Managing Director, there seems to have been little if any managerial supervision or control of his activities. The analyses of organs taken from 64 of the cohort of 76 were done for Dr Schofield.

17 Dr Adam Lawson, who had been Senior Medical Officer at Sellafield, succeeded Dr Schofield as CCMO on his death. He continued Dr Schofield's post mortem work: radiochemical analysis of organs removed from a further 11 individuals was undertaken at Sellafield before he retired in 1990. Only one further analysis took place (in 1993, of organs removed in 1991) under his successor, Dr Andrej Slovak. No human organs have been removed for analysis at Sellafield since 1991.

Coronial involvement

18 In 60 of the 64 Sellafield workers, the post mortem was coronial. Fifty-three of those were handled by the Coroner for West Cumbria, successively Mr Hubert Gough (23), Mr Adrian Walker (20) and Mr John Taylor (ten, all while assistant deputy or deputy coroner before his appointment as coroner in 1995).

19 Analysis of the organs removed at post mortem was done for legitimate coronial purposes in only 11 cases; for purely scientific reasons in 35; and for reasons connected to litigation in a further six. In eight cases, the organs were lawfully removed by the pathologist in the belief that they were relevant to the cause of death but the coroner did not then request that they be analysed: the legality of the analysis which was performed at Sellafield is not clear.

Communication

20 An informal arrangement between Dr Schofield and the pathologists at West Cumberland Hospital (WCH) meant that he was told when a post mortem was to be performed on the body of a former Sellafield worker. He was therefore easily able to obtain organs for analysis. Where the death might have been caused by radiation, Dr Schofield would usually be contacted by the coroner, in order to obtain the man's radiation history.

21 Dr Schofield was eager to obtain organs from nuclear workers who had been exposed to radiation in the course of their employment. No structured arrangement existed to flag those workers while alive in order that organs could be obtained at eventual post mortem. On three occasions, however, contact was made for that purpose with workers' treating doctors.

How were organs collected and stored pending analysis?

22 If the post mortem took place at WCH, Dr Schofield or Dr Lawson would often attend to collect the organs, taking them back in a coolbox to Sellafield by car. If nobody from Sellafield was able to attend, the organs would be placed in plastic bags in a freezer to await collection. Similar procedures

were followed at other hospitals: BNFL medical officers from other sites would collect the organs if Sellafield staff could not attend.

23 Once at Sellafield, the organs were weighed, labelled and stored in a freezer in the building which housed both the Medical Department and the analytical laboratories.

What organs were taken?

24 An extraordinary range of organs was removed for analysis. The liver was removed in all cases and one or both lungs in all but one. Vertebrae, sternum, ribs, mediastinum/lymph nodes, spleen, kidneys and femur were removed in the majority of cases. Other organs removed from time to time included the testes, brain, heart, patella and tongue. Advice on which organs should be taken was given, either generally or in individual cases, by the medical officer at Sellafield.

25 Although Dr Schofield, Dr Lawson or another member of staff from Sellafield commonly attended the post mortem, the organs were actually removed from the body in each case by the pathologist or by a mortuary technician.

How were organs analysed?

26 Analysis of post mortem samples was a complex process and, given the laboratory's routine commitments, there was often considerable delay before it could be done. It was not uncommon for it to take more than six months for the analytical process to be concluded and the longest delay was more than four years. The only role of those working in the laboratory was to process the specimens and provide the results: they were not told who the deceased had been or given any information on how the organs had been obtained or what use it was intended to make of the results.

Disposal

27 The analytical process was destructive. Some residual material might be kept for a limited period of time in order to allow the results to be checked

if necessary but it was eventually disposed of as waste in the Low Level Waste Repository at Drigg.

Material remaining at Sellafield

28 The Inquiry found several small ashed samples and some further analytical material during its searches at Sellafield. Although these specimens are not covered by any legislative provision, SL has agreed to keep them for a year from publication of the Report to enable the relatives of the deceased, should they come forward, to be involved in the decision on disposal.

Onward transmission of organs

29 In the 1960s and early 1970s, a few organs received at Sellafield were analysed at laboratories elsewhere in the UK. When litigation alleging that the death had been caused by radiation had been intimated or initiated, the organs were sometimes divided and shared with the family's medical expert to allow for an independent analysis.

Onward transmission of data

30 Dr Schofield sent analytical results derived from 35 nuclear workers to the United States Transuranium Registry and Dr Lawson sent data from a further 16. In every case the individual's name was disclosed and in the majority clinical and occupational information was also provided: this was an obvious breach of confidence. Data formerly held in the US have now been erased.

The pathologists

31 The majority of the post mortem examinations at which organs were removed for analysis at Sellafield were conducted by three consultant pathologists at WCH: Dr David Smith (20), Dr George Ghazala (15) and Dr Philip Whitehead (ten).

Post mortem reports

32 The formal post mortem reports submitted to the coroner seldom referred to the removal of organs for analysis. Dr Smith and Dr Whitehead mentioned it twice, each listing the organs actually removed only once. In contrast, Dr Ghazala mentioned that organs had been removed in every report and listed the removed organs in 13 of his 15 cases.

Reasons for removal

33 Dr Ghazala died before the Inquiry was instituted. Dr Smith and Dr Whitehead recalled that Dr Schofield had wanted the organs for research. Where there was no connection between radiation and the death, Dr Smith had assumed that Dr Schofield was taking organs for "control" purposes.

34 Both Dr Smith and Dr Whitehead were ignorant of the law which underpinned their post mortem practice. They failed to appreciate that the relatives' consent, as well as that of the coroner, was required before organs could be removed for research.

The coroner

Removal of organs for analysis

35 A coroner could legitimately request radiochemical analysis of a removed organ (a special examination) only if the results might bear upon the cause of death. There was no coronial justification for analysis if the cause of death could not have been considered to be due to radiation; and the coroner could not request the analysis unless he had decided to hold an inquest. Nevertheless, in many of the Sellafield cases, the coroner ignored these constraints.

36 The coroner, having been told over the telephone of the initial findings, often did not trouble to read the post mortem report. This was inexcusable. In some cases, the report mentioned that organs had been removed and provided to Sellafield; the coroner's failure to read the report meant that he remained in ignorance and the chance of his taking action to remedy the situation was lost. In others, the coroner was aware that organs had been taken and chose not to intervene despite it being obvious that the removal was unjustified.

Consideration of analytical results

37 Even when the analysis could be justified, the results were not always before the court at the inquest. This is inexplicable: if an inquest were to be held, sufficient evidence had to be available to allow all verdicts to be properly considered, which was obviously impossible if the results were not given in evidence. In other cases, the results contained potentially significant errors.

Use of the data

38 The possible scientific benefits of the post mortem work are obvious. In 1985, Professor Stephen Jones, who managed the dosimetry group at Sellafield, used some of the data to confirm the accuracy of an improvement he had made to the Langham formula, which has been of considerable value to those involved with radiological protection. The data have also been used in epidemiological studies of the Sellafield workforce, investigating the risks of occupational exposure to radiation.

39 The data remain available. Pending the outcome of the Inquiry, SL has quite properly refused to allow them to be used. Some of the families of the deceased want the data to be destroyed. The Inquiry acknowledges their deeply felt concerns but believes that destruction would be inappropriate: the data are potentially of great benefit to those working in the nuclear industry and should be made available, anonymised, for use in appropriate research.

Knowledge within the UKAEA

40 The UKAEA recognised the importance of post mortem work and officially encouraged it. It was aware that organs were taken at post mortem examination from its former employees.

Knowledge within BNFL

41 Many people were aware of the analysis at Sellafield of organs taken at post mortem. It was certainly not a secret: it was fairly widely discussed, and information about it disseminated, at Sellafield and at other nuclear sites. It does not appear that the workers knew of it but the trade unions certainly did.

Board knowledge

42 The Board was aware of the work from various sources, including Dr Schofield's annual medical reports for 1973 and 1979. This is unsurprising as it was potentially of benefit to BNFL, both for operational reasons and to assist in its defence to any claim.

43 It is not apparent, however, that the Board knew of the fine detail of the work; and it was under no duty to ensure that the pathologists supplying the organs did so in accordance with the law. The Inquiry therefore does not criticise the Board for failing to appreciate that organs were being provided in inappropriate circumstances. The Inquiry is, however, concerned by the lack of supervision of the medical officers: no arrangements were in place to monitor any research they chose to undertake.

Dr Schofield and Dr Lawson

44 It may be inferred from their conduct that neither CCMO appreciated that he was doing anything untoward: neither attempted to conceal his work. Both acted at a time when it was not fully appreciated that coronial post mortem did not provide *carte blanche* for organs to be removed for research. Dr Schofield was entitled to draw reassurance from the advice the UKAEA's medical officers had been given in 1969 by the Medical Defence Union (MDU; see paragraph 47). However, there is no evidence to suggest that either gave any thought at all to the ethical implications of his work.

45 It is also of concern that, in cases of particular interest to him, Dr Schofield appears to have taken somewhat dubious steps to obtain organs; the attempts which he sometimes made to ensure that deaths were reported to coroners could be regarded as a manipulation of the coronial process.

The United Kingdom Atomic Energy Authority

Background

46 The UKAEA was created in 1954 to run the UK's nascent atomic energy programme. The first seven cases in which radiochemical analysis was performed on organs removed from Sellafield workers took place while the site was operated by the UKAEA. After BNFL was formed in 1971, the UKAEA had little direct involvement in post mortem work. Organs were, however, removed from two former UKAEA employees, who had worked at Dounreay and Winfrith, and analysed at Sellafield; these cases are included in the 76-strong Sellafield cohort. In both, the removal and analysis of organs were for legitimate coronial purposes.

Understanding of the law

47 The Medical Officers' Co-ordinating Committee (MOCC) was chaired by the Chief Medical Officer and attended by medical officers from every UKAEA site, including Dr Schofield. In December 1969, it sought advice from the MDU on the legality of removing organs at post mortem. The MDU advised, erroneously, that once consent for a post mortem had been given there was no need for the pathologist to ask specifically for permission to remove and preserve any particular organ. Thus falsely reassured, the MOCC did not investigate the legal position further. The UKAEA itself did not seek any legal advice.

UKAEA employees

48 Between 1970 and 1984, organs were removed at post mortem from four workers at sites which were operated by the UKAEA and not transferred to BNFL. Analysis was performed at Harwell in three of the four cases. All had died of a possibly radiation-linked condition and the removal and analysis took place for legitimate coronial purposes.

Other research

49 Other than the strontium research (discussed in more detail below), the Inquiry has identified approximately 20 studies carried out by the UKAEA between 1956 and 1982 which involved the analysis of human tissue. Nearly all led to publication in peer-reviewed journals or by Her Majesty's Stationery Office (HMSO). In none was any information on consent to the provision of tissue mentioned and it is likely that, in accordance with practice at the time, consent was not sought.

50 The Inquiry does not criticise the UKAEA, which was not directly involved in the removal of human tissue and was entitled to assume, particularly after the reassurance given to the MOCC by the MDU, that the pathologists who provided the material did so in accordance with the law.

Residual material

51 The UKAEA holds three ashed, acellular samples of human material. Two are from a former UKAEA employee; one was obtained in the course of the strontium-90 studies.

The Trade Unions and the Compensation Scheme

52 Most of BNFL's employees were members of a trade union. Unions provided funding for solicitors to act on behalf of members' families in inquests or claims for damages arising from deaths alleged to have been caused by exposure to radiation at work.

53 In the early 1970s, the General and Municipal Workers' Union (GMWU) asked Mr Ian Robertson, of Crutes solicitors, to pursue claims for radiation injury on behalf of its members. After several years of litigation, Mr Robertson secured settlements with BNFL for the families of five members of the GMWU. In each of those cases, and in several other cases which were investigated but not pursued, organs were removed at post mortem and passed for analysis to Dr Schofield at Sellafield. Although the post mortem examinations were performed at the request of the coroner, the organs were not removed on his behalf and in only one case were the results of the analysis presented at the inquest. The prime motive for the analysis in the other five cases was use of the results in litigation.

54 Mr Robertson co-operated with the process, on occasion arranging for an expert either to attend the post mortem or to liaise with Dr Schofield on behalf of the family of the deceased. His initial involvement with each case arose because of the standing request from the GMWU but that did not obviate the need for him to obtain formal instructions from the relatives before starting to act on their behalf: it was not appropriate for him to assume that a widow would wish to pursue litigation.

55 In some cases, however, he did not obtain such instructions, nor did he determine the relatives' views on whether organs could be removed for analysis. Mr Robertson faced practical difficulties due to the speed with which coronial post mortem examinations were arranged and performed, and he acted in what he perceived to be the families' best interests.

56 The GMWU knew that tissue samples were obtained and analysed but was entitled to assume that what was done was done in accordance with the law. It had no duty to discuss with its members in general the details of what might be done in the course of individuals' litigation. Officials at several other unions whose members worked at Sellafield and at the AWE were in a similar position.

The Compensation Scheme for Radiation-Linked Diseases

57 The Compensation Scheme came into operation in 1982, by agreement between BNFL and its recognised unions. It provided for assessment of the probability of a nuclear employee's death having been caused by radiation and for the payment by BNFL of compensation without the need for litigation. The Compensation Scheme has since been expanded to cover employees of other nuclear organisations, such as the UKAEA and the AWE.

58 The usual sources of data were the results of *in vivo* monitoring, including urinalysis and radiation badges. The original rules provided for data from radiochemical analysis of organs removed at post mortem to be used when available but the availability of such data was never a prerequisite for an award and organs were never removed solely for Compensation Scheme purposes. The various unions knew, through their representatives on Compensation Scheme committees, of the provisions for the use of post mortem data.

59 The rules of the Compensation Scheme were later revised; data from radiochemical analysis are now used only if their use produces a result more beneficial to the claimant than the application of other data; this is seldom the case.

The National Radiological Protection Board

60 The NRPB was created in 1970 to conduct research into and to advise on protection from radiation hazards. It is now a part of the Health Protection Agency. From time to time its staff undertook the analysis of organs obtained at post mortem, either as part of its own research or merely as an analytical service, for example for coroners.

The population studies

61 This series of studies, organised by Dr Donald Popplewell, Principal Scientific Officer at the NRPB, began in 1980 with the aim of ascertaining levels of plutonium in the organs of people who had not worked in the nuclear industry. Such data would allow comparison with levels in organs from nuclear workers. Organs were obtained from randomly selected members of the public who had lived in one of several distinct areas: West Cumbria (later, also South Cumbria), Oxford, Newcastle and Edinburgh. West Cumbria was considered of particular importance because of its proximity to Sellafield and organs were taken only from those who had lived close to the plant.

62 Many pathologists from the selected areas were involved in the removal of organs for the studies. The minimum requirement for analysis in each case was one lung, up to half the liver and two ribs; a femur, lumbar vertebrae, testes, sternum, kidney and spleen were also often taken. Organs removed at post mortem were stored in freezers pending collection by NRPB employees.

63 Between May 1980 and November 1985, organs were removed at 100 post mortem examinations: 31 in West Cumbria, 23 in Edinburgh, 20 in Newcastle, 19 in Oxford and seven in South Cumbria. All but one of the 77 English post mortem examinations were coronial; in Edinburgh, the organs were uniformly taken from hospital post mortems. Small honoraria, between £5 and £15 per set of organs, were paid to the mortuary technicians; the pathologists were not paid.

64 The study required that the organs removed were not affected by any disease process, so the cause of death was usually a heart attack or an accident. In no case could it be seriously argued that the results of the analysis were of any relevance to the cause of death.

65 The results of the studies were published both in NRPB reports and in peer-reviewed scientific journals. The papers set out in detail the number of cases and the nature and extent of the organs analysed.

66 Material obtained for the population studies was sometimes used in the course of other work at the NRPB. As part of that other research, organs were taken at four further post mortem examinations in Oxford in 1985; organs were also received in 1990 from a fifth body, having been removed after dissection in the Oxford University Department of Anatomy.

Consent

67 No attempt was made to obtain the consent of the families of the deceased to the removal of organs for research. In 1985, an article by Professor Bernard Knight, published in the *Bulletin of the Royal College of Pathologists*, emphasised the requirement for such consent, particularly at coronial post mortem. Although merely re-stating the law, the article caused consternation among pathologists and many stopped providing organs to the NRPB.

68 When the article's impact became apparent, the NRPB explored various avenues by which the necessary consent might be secured. Assistance was sought from the police and from general practitioners in West Cumbria. Dr Lawson, the former BNFL CCMO, and later Dr Roger Bursey, an occupational health physician at WCH, were appointed to seek consent. All such efforts failed, no further organs were obtained and the population studies came to an end.

Residual material

69 No organ or material derived from any organ received by the NRPB for the population studies remains in existence.

Legality of the population studies

70 Documents disclosed by the NRPB show that before the population studies began some desultory consideration was given to the legal requirements for the removal of organs. The NRPB ought to have ensured that Dr Popplewell was given adequate guidance on the legal and ethical foundation of the studies; equally, Dr Popplewell, who although a well-respected scientist had little knowledge of the law, ought to have sought clarification from his employers.

The NRPB's position

71 The NRPB was never itself under any legal duty to obtain the relatives' consent to the removal of organs. It assumed that the pathologists who supplied the organs would be aware of the law governing their actions and would comply with it. This assumption was reasonable but mistaken.

The pathologists' position

Post mortem reports

72 Of the 77 reports on post mortem examinations in England at which organs were taken for the population studies, no fewer than 75 failed to mention that organs were removed. Although no evidence suggests that this failure constituted a deliberate attempt at concealment, it did mean that coroners remained unaware of the pathologists' actions. The report of one further post mortem does record removal of organs for the population studies but the NRPB's log books, which were assiduously kept, do not record that they were received and the case has not been included in the figures in paragraph 63.

Ignorance of the law

73 The Inquiry heard evidence from six of the pathologists who had provided organs to the NRPB. Between them, they had performed 41 of the post mortem examinations. All accepted that the organs taken for the population studies were not relevant to the cause of death. They appeared wholly ignorant of the law which underpinned their work, failing to realise that they did not have *carte blanche* to remove organs for non-coronial purposes at coronial post mortem.

The coroners' position

74 The Inquiry heard evidence from two of the coroners who had requested post mortem examinations at which organs were removed for the population studies. Both claimed to have been entirely unaware that this had happened and no post mortem report submitted to either of them mentioned that organs had been removed. One coroner professed himself appalled to learn that organs had been removed from bodies in his custody and said that he would have intervened immediately had the matter come to his attention. It must be observed that the power of that evidence was lessened by the admission made by both coroners that they did not routinely trouble to read the formal, detailed post mortem reports submitted to them by the pathologists.

Paediatric and fetal studies

75 The NRPB was involved in the analysis of organs, mostly vertebrae and liver, removed at 16 hospital post mortem examinations on children, for which consent had been obtained. The study was organised by Professor (now Sir) Alan Craft, Professor of Child Health in Newcastle, and most of the children had been under his care. It had received formal approval from ethics committees in West Cumbria, Newcastle and North Tyneside. The results were published only in two internal NRPB papers, in 1985 and 1986.

76 Between 1989 and 1997, the NRPB investigated the radionuclide content of second trimester fetal tissues. The studies were approved by ethics committees in Oxford and West Cumbria. The law did not require the mother's consent: the West Cumbrian committee stipulated that it should

be obtained but the Oxford committee did not. It may be relevant that the Oxford committee made its decision before the publication in July 1989 of the Polkinghorne report, which advised that consent be obtained when fetus were used in research.

77 In all, 55 fetus were obtained from Oxford and 40 from West Cumbria. The results were presented at a seminar in 1994 and published in two peer-reviewed journals, in 1994 and 1999.

Contract and other work

78 The first analysis by the NRPB of organs taken at post mortem was in 1972; they had been taken from a former nuclear worker and sent to the NRPB by Dr Schofield. The analysis was performed by Dr Popplewell and Dr Schofield continued to send organs to him for analysis from time to time in the early 1970s: this appears to have been done informally, without the coroner's knowledge.

79 The NRPB also analysed organs removed at post mortem when asked to do so by coroners and provided expert evidence on the significance of the results. The cases included workers from Aldermaston, Calder Hall and Winfrith. In so doing, the NRPB was providing a service as an independent expert and its actions cause the Inquiry no concern.

Summary

80 Most of the work done by the NRPB cannot be criticised. However, the Inquiry has seen no evidence that the legal and ethical issues raised by the retention of organs at post mortem were adequately considered. In particular, the requirement for the consent of the deceased's relatives was not adequately addressed. Discussions with coroners and relatives were not held. Instead, the NRPB relied on pathologists to act in accordance with the law: that reliance proved to be misplaced. It was not until after 1985, when Professor Knight's article led to pathologists revising their approach to the provision of organs for research and halted the supply, that the NRPB fully considered the need for consent and became involved in attempts to obtain it.

The Atomic Weapons Establishment

81 The AWE is responsible for the maintenance of the UK's nuclear deterrent. Its work involves handling and purification of radionuclides, principally plutonium, and its workers are therefore at risk of exposure to radiation.

82 Over the years, several of its employees who had developed cancers initiated legal action in which it was alleged that the cancer had been caused by such exposure. The AWE worked closely with the Treasury Solicitor's Department in defending those claims. If the men in question died, the Treasury Solicitor would advise the coroner on the appropriate investigations, including radiochemical analysis of organs removed from the body at post mortem examination, which would assist in determining the cause of death. The analyses were performed either by the NRPB or at Sellafield for Dr Schofield.

83 The organs of 20 former employees of the AWE and of a further two individuals employed at Woolwich and Greenwich by the Ministry of Defence (MoD) were, or in one case might have been, removed with a view to radiochemical analysis although in two cases such analysis was not in fact undertaken. Loss of documents over time has made definitive conclusions as to the legality of the removal in some cases difficult to reach, but in 17 cases the analysis was performed either at legitimate coronial request or with the consent of the deceased's relatives.

84 The Inquiry is also aware of 15 ex-servicemen who were or were at some time thought to be veterans of the UK's nuclear tests and whose organs were or might have been removed at post mortem examination with a view to radiochemical analysis. In all, the AWE's involvement was confined to giving advice on the likelihood of the individual having been exposed to harmful radiation in the course of the tests.

85 The AWE and the MoD, its parent organisation for much of the material time, were chiefly concerned with defending themselves against adverse findings at inquests into the deaths of former employees and ex-servicemen and against any claims for damages arising out of deaths or other injuries. Although there was some discussion of positive action to be taken (for example, by maintaining a list of employees who had been exposed to radiation and from whom organs might be removed at post mortem if the opportunity arose), the AWE's role remained reactive, responding to deaths and claims only as and when they arose.

86 A small amount of research conducted by the AWE involved analysis of tissue taken at post mortem examination. It was, save for one study conducted in the early 1990s, done without appropriate consent. The deceased people from whom organs for the studies were taken were few in number and the amounts of tissue taken from the bodies were small.

Registries

87 A central research programme which can obtain and use data from radiochemical analysis of organs and relate the results to measurements obtained from *in vivo* urinalysis has obvious benefits, allowing the adequacy of past and current radiation protection guidelines and dose assessment methodologies to be addressed directly. The United States Transuranium and Uranium Registries (USTUR) constitutes one such programme.

88 The USTUR relies entirely on voluntary donations by nuclear workers and is founded on fully informed consent given by the individual concerned to removal and analysis of organs at post mortem. The consent lapses unless renewed every five years. When the individual dies, no post mortem examination (for USTUR purposes) or body donation takes place without the additional agreement of the surviving spouse or next of kin.

89 Although the idea of a similar registry was contemplated in the UK from the mid-1960s, it was not until 1980 that serious consideration was given to its possible creation. A formal proposal was made, led by the MRC and supported by the nuclear industry as a whole, to set up a registry. For reasons which are not clear, the study did not proceed.

90 Further attempts to establish a registry were made in the late 1980s. In 1988, representatives from various nuclear organisations discussed a proposal to set up a European actinide registry similar to the USTUR. In 1989, BNFL proposed a national UK post mortem registry, which would not actively seek organs for analysis but would rely on receipt of data from coronial post mortems. The project became known as the UK Occupational Radionuclide Exposure Study, or UNIKORNES; representatives from BNFL, the NRPB, the UKAEA and the MoD were actively involved.

91 Despite extensive discussion, and much enthusiasm for the idea from the individuals involved, no national registry was established. In 1992, the UKAEA decided not to support it, having reached the view that the cost would be out of proportion to the potential benefit. BNFL was also concerned about the cost and thought the Sellafield workforce likely to be hostile to the idea.

92 The links between the UK and the USTUR were strong. Dr Schofield and Dr Lawson both visited the US to see how the USTUR functioned and on several occasions sent their post mortem data to the USTUR; in all, the USTUR received data derived from 51 UK nuclear workers. The names and, in some cases, medical details of the individuals from whom the organs had been taken were also sent, without the families' consent or even knowledge: this was a breach of confidence.

93 The existence of the data was mentioned in USTUR annual reports but the individuals themselves were not named. The data have now been erased. No human tissue was sent to the US.

Strontium and the Medical Research Council

94 Strontium-90 is a radioactive isotope of strontium which is produced only by nuclear fission: it does not occur naturally. In the human body, it is concentrated in bone. Concern over possible adverse effects of strontium-90 in fallout from nuclear weapons tests led to several research projects in both the UK and the US. The studies involved analysis of a variety of substances, including cow's milk, soil, vegetation and animal and human bone. The analytical process was similar to that later used for estimation of uranium and plutonium.

Project Sunshine

95 Project Sunshine, initiated in the US in 1953, was one such study. The study received vertebrae taken in the UK from 43 individuals who died between 1955 and 1958.

The UK strontium studies

96 In the UK, levels of strontium in human bone were determined in a long-running research project between 1955 and 1973. The research was initially run by the UKAEA but from 1957 it was overseen by a committee of the MRC, the Agricultural Research Council (ARC) and the Development Commission and conducted by a subcommittee chaired by Dr John Loutit of the MRC.

97 The research consisted of several different studies: a large national survey and smaller, local surveys.

- The national survey involved analysis of bone from 3,394 individuals: in addition, bone was taken, but not analysed, from a further 132.

- The local surveys were conducted at Cambridge (76 individuals), Glasgow (2,052) and West London (418). A survey of bone taken from 91 fetus was also conducted in London.

In all, bone was collected for the UK strontium research from 6,072 individuals and 91 fetus.

98 Bone for the strontium survey was removed by pathologists or mortuary technicians in the course of post mortem examinations, mostly from children under the age of six years. The femur was chosen because Dr Loutit believed that it was routinely removed at post mortem; from 1966, vertebrae were used instead.

99 In 1959, difficulty in obtaining adequate numbers of samples led Dr Loutit to offer a modest payment but none was ever made.

100 Conversion of the bone to ash was conducted at various locations owned by the UKAEA, the ARC and the MRC. The actual analyses were performed before 1964 in the UKAEA's laboratory at Woolwich and thereafter at Capenhurst.

101 By 1960, scientists involved in the research had expressed concerns that its scientific and epidemiological utility was limited but the work continued, as the reassurance it offered was politically useful.

102 The results were published periodically, initially by the UKAEA and from 1959 by HMSO. They demonstrated that, even at their peak, levels of strontium-90 in human bone were no threat to health. The last paper was published in 1973; it described the results obtained from bone taken from people who had died in 1970. Although bone continued to be supplied to the MRC until at least 1972, any removed from individuals who died after 1970 was not analysed and was probably destroyed.

103 The UK strontium research, in conjunction with similar work carried out in other countries, provided political impetus for the 1963 Limited Test Ban Treaty.

104 Bone from Australia (taken from more than 10,000 individuals) and Hong Kong (31 individuals) was also analysed by the UKAEA.

Consent

105 Arrangements for the supply of bone were made directly between the MRC and pathologists. Consent to the removal of bone for the strontium research was not obtained from the families of the deceased.

106 Since the cause of death was never related to exposure to strontium, the removal of bone at coronial post mortem could never have been justified for coronial purposes.

107 Before the Human Tissue Act 1961 was passed, there were no relevant statutory provisions and it cannot be said that the bone was unlawfully removed. In the absence of consent, bone taken after the Act came into force was removed contrary to its provisions.

The MRC's opportunities to act

108 In 1959, the MRC was made aware of possible legal and ethical difficulties with the supply of bone for the strontium research, being advised by Her Majesty's Inspector of Anatomy that although removal of tissue was not contrary to any Act, it was not legally sanctioned.

109 The issue was drawn to the MRC's attention again in 1960, when it was consulted over the provisions of a proposed Bill, which became the Human Tissue Act 1961. Following a suggestion from a pathologist that consent should be obtained, the MRC gave further consideration to the provisions of the Bill in 1961. It knew that consent would become necessary but it did not offer advice to the pathologists from whom it obtained the bone.

Previous investigations

110 Two previous inquiries have considered the strontium research.

- In 1998, a committee of inquiry, chaired by Rabbi Julia (now Baroness) Neuberger, produced a report but, as the MRC conceded to this Inquiry, it could not be regarded as a comprehensive review.

- In 2001, the Scottish Executive commissioned a report, which was published in 2002. It appears not to have had access to all of the documents seen by this Inquiry.

The pathologists' position

111 There is no evidence that the pathologists who removed bone at post mortem examination and supplied it to the MRC satisfied themselves before so doing that the relatives' consent had been obtained. They ought to have known that after 1961 this was a mandatory requirement.

The MRC's position

112 The MRC knew of and had investigated the potential problem with consent. The Government had sought its views on what became the Human Tissue Act 1961, which was directly relevant to its work. It did not issue guidance to its researchers. The MRC ought to have ensured that the bone used in its research had been lawfully supplied.

West Cumberland Hospital

113 During the period covered by the Inquiry, the pathologists at WCH:

- supplied organs to Sellafield taken from 57 former nuclear workers;
- removed organs from 32 randomly chosen individuals, all but one of which were collected by the NRPB;
- supplied 18 thyroid glands to the AWE in 1968;
- provided 40 fetus to the NRPB.

114 The Inquiry has investigated the management of the hospital's pathology department and those responsible for organ retention. It was hampered by the fact that many records had been routinely destroyed or were missing.

The pathology department

115 From his appointment in 1967, Dr Smith was the senior consultant pathologist at WCH and was responsible for managing the hospital mortuary. Despite the appointment of a pathology manager in the mid-1980s, Dr Smith remained in *de facto* control of clinical matters and the senior management of the hospital had little to do with the mortuary.

116 The Inquiry heard evidence from Mr William Chapman, who had been a mortuary technician at WCH from 1979 to 1996. His work had involved preparing bodies for post mortem and he had assisted in the provision of organs to BNFL and the NRPB. He described the mortuary as grim and gave the impression that it was a neglected department.

Knowledge of organ provision

117 It is unclear who at WCH was aware that organs were being removed from Sellafield workers. Mr Chapman said that Mr Nigel Woodcock, the Unit General Manager of the hospital from 1990, knew of the practice. Mr Woodcock denied that he had been aware of organ removal; he said that if he had known, he would have been concerned and would have taken action. The Inquiry preferred Mr Woodcock's evidence, particularly bearing in mind that organs were supplied to BNFL on only one occasion after he began work at the hospital.

118 There is no indication that anyone at WCH more senior than Dr Smith knew of the provision of organs for the NRPB's population studies. The hospital management was aware of the provision of fetus to the NRPB; this study had received ethical approval and maternal consent was obtained in each case.

The Families

119 The Inquiry heard evidence from 14 families and is satisfied that the range of cases in the 14 is representative. Ten of the deceased had worked at Sellafield, two at Springfields, one at Capenhurst and one had never been a nuclear worker. In 12 of the cases organs were analysed at Sellafield. The remaining two were analysed at the NRPB, one for the population studies and one for the coroner as part of the NRPB's contract work.

120 Several themes recur in the families' evidence:

- none was asked for permission to remove organs from the deceased person's body, whether for research or for use in litigation;
- most were, understandably, unaware of what a post mortem examination involved and none had considered the possibility that whole organs could be removed for analysis and not returned to the body, still less that this could be done without their knowledge or consent;
- they had been given little or no information, whether by coroners, coroner's officers, treating clinicians, pathologists, solicitors or the nuclear industry;
- none had been made aware at the time that organs had been removed;
- some had had the opportunity to find out that organs had been removed when they heard the expert evidence which was given at the inquest; some found out only many years later, when the Inquiry was instituted;
- the discovery that a body which they had thought had been buried or cremated intact was in fact missing many internal organs came as a great shock;
- much distress was caused by perceived lack of dignity and respect shown to the body;
- some, had they been asked and given detailed information at the time, would have agreed that the organs could be removed and analysed.

121 In most of the cases considered by the Inquiry, relatives were let down at the time when they were most vulnerable by those in whom they were entitled to place an absolute trust. The removal and analysis of organs for genuine coronial reasons occurred in relatively few cases; in the majority, it was unnecessary or inappropriate. Relatives were seldom asked for their consent. As a result, families buried or cremated incomplete bodies and many of those who have discovered the truth, years later, have been greatly distressed.

Pathologists

122 All the pathologists who gave evidence to the Inquiry had been profoundly ignorant of the law under which they had performed post mortem examinations. The relevant legislation was made available to all doctors, accompanied by clear guidance from the Department of Health in 1961, 1975 and 1977.

123 In consequence of this ignorance, pathologists erroneously believed that:

- permission to perform a hospital post mortem, unless expressly restricted in some way, gave them *carte blanche* to remove tissue and organs for whatever purpose they saw fit;
- authority from the coroner to perform a coronial post mortem conferred the same freedom to remove material even if they did not consider that it could be related to the cause of death;
- there was no true distinction between the extent of investigation permitted at hospital and at coronial post mortem examinations: that is, they failed to appreciate the more limited nature of a coronial post mortem, which is confined to establishing the cause of death.

As a result, they often removed organs at both coronial and hospital post mortem examinations, without consent and hence in breach of the provisions of the Human Tissue Act 1961.

124 The pathologists' ignorance arose from deficiencies in medical education and training.

125 When completing their formal reports to the coroner, pathologists seldom recorded who had attended the post mortem examination or whether, and which, organs had been removed from the body.

Coroners

126 Coroners did not communicate with families, who were left in the dark. There was no attempt to explain to them why the coroner had ordered a post mortem or what it would entail.

127 Coroners often failed to read post mortem reports. As a result, even when the report did indicate that organs had been inappropriately removed, they remained in ignorance and took no action to address the mischief.

128 Coroners who did know that organs which did not bear upon the cause of death had been taken for analysis without their consent failed to act.

129 Coroners ignored the constraint that the law permitted them to request radiochemical analysis, which was a special examination, only if they had decided to hold an inquest.

130 Coroners asked BNFL to prepare analytical reports and used the information to guide them when determining whether the death was the result of an industrial disease. They ignored the potential conflict of interest in asking the deceased's employer to comment on the likelihood of the death having been caused by the deceased's employment.

131 Coroners did not ensure that the results of organ analysis were made available to them; in particular, on several occasions inquests were held and the results of the analysis, which had been performed at the request of the coroner, were not adduced in evidence.

132 Coroners assisted BNFL, the NRPB and the MRC to obtain organs for their research, heedless of whether the necessary consent was obtained.

133 The relationship between the pathologists, the coroners and the Sellafield medical officers became too close. There were failures to adhere to professional standards.

Conclusion

134 In many cases, families have been wronged. Organs were removed at post mortem and provided for analysis despite being of no possible relevance to the cause of death. The results of radiochemical analysis were seldom taken into account when the death was certified: they were important not for the coronial investigation but primarily for research.

135 The blame lies mainly at the door of the pathologists who performed the post mortem examinations. Ignorant of the law, they removed organs for analysis without satisfying themselves that the relatives' consent had been obtained. In coronial cases, proper supervision would have prevented the abuse and allowed the bodies to be treated with dignity and respect.

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