

The Royal Commission on Environmental Pollution report on crop spraying and the health of residents and bystanders – Government response

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Introduction

1. The Royal Commission on Environmental Pollution's Special Report, *Crop Spraying and the Health of Residents and Bystanders*, was launched in September 2005. The report sets out the Royal Commission's concerns over the exposure of residents and bystanders to agricultural pesticides. The report proposes changes to the way in which the health concerns of residents and bystanders potentially exposed to pesticides are addressed, argues that there is a need for a more precautionary approach to minimise resident and bystander exposure and for further research into the model used to assess exposure. It makes recommendations concerning the governance of the pesticide approvals process and argues that there is a need for clearer communication of uncertainty and greater availability of information to the public on pesticide spraying.
2. The Government is grateful to the Royal Commission for this Special Report, which was produced following a request from Alun Michael, the then Minister for Rural Affairs and Local Environment Quality, to examine the evidence on which the current pesticide approvals system is based and the reasons for people's concerns. The Government appreciates the contribution that the report makes to the debate on the exposure and potential health effects of pesticides for residents and bystanders and believes that it has helped drive forward that discussion.
3. This document provides the UK Government's formal response to the Special Report. It should be noted that there are some areas of the response where responsibilities fall to a particular Government Department, for example, the health issues are primarily the concern of the Health Departments while exposure issues are primarily the concern of Defra and the equivalent departments in the Devolved Administrations.
4. The response summarises action being taken and proposed as it relates to the Royal Commission's recommendations. The responses appear in the same order as the recommendations in Chapter 6 of the report; the Royal Commission's recommendations are given in bold italics throughout and the original paragraph numbers are included for clarity.
5. It should be noted that the code of practice for agricultural pesticide use, known as the "Green Code", which the Royal Commission considered in its report and against which some of its recommendations were drawn, has been revised in England and Wales to bring together the codes of practice for agriculture, amenity, horticulture and forestry use of pesticides; the revised code was published on 13 February 2006. The revised code is titled *Pesticides – Code of Practice for using Plant Protection Products*¹. This code includes the information, some of which has been revised, previously contained within the "Green Code", and will be referred to as the "PPP Code" throughout. A revised code covering Scotland is expected to be published in July 2006. A revised Northern Ireland code is also expected to be published in the future.

The Government's approach

6. In framing this response the Government has carefully considered the evidence presented in the Royal Commission's report and also taken into account the commentaries published by its

¹ January 2006 Code of Practice for using Plant Protection Products ISBN 0-85521-170-9 http://www.pesticides.gov.uk/safe_use.asp?id=64

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independent expert advisory committees – the Advisory Committee on Pesticides² and jointly by the Committees on Toxicity and Carcinogenicity of Chemicals in Food, Consumer Products and the Environment³ – on the scientific issues raised by the report. In doing so the Government has attempted to gain a properly balanced view of the issues surrounding resident and bystander exposure to pesticides informed by both the Royal Commission's report and this further independent advice.

7. The Government notes there are a number of areas where these three advisory committees were in agreement with the Royal Commission's report. However, it also notes that the advisory committees take a different view from the Royal Commission on a number of issues, particularly the level of urgency and nature of further research required on health effects and the overall level of additional precaution required.
8. The Government has also noted that a number of the Royal Commission's recommendations are for the introduction of statutory measures. In developing this response the Government has considered these in the broader context of pursuing the Principles of Good Regulation⁴, and fulfilling the Government's commitment to implementing the recommendations of the recent Better Regulation Task Force *Less is More*⁵ report.
9. The Government considers that regulation, through additional statutory provisions, is not the only tool available to achieve the outcomes envisaged by the Royal Commission. There are other alternative mechanisms, such as voluntary approaches, that may be able to deliver these policy outcomes more efficiently and effectively and help reduce administrative burdens on industry.
10. The Government believes that many of the issues which the Royal Commission's report seeks to address could be resolved through better co-operation and understanding between farmers and residents through improved dialogue and local best practice. The approach adopted in this response aims to ensure such dialogue is supported and the development of local solutions to issues is not hindered by overly prescriptive statutory requirements.
11. The Government is also conscious that the European Commission is due to publish a Thematic Strategy on the Sustainable Use of Pesticides which will include proposals for a new EU directive. This directive may establish an EU framework of controls on sustainable pesticide use and any development of new UK regulations will need to take place within this context.

Response to recommendations

12. ***6.19 Our recommendations encompass a wide range of measures and reflect the significant degree of uncertainty, which in our view underlies current understanding of resident and bystander safety and exposure. We have recommended a more precautionary approach pending more research. This will deliver a significant strengthening of risk management procedures until a more rigorous evaluation of the risk and necessary accompanying measures can be made. The interim measures***

² April 2006 Advisory Committee on Pesticides, Crop spraying and the Health of Residents and Bystanders a commentary on the report published by the Royal Commission on Environmental Pollution in September 2005. http://www.pesticides.gov.uk/acp_temp/rcep_response_vfinal.pdf.

³ Committee on Toxicity <http://www.food.gov.uk/science/ouradvisors/toxicity/> and Committee on Carcinogenicity <http://www.advisorybodies.doh.gov.uk/coc/>

⁴ Cabinet Office Principles of Good Regulation http://www.cabinetoffice.gov.uk/regulation/consultation/consultation_guidance/planning_a_consultation/principles_good_regulation.asp

⁵ 2005 Better Regulation Committee: Regulation – Less is More. Reducing Burdens, Improving Outcomes ISBN: 0-7115-0466-0 <http://www.brc.gov.uk/downloads/pdf/lessismore.pdf>

need to be introduced in the UK and drawn to the attention of the authorities in the EU who, we are told, do not currently regard bystander exposure to pesticides as a priority.

13. The Government readily accepts that there is a level of public concern with the current understanding of resident and bystander exposure to pesticides. The Government also continues to recognise that there is a degree of uncertainty in the current risk assessment for residents and bystanders, as there is with all risk assessment processes. The Government considers that actions taken to address these uncertainties must be evidence based and proportionate to the risks identified.
14. The Government recognises the importance of having a robust model for resident and bystander exposure as part of the approvals process. New research has already been commissioned to ensure that this model is further developed in a transparent and demonstrably robust manner to give the public greater confidence in the approval system for pesticides.
15. The Government considers there is already a significant level of precaution in addition to the approvals system both in terms of the statutory guidance on best practice and voluntary schemes such as the Voluntary Initiative⁶ and the various farm assurance schemes⁷. The Government considers that development of these voluntary approaches should continue and that an additional level of statutory precautionary measures is not supported by the evidence outlined in the Royal Commission's report.

Health Issues

16. ***6.20 Based on the conclusions from our visits and our understanding of the biological mechanisms with which pesticides interact, it is plausible that there could be a link between resident and bystander pesticide exposure and chronic ill health. We find that we are not able to rule out this possibility. We recommend that a more precautionary approach is taken with passive exposure to pesticides. The existing uncertainties indicate an urgent need for research to investigate the size and nature of the problem and any underlying mechanisms that link pesticide spraying to ill health (2.65).***
17. In its conclusions the Royal Commission states that *"There is no dispute that some people who have been exposed to pesticides have become ill. The dispute has concerned the causality and underlying basis for these illnesses. On the evidence that we have received we cannot draw firm conclusions on causality."*⁸ The Government accepts that if a resident or bystander were to accidentally receive a high exposure to certain pesticides then some acute adverse effects might occur. One of the aims of the precautionary measures set out in the PPP Code is to avoid such circumstances occurring. The Government agrees with the Royal Commission that the evidence does not allow a firm conclusion to be drawn on causality in relation to chronic ill health.
18. The Government believes that being unable to rule out the possibility of a link can not be considered a basis to support the recommendation of an urgent need for research into any

⁶ The Voluntary Initiative <http://www.voluntaryinitiative.org.uk/Content/default.asp>

⁷ Assured Food Standards 'Red tractor' scheme is the umbrella organisation for a number of farm assurance schemes http://www.redtractor.org.uk/site/rt_home.php

⁸ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Paragraph 6.4 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

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potential chronic ill health effects from pesticide exposure of resident and bystanders. Similarly there is no scientific basis for additional precaution beyond the already precautionary approach currently adopted.

19. **6.21 We recommend a comprehensive systematic review of the literature on pesticide spraying and human health that takes account of the shortcomings of the Ontario Report (2.66).**
20. The Government notes that the Royal Commission “...*did not undertake [its] own comprehensive critical review of the health based literature for either occupational or non-occupational exposure...*”⁹ and that the Royal Commission considers such a study “...*would take a large amount of resources*”¹⁰. The Government notes that its independent expert advisory committees have indicated doubts regarding the value of a comprehensive systematic review and favour smaller more directed reviews. For example, the Committee on Toxicity suggested an epidemiological review of para-occupational exposure to pesticides and a review of the literature on chronic fatigue syndrome and multiple chemical sensitivity; the Committee on Carcinogenicity suggested that geographical studies of cancer incidence linked to potential exposure (possibly to include appropriate biomonitoring data) should be considered.
21. Given the differing views on the value of a comprehensive study and potentially significant costs involved, before commencing such a review the Government will initially consider a feasibility study examining the scope, costs and benefits of a full systematic review including how the outcomes of such a review would be used and by whom. The Government will also continue with the current practice of monitoring the literature and conducting targeted reviews as appropriate and will, in particular, consider the feasibility of the studies noted above as suggested by the advisory committees.
22. In undertaking any studies the Government will attempt to address the shortcomings of the Ontario report¹¹ which include the selection of data used, and the selective interpretation of results. The Government notes that the lack of good exposure data in most studies is an issue which could not be remedied in any future review of such publications.
23. **6.22 We recommend that an imaginative systematic approach is taken to apply both well validated as well as novel clinical investigative methods to those with chronic symptoms linked to pesticide spraying such as magnetic resonance spectroscopy (MRS) and gene and protein profiling (2.67).**
24. The Government does not agree that novel clinical investigative methods should be applied specifically to those with chronic symptoms that may be linked to pesticide spraying. If any such specialist investigations were to be carried out the Government believes they should be aimed at all potential causes of chronic illnesses such as chronic fatigue syndrome and multiple chemical sensitivity, not just the proposed hypothesis relating to resident and bystander exposure to

⁹ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Paragraph 1.15 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

¹⁰ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Paragraph 2.34 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

¹¹ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Paragraph 2.30 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

pesticides. The Government considers that a fundamental research programme into multi-system disease involving Research Councils and the Department of Health as recommended by the Royal Commission is not warranted and that such investigations may not be a priority.

25. The Government notes that there are two schools of thought with regard to multiple chemical sensitivity – it is either psychological in nature or physiological. In either case, this could indicate a particular sensitivity in some individuals. The differences between multiple chemical sensitivity and chronic fatigue syndrome are unclear, in part due to an uncertainty in the designation of causes of these conditions. A review of chronic fatigue syndrome/multiple chemical sensitivity is to be taken forward by the Committee on Toxicity in collaboration with the Department of Health Toxicology Unit.
26. ***6.23 We recommend that the Health Protection Agency (HPA) and related organizations within the devolved administrations in Scotland and Wales collect population data on pesticides, their metabolites and biomarkers of effects that would provide a sound basis for exposure assessment and also could be used to establish a national database for monitoring (2.68).***
27. The Government believes that appropriate population biomonitoring may be of value and that targeted biomonitoring work may yield more useful information than large studies for gaining an estimate of potential resident and bystander exposure. For example, small scale focused prospective studies using pesticides for which there is good knowledge of kinetics in humans are most likely to be informative for non-cancer endpoints and such studies could form the basis for extrapolating potential resident and bystander exposure to other pesticide active ingredients. Similarly, biomonitoring could be of value in interpreting any studies of cancer and the potential association with exposure to pesticides.
28. The Government will investigate whether such studies could be carried out, and notes that the Health Protection Agency has a key role in co-ordinating any such work in the UK.
29. ***6.24 We recommend that the private sector and universities be encouraged to develop new animal models that better reflect the chronic disorders experienced by residents and bystanders exposed to pesticide spraying (2.69).***
30. The Government considers that there is no rationale for developing animal models to test for poorly defined end effects such as those related to multiple chemical sensitivity without a clear mechanistic basis for undertaking such work. There would be substantial difficulties in evaluating end points as the majority of the symptoms reported are subjective. The Government also notes that there is little value in using in vitro techniques to investigate such chronic ill health effects. The Government notes that where end points can be measured models have already been developed, for example, all pesticides are tested for potential carcinogenicity in rodents.

Monitoring Human Health

31. **6.25 We endorse the Department of Health's move to strengthen higher professional development in the field of toxicology within general practice. They should also ensure that professionals working in public health and specialised poisons centres have a clear awareness and understanding of how to investigate the chronic health problems related to pesticides by residents and bystanders (2.97).**
32. The Government considers that further involvement of primary care in the investigation of potential toxicological causes of chronic ill health would be difficult to undertake, due to the diversity of ways in which this is delivered. Most general practitioners would not have the time to consider the possible causes of the mainly ill-defined symptoms individuals may present with. The Government believes that investigations of the potential causality of chronic health problems should consider all possible toxicological routes alongside other explanations and that a specific focus on pesticides may be counterproductive. The Government is investigating the feasibility and value of further raising awareness amongst practitioners.
33. The Government has set up a working group, with the Royal College of General Practitioners providing the Chairman. The aim of this working group is to investigate the production of a module of toxicology that could be integrated into the curriculum for General Practitioners. This would help to ensure that professionals working in public health and specialised poisons centres have a clear awareness and understanding of how to investigate chronic health problems with potentially toxicological causes.
34. **6.26 We recommend that the Royal Medical Colleges agree how patients with chronic symptoms associated with pesticide spraying should be investigated and treated, and identify a clear referral pathway from primary care to an appropriately trained consultant specialist (2.98).**
35. The Royal Medical Colleges are independent of Government and it is for those bodies to respond to this recommendation.
36. **6.27 We recommend that a new national reporting and monitoring mechanism for ill health associated with pesticide spraying should replace the Pesticide Incident Appraisal Panel (PIAP), and that this should fall within the remit of the Health Protection Agency and related organisations in the devolved administrations (2.99).**
37. The Pesticide Incident Appraisal Panel (PIAP) contributes to the post-approval monitoring of pesticides by examining the evidence obtained by Health and Safety Executive inspectors investigating complaints of ill health allegedly arising from exposure to pesticides. PIAP's primary function is to identify trends in ill health that may be associated with pesticide usage. The Government recognises that PIAP was not developed to assess causality in individual cases.

38. The Government considers that any changes to PIAP, including the development of new mechanisms, will need to be integrated with any wider changes to the regulatory and policy structure for pesticides proposed as part of the implementation of the recommendations of the Hampton review *Reducing administrative burdens: effective inspection and enforcement*¹². The Government will await the outcome of discussions on these wider issues before considering any potential implementation of changes to PIAP.
39. ***6.28 We recommend that newly acquired and standardised clinical, physiological and laboratory information from those who attribute their adverse health effect to passive pesticide exposure should form the basis for future biological monitoring. In addition to those exposed to agricultural spraying, we recommend the establishment of a system that places greater emphasis on surveillance for adverse health effects of pesticides (2.100).***
40. The Government believes it would be appropriate for future biological monitoring studies to include newly acquired and standardised clinical, physiological and laboratory information from those who attribute their adverse health effect to passive pesticide exposure. The Department of Health will investigate this possibility further in discussion with the Health Protection Agency. The Government will consider increasing emphasis on the surveillance of adverse health effects of pesticides as part of any review of the role of the Pesticide Incident Appraisal Panel.
41. ***6.29 People are exposed to pesticides through uses other than in agriculture, such as amenity and timber treatment and these people have reported similar health concerns to those discussed in chapter 2. Although we have not studied these areas in detail, the measures we recommend on health issues and monitoring human health should be extended to cover these non-agricultural pesticides (2.107).***
42. The Government believes that in investigating the potential causes of chronic illness consideration should be given to all toxicological routes alongside other potential causes taking into account individual case histories and possible exposure routes. The Government believes this approach provides those who are suffering from chronic illness with the maximum opportunity of receiving appropriate treatment.

Exposure Assessment

43. ***6.30 We recommend that the current approach for assessing resident and bystander exposure should with some urgency be replaced by a computational model which is probabilistic, looks at a wider range of possible exposure routes and more robustly reflects worst-case outcomes. The model should be rigorously validated by wind tunnel and field tests designed for the purpose, including non-standard conditions to test the sensitivity of the model predictions (3.53).***

¹² 2005, Reducing administrative burdens: effective inspection and enforcement Philip Hampton. ISBN: 1-84532-088-3 <http://www.hm-treasury.gov.uk/media/A63/EF/bud05hamptonv1.pdf>

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44. The Government believes that the current approvals system for pesticides, which is at the forefront of international standards, provides adequate protection for both spray operators and members of the public. The Royal Commission noted that *"the present approach may be conservative and protective in its treatment of targets..."*¹³ and the Government agrees with this.
45. The Royal Commission also noted that they could not agree that *"...this [conservative and protective treatment] has been conclusively or transparently demonstrated for the exposure process"*¹⁴. The Government agrees that the current model for resident and bystander exposure needs to be reviewed against a more transparent model which clearly takes into account a wide range of possible exposure routes, both during and after spraying, and also addresses the changes in spraying practice and equipment that have taken place since the current model was developed.
46. The Government believes that it is important to develop the model using the most appropriate techniques that will provide the best assessment of potential exposure, and be transparent and demonstrably robust to ensure members of the public can have greater confidence in the approvals system. New field trials designed to measure exposures under more testing application conditions had already commenced before the Royal Commission's study concluded.
47. In developing the model Government will be consulting a number of experts, including a representative covering the Royal Commission's interests, on how the model should be developed. Computational probabilistic techniques will be considered as part of this process alongside other methodologies. Techniques and conditions for validating the model will include wind tunnel evaluation, field tests and non-standard conditions. Defra's Chief Scientific Adviser will ensure the development of the model meets acceptable scientific standards.
- 48. 6.31 We recommend that validation of the model should be supported by monitoring of representative pesticides in a range of field conditions. Such monitoring should include measurements of concentrations in air for extended periods after spraying to contribute to better understanding of possible exposure other than through immediate spray drift (3.54).**
49. The Government agrees that the model should be properly validated and that monitoring of representative pesticides in field conditions is one potential way of achieving this.
50. As indicated above, in developing the model consideration will be given to possible exposure routes both during spraying, including immediate spray drift, and subsequently through mechanisms other than the immediate effect of spray drift.
- 51. 6.32 We recommend that both the model and the test data be peer reviewed and published in the open scientific literature so that the basis for the predictions is transparent and can be evaluated (3.55).**

¹³ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders Paragraph 3.44 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

¹⁴ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Paragraph 3.44 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

52. The Government agrees. We are committed to ensuring that all Government-funded science and the science underpinning policy formulation is demonstrated to be of high quality, backed by scientific audit and through accreditation. The model will be reviewed regularly, being informed by the latest scientific evidence. The Government recognises the importance of peer review in evaluating the veracity of its science and subsequently in gaining public confidence.

Reducing exposure

53. ***6.33 We recommend that all actual spraying practice be brought into line with the aspirations of the Green Code [PPP Code] recommendations (chapter 5), including giving proper regard to the importance of optimal timing of the application and therefore efficacy of the pesticide. This will require appropriate monitoring arrangements, and sanctions for non-compliance (3.56).***
54. The Government agrees that actual spraying practice should be in line with the aspirations of the PPP Code. It is in the interest of farmers to ensure that pesticides are applied in a manner which maximises their efficacy and therefore both minimises their use and provides the best economic return.
55. Estimates presented to Government indicate that around 80 per cent of 'spray events' in England are performed on land managed as part of one of the crop assurance schemes and this is increasing as membership increases¹⁵. These schemes generally include monitoring pesticide usage and adherence to the PPP Code as part of their assurance processes. Failure to meet these requirements and therefore comply with the scheme would disadvantage the farmer in the marketplace and therefore provides a significant economic incentive for compliance.
56. The Government believes that these schemes provide a level of scrutiny and sanction for non-compliance that is appropriate and that continuing to support the take up of these schemes will be the most effective means of ensuring the aspirations of the PPP Code are met.
57. ***6.34 We recommend the introduction of buffer zones alongside residential property and other buildings such as schools, hospitals and retirement homes where people may be adversely affected by crop spray. Buffer zones should be evaluated on the basis of the revised resident and bystander exposure model. Until then, on the basis of our current understanding, we see five metre buffer zones as providing the necessary further protection and encourage the active management of these so as to decrease the likelihood of spray drift affecting residents and bystanders (5.86).***
58. The Government does not consider that the introduction of a statutory buffer zone is a proportionate response to the level of uncertainty surrounding the model for exposure of residents and bystanders currently used as part of the approvals process. In addition the Government considers that a buffer zone would not necessarily be the most appropriate means of addressing uncertainty. The Government considers that if uncertainty was shown to be

¹⁵ 2006, Estimation of Costs and Benefits Associated with Possible New Regulations for Pesticide Use, ADAS www.pesticides.gov.uk/approvals.asp?id=1875

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significant then this should be dealt with through the approvals process, for example, it may be appropriate to add an uncertainty factor to the modelled exposure estimate and test the revised value against the Acceptable Operator Exposure Level (AOEL).

59. The Government recognises that some residents do have genuine concerns over the perceived effects of pesticide spraying for a wide variety of reasons, including health and general nuisance. In such cases a buffer zone may help reduce the level of concern and increase public confidence. We are also aware of the argument that the introduction of a statutory requirement for a buffer zone in the absence of a clear context on the part of either the resident or farmer may actually result in an increased level of concern.
60. The Government believes that the best way to address these concerns is through dialogue between residents and farmers to identify areas of concern and develop mutually agreeable solutions based on a common understanding of the issue. Such solutions could include voluntary use of buffer zones by farmers but would also allow for other more innovative solutions to be developed on the basis of local needs. The Government does not believe that the introduction of statutory buffer zones is an appropriate response to these concerns.
61. The Government is committed to working with the various organisations representing the full range of stakeholders to identify how greater dialogue between farmers and residents can be encouraged. As part of this process we will also examine the language in the PPP Code to determine if this can be amended to greater encourage such local best practice.
62. ***6.35 We recommend that 'Grandfather rights', allowing those born before 31 December 1964 to spray without passing the relevant tests, should be phased out by 2010 (5.68).***
63. The Government recognises that both spraying technology and practice have developed significantly since 'Grandfather rights' were instituted and that it is important for those spraying pesticides to be properly trained in their use. Assurance schemes often require all spray operators to have undergone training regardless of whether they have 'Grandfather rights'. Further research is required to obtain accurate information on the numbers and the training requirements of farmers operating under 'Grandfather rights' and whether the training capacity exists to allow for the removal of these rights and over what timescale.
64. Government will conduct further investigations into the prevalence of spraying under 'Grandfather rights' and, in line with Cabinet Office best practice on changes to regulations, we will consult on whether 'Grandfather rights' should be removed and if so over what time period. This consultation will take place in the context of policy developments arising from the anticipated EU Thematic Strategy on sustainable use of pesticides.
65. ***6.36 We recommend that the purchase of agricultural pesticides should be restricted to those who are permitted to use them (5.69).***

66. The Government believes that the most common situations where pesticides are purchased by persons other than those who are permitted to use them will be when a farmer is purchasing pesticides for use by a contractor or where someone within the farm business is purchasing the pesticides as part an administrative function. Restricting purchase in these circumstances would have no benefit in terms of reducing the potential exposure to residents and bystanders.
67. For any purchase restrictions to have a beneficial effect on reducing potential exposure and improving best practice they would need to be related to the qualifications of the end-user rather than the purchaser. The Government believes that the key control on pesticide use is the requirement that new spray operators must have undergone training and an examination to obtain a certificate of competence. Additionally those who sell pesticides must be certified. Additional restrictions would need to take account of the above exemptions in relation to 'Grandfather rights' and would be difficult for Government to enforce.
68. Government does not feel that introducing further statutory restrictions on the purchase of pesticides will provide benefits that could not be achieved through voluntary measures. Government will work with the supply industry to examine whether an industry-led scheme to better manage control of pesticide purchase would be workable and would provide any benefits.
69. ***6.37 We recommend that the National Sprayer Testing Scheme becomes compulsory and that spray equipment should be checked annually so that it is regularly maintained in good working order by both contractors and farmers. Consideration should also be given to applying this recommendation to more rudimentary or small-scale types of spraying, such as those operating from all terrain vehicles (e.g. quad bikes) (5.98).***
70. The Voluntary Initiative¹⁶, set up in 2001, has initiated a programme of annual sprayer testing. Membership of the Voluntary Initiative has since become compulsory within the farm assurance schemes which cover the majority of spray events in England, significantly increasing the number of sprayers tested. As part of the independent scientific evaluation of the environmental impact of the Voluntary Initiative due to take place in 2006 the success of the current voluntary arrangements will be reviewed. A decision will then be made on whether to continue with a voluntary approach or whether a statutory requirement in the future would be more beneficial.
71. The Government believes it would be premature to legislate until the benefits of a voluntary approach have been fully evaluated. Any additional regulation would also need to take place in the context of policy developments arising from the anticipated EU Thematic Strategy on sustainable use of pesticides. Making the National Sprayer Testing Scheme compulsory on a statutory basis may also place a significant strain on the testing infrastructure and capacity and careful consideration would need to be given to how this might be addressed.
72. ***6.38 We believe that adherence to some of the recommended conditions under the Green Code [PPP code] should become statutory duties. These include maximum wind speed, spraying practice as specified on the label, boom height and vehicle speed.***

¹⁶ The Voluntary Initiative <http://www.voluntaryinitiative.org.uk/Content/default.asp>

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Further research on refining the resident and bystander exposure model should lead to recommendations for revised spraying conditions for all factors relevant to minimising exposure, and thus to a revision of the statutory obligations (5.73-5.74).

73. The Code of Practice (PPP Code) for using plant protection products has a special position in law. As it is a statutory code, if a spray operator, be they a farmer or commercial contractor, follows the advice in the code they will be doing enough to keep within the law. They may also be able to work in a different way from the code so long as that way is equally as safe. A court would find someone guilty of a breach of pesticide law if they have not followed the code and cannot show, when asked, that they have still kept within the law. This potentially allows farmers to adapt their practice to local circumstances including the needs of local residents. It also means that farmers can adopt practices that go beyond the PPP Code, or which result in improved efficacy, for example using more dilute pesticide than recommended on the label, and therefore potentially reduce pesticide use overall.
74. The Government believes that the current statutory status of the PPP Code is sufficient and that making adherence to some of the recommended conditions statutory duties would not be beneficial. Doing so could lead to the reduction in some local best practice and potentially an increase in the level of risk associated with bystander and resident exposure.
75. The Government recognises that further research on refining the resident and bystander exposure model could lead to a greater understanding of the conditions and factors which minimise the potential for such exposure. The Government will keep the advice in the PPP Code under review both in the light of the Royal Commission's report and future research on resident and bystander exposure. If such research indicates that modification of the advice is required this will be considered along with the legal status of such advice.
- 76. 6.39 We recommend that as part of their on-site visits the Health and Safety Executive Inspectors should request evidence of: record keeping of pesticide use; training and certification and testing of spray equipment (5.91).**
77. All Health and Safety Executive inspectors operating in the Field Operations Directorate which covers agriculture are authorised to enforce pesticide legislation, in particular the Control of Pesticides Regulations 1986¹⁷ (as amended) and the Plant Protection Products Regulations 2005¹⁸. Inspectors may check on the arrangements for the safe storage and use of pesticides during routine visits to farms or in the course of investigating specific complaints. In such cases it would be normal practice for inspectors to assess compliance with the relevant codes of practice and in particular to enquire about record keeping, training and certification of users and the maintenance of spraying equipment. All these issues are covered in current training courses but their importance will be stressed in future courses. Where inspectors find non-compliance with pesticide legislation they have the power to issue notices that direct that activities involving pesticides are not continued until their concerns have been remedied.

¹⁷. The Control of Pesticides Regulations (COPR) 1986 (SI 1986/1510), COPR (Amendment) Regulations 1997 (SI 1997/188)

¹⁸. Plant Protection Products Regulations 2005 (91/414/EEC) http://europa.eu.int/eur-lex/en/consleg/pdf/1991/en_1991L0414_do_001.pdf

78. 6.40 We recommend that courts should be empowered to suspend or revoke the right to spray where operators have been convicted of breaking the law (5.94).

79. The Government recognises the need for adequate disincentives to prevent spray operators from adopting bad practice. This should include appropriate and proportionate penalties available for use by the courts where a spray operator is convicted of breaking the law in relation to the use of pesticides.
80. The Government believes that the revocation of the right to spray would be a disproportionate penalty as this would potentially remove the livelihood of the farmer or spray contractor. The issue of 'Grandfather rights' allowing those born before 31 December 1964 to spray without possessing a certificate of competence, and any changes required to the nature and legal status of such certificates will need to be resolved before any penalty relating to the suspension of these can be considered.
81. If a spray operator does break the law in relation to pesticide spraying it is vital that they receive appropriate training and support to change their practices and ensure such breaches do not recur. Government will work closely with farmers groups and the current voluntary schemes to help ensure that this takes place.
- 82. 6.41 We recommend that membership of the National Register of Spray Operators becomes compulsory and that it should be linked to possessing a Certificate of Competence, which should expire if continuing professional development is not undertaken (5.99).**
83. Membership of the National Register of Spray Operators (NRoSO) requires continuing professional development on the part of a spray operator. The Government recognises the importance of this continued training and the benefits of spray operators having access to the latest knowledge and best practice.
84. The National Register of Spray Operators is part of the Voluntary Initiative and as such its performance against targets is due to be evaluated in 2006. Under the Voluntary Initiative arrangements have been introduced whereby crops grown within one of the crop assurance schemes must be treated by members of NRoSO. This has led to an increase in NRoSO membership which was 20,000 as of March 2005. The Government believes it would be premature to legislate until the benefits of a voluntary approach had been fully evaluated as part of the wider independent evaluation of the Voluntary Initiative. Conclusions from that review will be taken forward in the context of the EU thematic strategy on pesticide use.
85. The issue of 'Grandfather rights' also needs to be resolved prior to consideration of linking possession of a certificate of competence to compulsory membership of any organisation, as doing so would effectively eliminate those rights.

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- 86. 6.42 We recommend that the UK Government press the European Commission to implement the recommendations on bystanders made by the former Scientific Committee on Plants, taking into account the concerns discussed in our report (5.10).**
87. The European Commission asked the former Scientific Committee on Plants to comment on a draft Guidance Document on setting Acceptable Operator Exposure Levels (AOELs) (revision 6 of 10 September 2001). The Committee opinion, delivered in October 2002, noted that there appeared to be no clear definition of the term 'bystander' or methods for estimating exposure and recommended *"the Commission to reconsider the concept of bystander, its appropriate exposure scenarios and the adequacy of applying the AOEL to this subpopulation."*
88. The Scientific Committee on Plants also considered that the risk of occasional exposure at the time of application should be avoided by risk management procedures at the time of application (i.e. no one should be present if not involved in the application), but that exposure of rural dwellers could, in principle, be compared to the AOEL, although it should be noted that as such residents and bystanders include individuals from the general population and were not a selected group like operators. The Committee thought that guidance was required in this area. At the time the Royal Commission's study was underway the European Commission had not initiated any work on producing such guidance for bystander risk assessments.
89. There has now been further experience in using the guidance on AOEL setting, which has since been amended. The European Commission has asked the European Food Safety Authority's Scientific Panel on Plant Health, Plant Protection Products and their Residues (PPR), which replaced the former Scientific Committee on Plants, to provide an opinion on the latest version of the draft Guidance Document on setting AOELs (revision 9 of 5 July 2005).
90. The PPR opinion was adopted on 6 April 2006 and reflects the opinion delivered by the former Scientific Committee on Plants. The PPR also considered that the definition of bystander under Directive 91/414/EEC was not clear and recommended that the term be clearly defined and also that separate guidance should be developed. The European Commission is also revising the data requirements that applicants for approval of pesticides have to address under Directive 91/414/EEC, and it is proposed that separate exposure assessments must be done for bystanders and residents. Guidance on resident exposure will also be required.
91. The UK supports the Commission activities in this area and is currently taking the lead on revising the AOEL guidance document for the European Commission, which will aim to improve transparency regarding the assessment of exposure for bystanders and residents.
- 92. 6.43 The use of pesticides in organic farming is subject to the same regulations as in non-organic farming and our recommendations therefore apply equally to them (5.112).**
93. The Government agrees. There is no distinction in the regulations between organic and non-organic farming practices in relation to pesticide usage, therefore the measures outlined in this document also apply without distinction.

Governance Issues

94. **6.44 We recommend that the advice to Ministers from technical and scientific advisory committees, such as that of the Advisory Committee on Pesticides on the approval of pesticides, should take account of the criteria employed regarding risk and precaution, the choices available, and the likely impacts on those affected by the decisions being recommended. This information needs to be reflected explicitly when communicating risk management decisions to the public. The meaning of such terms as 'adequate protection' should be clearly defined and communicated. Areas of scientific uncertainty, ignorance and indeterminacy need to be recognised and their nature described explicitly. It should be clear how uncertainty has been managed within the assessment, for example, through the use of probabilistic analysis (3.53), uncertainty factors etc. The effect of uncertainty on the estimate of risk should be clear (5.37).**
95. The Government is committed to ensure that all scientific advisory committees who have signed up to the Code of Practice for Scientific Advisory Committees 2001¹⁹ comply with it. The purpose of the Code of Practice is to provide more detailed guidance specifically focused on the operation of scientific advisory committees and their relationship with Government, and to help translate the Guidelines on Scientific Advice in Policy Making into day to day practice²⁰.
96. Sections 55-60 of the Code of Practice for Scientific Advisory Committees detail the procedures for reporting risk and uncertainty. Section 58 specifically mentions that committee's reports should make clear where adequate data are unavailable and where judgements have had to be made in the face of uncertainty. Section 59 states that within the context of the remit given to them, committees should use the most appropriate method of reporting outcomes that takes into account the level and type of uncertainty involved. The Advisory Committee on Pesticides remains committed to following the Code of Practice.
97. **6.45 We recommend that advice passed to Ministers from expert committees and statements to the public should properly reflect the full range of opinion within such committees (5.43).**
98. Section 64 of the Code of Practice for Scientific Advisory Committees deals with dissenting views and makes clear that committees should not seek unanimity at the risk of failing to recognise different views on a subject. These might be recorded as a range of views, possibly published as an addendum to the main report. Any significant diversity of opinion should be accurately reflected in the main report. The Advisory Committee on Pesticides remains committed to following the Code of Practice.
99. **6.46 We recommend that advice from committees should be differentiated between advice to the Minister, written in accessible language, and advice to departments, which would normally be for officials to handle (5.28).**

¹⁹ December 2001, Office of Science and Technology, Code of Practice for Scientific Advisory Committees.
<http://www.ost.gov.uk/policy/advice/copsac/index.htm>

²⁰ 2000, Office of Science and Technology, Guidelines 2000: Scientific advice and policy making <http://www.dti.gov.uk/science/page15432.html>

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100. The Code of Practice for Scientific Advisory Committees sections 46-54 deal with the committees' working practices. Of note is section 47 which states that committees and their secretariats should aim to prepare their papers in an accessible language. This will include differentiation between advice to a Minister and advice to officials to handle. The Advisory Committee on Pesticides remains committed to following the Code of Practice.
- 101. 6.47 We recommend that in consultations and in dialogue with the public concerning pesticides, as in other areas of uncertainty, science should not be positioned without argument as being beyond doubt. It should be presented in a manner that is open about the level of risk and uncertainty involved (5.47).**
102. Public consultations should accord with the Government's Code of Practice on Written Consultations.²¹ There should be openness and sufficient information should be available to understand the chain of reasoning which has led to the advice put forward. Government is committed to this approach.
- 103. 6.48 In accordance with government guidelines for best practice we recommend that consultation responses should be made available to the public, unless the respondent has said that they wish their response to remain private (5.49).**
104. The Government is committed to following the Government's Code of Practice on Written Consultations including making responses available unless requested not to by the respondent.
- 105. 6.49 We recommend that the draft National Pesticides Strategy should give full recognition to the need to safeguard human health and the environment (5.56).**
106. The Government published its Strategy for the Sustainable Use of Plant Protection Products²² in March 2006. The strategy focuses on pesticides and the environment but the Government is committed to considering the extension of the strategy to human health issues by March 2007. In developing such an extension consideration will be given to the findings of the Royal Commission's report.
- 107. 6.50 We recommend that responsibility for pesticides policy should be separate from that for the approval of pesticides. One way to do this might be to move the policy function from the Pesticides Safety Directorate to a unit within the Environment Directorate of Defra. The unit should have a clear remit for recognising the importance of safeguarding human health and the environment as well as the requirements for pest control; the Department of Health should have an explicit role in agreeing its remit and assessing its performance. The remaining functions relating to the approval of pesticides could be transferred to the Environment Agency to enable better co-ordination with wider environmental objectives (5.58).**

²¹ Cabinet Office, Code of Practice on Consultation <http://www.cabinetoffice.gov.uk/regulation/documents/consultation/pdf/code.pdf>

²² March 2006, Strategy for the Sustainable Use of Plant Protection Products
http://www.pesticides.gov.uk/uploadedfiles/Web_Assets/PSD/PB11721_Pesticidesenvironment_Lo.pdf

108. The structure and responsibilities for future pesticides policy and regulation, including the approvals process, is currently being considered as part of the Government's commitment to implementing the recommendations of the Hampton review Reducing administrative burdens: effective inspection and enforcement²³. The Government will announce the outcome of this process in due course.

Public Information

109. **6.51 We recommend that records of which pesticides, and when and where they have been used, should be directly available from the persons responsible for crop spraying upon request to any resident and bystander and to researchers investigating the health effects of resident and bystander exposure (5.84).**
110. In 2004, Alun Michael the then Minister for Rural Affairs and Local Environment Quality, made a commitment to introduce new legal measures to require farmers and growers to keep records of pesticides used on crops and to make those records available to the public via a third party. Since that time this commitment has been superseded by new European legislation (EC Regulation 852/2004 on the Hygiene of Foodstuffs²⁴, EC Regulation 183/2005 on the Hygiene of Feed for Livestock²⁵). Under this legislation farmers and spray operators are now legally required to keep a record of their spraying activity and these records can be made available through a suitable mechanism.
111. In the case of acute exposure where a resident or bystander has come into immediate contact with a pesticide as it is being sprayed, the Government believes it is highly unlikely that a spray operator would not be prepared to immediately inform the affected person or a doctor of what was being sprayed. The Government does not feel that a statutory requirement of disclosure is necessary for this situation as it is already covered in the PPP Code. The PPP Code states that *"If a [spray operator] or people they are working with or near feel unwell as result of being exposed to pesticides, they should think about getting medical attention (depending on the nature and severity of the symptoms)"* it further recommends that *"information on the pesticide involved, labels, data sheets and possible cause of contamination should be sent with the patient"*. Government will review the wording of the PPP Code to determine whether this advice needs further clarification for the specific context of acute exposure of a resident or bystander.
112. More generally the Government agrees that residents and bystanders concerned about both acute and longer term chronic exposure should have access to information relating to pesticide use. The Government believes that most farmers would be willing to engage in a dialogue with residents, to address their concerns and provide them with appropriate information if requested, and that a statutory requirement is not necessary or appropriate. The Government is not aware of an existing scheme where one individual can demand this type of information directly from another and they are required by law to supply it.

²³ 2005, Reducing administrative burdens: effective inspection and enforcement Philip Hampton. <http://www.hm-treasury.gov.uk/media/A63/EF/bud05hamptonv1.pdf>

²⁴ 2004, Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs (Official Journal of the European Union L 139 of 30 April 2004) <http://www.food.gov.uk/multimedia/pdfs/hiojregulation.pdf>

²⁵ 2005, Regulation (EC) No 183/2005 of the European Parliament and of the Council of 12 January 2005 http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/oj/2005/L_035/L_03520050208en00010022.pdf laying down requirements for feed hygiene

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113. The Government does recognise that there may be circumstances where such a dialogue is not appropriate or possible and that in these cases the use of a third party is most appropriate. Such a mechanism would allow records to be requested, on a case-by-case basis, and supplied in an appropriate format and timescale to meet the requirements of both the farmer and the requester. The availability of a third party will also help prevent vexatious requests for information.
114. The Government will consider a pilot approach using a central bureau, to accept inquiries and gather data from farmers. Information would be requested on a case-by-case basis in order to minimise the overall burden. The level of demand for such information and, therefore, the burden which would potentially be placed upon farmers and spray operators is not known. A pilot approach would allow an accurate assessment of the level of demand and the potential administrative burden as well as the opportunity to explore some of the practical issues before any decision is made on a long-term approach.
- 115. 6.52 We recommend that the residents living next to fields that are to be sprayed be given prior notification of what substances are to be sprayed, where and when. The results of the pilot study in this area announced by the government should be treated as an exercise to determine how best to provide information, not as an opportunity to re-examine the principle of doing so, which should be accepted (5.79).**
116. The Government recognises that notification can assist residents to make informed decisions regarding their behaviour in relation to pesticide spraying, should they wish to do so.
117. The Government considers that where a resident expresses concern about a farmer's use of pesticides it is good practice to give information about the pesticide and the reason for using it. It is also good practice to tell people who occupy land, premises or houses close to the area being sprayed. This is reflected in the guidance within the PPP Code.
118. A pilot study on prior notification was announced in 2004 by Alun Michael the then Minister for Rural Affairs and Local Environment Quality. The results of this study²⁶ indicated that when residents' awareness had been raised through an introductory letter 75% expressed an interest in notification of spraying and that this dropped to 8% when some action was required on their part, for example a phone call, to obtain such information. Based on these findings there is no economic justification for requiring all adjacent residents to be notified in advance of all spraying events relative to a more targeted local approach²⁷. Provision of information does not guarantee any precautionary action will be taken by the recipient, Government would need to take other measures to ensure any health risks were addressed and therefore, the need for full notification can not be justified as a protective measure.
119. Application of pesticides in accordance with best practice and greatest efficacy requires quite specific weather conditions which can change rapidly on a day-to-day or even an hour by hour

²⁶ 2006, Pilot Study on Public Notification of Pesticide Use, ADAS www.pesticides.gov.uk/approvals.asp?id=1875

²⁷ 2006, Estimation of Costs and Benefits Associated with Possible New Regulations for Pesticide Use, ADAS www.pesticides.gov.uk/approvals.asp?id=1875.

The estimated costs of farmers providing an annual awareness raising leaflet plus the costs of 75% of residents then opting-in for notification of each spray event are approximately the same as those for notifying all residents of all spraying events. If, as found in the study when the level of opt in was significantly lower than this at 8%, then these costs would be further significantly reduced and a targeted opt in approach would be a much less expensive option.

basis meaning that planned spraying is often cancelled or the decision to spray is made at the last-minute. If a resident is notified in advance of spraying there is a risk that they may decide to take action as a result of this notification but that the spraying itself may be cancelled. This could lead to residents taking action on many more occasions than necessary. Similarly having made the effort to notify residents there is a risk that a farmer may feel constrained to spray in less than optimum conditions reducing the efficacy of the pesticide and potentially needing to increase the overall amount of pesticides used.

120. The Government believes that the above situations are best addressed through dialogue between the farmer and a resident so that both parties can understand the implications of notification, can consider alternative approaches which may satisfy the resident's concerns and if the resident would still like to be notified identify the most suitable means and timing of doing this.
121. The Government believes that making prior notification to all residents of every spraying event a statutory requirement would be highly bureaucratic and potentially reduce the ability of farmers to engage in such local best practice. The Government is committed to working with the various organisations representing the full range of stakeholders to identify how greater dialogue between farmers and residents can be encouraged and to develop ways in which farmers can be supported in providing information to residents. We will also examine the language in the PPP Code to determine if this can be amended to further encourage such local best practice.
122. ***6.53 We recommend that for those wishing to access land, notices should be provided on rights of way or at points where access is likely. These notices should specify what is sprayed and when. A simple sign saying land may be sprayed is not satisfactory, not least because it could be a disincentive to those wishing to access land at times when spraying may not have taken place for some time (5.80).***
123. Notification for bystanders accessing farmland needs to be considered in the context of similar constraints to those set out above for notification of residents.
124. The PPP Code provides guidance on the application of pesticides around rights of way. Spray operators should not allow pesticide to drift on to rights of way and should stop spraying if there is a risk that members of the public using the right of way may be exposed. The code also provides guidance on placing warning notices on rights of way and circumstances where it is desirable.
125. The need to spray in optimum conditions, as with resident notification, makes the timing of placing rights of way notices difficult and there may be occasions where they are placed and spraying does not occur. This could result in bystanders being unnecessarily discouraged from using footpaths or farmers feeling constrained to spray in less than optimal conditions and potentially increasing the amount of pesticides used.

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126. The pilot study into notification also examined the use of notices on public access points. The study found that a number of notices were vandalised or removed. A statutory requirement to place notices on rights of way would be difficult to enforce as it would not be possible to tell whether a notice had not been placed or had been unlawfully removed.
127. The Government considers that a statutory requirement for notices on all access points is not practical or enforceable. The Government believes that the current arrangements are satisfactory and will review the language in the PPP Code to determine if changes are required to further encourage local best practice.

Reducing the cost

- 128. 6.54 We recommend that the UK interpretation of the rules on the Single Farm Payment scheme should be changed to allow land in buffer zones to count towards set-aside and that farmers should be strongly encouraged to make use of agri-environment schemes to minimise the economic costs of buffer zones (5.126).**
129. The Government agrees that where farmers decide to introduce a buffer zone adjacent to residential property they should consider doing so in a manner that allows them to minimise the economic costs through use of set-aside or agri-environment schemes. The Government will consider whether the UK's interpretation of set-aside rules need modification to facilitate this. The Government will also work with farmers groups to encourage consideration of the concerns of residents in relation to pesticide usage as part of a farmer's assessment of where any set-aside or other form of buffer zone should be placed.

Royal Commission Report Appendices

130. Appendix I – Lessons from the Gulf War Syndrome

131. The Government has concerns over the evidence base for the discussion of Gulf veterans illnesses contained in Appendix I of the Royal Commission's report *Lessons from the Gulf War Syndrome*.²⁸
132. It is noted that the Royal Commission drew on the 2004 United States Research Advisory Committee on Gulf War Veterans' Illnesses (RAC-GWVI) Report: *Scientific Progress in Understanding Gulf War Veterans' Illnesses*.²⁹ The Royal Commission claimed that as a result of the RAC-GWVI Report, "Gulf War Syndrome" is accepted in the United States. While the UK Government accepts that "Gulf War Syndrome" is a useful 'umbrella term' to cover accepted conditions which are causally linked to the 1990/1991 Gulf Conflict, the overwhelming consensus of the international scientific and medical community remains that the ill-health reported by some Gulf veterans cannot be characterised as a unique Gulf-related illness. The United States Government does not recognise "Gulf War Syndrome". Nor do any other countries that sent troops to the Gulf.

²⁸ September 2005, Royal Commission on Environmental Pollution: Crop Spraying and the Health of Residents and Bystanders, Appendix I p152 <http://www.rcep.org.uk/pesticides/Crop%20Spraying%20web.pdf>

²⁹ 2004, Research Advisory Committee on Gulf War Veterans' Illnesses, Report and Recommendations http://www1.va.gov/rac-gwvi/docs/ReportandRecommendations_2004.pdf

133. The RAC-GWVI Report is a review of selected existing research. There are areas in the report which are not supported by the balance of scientific evidence. For example, a good part of the report is concerned with exposure to neurotoxins, notably low level nerve agents, and their possible link to illness in Gulf veterans. This does not take into account an important review subsequently published by the United States Institute of Medicine, which stated that there is insufficient and inadequate evidence to determine whether an association exists between low-level exposure to sarin and long-term adverse health effects³⁰. We also note that research drawn on to formulate the recommendations was carried out by members of the Research Advisory Committee on Gulf War Veterans' Illnesses, which raises concerns about objectivity. We note that the Royal Commission referred to the neuro-imaging work of Haley and colleagues³¹. These studies are very preliminary in nature and have attracted some criticism because the original work was based on a small atypical group of personnel and suffered from a low response rate and lack of a control group. In the UK, the Medical Research Council have advised that, pending publication of a large US study to replicate the work, they do not recommend that this area of research be taken forward for British Gulf veterans³². For these reasons we have reservations about this aspect of the Royal Commission's evidence base in this area.

³⁰. 2004, Committee on Gulf War and Health: Updated Literature Review of Sarin, Board on Health Promotion and Disease Prevention, Institute of Medicine of the National Academies, the National Academies Press <http://www.iom.edu/CMS/3793/16393/21879.aspx>

³¹. 2000, Haley R.W, Marshall W.W, McDonald G.G, Daugherty M.A, Petty F and Fleckenstein J.L, Brain abnormalities in Gulf War Syndrome: Evaluation with 1H MR Spectroscopy. *Radiology* 2000, 215:807-817.

³². MRC recommendations on research into Gulf veterans' illness http://www.mrc.ac.uk/index/public-interest/public-topical_issues/public-military_health/public-gulf_veterans.htm

Annex 1 – Glossary of terms and abbreviations

AOEL	Acceptable Operator Exposure Level
ACP	Advisory Committee on Pesticides
COC	Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment
COT	Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment
EU	European Union
Green Code	the statutory guidance on the use of agricultural pesticides until December 2005 when it was superseded by the Code of Practice for using Plant Protection Products (PPP code)
HSE	Health and Safety Executive
NRoSO	National Register of Spray Operators
PIAP	Pesticide Incident Appraisal Panel
PPP Code	Code of Practice for using Plant Protection Products
PPR	Panel on Plant Health, Plant Protection Products and their Residues (Scientific panel of the European Food Safety Authority)
RCEP	Royal Commission on Environmental Pollution
Spray event	a single occurrence of a crop being sprayed.

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