Review

Of the

Public Reports Prepared by the Government Actuary's Department on the Great Britain National Insurance Fund

as at December 2002

Office of the Superintendent of Financial Institutions
Bureau du surintendant des institutions financières

Office of the Chief Actuary
Bureau de l'actuaire en chef

Canada

17 December 2002

Mr. Chris Daykin
CB Hon DSC, MA, FIA, FSS, ASA
Government Actuary
Government Actuary's Department
New King's Beam House
22 Upper Ground
London, England
SE1 9RJ

Dear Mr. Daykin:

On behalf of the Office of the Chief Actuary of Canada, I am pleased to enclose herewith a copy of our actuarial review of the public reports prepared by the Government Actuary's Department on the Great Britain National's Insurance Fund.

Respectfully submitted,

Jean-Claude Ménard

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References and acronyms used in this report

Cm 4406	National Insurance Fund Long Term Financial Estimates
Cm 4920	Report On The Cost Of Up-Rating The Basic Retirement Pension In Line With The General Level Of Earnings
Cm 5383	Report On The Drafts Of The Social Security Benefits Up-Rating Order 2002 And The Social Security (Contributions) (Re-Rating And National Insurance Funds Payments) Order 2002
GAD	Government Actuary's Department
GB	Great Britain
ISSA	International Social Security Association
NIF	National Insurance Fund
OCA	Office Of The Chief Actuary
OSFI	Office Of The Superintendent Of Financial Institutions
IAA	International Association of Actuaries

This report was prepared by the Office of the Chief Actuary (OCA) of the Office of the Superintendent of Financial Institutions. The review was conducted by Mr. Jean-Claude Ménard, Chief Actuary of the OCA, Fellow of the Canadian Institute of Actuaries and of the Society of Actuaries, who was assisted by Mr. Michel Millette, Senior Actuary, Fellow of the Canadian Institute of Actuaries and of the Society of Actuaries.

EXECUTIVE SUMMARY

This report presents the results of a review of three actuarial reports prepared by the Government Actuary's Department of United Kingdom and the detailed actuarial examination on which they are based.

The review was conducted in accordance with the following terms of reference:

1. To review the public reports prepared by the Government Actuary's Department (GAD) on the Great Britain National Insurance Fund.

2. To report on the extent to which these reports are in accordance with relevant professional standards of practice.

3. To make recommendations concerning data analysis, modelling methodology, professional independence regarding assumptions and presentation of results

After reviewing all of the information, and after much discussion with officials of the GAD, we found that we were able to reach agreement on all opinions and recommendations presented in this report.

We have set out our opinions and recommendations in the various sections of this report according to our terms of reference. The recommendations are summarized below.

Section 2 – Professional Experience

GAD offers a unique combination of actuarial expertise in different fields of work and very few actuaries working in the United Kingdom have their experience in valuating and costing social insurance programs like the National Insurance Fund.

The professional experience of the Government Actuary and the staff who worked on the actuarial reports is, in our opinion, adequate for carrying out the work required.

Recommendation 1. We recommend maintaining the current legislation allowing either the Government Actuary or the Deputy Government Actuary to submit the actuarial report to the

Government. It enables GAD to maintain and improve the level of actuarial services to both UK and worldwide clients.

Section 3 – Professional Standards of Practice

We reviewed the work involved in preparing the actuarial reviews of the National Insurance Fund in relation to relevant United Kingdom Standards of Practice and International Actuarial Association Guidelines of Practice for Social Security Programs.

In our opinion, the actuarial work on actuarial reports was completed in compliance with the relevant Professional Standards.

Section 4 – Data

The data requirements for the actuarial reports are extensive. In our opinion, the Government Actuary had access to the data he required and had completed adequate and appropriate data validation. The data used are adequate and appropriate for the purpose of the actuarial valuation of the National Insurance Fund.

Recommendation 2. We recommend that Department for Work and Pensions (DWP) be requested to provide Government Actuary's Department (GAD) with details on the data on people contracting out without undue delays. This will significantly help GAD to do the projections needed for people contracting out of the State Earnings-Related Pension Scheme (SERPS).

Section 5 – Methodology

The reports are based on a series of models of the National Insurance Fund's operations, which projects the contributions, the investment earnings, the benefits paid, the administrative expenses as well as the level of the Fund in future years. The methodology used to calculate future contribution income and benefit expenditures are, in our opinion, appropriate, reasonable and have been properly applied. In addition, the Government Actuary has, in our opinion, full independence in selecting the appropriate methodology to conduct regular actuarial reviews of the National Insurance Fund.

Recommendation 3. We recommend modifying the next quinquennial review of the National Insurance Fund Long Term Estimates to include a section on the reconciliation of results as was done in the actuarial reports Cm 4920 and Cm 5383.

Recommendation 4. We recommend the Government Actuary to maintain the tradition of continual improvements to the methodology by such actions as:

- Developing objective criteria for selection of current sensitivity tests and for any future additional sensitivity tests.
- Reviewing what length of experience data should be considered when developing projected distributions of parameters.

Recommendation 5. We recommend that the Government Actuary continue to produce the short-term and long-term estimates using the same valuation models to insure consistency in results.

Section 6 – Assumptions

The models require the inputs of the numerous assumptions about future economic and demographic experience. A great deal of research and analysis goes into the selection of these assumptions.

In our review of the major actuarial assumptions, we found that each of them was in reasonable range. We found that the mortality rates could have been reduced slightly more in the future particularly for the males. From the evidence shown and seen in the reports reviewed, we believe that the Government Actuary is fully independent in the selection of assumptions and that, in aggregate, the assumptions used are within a reasonable range.

Recommendation 6. The practice of selecting assumptions that are consistent with the short-term government economic assumptions is adequate and should be continued in the future.

Recommendation 7. We recommend that the Government Actuary extends his current program of consultation on demographic assumptions to the determination of the main economic assumptions.

Section 7 – Communication of Results

The reports fairly communicate the results of the work performed by the Government Actuary and his staff. We strongly believe that the long-term assessment of the National Insurance Fund is highly reliable.

Recommendation 8. To increase the ease of reading and understanding, we recommend to better disclosure of the key demographic assumptions, namely the fertility, migration and mortality rates, in the next quinquennial review rather than reliance on these assumptions being described in the separate report which GAD prepared on the national population projections.

Recommendation 9. For the next quinquennial review, we recommend disclosing the projected benefits and contribution income year by year for the first ten years of the projection period. This improvement would help the reader to compare the results of the quinquennial review with any report subsequently released by the Government Actuary, such as reports Cm 4920 and Cm 5383.

Recommendation 10. We recommend including in the executive summary more sensitivity tests for the rate of increase in pensions assumed like these proposed ones: price up-ratings, price up-ratings +1.0%, price up-ratings +1.5% (which corresponds to earnings up-ratings) and price up-ratings +2.0%. Under each sensitivity test, the Government Actuary should reproduce the estimated required contribution rates, the NIF expenditure as a percentage of projected GDP and the relative change in GDP per pensioner as it is presented in Table 1.4 of the summary of the quinquennial review.

Recommendation 11: We recommend increasing the frequency of the periodic actuarial review of the National Insurance scheme (Cm 4406) from quinquennial to quadrennial and synchronizing the production of the actuarial report with that of the national population projections. GAD should aim to produce its long-term reviews on a timely basis.

Recommendation 12: For each actuarial review on the assessment of long-term financial estimates of NIF, we recommend issuing a press release containing the main findings included in the Executive Summary of the report.

1. Introduction

This report presents the results of a review of three actuarial reports prepared by the Government Actuary's Department of United Kingdom and the detailed actuarial examination on which they are based.

1.1 Terms of Reference

This review is accordance with the following terms of reference:

1. To review the public reports prepared by the Government Actuary's Department on the Great Britain National Insurance Fund, in particular:

   a) National Insurance Fund Long Term Financial Estimates (Cm 4406)
   b) Report by the Government Actuary on the drafts of the Social Security Benefits Up-rating Order 2002 and the Social Security (Contributions) (Re-rating and National Insurance Funds Payments) Order 2002 (Cm 5383), and
   c) Report by the Government Actuary on the cost of up-rating the basic retirement pension in line with the general level of earnings (Cm 4920)

2. To report on the extent to which these published reports:

   a) are in accordance with relevant professional standards,
   b) are in accordance with good professional practice internationally and practice guidelines being developed by the International Association of Actuaries (IAA), and
   c) can be considered to be suitable to address the needs of clients and third parties who might rely on them.

3. To consider the processes leading to the production of the published reports and to make recommendations concerning:

   a) approaches to data analysis and validation,
   b) methods used for validation of modelling methodology,
   c) adequacy of checks on results,
   d) internal peer review processes, and
   e) professional independence regarding choice of assumptions, methodology and presentation of results.

4. To report to the Government Actuary with 1) a brief summary report, which could be made public, if the Financial Secretary to the Treasury so wishes, and 2) a management letter with more detailed recommendations for consideration by the Government Actuary's Department.

Note: It is not intended that the practice reviewer will validate the methodology or the numbers contained within the reports or be required to fully peer review the reports.

1.2 Procedures Followed

A letter dated 8 February 2002 from Mr. Chris Daykin, the Government Actuary of the United Kingdom, was sent to Mr. Jean-Claude Ménard, the Chief Actuary of Canada from the Office of the Superintendent of the Financial Institutions. This letter requests an external practice review of the statutory work done by GAD. In a letter dated 18 March 2002, Mr. Ménard agreed to perform such a review. In his letter, Mr. Ménard also asked for more information received later on by his Office.

A three-day meeting beginning July 8th followed in London. During the visit, Mr. Ménard interviewed Mr. Daykin; Mr. Andrew Young, Deputy Government Actuary; Mr. David Lewis, Chief Actuary; Mr. Aidan Smith, Actuary; Mr. George Russell, Chief Actuary; Mr. Adrian Gallop, Actuary; and Miss Sarah Hawken.

The GAD responded promptly and fully to each request we made for information.

After reviewing all the information, and much discussion with Michel Millette, we found that we agreed on all the opinions and recommendations presented in this report.

1.3 The National Insurance Fund

The National Insurance Fund of Great Britain is a social insurance plan that provides weekly income benefits and some lump sum benefits to participants upon retirement, death, unemployment, maternity and disability.

The basic pension is currently payable to male contributors from age 65 and to female contributors from age 60 (rising in stages to age 65 between 2010 and 2020), subject to the contribution conditions being satisfied.

People who do not claim their pension at those ages will be awarded higher pensions, the increase being currently 7 3/7% for each year's deferment up to a maximum of five years. Starting in 2010, such people will be awarded higher pensions, the increase being 10 2/5% for each year's deferment with no maximum.

Since April 1978, employees who have paid Class 1 contributions have been entitled to an earnings-related additional pension. The earnings on which contributions are paid in any tax year are revalued in line with the increases in the general level of earnings, up to the year before that in which pension age is attained. This additional pension will eventually be 20% of average earnings and may then be regarded as accruing uniformly over the working life, between age 16 and pension age.

Widow's benefit comprises widow's payment, widowed mother's allowance and widow's pension. The entitlement is based on contributions paid by or credited to the deceased husband and is broadly similar to the conditions for retirement pension, adjusted for the actual age of the deceased at death. The benefit is usually converted to retirement pension not later than age 65, although widowed mother's allowance can be paid beyond age 65. An earnings-related additional widow's pension is payable in respect of earnings on which contributions were paid by the husband since April 1978. This additional pension accrues in the same way as the additional retirement pension described above.

Incapacity benefit is paid in respect of a claimant who is unable to work because of sickness and disability. The claimant must satisfy the contribution conditions. The last two contribution years must be qualifying years by virtue of contributions. Both short-term and long-term benefits are payable from the Fund.

Jobseekers allowance replaced unemployment benefit in 1996 and is payable upon satisfying contribution conditions. Sufficient Class 1 contributions must have been paid in at least one of the last two contribution years before the claim and both years must be qualifying years by virtue of contributions and/or credits. After benefit has been paid for 6 months it cannot be paid again until the claimant has requalified by working as an employee for at least 16 hours in each of at least 13 weeks in the 26 weeks before benefit is reclaimed and is based on a later contribution period.

Employed and self-employed persons whose earnings are above specified minima are required to contribute to the National Insurance Fund. Those with earnings below these minima and non-employed persons may do so if they wish. Currently employees who have earnings above the earnings threshold pay earnings-related Class 1 primary contributions on earnings above that limit; their employers pay earnings-related Class 1 secondary contributions on earnings above that limit if the employee earns above the earnings threshold. Employees pay contributions up to an upper earnings limit. Employers pay contributions on all their employees' earnings above the earnings threshold. No Class 1 primary contributions are payable by those at work after pensionable age, (currently 65 for men and 60 for women) but the employer is still required to pay Class 1 secondary contributions.

Self-employed persons who have not been granted exemption on account of low earnings pay flat-rate Class 2 contributions and, on their profits between specified levels, earnings-related Class 4 contributions. The self-employed do not pay contributions on earnings above a specified upper limit. Non-employed persons and others not required to contribute may pay contributions on a voluntary basis.

Table 1 Standard Class 1 Contribution Rates for Employees (Primary) and Employers (Secondary)

Tax Year	Full Class 1 rate			Contributions payable to NIF after deducting allocations to the NHS			Contribution reduction for those contracted out		
	Employees %	Employers %	Total %	Employees %	Employers %	Total %	Employees %	Employers %	Total %
1998-99	10.0	10.0	20.0	8.95	9.10	18.05	1.6	3.0	4.6
1999-00	10.0	12.2	22.2	8.95	11.30	20.25	1.6	3.0	4.6
2000-01	10.0	12.2	22.2	8.95	11.30	20.25	1.6	3.0	4.6
2001-02	10.0	11.9	21.9	8.95	11.00	19.95	1.6	3.0	4.6
2002-03	10.0	11.8	21.8	8.95	10.90	19.85	1.6	3.5	5.1

NIF: National Insurance Fund
NHS: National Health Service

Table 1 shows the full rates of contribution applicable to employed persons. The total primary rate paid by those married women and widows who pay the reduced rate of contribution has remained at the current rate of 3.85%, of which 2.80% goes to the National Insurance Fund.

Table 2 Contribution Rates, Including the NHS Allocation, and Earnings Limits for Self-Employed Persons

Tax Year	Small earnings exception limit £ per year	Class 2 contribution £ per week	Profit limits for Class 4 contributions: Lower limit £ per year	Upper limit £ per year	Class 4 contribution on profits between limits %
1998-99	3,590	6.35	7,310	25,220	6.0
1999-00	3,770	6.55	7,530	26,000	6.0
2000-01	3,825	2.00	4,385	27,820	7.0
2001-02	3,955	2.00	4,535	29,990	7.0
2002-03	4,025	2.00	4,615	30,420	7.0

Particulars of the small earnings exception limit, the earnings or profits limits and the contribution rates for the self-employed are shown in Table 2.

Full rate Class 1 contributors are eligible for all benefits provided by the scheme. Reduced rate Class 1 contributors (married women and widow optants) may be entitled to statutory sick pay and statutory maternity pay but are not entitled to other benefits except when title arises through their husband's contributions. Class 2 contributors (self-employed persons) are eligible for all benefits, with the exception of contribution based Jobseekers Allowance and the earnings-related addition to retirement, widows' and incapacity benefits. Class 3 voluntary contributors are entitled only to flat-rate retirement pensions, widows' benefits and the pensioners Christmas bonus.

Members of occupational pension schemes meeting required conditions may be contracted out of the additional pension. In that case, both the employees and their employers are allowed a reduction in the rate of National Insurance contributions payable on the band of earnings between the lower and upper earnings limits as described above.

1.4 The National Insurance Fund Long-Term Financial Estimates (Cm 4406)

Every five years the Government Actuary must report to Parliament on the finances of the Great Britain National Insurance Scheme over the next 50 years or so.

The main purpose of this actuarial report is to estimate the contribution rates required to be paid to the Great Britain National Insurance Fund. This report is based on the legislation in force in March 1999 and therefore reflects the equalisation of pension ages at 65 by 2020, the changes to the State Earnings-Related Pension Scheme (SERPS) and contracting out of SERPS enacted in the *Pensions Act 1995* and the contribution rules changes contained in the *Social Security Act 1998.*

This quinquennial actuarial report of the National Insurance Fund involves projections of its revenues and expenditures over a long period of time, namely to the year 2060, so that the future impact of historical and projected trends in demographic and economic factors can be properly assessed. The report shows the breakdown of total expenditures of the National Insurance Fund by type of expenditure. It also shows the contribution rates estimated to be required in future based on the principal assumptions.

1.5 Report on the Cost of Up-rating the Basic Retirement Pension in Line with the General Level of Earnings (Cm 4920)

In addition to the quinquennial report, whenever it is proposed to make major changes to the National Insurance Scheme, there will usually be a report from the Government Actuary, such as Cm 4920.

This actuarial report presents the likely effects on the National Insurance Fund of increasing annually the rate of basic retirement pension by the percentage increase in the general level of earnings. It considers projections of the balance in the National Insurance Fund if the basic retirement pension continues to be up-rated in line with prices, or alternatively, is increased from now on in line with the general level of earnings.

This report further considers the effect on the National Insurance Fund of the higher rates of basic retirement pension which the government is proposing to take effect from April 2001 and April 2002 and examines the impact of either prices or earnings up-ratings thereafter.

1.6 Report on the Drafts of the Social Security Benefits Up-rating Order 2002 and the Social Security (Contributions) (Re-rating and National Insurance Funds Payments) Order 2002 (Cm 5383)

Whenever National Insurance benefit rates or contribution structures are altered, ministers must present to parliament a report by the Government Actuary. These reports look at the finances of the National Insurance Scheme over the very short-term showing the cost of increasing benefits or altering contributions.

This report presents the likely effects on the National Insurance Fund of the Social Security Benefits Uprating Order 2002 and the Social Security (Contributions) Order 2002. This report shows estimates of the receipts and payments from the National Insurance Fund for 2001-02 and 2002-03. The receipts from contributions and the payments on benefits in these years will depend, among other things, upon the levels of unemployment and employment, and the rate of increase in earnings.

1.7 Interpretation of Results

Cm 4406 presents the following valuation results:

- the projected future contribution rates every 10^{th} year through to 2060,
- the NIF expenditure as a percentage of projected GDP,
- the breakdown of NIF expenditure by type of expenditure, assuming that future benefits in payment increase with prices,
- the change in GDP per pensioner relative to the current level based on future price up-rating or earnings up-rating,
- the initial retirement benefit as a percentage of average earnings, which is the replacement rate, based on two important assumptions: price up-rating or earnings up-rating, and
- a number of sensitivity tests (which illustrate the results) that would be obtained under various changes in actuarial assumptions.

Cm 4920 presents the following valuation results:

- projections of the balance of the NIF each year from 2000-01 up to 2005-06 with the rate of basic retirement pension being up-rated annually either in line with price inflation, or in line with earnings growth,
- an impact on the contribution rates depending on whether the Fund is above or below the minimum recommended level of 17% of benefit expenditure,
- the contribution rates that would be required in order to balance income to and outgo from the NIF in the longer term under both price and earnings up-ratings, and
- a number of sensitivity tests on the following key assumptions: price increase, earnings increase, rate of investment return, levels of employment and unemployment, mortality and disability rates, age structure of the working population, legislative assumptions such as rates of contracted-out rebates, behavioural assumptions as to the number of people contracting out following the introduction of stakeholder pensions.

Cm 5383 presents:

- the contributions and benefits from the NIF for 2001-02 and 2002-03,
- the effects on the NIF of changes which will be made by the *Social Security (Contributions) (Amendment) Regulations 2002,* and
- the projections of the balance of the NIF as at 31 March 2003 and the expected excess over the minimum recommended level.

All of the results are estimates. All but the sensitivity tests represent the Government Actuary's estimates that are based on reasonable assumptions, with no deliberate margins of conservatism or other deliberate bias. As mentioned in many places in the reports, the estimates are dependent on many assumptions.

It is essential to recognize that these results are accurate projections but must not be viewed as predictions of the future. They simply present what the outcome will be if all of the assumptions were to come true in the future. The parameters involved (e.g. fertility rates, migration rates, mortality rates, disability incidence rates, participation rates, retirement rates, rates of prices increase, rates of earnings increase) are not open to accurate prediction.

The estimates in Cm 4406, Cm 4920 and Cm 5383 and in previous reports are essential outputs to provide guidance in funding the Scheme and in performing other planning and management tasks. Yet, no matter how carefully they are prepared, they are still only estimates. Thus, it is important that readers of the actuarial reports look at the sensitivity tests to get a feel for the range of possible actual outcomes. Due to the sensitivity of the results to variations in the assumptions, it is important to consider the possible effects on the finances of the NIF of actual experience deviating from the assumptions that were used for the projections.

1.8 Outline of this Report

Sections 2 and 3 of this report address the second item in our terms of reference regarding professional experience and professional standards of practice.

Section 4 (Data), Section 5 (Methodology) and Section 6 (Assumptions) address the third item in the terms of reference.

Section 7 addresses Item 2c) and Section 8 addresses the fourth item in the terms of reference.

The Executive Summary provides an overview of our findings.

2. Professional Experience

GAD offers a unique combination of actuarial expertise in a number of different fields of work. With its financial viability entirely dependent on client relationships and fees for service, the highest priority is given to addressing client needs and requirements, whilst adhering to the actuarial profession's code of conduct and practice standards.

The work covered by the department falls into four main areas:

1. Occupational Pensions: GAD has wide-ranging experience of occupational pension schemes. They have high levels of expertise in a number of specialized fields related directly to pensions policy and practical consultancy advice to pension scheme managers and trustees.
2. Social Insurance: The Government Actuary has a statutory obligation to produce regular independent reports connected with social insurance in the UK. The knowledge and expertise built up in GAD over the past 80 years, in every aspect of social insurance, is recognised world-wide and is regarded as essential for providing financial estimates and making policy decisions both in the UK and in many other countries.
3. Pensions Policy, Demography and Statistics: GAD is responsible for the preparation of the official national population projections of the UK and for preparing the national life tables. GAD has a specialist demographic unit with a high level of expertise in this field. They also publish comprehensive surveys of occupational pension schemes in the UK.
4. Financial Institutions: Although many of GAD's experienced actuaries in this area of work have now been transferred to the Financial Services Authority, GAD continues to provide advice on the supervision of occupational pension schemes and advises overseas governments and regulators on the regulation and supervision of insurance companies and pension funds.

Our review is conducted mainly on the staff of the Social Insurance Section and indirectly on the staff of the Demography and Statistics Section.

2.1 Background

Cm 4406 was submitted to the Secretary of State for Social Security in July 1999 by the Government Actuary, Mr. Chris Daykin, in accordance with the terms of section 166 of the *Social Security Administration Act 1992.*

Cm 4920 was submitted to the Secretary of State for Social Security in November 2000 by Mr. Daykin in accordance with section 36 of the *Child Support, Pension and Social Security Act 2000.*

Cm 5383 was submitted to the Secretary of State for Work and Pensions and to the Paymaster General in February 2002 by Mr. Daykin in accordance with sections

142(1), 147(2) and 150(8) of the *Social Security Administration Act 1992* as amended by the *Social Security Contributions (Transfer of Functions, etc.) Act 1999.*

Mr. Daykin has been a Fellow of the Institute of Actuaries since 1973. He has held the position of Government Actuary at the Government Actuary's Department (GAD) from 1989. He held different positions within the same department between 1973 and 1989. His 25 years of experience in social insurance actuarial work is more than that recorded by most actuaries working in the UK or in any other industrialized country. Besides his overall responsibility for giving actuarial advice to the UK government, he has provided actuarial advice to more than 30 other countries. He is a past-President of the Institute of Actuaries.

The professionals who worked most closely with Mr. Daykin on the reports reviewed are Mr. Andrew Young, Deputy Government Actuary and Mr. David Lewis, Chief Actuary. Mr. Young has been a Fellow of the Institute of Actuaries since 1974. He has worked on actuarial reviews of the National Insurance Fund for more than 20 years. Before becoming the Deputy Government Actuary in Demography, Pensions Policy and Social Security in 1995, he had been the Chief Actuary of Social Security for ten years. His main responsibilities at GAD are to provide advice to Parliament, Ministers and officials in other departments on social security pensions and occupational pension policy, demography and the finances of the National Insurance System and certain other Social Security Benefits. Mr. Young has extensive experience in providing actuarial advice to foreign countries. He is also the Chairman of the Technical Support and Research Committee of the Pensions Board of the Institute of Actuaries.

Mr. Lewis has been a Fellow of the Institute of Actuaries since 1976. He joined GAD in 1992 after working for more than 15 years for a life insurance society. He became the Chief Actuary of Social Security in 1995 and as such, supervised the Actuarial work of Cm 4406, the National Insurance Fund long-term estimates. He is currently responsible for producing the next long-term review of the National Insurance Fund. He provides advice to Parliament, Ministers and officials in other departments on the benefits and finances of the National Insurance system.

In addition, there are five other qualified actuaries and many trainee actuaries who worked on the three actuarial reports reviewed in this report. During his visit, Mr. Ménard met Mr. Aidan Smith, a Fellow of the Institute of Actuaries since 2000, who has an extensive knowledge of the Great Britain State Earnings-Related Pension Scheme (SERPS). He also met Miss Sarah Hawken, a professional who has the responsibility to forecast numbers and expenditure of Social Security benefits. With 30 years of experience acquired at GAD, at the former DSS (now the Department for Work and Pensions) and at the Inland Revenue, she has an impressive knowledge of the type of benefits provided by the National Insurance system.

Finally, Mr. Ménard met Mr. George Russell, Fellow of the Institute of Actuaries since 1990. He is the Chief Actuary of the Pensions Policy, Demographic and Statistics Division. As such, he is responsible for the demographic team, which undertakes the official UK national population projections. Mr. Ménard also met Mr. Adrian Gallop, Fellow of the Institute of Actuaries since 1988. He assisted in the production of the 1998-based population projections for the United Kingdom and its consistent countries, which are used to forecast the contributions and expenditures of the National Insurance Fund.

2.2 Observations

- Staff

Clearly, for each actuarial review of the NIF, it is desirable to have the setting of assumptions and the review of data sources and methodologies made by a group of professionals who have had considerable previous experience with the process. The more professionals with previous experience the better, all other things being equal. We are pleased to observe that there is a mix of more experienced and newer personnel on the staff of GAD.

There are very few actuaries working in the United Kingdom with experience in valuing and costing social insurance programs like the National Insurance Fund. The data sources, macro-economic modelling and range of assumptions involved in evaluating social programs are more complex than for employer-sponsored plans and thus employer plan experience is useful but not as useful as previous experience with social programs like the National Insurance Fund.

The staff of the Social Insurance Section and the Pensions Policy and Demography Section is composed of 22 people with 8 qualified actuaries. There are hardly any other organizations in the world with so many qualified actuaries with many years of experience in the social security field.

GAD is highly respected by the international social security community. This is evidenced by the fact that the expertise of Messrs. Daykin, Young and Lewis has been sought by more than 20 countries in recent years.

Messrs. Daykin, Young and Lewis have considerable experience and understanding of the issues involved in evaluating the NIF, more than most other actuaries working in the United Kingdom.

We are satisfied that Mr. Daykin and the staff who assisted him in preparing the Cm 4406, Cm 4920 and Cm 5833 reports have relevant experience and are qualified to carry out the assignment.

- <u>Consultation with Experts</u>

Because of the wide range and complexity of the assumptions and methodologies involved in actuarial reviews of the NIF, it is desirable for the Government Actuary to seek out the advice and guidance of other experts, including actuaries, demographers and economists, who may have different perspectives on the future as it may affect the Fund to ensure a wide range of analysis and opinion is considered.

While there is formal advice and guidance for the demographic assumptions through the consultation on population projections, there is no formal process of consultation on the economic assumptions and the methodology used by GAD.

- <u>Flexibility in Actuarial Advice Provided</u>

In accordance with section 142 of the *Social Security Administration Act 1992*, either the Government Actuary or the Deputy Government Actuary can submit the actuarial report to the Government. This increases the flexibility and level of services to external clients. This should be maintained in the future.

2.3 Opinion on Professional Experience

In our opinion, the professional experience of the Government Actuary and the staff who worked on the actuarial reports Cm 4906, Cm 4920 and Cm 5383 was adequate for carrying out the work required.

2.4 Recommendation

Recommendation 1: We recommend maintaining the current legislation allowing either the Government Actuary or the Deputy Government Actuary to submit the actuarial report to the Government. It enables GAD to maintain and improve the level of actuarial services to both UK and worldwide clients.

3. Professional Standards of Practice

In this Section, we address the following question:

"To what extent, the actuarial reports Cm 4406, Cm 4920 and Cm 5383 are in accordance with the relevant professional standards of practice?"

3.1 Background

Today, the work of the actuary has expanded dramatically. Actuaries are experts in the analysis modelling and management of financial risk, particularly in life insurance, general insurance, pensions, social security, health care financing, risk management of financial institutions, financial planning, assessment of damages or loss, corporate finance, investment and asset management.

There are tough requirements for trainees entering the profession today. Trainees have a graduate background in mathematics or statistics before studying to become a Fellow of the Faculty or Institute of Actuaries by completing 15 professional exams.

The relevant rules of Professional Conduct Standards (PCS) for actuarial work in the United Kingdom are those that have been adopted by both the Council of the Faculty of Actuaries and the Council of the Institute of Actuaries. The Faculty and the Institute have adopted formal "Professional Conduct Standards" including a section on "Standards for Actuarial Advice". The Guidelines of Practice recently adopted by the International Actuarial Association are also considered.

The PCS give guidance on professional conduct to which all actuaries must conform in spirit as well as in letter.

3.2 United Kingdom Professional Conduct Standards

The Faculty of Actuaries and the Institute of Actuaries are separate professional bodies constituted by individual Royal Charters. However, in professional matters there is a unified approach between the Faculty and Institute of Actuaries. Both the Council of the Faculty and the Council of the Institute have approved the PCS. It applies equally to all actuaries of both bodies and it is the professional responsibility of each actuary to be conversant with it.

The requirements of the PCS are restricted to general principles and standards, which must be adhered to when interpreting professional guidance. Guidance Notes may impose additional requirements in specific circumstances and are classified as Practice Standard or Recommended Practice.

The actuarial profession has an obligation to serve the public interest. Collectively it seeks to do so by informed contribution to debate on matters of public interest and by influencing those with power to protect and enhance the public interest. Individually members must maintain and observe the highest standards of conduct.

In our view, the Government Actuary and his staff, in completing the work on Cm 4406, Cm 4920 and Cm 5383, have met the requirements of the applicable rules of Professional Conduct Standards.

3.3 United Kingdom Standards of Practice for Social Insurance Plans

We note that no United Kingdom specific standard of practice currently exists giving guidance on actuarial methodology for social insurance plans like the National Insurance Fund.

However, PCS section 4.4 stipulates that written actuarial advice to a client must include adequate information, appropriate to the circumstances, as to its scope, purpose and terms of reference. It must state clearly any methodologies adopted and any material assumptions made by the actuary. Where corresponding actuarial advice has been given previously it is acceptable to state only material changes in methodologies or assumptions.

As well, section 4.5 stipulates that the actuary must carry out appropriate investigations to assess the accuracy and reasonableness of any data being used or state why this has not been done. The actuarial advice must include an explanation or qualification if the actuary has any reservations about the reliability of the data.

In our view, the work on actuarial reports Cm 4406, Cm 4920 and Cm 5383 complied with the relevant portions of the Professional Conduct Standards.

3.4 International Actuarial Association Guidelines of Practice for Social Security Programs

On 10 December 2001, the IAA published an Exposure Draft on Guidelines of Practice for actuarial work provided with respect to Social Security Programs. The IAA Council adopted this exposure draft on 16 March 2002. These guidelines were adopted on 21 October 2002. They now have the status of non-binding guidelines for British actuaries.

Included in the Guidelines are sections on:

- scientific rigour
- objectivity
- transparency, explicitness, simplicity and consistency in report
- matters to be included in actuarial reports

- data
- assumptions
- methodology
- presentation of results
- cash flow financial projections
- sensitivity analysis
- analysis of projection results
- conclusions
- attestations

Where specified in the terms of reference of the valuation or review, or in the legislative requirement for an actuarial report, the actuary should provide any opinion required on the financial soundness or balance of the social insurance program, on the adequacy or otherwise of contributions, or on the necessary future level of contributions.

In our opinion, the actuarial work on actuarial reports Cm 4406, Cm 4920, and Cm 5383 complied with all elements of the IAA Guidelines of Practice for actuarial work provided with respect to Social Security Programs.

3.5 Opinion on Professional Standards

In our opinion, the work on actuarial reports Cm 4406, Cm 4920 and Cm 5383 was completed in compliance with the relevant professional standards.

4. Data

In this Section we address the following question:

"Has the Government Actuary had access to the information he required and completed such tests and analyses on the data as might be expected?"

4.1 Background

Appropriate data are required for data inputs into the computer model used in the actuarial reports reviewed, for validation (back-testing) of the model, and to develop appropriate actuarial assumptions for future years. The extensive data requirements for the actuarial reports Cm 4406, Cm 4920 and Cm 5383 are as follows:

- The published population projections produced by another section headed by Mr. Russell of GAD are used.

- The Department for Work and Pensions (DWP) regularly provides the benefit data. It consists of statistical information on all the benefits payable from the National Insurance Fund. Where necessary or available, DWP may provide more detailed analysis of the data sent. GAD also has access to databases produced by DWP, which they can query to extract relevant information.

- Economic activity rates by age and sex are derived from various reports prepared by the Office for National Statistics (ONS).

- Earnings data for employees by age, sex, salary bands and contracted-out status is based on the New Earnings Survey published each year by ONS, together with some more detailed analysis of this data provided to GAD at their request by ONS.

- Data on the salary levels of self-employed people are provided directly by the Inland Revenue (IR).

4.2 Observations

We have the following observations:

- The data are extensive, reasonably complete and available on a timely basis.
- The data have been tested for reasonableness by GAD and any deficiencies resolved before data are used.
- The data used to develop assumptions include both historical data and various projections of possible future experience. The principal data sources are government departments, mostly of the United Kingdom Government.

- Contribution estimates are reconciled with actual data on collections as far as possible each year, including an apportionment exercise to split the contributions between those due to the NIF and those due to NHS.
- The introduction of a new computer system by the Contributions Agency to collect and record national insurance contributions has led to a significant delay in the availability of any up-to-date data on people contracting out.
- GAD has maintained its contacts with other Departments and Agencies such as Inland Revenue, the Contributions Agency and DWP.

4.3 Opinion on Data

In our opinion, the Government Actuary had access to the data he required and had completed such tests and analyses on the data as might be expected. The data testing, when taken in combination with the validation processes described in Section 5 (Methodology) of this report, is adequate and appropriate. The data used are adequate and appropriate for the purpose of the actuarial review of the National Insurance Fund presented in the three reports under review: Cm 4406, Cm 4920 and Cm 5383.

4.4 Recommendations

Recommendation 2: We recommend that DWP be requested to provide GAD with details on the data on people contracting out without undue delays. This will significantly help GAD to do the projections needed for people contracting out of the SERPS.

5. Methodology

In this Section, we address the following question:

"Were the methods used in completing Cm 4406, Cm 4920 and Cm 5383 reasonable and were the checks on results appropriate and adequate?"

5.1 Background

The results presented in Cm 4406, Cm 4920 and Cm 5383 are based on a series of models of the National Insurance Fund's operations that projects the contributions, the investment earnings, the benefits paid, the administrative expenses as well as the level of the Fund in future years.

The future required contribution rates are a result of a deterministic projection of the contribution income and benefit expenditure. Figures are derived from independent benefit models and the contribution model. The models produce both the short-term and long-term estimates. The parameters for the models are constantly updated to reflect recent experience and, as necessary, redeveloped or rewritten according to need.

All the models in the short term (namely for the actuarial reports Cm 4920 and Cm 5383) are aligned with the latest statistics and, where appropriate, the latest benefit expenditure or contribution income actuals. The models include assumptions as to future rates of mortality, fertility, and migration to project the population in the future.

Moreover, the models use economic assumptions such as, participation rates, unemployment rates, future price increases (inflation), future earnings increases, and future rates of return on investments. The benefit models also use such assumptions such as, retirement rates, disability rates and probabilities of being married.

5.1.1 Methodology Used to Calculate Future Contribution Income

For calculating future contribution income, the method is to:

1) Apply projected economic activity rates to the projected population to get estimates of the employees by age and sex in future.
2) Apply the projected contracted-out proportions to the projected employees to estimate those contracted-out.
3) Use a constant future earnings distribution (by age, sex and salary band) and the real earnings growth assumption (adjusted for demographic changes) to estimate future earnings.

4) Use the projected employees and self-employed, the earnings distribution by age and sex and the contracted-out status to estimate the contribution income and contracting-out rebates payable.
5) Calculate the contribution income assuming that current contribution rates are maintained in future and that various contribution limits are increased in accordance with current practice. Estimates from the model are adjusted with the latest known actual data.
6) Calculate the contribution rate required to meet benefit expenditure in future years.

5.1.2 Methodology Used to Calculate Benefit Expenditure

For calculating benefit expenditure each benefit has its own model, which apart from the earnings related part of the state pension, is largely independent of the estimate of contribution income.

Basic retirement pension is a flat rate pension and constitutes by far the largest part of the expenditure of the Fund. Future expenditure is estimated by applying a proportion entitled and a mean proportion of standard rate (i.e. an average benefit entitlement) to the future numbers in the population over state pension age by each individual age/sex. Women have to be further subdivided by category, as their entitlement rules are so complicated. The proportions are set according to the current parameters derived from the recent data, the trends in those parameters and an estimate of the likely effects of past changes in working patterns, contribution rules and entitlement provisions on the parameters in future. Different parts of the basic state pension are estimated according to the different rules. A loading is applied to the estimated GB expenditure to allow for pensions paid overseas.

The State Earnings-Related Pension Scheme (SERPS) is the next largest item of expenditure. SERPS entitlement depends on the employee's earnings within the relevant band in the past and future and whether the additional pension has been contracted out. SERPS has changed a number of times since it was introduced (SERPS was replaced by State Second Pension for benefits accruing from April 2002). The relevant earnings are split into separate categories to allow the different rules to be applied. Estimates of numbers entitled are not required as only relevant earnings drive the expenditure. Past earnings data by age and sex and category is available from statistical/administrative records. Future estimates of relevant earnings are derived from the contributions model. Awards of pension in future are estimated by taking the earnings in each past year for each cohort, surviving and revaluing them as appropriate and applying the applicable accrual rates. The pensions awarded are then survived, up-rated if appropriate and include awarding inherited widows pensions if appropriate, which in turn are survived. Separate results are calculated for the gross expenditure and the reduction due to contracting out. The model is aligned to recent data.

The next largest item of expenditure is incapacity benefit (IB). This is projected using an awards and survivorship model. Award rates of IB by age and sex are derived from past data and these rates, allowing for any trends, are used to estimate future awards based on the projected economically active population (i.e. the individuals exposed to the risk of claiming). Survival rates on IB by age, sex and duration are again derived from past data and the existing stock of IB claimants. New awards are assumed to decrease in future in line with the survival rates. Mean proportions of standard rate are then applied to derive costs. Different parts of the benefit are done separately as appropriate.

Other benefit expenditures are comparatively small.

5.2 Observations

We have the following observations:

- In Cm 4406 the reconciliation of results with the previous quinquennial review is done only for the projected contribution rates (Table 5.7). In Cm 4920 (Table 8.1) and Cm 5383 (Appendix 8), a far more complete reconciliation of results (or comparison of estimates) in terms of contributions, benefits and the level of the Fund itself is presented.
- The models are seamless in as far as the same models are used to regularly produce all the short-term estimates that are regularly required as well as the longer-term ones.
- The models are flexible because they are not just used to make financial projections of the benefit arrangement but also to consider the financial effects of alterations to the arrangement.
- The models are sufficiently robust to measure the financial impact of the sensitivity tests presented in the actuarial reports.
- GAD's staff is composed of experienced modellers who developed computational tools flexible enough to allow for the investigation of changes in selected assumptions.
- The different models used by GAD enable the Government Actuary to give sound actuarial advice.

5.3 Opinion on Methodology Used for Validation

In our opinion, all the methodology elements employed in Cm 4406, Cm 4920 and Cm 5383 are appropriate and reasonable for the purposes of the National Insurance Fund and have been properly applied.

5.4 Opinion on Professional Independence Regarding Choice of Method

In our opinion, the Government Actuary has full independence in selecting the appropriate methodology to conduct regular actuarial reviews of the National Insurance Fund as demonstrated by the content of reports Cm 4406, Cm 4920 and Cm 5383.

5.5 Recommendations

Recommendation 3: We recommend modifying the next quinquennial review of the National Insurance Fund Long Term Estimates to include a section on the reconciliation of results as was done in the actuarial reports Cm 4920 and Cm 5383.

Recommendation 4: We recommend the Government Actuary to maintain the tradition of continual improvements to the methodology by such actions as:

- Developing objective criteria for selection of current sensitivity tests and for any future additional sensitivity tests.
- Reviewing what length of experience data should be considered when developing projected distributions of parameters.

Recommendation 5: We recommend that the Government Actuary continue to produce the short-term and long-term estimates using the same valuation models to insure consistency in results.

6. Assumptions

In this Section, we address the following question:

"Were the assumptions used in completing Cm 4406, Cm 4920 and Cm 5383 reasonable?"

6.1 Background

The long-term actuarial review that is required to be made every five years under section 166 of the *Social Security Administration Act 1992* requires that the Government Actuary look back in time, to review the operations of the program and also look forward, to make an estimate of its future operations.

For the forward-looking part of the process, the Government Actuary uses models that incorporate the details of the National Insurance benefits and contributions. The models reflect the expected behaviour of the factors that determine the year-by-year development of the benefit expenditure and the contribution income. The model for a plan as complex as the NIF is necessarily itself complex. The assumptions incorporated into the model for a particular actuarial review reflect the Government Actuary's judgment, based on his interpretation of past experience and the available evidence about the likely course of future experience.

The nature of the actuarial process is to make estimates (not predictions) about the future based on the evidence available and then to revisit and review them every one, three or five years and where appropriate, to make "mid-course corrections" in the assumptions as the emerging experience of the Scheme deviates from the previous assumptions and the available information on likely future experience changes. In assessing whether to change an assumption and if so, by how much, the actuary must weigh:

- long-term historical data
- shorter-term historical data
- very recent experience data
- academic research and other external sources of relevant information

The assumptions are intended to apply over the long-term future, so the actuary will normally give substantial weight to long-term historical data but where the actuary judges that more recent data for a particular assumption indicate a trend that is likely to continue for the long-term future, the actuary will recognize that trend in adjusting the assumption.

For many of the assumptions used in the model, the Government Actuary has adopted an approach that actuaries describe as "select and ultimate". Under this approach, the particular assumption gradually changes over a period of years (the "select period") from one that is initially very close to actual recent experience to one that reflects the actuary's best estimate of the long-term future (the "ultimate" assumption). The length of the select period can be different for different assumptions. The choice is based on the actuary's judgment and depends partly on the nature of the parameter involved and partly on how significantly the ultimate assumption differs from recent experience.

The results of the actuarial process at any given time do not yield a "right" answer but should lie somewhere within a range that can be regarded as "reasonable". Previous actuarial reviews of the National Insurance Scheme (NIS) have been based on key assumptions that could be described as "best-estimate", i.e. the assumptions were, in the judgement of the Government Actuary, such that adverse or favourable deviations of actual future experience from each of those assumptions are about equally likely.

The major actuarial assumptions in Cm 4406, Cm 4920 and Cm 5383 can be conveniently divided into three groups:

- "Demographic" assumptions that deal with changes in the covered population (fertility, migration and mortality rates);
- "Economic" assumptions that deal with participation rates, earnings, prices, returns on investment; and
- "Benefit" assumptions that deal with occurrence of events (death, disability, unemployment, retirement) that trigger the starting or stopping of benefit payments or contribution income under the NIS.

6.2 Demographic Assumptions

Cm 4406 is based on the mid-1996 based population projections. The Pensions Policy, Demography and Statistics Section led by the Chief Actuary, Mr. Russell produces these projections.

These population projections are produced every two years after extensive consultation with many organizations in the United Kingdom.

6.2.1 Fertility

The fertility rates for women at each age in recent years have totalled just below 1.8 children per woman, roughly the average level that has applied since the late 1970s, though well below the fertility experienced during the immediate postwar years and in the 1960s. It was assumed that the total fertility rate would remain at 1.8 throughout. This is about 15% below the rate of 2.1 required for each generation to replace itself.

Opinion on Fertility

In our opinion, we believe that the fertility assumptions used in the Cm 4406 report are "reasonable".

6.2.2 Migration

The population projections assume a net inward migration of 68,500 per annum from 1998/99 onwards. This, together with the other changed assumptions, result in an extra 1.3 million people of working age by 2030 and an extra 0.5 million pensioners by the year 2060.

Opinion on Migration

We would have preferred to see the net inward migration of 68,500 people per annum expressed as percentage of the future population.

We would also have preferred to see more information on the immigration and emigration levels implicitly used in Cm 4406.

In our opinion, we believe that the net inward migration assumption used in the Cm 4406 report is reasonable.

6.2.3 Mortality

The projected numbers of pensioners will be very largely determined by the assumption about future mortality and, to a lesser extent, by migration. The mortality rates assumed have been based on the experience over recent years, with an allowance made for continuing improvement in mortality for the period of the projection. The following tables show the expectation of life in Great Britain used in Cm 4406 and the new 2000 population projections report.

Table 3 Future Expectation of Life at Birth

	Cm 4406 Actuarial Report (based on mid-1996 Great Britain projections)			National Population Projections Report (based on mid-2000 United Kingdom projections)		
	1996	**2030**	**2060**	**2000**	**2030**	**2060**
Males	74.3	78.5	79.2	75.5	79.3	80.0
Females	79.5	83.2	84.0	80.3	83.5	84.2

Table 4 Expectation of Life at Age 65

	Cm 4406 Actuarial Report (based on mid-1996-Great Britain projections)			National Population Projections Report (based on mid-2000 United Kingdom population projections)		
	1996	**2030**	**2060**	**2000**	**2030**	**2060**
Males	14.9	17.6	18.2	15.7	18.6	19.1
Females	18.4	21.2	21.7	19.0	21.3	21.8

Opinion on Mortality

In our opinion, the mortality assumptions used in the Cm 4406 report are reasonable. However, when we look at the new report on the population projections, it seems that the life expectancy for males was probably underestimated for the coming years. For example the expectation of life at 65 is now projected to attain 18.6 years in 2030, compared to 17.6 years used in the Cm 4406 report.

It is worth noting that some work has been done recently under the National Statistics Quality Review to examine what improvements could be made in the processes for projecting mortality improvements.

6.3 Economic Assumptions

6.3.1 Economic Activity Rates

Future economic activity rates up to 2011 were taken from projections published in Labour Market Trends by the Department for Education and Employment. These rates were held constant thereafter except for some ad hoc adjustments to reflect the impact of the increase in female state pension age from age 60 to 65 between 2010 and 2020.

The changes in activity rates over the years reflect economic and several other factors. In general, the trends over the past 20 years have been towards lower activity rates for men, particularly at ages over 55, and higher activity rates for women. The following table presents the economic activity rates for different age groups.

Table 5 Economic Activity Rates

Age	Males		Females	
	1999	**2011+**	**1999**	**2011+**
16-19	67%	68%	63%	61%
20-24	84%	86%	71%	74%
25-34	93%	91%	75%	80%
35-44	92%	89%	77%	79%
45-54	89%	87%	77%	83%
55-59	75%	71%	53%	55%
60-64	54%	49%	30%	37%
65-69	15%	13%	4%	4%
70 and over	5%	4%	4%	4%

Unemployment has little effect on the expenditure but could affect the contribution income. The unemployment assumption is based on the current level adjusted in light of past experience. The number of unemployed claimants was assumed to be 1.4 million up to 2011. After this, the proportion of the economically active that are unemployed was kept at 4.7%, the same proportion as in the year 2011, for all future years.

It might reasonably be expected that a fall in the proportion of the population at working ages would lead to some tightening of the labour market, producing a fall in the number unemployed and some increase in the proportions of married women and of persons at older ages remaining in or being drawn into the work force.

Opinion on Economic Activity Rates

In our opinion, the Cm 4406 assumptions for the unemployment rate and economic activity rates are reasonable.

6.3.2 Price Increases

The price increase assumption has regard to the long-term past average in the United Kingdom and a view on the current and future outlook based on recent experience and stated government policy.

Since the estimated contribution income and benefit expenditure for future years are expressed in constant price terms in Cm 4406, the actual level of price increase has little effect on the results. Where an assumption on price increases has been necessary, price increases have been assumed to be 4.0% per annum.

Opinion on Price Increases

In our opinion, the price increases assumption used in Cm 4406 is reasonable.

6.3.3 Earnings Increases

The excess of earnings increases over price increases is a crucial assumption for the cost of benefits where they are assumed to go up in line with prices. The effect of increasing benefit levels with earnings inflation is shown in many places throughout the reports.

The excess of earnings increases over price increases is assessed by comparing changes in the historical rates of price and earnings increases based on published indices. This shows that real earnings growth has been at least 2% per annum over long periods in the past.

The following table shows historical values of increases in price and earnings.

Table 6 Evolution of Increases in Price and Earnings

Period	Annual Price Increases	Annual Earnings Increases	Excess of Earnings Over Price
1963-1969	4.1%	6.9%	2.7%
1969-1979	12.1%	14.4%	2.1%
1979-1989	7.7%	10.1%	2.2%
1989-1999	3.8%	5.2%	1.4%

In Cm 4406, the assumption of excess of earnings over price was set at 1.5% per annum. GAD is considering raising the real earnings assumption to 1.75% or even 2.0% for the forthcoming quinquennial review.

Opinion on Earnings Increases

Considering the historical experience in the UK, the earnings increase assumption is reasonable.

6.3.4 Rate of Return on Investments

The investment return on the National Insurance Fund is estimated by applying an assumed rate of return to the average balance in the Fund during the year. Since investment income represents approximately 1% of total income (in Cm 4406), the assumption on rate of return is not as important as for a fully funded occupational pension plan. While Cm 4920 shows that investment income could reach 2.5% of total income in 2005-06, it is still a small part of the income of NIF.

Opinion on Rate of Return on Investments

Due to the small proportion of investment income compared to the contribution income, the methodology and assumptions are reasonable.

6.4 Benefit Assumptions

6.4.1 Retirement Rates

The assumption for retirement rates is considered in Cm 4406. The projected future number of basic retirement pensioners resident in Great Britain was obtained by applying factors to the numbers in the population projection at the relevant ages to allow for those in Great Britain not receiving retirement benefits. An additional factor was applied to estimate the numbers of non-resident pensioners.

It is possible to defer claiming retirement pension for up to five years after minimum pension age. The proportion currently deferring is estimated to be around 1.5% for men, but around 5.5% for women. The saving in pension expenditure in any one year as a result of people deferring retirement is subsequently offset by the cost of the increments in their rate of pensions once retirement takes place. These financial effects offset each other in the longer term and the proportions in the population affected are relatively small. However, in the past a considerably higher proportion deferred and current expenditure on increments is still quite substantial. Furthermore, there will be changes to the scheme for deferreds and the rate of increments, following the raising of female pension age from the year 2010. Estimates include allowance for deferreds and increments to continue at the current level for new awards up to the year 2010, after which it is assumed that, when pension age for women becomes 65, the proportion deferring will fall to the 1.5% level shown currently for men, and that the higher rate of increments will be paid.

For men residing in Great Britain, it has been assumed that 99% of those in the population reaching age 65 are eligible for retirement pension, including deferreds. For women, a slightly higher overall ultimate proportion is assumed, although, because some do not become entitled until their husband reaches 65, in practice the proportion is lower at pension age.

At present about 7.2% of all retirement pensions are payable to non-residents. This percentage has been rising slowly and for those more recently retired it is around 8.5%. It has been assumed that the percentage for new retirements will continue to rise at the current rate to reach 10% of all pensioners (11% of GB pensioners) and that it will stabilize at that level. The overall percentage will increase correspondingly and stabilize at the same percentage some 20 years later. Similar ultimate proportions have been assumed for both men and women.

For women, in addition to the factors affecting men, it is also necessary to allow for future changes to the proportions entitled to retirement pensions at minimum pension age. The steady increase in the proportions of women economically active and the abolition of the married women's contribution option result in increasing proportions of women being entitled to a retirement pension on their own contribution record rather than relying solely on that of their husband. As a result, instead of a large proportion of married women becoming entitled to retirement pension only when their husband retires, increasing proportions are becoming eligible for some retirement pension based on their own contributions when they reach age 60.

Opinion on Retirement Rates

The assumptions used reflect the current experience of the National Insurance Scheme and properly take into account the legislated change of the minimum pension age for women between 2010 and 2020. In our opinion, these assumptions are reasonable.

6.4.2 Disability and Continuation Rates

The assumptions used to derive the estimates for future expenditure on incapacity benefit were based on the past statistics available for invalidity and sickness benefits as well as more recent statistics on incapacity benefit.

Opinion on Disability and Continuation Rates

In our opinion, the assumptions used are reasonable.

6.5 Opinion on Professional Independence Regarding Choice of Assumptions

While the Government Actuary is fully independent in selecting the assumptions, consistency with short-term government economic assumptions is ensured through the report.

From the evidence shown and seen in the reports that we were asked to review, we believe that the Government Actuary is fully independent in the selection of long-term assumptions.

6.6 Reasonableness of the Assumptions in the Aggregate

In our review of the major actuarial assumptions, we found that each of them was in the reasonable range. In our view, mortality rates could have been reduced slightly more in the future, particularly for the males. The new 2000 populations projections report confirms our opinion.

In our opinion, the assumptions used in completing Cm 4406 are in aggregate within the reasonable range.

6.7 Recommendations

Recommendation 6: The practice of selecting assumptions that are consistent with the short-term government economic assumptions is adequate and should be continued in the future.

Recommendation 7: We recommend that the Government Actuary extend his current program of consultation on demographic assumptions to the determination of the main economic assumptions.

7. Communication of Results

In this Section we address the following questions:

"Do the Cm 4406, Cm 4920 and Cm 5383 fairly communicate the results of the work performed by the Government Actuary and his staff?"

"Can these reports be considered suitable to address the needs of the clients and third-parties who might rely on them?

7.1 Background

Cm 4406, the National Insurance Fund Long-Term Financial Estimates, as submitted to the Secretary of State for Social Security in July 1999 by the Government Actuary, Mr. Daykin, is a bound soft-cover book of 112 pages. It consists of the following sections:

1. Complete table of contents, listing all sections, tables and graphs (9 pages)
2. Summary of the review (6 pages)
3. Introduction and scope of the review (2 pages)
4. Impact of different assumptions for future benefit increases (10 pages)
5. Changes in numbers of contributors and pensioners (5 pages)
6. Estimated expenditure and required future contribution rates (8 pages)
7. Home responsibility protection and maturing of SERPS (5 pages)
8. Effects of contracting-out (4 pages)
9. Sensitivity analysis (5 pages)
10. Effect of Social Security Act 1998 changes (2 pages)
11. Effect of the March 1999 Budget (4 pages)
12. Five Appendices (52 pages)

Cm 4920, as submitted to the Secretary of State for Social Security in November 2000 by the Government Actuary, Mr. Daykin, is a bound soft-cover book of 44 pages. It consists of the following sections:

1. Letter of transmission, complete table of contents listing all sections, tables and graphs (4 pages)
2. Summary (1 page)
3. Introduction (2 pages)
4. Methods and assumptions used for the projections (3 pages)
5. Projected balance in NIF on Assumption 1 (5 pages)
6. Projected balance in NIF on Assumption 2 (4 pages)
7. Effects on the longer-term finances of NIF (4 pages)
8. Effects of variations in assumptions (3 pages)
9. Comparison of estimates in this report with previous estimates (3 pages)
10. Appendices (15 pages)

Cm 5383, as submitted to the Secretary of State for Work and Pensions and to the Paymaster General in February 2002 by the Government Actuary, Mr. Daykin is a bound soft-cover book of 28 pages. It consists of the following sections.

1. Letter of transmission and table of contents (2 pages)
2. Summary (1 page)
3. Description of the changes to benefits and contributions (2 pages)
4. Methods and assumptions used to project receipts and payments (1 page)
5. Estimates of receipts and payments and balance (2 pages)
6. Analysis of benefit payments and contribution receipts (less than 1 page)
7. Effect of different assumptions about employment, unemployment, earnings and contracting out (2 pages)
8. Conclusion (1 page)
9. Appendices (17 pages)

Cm 4406, Cm 4920, and Cm 5383 are also available on the GAD Website at www.gad.gov.uk.

7.2 Observations

Cm 4406 is a quinquennial review. Since the national population projections report has an impact on NIF financial estimates and since these population projections are released every two years, a synchronization of a long-term review of the National Insurance Scheme with the publication of new population projections could improve the precision of the long-term financial estimates of the National Insurance Scheme.

Cm 4406 is the Quinquennial Review for the period ending 5 April 1995. This report was signed by the Government Actuary in July 1999. We believe that a shorter period between the two dates would increase the public interest in the findings of the report.

Cm 4406, Cm 4920 and Cm 5383 are well organized and readable documents. They include many useful tables and graphs. The caveats and overall conclusions are clearly set out in the summary of each report.

The inclusion of a summary is extremely valuable for external readers. There are matters of presentation that could be improved. We have brought them to the attention of the Government Actuary.

7.3 Suitability of the Reports to address the needs of the clients and third-parties who might rely on them

In each actuarial report, the scope, use and limitations of the results are properly addressed. For example, in Cm 4406, we read in the summary of the review:

- Results of projections over the period to the year 2060 are subject to considerable uncertainty and the effects of <u>different</u> assumptions are shown in Section 8 of the report.
- This review is based on the legislation in force in March 1999.
- The main purpose of the review is to estimate the contribution rates <u>required</u> to be paid to the NIF in future years to meet the expenditure in a pay-as-you-go basis under the current benefit and contribution structure.

In Cm 4920, we read in the transmission letter to the Secretary of State for Social Security:

- The report considers projections of the balance in NIF if the basic retirement pension continues to be up-rated in line with prices or, <u>alternatively</u>, is increased from now on in line with the general level of earnings.
- The report further considers the effect on NIF of the higher rates of basic retirement pension which the government is proposing and examines the impact of <u>either prices or earnings up-ratings</u> thereafter.

In Cm 5383, we read in the transmission letter to the Secretary of State for Work and Pensions:

- The report estimates the receipts of payments from NIF for the years 2001-02 and 2002-03.
- The economic assumptions used correspond with those prepared by Her Majesty's Treasury at the time of the Pre-Budget Report in November 2001.
- On the basis of the <u>estimates</u> in the Report, the level of NIF at 31st March 2003 will be greater than one-sixth of benefit payments in 2002-03. Thus it exceeds the <u>minimum level that I recommend</u> to ensure that a reasonable working balance is maintained.
- It will not therefore be necessary for any Treasury grant to be made to NIF.

In our opinion, these examples demonstrate that the reports fairly communicate the results and limitations of the work performed by the Government Actuary.

An article published by the Standard and Poor (S&P) rating agency on 3 July 2002 illustrates how the results of these reports could be misused and lead to misunderstanding.

"The rating agency warns that the Government has an optimistic bias in its projections for the long-term cost of state pensions. S&P concluded that even though Britain was in a stronger financial position than most European Union countries as a result of the reduction in national debt and the restriction in the value of the state pension, the projections were based on a "number of questionable assumptions regarding the fiscal impact of ageing". As an example of this is the assumption that the pension benefit ratio (average state pension as a percentage of gross domestic product per person employed) would reduce by 50% by 2050."

This statement is based on Table 1.4 on page 15 of Cm 4406, which represents the change in GDP per pensioner relative to 1999.

Year	**1999-00**	**2010-11**	**2020-21**	**2060-61**
Price uprating	100.0	93.0	87.8	50.2
Earnings uprating	100.0	106.1	112.2	105.1

This table shows the relative change in the proportion of GDP to be spent on each pensioner in future years relative to the corresponding figure for 1999. With earnings up-rating, pensioners receive an increasing share in GDP relative to 1999. This reflects the fact that the benefit rate is increasing at the same rate as the economy, that women's entitlement will grow relatively over the next 20 years, and that more pensioners will have a significant SERPS benefit as older pensioners with little SERPS entitlement die and are replaced by newer pensioners with a fuller entitlement. With price up-rating of benefit rates, in future years each pensioner will receive a smaller proportion of GDP relative to 1999. This reflects the fact that price up-rating of benefit rates, will not keep pace with the underlying growth in the economy.

The above explanation was written in the report just below the table. However, the S&P press release misleads people because it fails to use the content of Tables 1.2 and 1.3 on page 12 of the Cm 4406 actuarial report. The press release was silent on the fact that this implies a reduction of 30% in contribution rates and in the total expenditure of the National Insurance Scheme as a percentage of GDP (from 5.5% to 3.7%). There is no evidence that the UK Government will let this happen. The projections show what would happen on the basis of present policies, and point to the likely impact (e.g. in relation to the real value of pensions being awarded, as shown in Figure 1.1 of Cm 4406), without speculating on what actions government might take in the future.

Moreover, the S&P press release fails to give the complete picture about the assumptions on either future earnings up-ratings or price up-ratings of benefits. The press release is reproduced in Appendix 3.

In our opinion and despite the fact that many sensitivity tests are done in the reports reviewed, the Government Actuary should probably add other sensitivity tests in the Executive Summary of the next quinquennial review. This addition would likely help reduce the risk of the results being misinterpreted in the future.

7.4 Opinion on Communication of Results

In our opinion, Cm 4406, Cm 4920 and Cm 5383 fairly communicate the results of the work performed by the Government Actuary and his staff. We strongly believe that the long-term assessment of the National Insurance Scheme in Cm 4406 is highly reliable.

7.5 Opinion on Professional Independence for Choice of Presentation of Results

In our opinion, both independent advice from GAD and the need for reliable projections have been achieved.

7.6 Recommendations

Recommendation 8: To increase the ease of reading and understanding, we recommend better disclosure of the key demographic assumptions, namely the fertility, migration and mortality rates, in the next quinquennial review rather than reliance on these assumptions being described in the separate report which GAD prepared on the national population projections.

Recommendation 9: For the next quinquennial review, we recommend disclosing the projected benefits and contribution income year by year for the first ten years of the projection period. This improvement would help the reader compare the results of the quinquennial review with any report subsequently released by the Government Actuary, such as reports Cm 4920 and Cm 5383.

Recommendation 10: We recommend including in the executive summary more sensitivity tests for the rate of increase in pensions assumed like these proposed ones: price up-ratings, price up-ratings +1.0%, price up-ratings +1.5% (which corresponds to earnings up-ratings) and price up-ratings +2.0%. Under each sensitivity test, the Government Actuary should reproduce the estimated required contribution rates, the NIF expenditure as a percentage of projected GDP and the relative change in GDP per pensioner as it is presented in Table 1.4 of the summary of the quinquennial review.

Recommendation 11: We recommend increasing the frequency of the periodic actuarial review of the National Insurance scheme (Cm 4406) from quinquennial to quadrennial and synchronizing the production of the actuarial report with that of the national population projections. GAD should aim to produce its long-term reviews on a timely basis.

Recommendation 12: For each actuarial review on the assessment of long-term financial estimates of NIF, we recommend issuing a press release containing the main findings included in the Executive Summary of the report.

8. Report to the Government Actuary

8.1 Summary Report

This report presents the results of a review of three actuarial reports prepared by the Government Actuary's Department of United Kingdom and the detailed actuarial examination on which they are based.

The review was conducted in accordance with the following terms of reference:

1. To review the public reports prepared by the Government Actuary's Department (GAD) on the Great Britain National Insurance Fund.

2. To report on the extent to which these reports are in accordance with relevant professional standards of practice.

3. To make recommendations concerning data analysis, modelling methodology, professional independence regarding assumptions and presentation of results

After reviewing all of the information, and after much discussion with officials of the GAD, we found that we were able to reach agreement on all opinions and recommendations presented in this report.

We have set out our opinions and recommendations in the various sections of this report according to our terms of reference. The recommendations are summarized below.

Professional Experience

Recommendation 1. We recommend maintaining the current legislation allowing either the Government Actuary or the Deputy Government Actuary to submit the actuarial report to the Government. It enables GAD to maintain and improve the level of actuarial services to both UK and worldwide clients.

Data

Recommendation 2. We recommend that Department for Work and Pensions (DWP) be requested to provide Government Actuary's Department (GAD) with details on the data on people contracting out without undue delays. This will significantly help GAD to do the projections needed for people contracting out of the State Earnings-Related Pension Scheme (SERPS).

Methodology

Recommendation 3. We recommend modifying the next quinquennial review of the National Insurance Fund Long Term Estimates to include a section on the reconciliation of results as was done in the actuarial reports Cm 4920 and Cm 5383.

Recommendation 4. We recommend the Government Actuary to maintain the tradition of continual improvements to the methodology by such actions as:

- Developing objective criteria for selection of current sensitivity tests and for any future additional sensitivity tests.
- Reviewing what length of experience data should be considered when developing projected distributions of parameters.

Recommendation 5. We recommend that the Government Actuary continue to produce the short-term and long-term estimates using the same valuation models to insure consistency in results.

Assumptions

Recommendation 6. The practice of selecting assumptions that are consistent with the short-term government economic assumptions is adequate and should be continued in the future.

Recommendation 7. We recommend that the Government Actuary extends his current program of consultation on demographic assumptions to the determination of the main economic assumptions.

Communication of Results

Recommendation 8. To increase the ease of reading and understanding, we recommend to better disclosure of the key demographic assumptions, namely the fertility, migration and mortality rates, in the next quinquennial review rather than reliance on these assumptions being described in the separate report which GAD prepared on the national population projections.

Recommendation 9. For the next quinquennial review, we recommend disclosing the projected benefits and contribution income year by year for the first ten years of the projection period. This improvement would help the reader to compare the results of the quinquennial review with any report subsequently released by the Government Actuary, such as reports Cm 4920 and Cm 5383.

Recommendation 10. We recommend including in the executive summary more sensitivity tests for the rate of increase in pensions assumed like these proposed ones: price up-ratings, price up-ratings +1.0%, price up-ratings +1.5% (which corresponds to earnings up-ratings) and price up-ratings +2.0%. Under each sensitivity test, the Government Actuary should reproduce the estimated required contribution rates, the NIF expenditure as a percentage of projected GDP and the relative change in GDP per pensioner as it is presented in Table 1.4 of the summary of the quinquennial review.

Recommendation 11: We recommend increasing the frequency of the periodic actuarial review of the National Insurance scheme (Cm 4406) from quinquennial to quadrennial and synchronizing the production of the actuarial report with that of the national population projections. GAD should aim to produce its long-term reviews on a timely basis.

Recommendation 12: For each actuarial review on the assessment of long-term financial estimates of NIF, we recommend issuing a press release containing the main findings included in the Executive Summary of the report.

8.2 Signatures

It is with great pleasure that this report is respectfully submitted to Mr. Chris Daykin, the Government Actuary of the United Kingdom.

by:

Jean-Claude Ménard

Mr. Jean-Claude Ménard
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

Mr. Michel Millette
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

December 2002

APPENDIX 1 – Letter from GAD to OCA

GAD
Government Actuary's Department
www.gad.gov.uk

8 February 2002

From the
Government Actuary
Chris Daykin
CB Hon DSc MA FIA FSS ASA

Mr. Jean-Claude Ménard FCIA FSA Chief Actuary
Office of the Superintendent of Financial Institutions
Canada
255 Albert Street, 12th Floor
OTTAWA
ON
Canada K1 A OH2

Dear Jean-Claude:

In the light of the current interest of the UK actuarial profession and many of our clients in the development of peer review and its variants, and, following discussions with our Minister, the Government Actuary's Department intends to embark upon a rolling programme of practice review of different areas of our business. As the first candidate for such review, we would like to undertake an external practice review of the statutory work, which we do on the finances of the Great Britain National Insurance Fund.

I would like to ask you whether you would be prepared to undertake such a practice review for us. As you will appreciate, there are not many experts in this field who operate within a similar tradition to ours and we would very much welcome your input through carrying out a review of what we do. I enclose a copy of the draft terms of reference which have drawn up.

We would of course meet your expenses in carrying out this work.

I look forward to hearing from you and hope that you will be willing to undertake this review for us.

Yours sincerely,

CHRIS DAYKIN

APPENDIX 2 – Letter from OCA to GAD

18 March 2002

Mr. Chris Daykin, CB Hon DSc, MA, FIA, FSS, ASA
Government Actuary
Government Actuary's Department
New King's Beam House
22 Upper Ground
London, England
SE1 9RJ

Dear Mr. Daykin:

We acknowledge receipt of your letter of 8 February 2002 wherein you state you are interested in a practice review of the statutory work done on the finances of the Great Britain National Insurance Fund, more specifically on the methodology and the processes involved.

The Office of the Chief Actuary has considered the work involved in conducting such a review and is prepared to undertake the review as proposed. It would be greatly appreciated if you could provide us, before our visit, the information listed in the Annex attached, so that such a review can be conducted on the following public reports prepared by the Government Actuary's Department on the National Insurance Fund:

1) the Report on National Insurance Fund Long Term Financial Estimates (Cm 4406),
2) the Report by the Government Actuary on the drafts of the Social Security Benefits Up-rating (No.2) Order 2002 and the Social Security (Contributions)(Re-rating and National Insurance Funds Payments) Order 2001 (Cm 5383), and
3) the Report by the Government Actuary on the cost of uprating the basic retirement pension in line with the general level of earnings (Cm 4920).

Your cooperation and able assistance in obtaining the information is appreciated. If you need any clarification regarding this request, please do not hesitate to call myself or Mr. Michel Millette at (613) 990-4589.

Yours sincerely,

Jean-Claude Ménard

Jean-Claude Ménard, F.S.A., F.C.I.A.
Chief Actuary
Phone: (613) 990-7577
E-mail: jmenard@osfi-bsif.gc.ca

Attach.

Documentation required:

1. The sources of data the Government Actuary's Department (GAD) had access to, the analysis and tests completed on the data as might be expected.

2. The structure and the development of the assumptions and methodological steps used to calculate the projections included in the report.

3. The approach that was taken on the sensitivity tests done and how they were determined and/or within what boundaries.

4. The professional experience of the GAD staff in the preparation of the report, adequacy for the work carried out and required.

5. The relevant professional standards of practice used to ensure the report was in compliance with them.

6. A complete description of your macro model.

7. A detailed experience analysis of your model.

8. A validation/reconciliation with past experience.

9. Further background information on the social security scheme in Great Britain.

APPENDIX 3 – Future Costs of State Pensions

Government Projections for state pensions costs and pensions statistics under fire

Article Published 3 July 2002

A report from rating agency Standard and Poor (S&P) warns that the Government has an "optimistic bias" in its projections for the long-term cost of state pensions. S&P concluded that even though Britain was in a stronger financial position than most European Union countries as a result of the reduction in national debt and the restriction in the value of the state pension, the projections were based on a "number of questionable assumptions regarding the fiscal impact of ageing". As an example of this is the assumption that the pension benefit ratio (average state pension as a percentage of gross domestic product per person employed) would reduce by 50% by 2050. According to S&P: "Recent debates in the UK make it far from certain that it will be politically feasible for future governments to let pensioners' standard of living drop by one half compared with the working population." S&P said that if it is assumed that state pension spending will grow at the same rate as the EU median, and that health spending will keep pace with the EU median, by the 2030s and 2040s, the budget deficit would be above the Maastricht treaty ceiling of 3% of GDP and the national debt would breach the 60% ceiling by 2045.

The Financial Times 3 July 2002 p2 ***Warning over optimistic bias on pension costs*** by Ed Crooks and Andrew Bolger.