ANNEX I

COMMENTS BY THE PARTIES ON THE REPLIES BY THE SCIENTIFIC EXPERTS TO THE QUESTIONS POSED BY THE PANEL

ANNEX I-1

COMMENTS BY THE UNITED STATES ON THE REPLIES BY THE SCIENTIFIC EXPERTS TO THE QUESTIONS POSED BY THE PANEL 31 JANUARY 2005

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I. INTRODUCTION

1. As previously explained, the United States has not identified any dispositive scientific or technical issues with respect to which the advice of scientific or technical experts is required. Nonetheless, the United States believes that the experts' responses to the Panel's detailed and thoughtful questions are helpful in providing a better understanding of some of the scientific issues raised by the EC. Moreover, as explained below, the United States submits that the expert advice provides further support for a finding that the EC's measures are inconsistent with the EC's obligations under the WTO Agreement.

2. The key issue in this dispute is whether the EC adopted a moratorium on biotech approvals. The official organs of the EC – the Commission, the Council, the Parliament, and the member States – have all acknowledged the existence of a moratorium, and it is only in the context of this particular dispute that the EC denies its existence. As the United States has explained, scientific or technical advice is not required to reach a finding on this central issue. For example, the EC argues that the statements of its officials announcing and acknowledging the moratorium are of no consequence for the purposes of this dispute, and the EC cannot explain the many instances where applications were stalled for one year or more in the absence of any outstanding requests for information. The weight to be placed on these important types of evidence turns on legal issues and non-technical questions of fact. In short, the Panel does not need to turn to scientific advice to reach a finding that the EC did, in fact, adopt a moratorium on biotech approvals.

3. At the same time, and as explained in the US Supplementary Rebuttal, the United States most certainly does not agree with the EC's assertions that all questions posed by EC regulators in the processing of product applications resulted from the legitimate need for additional scientific information. To be sure, the United States has never claimed that all requests for additional information were unwarranted. However, the United States has explained that many types of questions were unnecessary and were used to promote delay and perpetuate the moratorium. Thus, although findings by the Panel that particular questions were scientifically unnecessary for the assessment of the product are not required to establish the existence of the moratorium, such findings would provide further support for the existence of the moratorium.

4. And, in fact, the advice of the experts provides compelling evidence that many of the requests for information presented by EC regulators were not necessary for the evaluation of the product applications. For example, and as detailed in the body of this submission, the advice of the experts support findings that the following types of questions were unnecessary for conducting a safety assessment:

- questions related to safety effects of antibiotic resistance marker genes;
- repeated requests for additional and new types of molecular characterization;
- requests for new and different types of detection methods;
- requests for detailed information on environmental effects when the application sought approval only for import and processing, and not for planting;
- vague and open-ended requests for information on environmental effects;
- requests for semi-chronic toxicity studies;
- repeated requests for additional whole-food studies; and
- requests for studies on the composition of food produced from animals that consumed biotech feed.

The fact that many of the questions posed by EC regulators were not needed for the assessment of the biotech product applications both (i) supports a finding that the EC did not process the applications without "undue delay," and (ii) more generally, supports a finding that the EC did in fact adopt a moratorium on biotech approvals.

5. With regard to the member State safeguard measures, the EC does not dispute that Community-level scientific bodies reached positive assessments with respect to each product covered by a safeguard, and the EC does not dispute that the same bodies considered and rejected the rationales that the member States put forth to justify the measures. Moreover, the EC has not yet explained what specific scientific information might serve as a basis for adopting these measures under the SPS Agreement, nor has the EC explained how or whether the Community-level assessments were incorrect.

6. Where, as here, the defending Party has not even proffered a scientific basis for an SPS measure, there is no need to turn to expert advice to reach a finding under the SPS Agreement. Nonetheless, and as explained below, the expert responses further support findings that the safeguard measures are inconsistent with the EC obligations under the SPS Agreement. For example, the experts explain that, contrary to member State claims, there is no basis related to food safety for adopting any of the member State safeguards, and that there was no environmental basis for safeguard measures on products which received EC approval for import and processing (and not for planting).

7. In a few cases, an expert pointed to some hypothetical risks that, at the time of the adoption of the safeguard, the expert believed might have provided a basis for concern. But even in these cases, the expert wrote that by this time (i.e., January 2005), the member States have had more than adequate time to conduct a full assessment of any such risks, and that in light of available risk management

measures, total product bans were unnecessary. In short, the responses of the experts are of no assistance to the EC in defending the member State safeguards.

II. COMMENTS ON EXPERTS' RESPONSES[1]

A. GENERAL QUESTIONS

Question 1: On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that antibiotic resistance marker genes (ARMG) pass from a biotech food or feed product to bacteria or other micro-organisms present in the human or animal gut?

(a) If scientific evidence indicates that such an event could occur, what risks, if any, would arise from that event? What is the comparative relevance or magnitude of this risk in relation to the likelihood of such a transfer from other sources of antibiotic resistance not involving the use of recombinant DNA technology?

(b) If such risks have been identified, what is the likelihood of adverse effects to human or animal health, in light of the processing of raw biotech products into human food or animal feedstuffs?

(c) Are these consequences relevant to the specific types of ARMG currently used in the products at issue in this dispute? Please explain.

(d) If such risks have been identified, what risk management options are available to mitigate those risks and what is their efficacy?

8. The expert advice offered in response to these questions confirms that member State objections based on potential risks from antibiotic marker genes are not supported by scientific evidence. Rather, the expert concurred with the opinions of the Scientific Committee on Plants (SCP) that examined this issue as part of their evaluation of the products containing such genes: that the presence of these genes do not present a significant risk to human health. Professor Nutti explained as follows:

> "According to FAO/WHO (2000), DNA transfer from plants to microbial or mammal cells, under normal circumstances of dietary exposure, would require all the following events to occur:
>
> – the relevant gene(s) would have to be released, probably as a linear fragment;
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> – the gene(s) would have to survive nucleases in the plant and in the gastrointestinal tract;
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> – the gene(s) would have to compete for uptake with dietary DNA;

[1] The US comments are organized sequentially, following the numbering of the Panel's questions. The United States has commented on those responses of the experts that it believes are most relevant to the issues in this dispute. The absence of comments on a particular question does not indicate either agreement or disagreement with the experts' responses to that question, and the United States may, as appropriate, provide comments on the issues raised in such responses at later stages of this proceeding.

– the recipient bacteria or mammalian cells would have to be competent for transformation and the gene(s) would have to survive their restriction enzymes; and

– the gene(s) would have to be inserted in the host DNA by rare repair or recombinant events.

There have been numerous experiments aimed at evaluating the possibility of transfer of plant DNA to microbes and mammalian cells. **To date, there are no reports that marker genes in plant DNA transfer to these cells**

The transfer of marker genes which confer resistance to kanamycin, ampicillin and streptomycin to bacteria in the human gut is unlikely to present a significant health impact since bacteria resistant to these antibiotics are already spread all over or are naturally found in the human gastrointestinal tract (Smalla et al., 1993; Calva et al., 1996; Shaw et al., 1993; Smalla et al., 1997). Besides, kanamycin/neomycin and streptomycin are rarely used for humans due to their collateral effects (WHO 1993)."[2]

9. Taking this advice into account, as well as the information previously provided by the United States,[3] member State objections based on such concerns can at best be considered to raise merely theoretical risks.

Question 3: On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that wide-spread cultivation of Bt crops such as biotech maize of the Bt variety adversely affects non-target organisms which may be exposed to such crops under typical agricultural practice? (See, *inter alia*, EC-149, EC-150, EC-151, EC-152) If so, how does this risk compare with risks to non-target organisms arising from non-biotech applications for Bt toxins (i.e., the use of Bt toxin as an insecticide in conventional and organic farming)? What risk management options are available to mitigate any resulting risks and what is their efficacy?

10. With respect to Bt crops, specifically Bt cotton and/or Bt maize, both experts responding to this question provide similar assessments of the likelihood that Bt crops would be expected to adversely affect non-target organisms. Dr. Andow states that while "there is some scientific evidence to support the hypothesis that wide-spread cultivation of Bt crops adversely affects non-target organisms ... this evidence is insufficient to establish the hypothesis that such adverse effects are expected to occur."[4] Similarly, Dr. Squires notes that "[t]he evidence is insufficient to confirm whether widespread cultivation of Bt crops in Europe would affect non-target organisms."[5]

[2] Dr. Marilia Regina Nutti's Answers to Questions to Experts.

[3] See US Supplementary Rebuttal, p. 36 et. seq; See also US comments on Expert Answers to Questions 69-77 *infra*.

[4] Dr. David A. Andow's Answers to Questions to Experts, paras. 03.01, p. 2. See also Dr. Andow's Answers to Questions to Experts, para. 04.06, p. 7 ("Generally speaking, of all of the potential environmental risks of transgenic Bt crops, it can be said that resistance in the target pests is a real, tangible risk, while risks associated with gene flow and risks to non-target organisms are mostly only potential risks."); para. 03.16, p. 6 ("Coupled with paragraph 03.12, it is unlikely that either Bt crops or Bt insecticides will adversely effect mammals through direct toxicity.")

[5] Dr. Geoff R. Squire's Answers to Questions to Experts, "Responses to Questions 3 to 5."

11. While both experts acknowledge that these crops may present "possible hazards" to non-target organisms from Bt crops,[6] both experts agree that – even assuming the crops present more than a theoretical risk – risk management measures are available to mitigate any potential risks. Dr. Squire states that:

> "[i]t [is] much more easy to confine maize within cropped fields than it is oilseed rape or beet, for example ... [I]f Bt maize was found to harm the in-field biodiversity, it should be feasible to reverse the effect by growing different crops in a rotation. Perhaps the main uncertainty is the effect of Bt maize on the soil food web ... . Effects in the soil would be harder to monitor because it is very difficult to assess soil biodiversity, particularly among bacteria and fungi. Nevertheless, any adverse effects should be mitigatable through a rotation."[7]

12. Dr. Andow similarly confirms that there are a variety of risk management options short of a complete ban that are available to deal with any potential adverse effects on non-target organisms:

> "[r]isk management measures should be commensurate to the risk. ... Another approach [in the alternative to a complete ban] would be to limit the area of the transgenic crop until a reasonable assessment of the possible hazards and potential risks are completed. As the information is gathered, the risk management measure can be modified consistent with the principle of 'modification.' For actual risks, such as the presumed risk to monarchs, geographic restrictions in use of the Bt crop could be considered ... Monitoring of the population at risk could be required, although this would likely be more expensive than restricting or managing use ... By no means should the Panel assume that this is an exhaustive list of possible management options. These are suggestions of approaches to risk management emphasizing avoiding risk. Approaches that emphasize mitigation of risk or tolerance of risk could also be considered."[8]

13. These experts' conclusions – that there is no scientific evidence supporting any actual, expected adverse effects on non-target organisms from Bt crops and that hypothesized potential hazards can be feasibly mitigated through risk management measures or at least monitored and risk management measures subsequently developed – clearly do not support the EC's claim that Bt crop applications were "duly" delayed by member States' concerns about potential adverse effects on non-target organisms. As the United States explained in its Supplementary Rebuttal, certain member States simply objected to applications based on hypothesized risks to non-target organisms, without considering any risk management options that might be available to mitigate or avoid alleged hypothetical hazards.

14. The experts' answers highlight the EC's obligation under the SPS Agreement to evaluate risk management options when considering applications for biotech products. Under the SPS Agreement, an assessment must "... [e]valuat[e] the likelihood of entry, establishment or spread of a pest or

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[6] Dr. Andow's Answers to Questions to Experts, paras. 03.02-03.13, pps. 2-5 (Dr. Andow describes a potential risk to *C. carnea* from Cry1Ab Bt maize, but opines that "the actual risk to *C. carnea* would not be large." para. 03.09, p. 4); Dr. Squire's Answers to Questions to Experts, "Responses to Questions 3 to 5" ("The weight of the evidence ... generally favours the view that little immediate toxic effect of Bt maize on the food web will occur in the field; but the evidence admits the possibility of chronic effects following long-term exposure to Bt maize.")

[7] Dr. Squire's Answers to Questions to Experts, "Responses to Questions 3 to 5" (emphasis added)

[8] Dr. Andow's Answers to Questions to Experts, paras. 03.17, 03.19-03.20, 03.23, p. 6.

disease within the territory of an importing Member according to the sanitary or phytosanitary measures which might be applied, ..."[9] Accordingly, even allowing for such hypothetical risks, it was incumbent upon the EC to analyze the risk management options available to mitigate or avoid entirely such effects and to make a decision on the application accordingly. As the experts' statements confirm, such management options were available and should have been evaluated.

Question 4: On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that the wide-spread cultivation of Bt maize or other, non-biotech applications of Bt toxins, leads to the emergence of Bt-resistant target organisms under field conditions? If so, what risk management options exist to mitigate any resulting risks and what is their efficacy?

15. Both experts similarly attest to the availability of risk management options to minimize the likelihood of emergence of Bt-resistant target organisms as a result of Bt maize cultivation (as well as other, non-biotech applications of Bt toxins) Dr. Andow notes:

> "[t]here are several risk management options for Bt maize, but they are all concerned with reducing the selective advantage of resistant alleles in populations of the target species. The most widely used resistance management strategy for Bt maize (and all Bt crops) has been the high-dose/refuge strategy. This has been used by the US Environmental Protection Agency. For Bt maize, it is generally accepted that a 20% refuge is needed for the high-dose refuge strategy to be effective. Low-dose Bt events will require a greater refuge. There is no scientific consensus as to how big a refuge is needed... . Additional resistance management strategies may become possible to develop after resistance in the target pest is identified and characterized... . Theory has predicted that the high-dose/refuge strategy will be efficacious ... These assumptions have been confirmed scientifically for European corn borer (*Ostrinia nubilalis*) in the northern US corn belt. These assumptions are likely for European corn borer in the southern US and in western Europe... . Hence it can be concluded that in some circumstances it is possible to predict that the high-dose/refuge strategy should be efficacious. It is possible that the absence of detection of field resistance to Bt maize in the US is partially attributed to the efficacy of the high-dose/refuge strategy."[10]

16. Dr. Squires states:

> "[t]he processes involved in Bt resistance and its management are generally appreciated by scientists, and mitigation strategies that have a strong scientific basis have been considered. By the late 1990s, mathematical models of the population dynamics of resistant and susceptible biotypes were being used to estimate the number of years for which the GM trait would remain effective in the face of genetic adaptation by the pest. The point is that sound scientific knowledge has been applied to this problem for several years... . The strategies [for mitigation] might involve providing refuges in or near the crop where resistant individuals do not have an advantage over resistant ones, periodically controlling the pest by other means and growing different 'types' of Bt maize, or Bt and non-Bt maize, either together or in sequence. Mitigation will be much easier to implement where the existing ethos is

[9] WTO Agreement on the Application of Sanitary and Phytosanitary Measures ("SPS Agreement"), Annex A, para. 4.

[10] Dr. Andow's Answers to Questions to Experts, paras. 04.07-04.08, 04.09, 04.10, 04.13, pp. 7-10.

> sympathetic to integrated pest management based on genetic and ecological principles ... ."[11]

17. While the United States does not necessarily agree with all of the specific details regarding the nature of the risk management measures described above, the United States does agree with the overall points the experts make regarding the availability of risk management options for dealing with Bt resistance. The experts' testimony confirm that resistance is not a new or unusual risk posed uniquely by biotech Bt maize. Rather, it is a well-known potential risk posed by many non-biotech applications of insecticides, and consequently, well-understood, efficacious mitigation strategies predicated on "strong scientific bases" have been developed (often referred to as insect resistance management (IRM) strategies)

18. Given the availability and use of such IRM plans, the experts' conclusions confirm that the delay of Bt crop applications under the EC's pre-market approval system cannot be justified by alleged concerns over the emergence of Bt-resistance where objecting member States failed to address the validity of the IRM plans already submitted by applicants, particularly when those plans were deemed acceptable by the relevant EC scientific committees.

Question 9: In what ways does molecular characterization inform the risk assessment for any particular biotech product? Can a risk assessment be carried out in the absence of a comprehensive molecular characterization of each transformation event?

19. The United States notes that Dr. Marion Healy's answer to question 9 supports the US position regarding the proper approach to assessing the safety of biotech products.[12] Dr. Healy states

> "[i]t is well accepted that assessment of ... foods from genetically modified organisms ... involves the use of the 'comparative approach', whereby GM foods are compared to their counterpart foods produced using conventional techniques and which have been safely consumed over significant periods of time. The objective of such a comparison is to identify any differences with the conventionally produced food. Any identified differences are then examined for their biological impact in terms of health and safety... . The comparative approach ... encompass[es] three major elements: molecular characterisation of the inserted gene (transgene); biochemical, structural and functional properties of the protein product from the inserted gene; and analysis of the composition of the food... ."[13]

In other words, whether a difference has been detected is not in itself important: what matters is whether that difference has any impact on health and safety. Thus, when evaluating biotech applications, it is not sufficient for the EC only to identify the existence of some difference between the biotech product and its conventional counterpart. Rather, the pertinent issues are the the potential significance of that difference to human and environmental health and safety.

20. Yet, the United States has provided numerous examples where member States objected to biotech applications simply because of an identified difference between the biotech product and its conventional counterpart (often times simply the genetic modification itself), without examining the actual "biological impact" of such difference.[14] In doing so, these member States ignored the

[11] Dr. Squire's Answers to Questions to Experts, "Responses to Questions 3 to 5."
[12] US Supplementary Rebuttal, paras. 128-133.
[13] Dr. Marion Healy's Answers to Questions to Experts, p. 1.
[14] See US Supplementary Rebuttal, Section IV.

substantial evidence that existed for each application establishing the product's safety. Dr. Healy confirms,

> "[t]he totality of information available from these types of studies should be considered in coming to a view about the safety of the food; information from each element contributes to the assessment of safety ... . [T]he molecular characterisation is not the only mechanism for identifying unintended effects and the information from such studies should be considered in conjunction with the information from the other elements of the safety assessment... . [T]he issue does arise as to how comprehensive the molecular characterisation should be in order to fulfil the requirements of an appropriate safety assessment. In large part, the answer to this question depends on the type and quality of information available for the three elements of the safety assessment, the information revealed from these studies and the state of knowledge about the gene(s) to be transferred, the donor organism and the recipient organism."[15]

21. The member States ignored the "totality of information" supporting the safety of particular biotech applications and requested additional information of questionable probative value.[16] Indeed, as Dr. Healy has noted in her answer to question 9, all of the plants at issue in this dispute contain relatively simple genetic modifications and have been engineered to produce one or more well-characterized proteins, a fact which member States' requests for additional information failed to reflect.[17] Dr. Healy explains:

> "It must also be acknowledged that the commercially produced GMOs generated to date have utilised well defined crops as recipients of the genetic modification and well defined genetic elements in the transgenes. Generally, the genetic elements have been extensively studied at both the DNA and protein levels. Consequently there has been a high level of confidence in the assessments carried out to date."[18]

22. Dr. Healy's expert opinion also provides additional support for the US contention that certain member States' requests for multiple whole food studies in which animals are fed with the biotech food for a period of several weeks to assess potential toxicity to humans and livestock were unfounded.[19] According to Dr. Healy, the comparative approach

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[15] Dr. Healy's Answers to Questions to Experts, pp. 1-2.

[16] For example, various member States requested, among other things: additional molecular characterization beyond the standard molecular characterization already provided by the applicant; additional, long-term or repeat dose (chronic) tests to prove the lack of the toxicity of the protein, despite the results of acute toxicity tests and the homology comparisons confirming the product's safety; additional whole food studies, despite the submitted safety results of compositional analyses and of the initial whole food study; additional assessments on hybrid biotech plants despite the submitted data confirming the safety of the parental biotech lines; additional studies to confirm the safety of food derived from animals fed biotech feed, despite compositional analyses demonstrating that the nutritional makeup of the feed fell within normal biological ranges of variation established for non-engineered, commercially available feed and despite data showing that the introduced protein was rapidly degraded or excreted, like any other dietary proteins. See US Supplementary Rebuttal, Section IV.B

[17] US Supplementary Rebuttal, paras. 134-138 (detailing member States' demands that applicants conduct additional, long-term or repeat dose (chronic) tests to prove the lack of the toxicity of the protein involved in the biotech product).

[18] Dr. Healy's Answers to Questions to Experts, p. 3 (emphasis added).

[19] US Supplementary Rebuttal, paras. 143-144.

> "is used in place of the traditional approach of assessing the safety of discrete chemicals added to, or present in, food ... that are generally subjected to a range of toxicological evaluations in animal studies in a dose dependent manner. (WHO, 1987) The toxicological approach is not appropriate for whole foods because of the complex mixture of chemicals present in a whole food, some of which will be present at very low levels, and the difficulty of conducting meaningful dose response studies in animals while providing a nutritionally balanced diet."[20]

23. Finally, in its Supplementary Rebuttal, the United States explained that a pattern of deliberate delaying tactics by the EU was also illustrated by other types of scientifically baseless objections or requests for information that would have no relevance to an evaluation of the product's safety. The United States cited as one example Italy's objections to the Bt corn CRY1F (1507) application[21] and the application for Roundup Ready maize NK 603.[22] In those cases, Italy demanded, without providing any rationale, a proteomic analysis.

24. Both experts' answers to question 9 support a finding that Italy's request was scientifically unjustified. Dr. Andow states in response to Question 9 that "[m]any other molecular methods are under development, including proteomics and others, but these are not yet ready for use in risk assessment now."[23] Similarly, Dr. Healy notes in response to question 9, "[s]ome of the technologies being developed are currently not appropriate for use in safety assessments as they do not yet provide any further assurance of safety or the results cannot be fully interpreted."[24]

B. ISSUE 1 (APPLICATION-SPECIFIC QUESTIONS)

Bayer oilseed rape (Falcon GS40/90), C/DE/96/05 (EC chronology 62)

Question 10: Given the information before the Panel, including the notification by AgrEvo (EC-62/At.1-30) and the EC SCP's opinion (EC-62/At.74), was the information to assess the long-term effect of the newly expressed protein on the biogeochemical cycle and the food chain requested by the Italian CA (EC-62/At.95) necessary to ensure that conclusions of the safety assessment were valid?

25. The response of the experts supports the US position that this type of general request for additional information – particularly when submitted after a full safety evaluation by EC scientific committees – represents a delaying tactic rather than a good faith effort to evaluate the application. As explained in the US supplementary rebuttal, an important delaying tactic was to ask for additional information regarding various vague, potential environmental effects – such as vague requests for information on geochemical processes.[25] In his response, Professor Andow explains why this type of vague request is unwarranted:

> "A request for additional/clearer assessment of the possible effects on the environment would not be clear or specific enough to allow a notifier to know how to respond, and hence although information on the environmental impacts is necessary to ensure that conclusions of the safety assessment were valid, a general request for

[20] Dr. Healy's Answers to Questions to Experts, p.1.
[21] US Supplementary Rebuttal, para. 188.
[22] US Supplementary Rebuttal, para. 194.
[23] Dr. Andow's Answers to Questions to Experts, para. 09.03, p.19.
[24] Dr. Healy's Answers to Questions to Experts, p. 3.
[25] US Supplementary Rebuttal, section IV.B.7.

> such an assessment would not be an appropriate way to request such information. In a similar way the request by the Italian CA is not clear or specific enough to be considered necessary. There are hundreds of possible processes in biogeochemical cycles that could be investigated, and thousands of possible ways to evaluate food chains. Unless the Italian CA can point to prior regulatory precedents where these terms are clarified, the phrasing of the request is not scientifically justified. Alternatively, had the Italian CA specified certain biogeochemical cycles and food chains to assess, then it would be possible both for the notifier to assess them and for me to determine their necessity to ensure that conclusions of the safety assessment were valid."[26]

26. Similarly, the United States explained in its supplementary rebuttal that requests for additional food toxicity tests were unwarranted where all of the available data indicated that the product presented no risk to food safety.[27] In her response, Professor Nutti supports the US position that the type of additional food safety information sought by the Italian CA was unwarranted:

> "Based on the information provided by the applicant and the analysis carried out by the EC Scientific Committee for Plant (SCP) and following the Codex Guidelines, my understanding is that the request by the Italian CA (EC-62/At.95) was not necessary to ensure that conclusions for the safety assessment of the newly expressed protein in the food chain were valid. As pointed out by the EC SCP, the new protein has a very low potential for being allergenic or toxic and also is degraded within the gastric fluids. In my opinion, the conclusion of the EC SCP that the protein was safe for consumption in the food chain is correct and was based on sound scientific evidence, which was presented by the applicant."[28]

Question 12. Given the information before the Panel, including the notification by AgrEvo and the conclusions of the EC SCP, was the information regarding the molecular characterization of this product requested by the lead CA (EC-62/At.106) necessary to ensure that conclusions of the safety assessment were valid?

27. This question regarding a request for additional molecular characterization – combined with the experts responses to this question – illustrates one of the themes of the US supplementary rebuttal. That is, when evaluating whether a request for information was warranted for conducting a safety assessment (or was instead a delaying tactic) one must consider all of the information provided by the applicant, and the importance of any additional information not for the purposes of general scientific inquiry, but instead for the purpose of evaluating the safety of the product.

28. Professor Snape, in his response, indicates that he personally would have preferred more information on molecular characterization, and indeed would even like to see types of data beyond the additional data requested by the lead CA. Professor Snape's opinion, however, is phrased in terms of what information he would like to see as a scientist specializing in genetic changes, and is not phrased in terms of what actual information is required to evaluate the safety of the product.[29]

29. In contrast, Dr. Healy does consider the request for additional molecular characterization in the context of the entire application, and with an eye to the ultimate goals of the EC approval process.

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[26] Andow Response, Question 10.
[27] US Supplementary Rebuttal, section IV.B.2.
[28] Nutti Response, Question 10.
[29] Snape Response, Question 12.

In context, and with these goals in mind, Dr. Healy concludes that the request for additional data was not warranted:

> "Additional information of the sequences at the sites of insertion may reveal fine structural details and identify similarities and differences with the parental line at these sites. Such detailed structural analyses usually aim to provide an indicator of unintended effects from the genetic modification. However, in some cases it may be difficult to determine the biological significance of any sequence differences because of a lack of knowledge about the extent of sequence variation between individual organisms within the parental line. Furthermore, other indicators of unintended effects, that are biologically meaningful, are obtained from other elements of the safety assessment (eg analysis of protein, composition of food).
>
> A comprehensive package of information was provided that addressed the key elements required in a safety assessment and there was no indication of any safety issues when all the available data was taken into account. Furthermore, the pat/PAT gene/protein is well characterised, has been utilised successfully in a number of crops and their resultant food products and was derived from a well described organism.
>
> CONCLUSION: The additional molecular characterisation requested by the Lead CA is unlikely to affect the conclusions of the safety assessment and was not necessary to ensure that the conclusions of the safety assessment were valid. The totality of information provided in the dossier to that point in time were adequate to support the validity of the conclusions of the safety assessment without the need for the additional data requested in the letter dated 2 April 2002."[30]

Bayer hybrid oilseed rape (MS8/RF3), C/BE/96/01 (EC chronology 63)

Question 15: Given the information before the Panel, including the conclusions of the EC SCP, was the information regarding the assessment of the long-term effect of the newly expressed protein on the biogeochemical cycle and the food chain requested by the Italian CA (EC-63/At.87) necessary to ensure that conclusions of the safety assessment were valid?

30. This question, and the experts' responses, are essentially the same as for Panel's Question 10 on Exhibit 62. In particular, Professor Andow's response supports the US view that vague questions on unspecified environmental effects are unwarranted, and Professor Nutti's response supports the US view that when all available data indicates the absence of a food safety problem, it is unnecessary to request yet additional studies addressed to food safety.

Question 16: Given the information before the Panel, including the conclusions of the SCP, was the information regarding molecular characterization of this product requested by the lead CA (EC-63/At.107) necessary to ensure that conclusions of the safety assessment were valid?

31. Dr. Healy's response to this question once again emphasizes the need to evaluate the entire application in order to determine whether a request for additional information is necessary to evaluate the safety of the product, or instead is a question for theoretical scientific inquiry. As in her answer to the Exhibit 62 question on molecular characterization, Dr. Healy explains why no further molecular characterization was required to evaluate the safety of the product:

[30] Healy Response, Question 12.

"The additional molecular characterisation data sought by the lead CA in 2002 were not required to demonstrate the safety of food products derived from MS8, RF3 or MS8xRF3 hybrid lines. The rational[es] for this view are:

– Finely detailed molecular analysis of a defined chromosomal region in commercially adapted plant lines such as oilseed rape is likely to reveal minor nucleotide differences between various lines that have no significance with respect to the safety of derived food products. In the absence of an equivalent nucleotide analysis from a number of commercial food-producing oilseed rape lines, these data do not contribute substantially to the bank of information that is necessary to adequately characterise MS8 and RF3 at the molecular level. Moreover, it is not clear how such data should be interpreted in an assessment of transgenic plants.

– The data provided at that point in time (i) allowed adequate description of the insertion events in both transgenic lines, (ii) was sufficiently detailed, presented clearly and of acceptable quality, and (iii) was consistent with a generally accepted approach to the molecular characterisation of transgenic crops used for food production.

– The most significant elements of the assessment of MS8 and RF3 oilseed rape lines more appropriately focus on the molecular characterisation of the insertion events and the resultant novel gene products, particularly in terms of their potential toxicity and allergenicity. The food products derived from transgenic oilseed rape are likely to contain at most only trace amounts of plant proteins due to processing. Comparative compositional data from the seeds of both transgenic lines and the corresponding isogenic lines therefore provides necessary information to determine unintended effects.

Conclusion: The totality of information provided in the dossier to that point in time contained sufficient information to support the validity of the conclusions of the safety assessment without the need for the additional molecular characterisation data requested in the letter of the Biosafety Council dated 28 March 2002."[31]

Question 17: Were detection methods commercially available in 2001 sufficient to enable the detection of the transgenic proteins expressed by the plant line hybrid oilseed rape MS8/RF3? Given the information before the Panel, including the SNIF (EC-63/At.109) and the updated environmental risk assessment (EC-63/At.110-140), was additional information regarding a quantitative detection method (EC-63/At.141) necessary to ensure that conclusions of the safety assessment were valid?

[31] Healy response, Question 16.

32. Both experts that responded to this question were of the opinion that detection methods were available in 2001,[32] and that additional information regarding a quantitative detection method were not required for a safety assessment.[33]

Question 18: Given the information before the Panel, including the SNIF and the updated environmental risk assessment (referenced above), was the information regarding molecular data requested by the CA (EC-63/At.144) necessary to ensure that conclusions of the safety assessment were valid?

33. Dr. Healy's answer to this question exemplifies another type of problem with some EC requests for additional data. In particular, given the continual progress of science and technology, finer tests are developed over time. But, if an application is always required to be updated with the results of the latest testing methodologies, no application would ever be approved. Rather, as Dr. Healy explains, the pertinent question is whether, in the context of the overall application, the results of a newly-developed test are actually required for a safety assessment of the product. Dr. Healy explains this point in the context of Exhibit 63:

> "Given the pace of advancing knowledge in the field of molecular biology and plant biotechnology and the rapidly evolving technical capabilities, for a foreseeable time, there will often be a discrepancy between the scientific data submitted in a dossier for assessment, and the information possible from the most recently developed experimental techniques. In the specific case of the frequently updated dossier on MS8, RF3 and hybrids, it is clear from the wording of the request to the company that the additional information sought is for the purpose of "simply" making the file consistent with the current Belgian guidelines on molecular data. This additional information does not add substantially to the weight of evidence that supports the lack of human health and safety concerns associated with the use of the transgenic oilseed rape.
>
> ...
>
> Conclusion: The additional information sought by the CA in the email of 14 July 2003 (EC 63-144) on molecular data was requested to update the dossier to new guidelines and was not necessary to ensure the conclusions of the safety assessment were valid."[34]

Question 19: Given the information before the Panel, including the SNIF, the updated environmental risk assessment and the clarification provided by the notifier (EC-63/At.147), was the information regarding ecological effects of this product on agricultural systems

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[32] Healy Response, Question 17 ("Conclusion: The available evidence indicates that immunoassay-based detection methods suitable for the detection of PAT protein in MS8xRF3 hybrid transgenic plants were commercially available as early as 2000. "); Nutti Response, Question 17 ("My conclusion is that the method presented was technically sufficient for the safety assessment, although it would have to be validated.").

[33] Healy Response, Question 17 ("Conclusion: Additional information regarding an event specific, quantitative detection method requested in February 2003 is not necessary to ensure that the conclusions of the safety assessment are valid."); Nutti Response, Question 17 ("Although a quantitative method will provide relevant information for labelling and to the consumer, it is not necessary to ensure the validity of the safety assessment. ")

[34] Healy Response, Question 18.

requested by the lead CA (EC-63/At.149) necessary to ensure that conclusions of the safety assessment were valid?

34. This question again illustrates the problem with vague information requests addressed to unspecified and highly speculative possible effects on the environment. Each of the experts responding to this questions has somewhat different views on what, if any, specific environmental issues might have been appropriate for further inquiry, but all agree that an applicant cannot be expected to respond to an entirely open-ended inquiry that does not specify the environmental concern or the specific matter to be investigated. For example:

Professor Andow:

> "As there are literally hundreds of species of non-target organisms that could be tested, it can always be argued that more species should be evaluated. Indeed, several important ecological functional groups were not evaluated, including parasitoids and detritivores. Without a specific reason, it is difficult to argue that testing a parasitoid is necessary for the risk assessment. A case could be made that a detritivore would have been a better choice for study than epigeal predators. However, if this was the specific concern of the lead CA, it would have been appropriate to clarify the point. Hence, I conclude that the request by the lead CA for more information on point 5 was not necessary to ensure that conclusions of the safety assessment were valid."[35]

Professor Snow:

> "The vagueness of this request and the lack of related information from the notifier make it difficult to provide a clear answer to this question from the Panel.
>
> The lead CA asked for information about effects on "farmland diversity (macro-fauna, weed flora and microbial soil ecosystem), food web integrity (trophic structure), population dynamics of key species, life-cycles, etc." (EC-63/At. 149 translation). Although this request seems to ask for some unnecessary data (and the request is quite vague), several Member States were concerned about the ecological effects of more intensive herbicide use. I assume that this is the focus of concern - that more information was requested to determine the effects of cultivating new herbicide-tolerant crops on the weed plants that support insect and animal populations in farmland habitats in these countries.
>
> Realistically, this is a difficult set of questions to answer, regardless of whether one uses basic theory or empirical research. As noted above, the indirect effects of introducing herbicide-tolerant crops to countries like the UK are still being investigated, so in this sense the requested information could be considered as necessary. However, it not feasible to obtain scientific data on all of the processes listed by the CA without extensive multi-year studies. Even the Farm Scale Evaluations are too short and too small-scale to answer these questions (e.g., Andow 2003, Squire et al. 2003). Adverse effects on flora and fauna are mentioned in SPS and ISPM 11, but it is not possible to test for all of these effects prior to deregulation.

[35] Andow Response, Question 19 (emphasis added).

> Instead, scientific committees typically use their best judgement to recommend approving or denying applications for marketing."[36]

Professor Squire:

> "The updated environmental risk assessment is comprehensive on topics for which data are available. The further information on ecological effects requested by the lead CA was clearly not available, and could only be in existence if there had been either large scale experimental measurements on the habitats typical of where the crop would be grown commercially or specially commissioned experiments on trial crops, as in the UK's Farm Scale Evaluations. Since cropping with this variety and its herbicide has potentially new effects on the arable flora (i.e. different from those of other oilseed rape varieties with other herbicides), which may be severely depleted in any case, it is legitimate to ask what such effects might be. <u>However, the general matter of the need for a comparator is relevant here</u> (Notes, paragraphs 7-10). <u>Surely it is incumbent on both sides in the argument to proffer their standard or comparator against which the new technology should be judged.</u>"[37]

35. In sum, although the experts may have somewhat differing views on potential environmental effects, all agree that it is not possible for an applicant to respond to vague requests asking for data on every possible effect on the environment, no matter how remote. Instead, such vague, open-ended questions are a formula for endless delays.

<u>Monsanto Roundup Ready oilseed rape (GT73), C/NL/98/11 (EC chronology 70)</u>

Question 27. Given the information before the Panel, including the notification, was the information regarding feed safety aspects of this product requested by the Netherlands (EC-70/At.8 and 13) necessary to ensure that conclusions of the safety assessment were valid?

36. In its Supplementary Rebuttal, the United States explained that continual requests for additional animal feeding studies were not required for safety assessment, but instead were commonly used as a delaying tactic.[38] Professor Nutti's response to Question 27 provides yet another example where requests for additional feeding studies were <u>not</u> required in order to evaluate the safety of the product. Professor Nutti explains:

> "Based on the information provided by the applicant in EC-070/At.8 and 13, and the analysis done by the EC SCP and according to the Codex Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (Page 4, paragraph 53), some foods may require additional testing; regarding animal feeding studies, extra studies may be warranted if changes in the bioavailability of nutrients are expected or if the composition is not comparable to conventional foods. Although the product was concluded to be substantially equivalent, the notifier carried out animal feeding studies with rainbow trout, quail, broilers and lamb. In all these studies, no differences were detected among the animals fed conventional and GM

[36] Snow Response, Question 19 (emphasis added).
[37] Squire Response, Question 19 (emphasis added).
[38] US Supplementary Rebuttal, paras. 182-184.

> oilseed rape based feeds. Therefore, it is concluded that the studies requested by the Netherlands were not necessary to ensure the product's safety assessment."[39]

Monsanto Roundup Ready corn (NK603), C/ES/00/01 (EC chronology 76)

Question 37. Given the information before the Panel, including the notification (EC-76/At.1-2 and 27), was further information regarding molecular characterisation, nutritional analysis, and environmental impact requested by the lead CA (EC-76/At.6) necessary to ensure that conclusions of the safety assessment were valid?

37. Experts responded to the nutritional analysis and environmental impact parts of this question, and in both cases the experts believed that the further information sought by the lead CA was not needed to assess the product.

38 With respect to nutritional analysis, Professor Nutti explains as follows:

> "Based on EC-76/At.1-2 and 27, and regarding nutritional analysis, compositional analysis of NK603 maize grain has demonstrated substantial equivalence with traditional maize. This is supported by lack of differences shown in the results of feeding NK603 to broiler chickens compared with birds fed with NK603 parental line or with five commercial reference lines, as well as repeated dose feeding studies in rats, which contribute to determine the composition and nutritional equivalence. Whatever studies were further requested by the lead CA in EC-76/At.6, such studies were not necessary to ensure that conclusions of the safety assessment were valid since all the relevant information had already been provided. In EC-76/At.27, the Spanish Biosafety Commission had already estimated that for the uses considered and at the current scientific and technical "state of the art", there was no scientific evidences which indicated any risk for human and animal health of NK603 maize."[40]

39. With respect to environmental impact analysis, the experts' responses indicate that it was unnecessary for the EC to conduct an in-depth analysis of environmental issues because the application was for import and processing, and not for cultivation. Although Dr. Squire writes that some additional environmental information may reasonably have been sought, he does not support requiring all the detailed environmental data that might be called for if the application were for cultivation.[41] Moreover, Dr. Andow explains in detail why the limitation of the application to import and processing reduces the amount of data that is required to assess the environmental safety of the product, and why the lead CA's questions were not required to assess the product:

> "37.04. I believe that none of the questions posed under environmental impact are necessary to ensure that conclusions of the safety assessment were valid.
>
> 37.05. Given that the notification is not for cultivation, whether survival is slightly better in continuous maize than in rotated maize ignores the bigger point, which is that maize does not survive very well. While the CA is correct in noting the difference, this difference is not necessary to ensure that conclusions of the safety assessment were valid.

[39] Nutti Response, Question 27.
[40] Nutti Response, Question 37.
[41] Squire Response, Question 37.

> 37.06. While it is true that potential interactions need to be looked into broadly and deeply if the GM crop were to be cultivated, it is not true that such an investigation is necessary for the present notification. It would be better to focus attention on detecting accidental releases and quickly eliminating them.
>
> 37.07. Although it is true that detailed information on transferability of genetic material from the GM crop to other organisms is needed if the GM crop were to be cultivated, it is not true that detailed information is needed for the present notification. Some information is necessary to consider how gene escape can occur either during processing, storage or transport, but detailed information is not necessary.
>
> 37.08. As the GM plant is not to be cultivated under the present notification, information on herbicide application is not needed."[42]

Monsanto Roundup Ready corn (GA 21), C/ES/98/01 (EC chronology 78), C/GB/97/M3/2 (EC chronology 85)

Question 40. Given the information before the Panel, including the application (EC-85/At.25-26), questions by Denmark (EC-85/At.32) and responses to these questions (EC-85/At.41), was the additional information requested by Denmark (EC-85/At.42) necessary to ensure that conclusions of the safety assessment were valid?

40. This application provides another example in which a CA has requested additional animal feeding studies which are not required for a safety assessment of the product. As Professor Nutti explains,

> "Base[d] on the information provided by the applicant (EC-85/At.25-56) and responses to the questions raised by Denmark (EC-85/At.41 and EC-85/At.32, respectively), regarding animal feeding studies, my understanding is that the applicant has provided sufficient relevant information. According to the Codex Alimentarius Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003, paragraph 53), additional animal testing will be required if the composition is not comparable to conventional foods, which is not the case of Monsanto's event corn GA 21."[43]

Monsanto/Syngenta Roundup Ready sugar beet, C/BE/99/01 (EC chronology 88)

Question 42. Given the information before the Panel, including the notification (EC-88/At.1) and additional information provided by the notifier (EC-88/At.10-11), was the information regarding allergenicity, molecular characterisation, and gene transfer in digestive tracts requested by the lead CA (EC-88/At.12) necessary to ensure that conclusions of the safety assessment were valid?

41. This question illustrates a case where the CA's question may have been relevant to the assessment of the product, but where the applicant's original notification had provided the information sought by the CA. Professor Nutti's response carefully analyzes this question, and concludes with respect to all three aspects (allergenicity, molecular characterization, and gene transfer) that the

[42] Andow Response, Question 37.
[43] Nutti Response, Question 40.

requested information had already been provided in the application. As a result, the lead CA's additional request resulted in needless delay in the processing of the application.[44]

Monsanto MaisGard Roundup Ready (MON 810 & GA21) corn (stack), C/ES/99/02 (EC chronology 94)

Question 44. Given the information before the Panel, including the notification (EC-94/At.1-3), was the information requested by the Netherlands(EC-94/At.12) concerning molecular characterization, DNA sequence analysis of the insertion event, analysis of protein levels, effect of glyphosphate treatment, composition, toxicology and the request for a study on dairy cows necessary to ensure that conclusions of the safety assessment were valid?

42. Professor Nutti provided a detailed analysis of four additional types of food-safety data requested by the Netherlands, and in each case she concluded that the information requested was not required for a safety assessment.

43. For example, the applicant was asked to provide a semi-chronic feeding study on mice, even though acute exposure studies and all other available data indicated that no such additional studies were required. Professor Nutti explains as follows:

> "Based on Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 34 to 43, Assessment of Possible Toxicity, we have at para 37 that the use of appropriate conventional toxicology or other studies on the new substance may be necessary, if taking into account its function and exposure, there are doubts on the safety of the new substance. In this case the applicant has provided in the dossier (EC-94/At.1-3), all the information usually requested for the food safety assessment, for toxicological assessment he presented safety studies on protein digestion in mammalian gastric and intestinal systems, acute gavage studies in mice, homology to known toxins and allergens and exposure to human diet. Based on Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 53, my understanding is that additional animal feeding studies may be warranted for GM foods if changes in the biovailability of the nutrients are expected or if the composition of the GM food is not comparable to conventional food, that is not the case of the new hybrid MON 810x GA21 maize. My understanding is that the information submitted by the applicant was sufficient to ensure the validity of the safety assessment."[45]

Syngenta Bt-11 sweet corn , (EC chronology 92)

Question 46. Were detection methods commercially available in 2002 sufficient to enable the detection of the transgenic proteins expressed by the plant line Bt11 sweet corn?

44. This question highlights an application where the processing was delayed by requests for the development of a detection method, when in fact a detection method was available to EC regulators. After a detailed analysis, Dr. Healy concludes that "that an immunoassay based detection method

[44] Nutti Response, Question 42.
[45] Nutti Response, Question 44.

suitable for the detection of Cry1A(b) protein in Bt-11 transgenic plants was commercially available in 2002."[46]

Bayer LibertyLink soybeans, (EC chronology 93)

Question 49. Given the information before the Panel, including the application (EC-93/At.1-2), was additional information regarding nutritional and biochemical characterization and toxicity of the transgenic plant requested by the Greek and Italian authorities (EC-93/At.16-17) necessary to ensure that conclusions of the safety assessment were valid?

45. This question provides an example where a CA delayed an application by requesting food safety data on an herbicide, when in fact herbicide residues are regulated through a different regime. As Professor Nutti explains,

> "Questions 1 and 2 [of the Italian authority] related to the herbicide treatment in the tests and possible residues of this treatment in the final product. My understanding is that the risk assessment conducted here is related to the GMO and not to the herbicide, so this information is not relevant for the conclusions of the safety assessment. It is important to point out that the herbicide residue in the product has to be within the limits established by JEFCA and the Codex Alimentarius, so the herbicide has been assessed in a different study. Sometimes, companies that are carrying out the safety assessment of herbicide resistant GMOs, perform field tests with and without herbicides, but this is not the main objective of the evaluation, as we need to compare the transgenic and non transgenic crops and not the utilization of the herbicide."[47]

Monsanto Roundup Ready corn (NK603), (EC chronology 96)

Question 53: Given the information before the Panel, including the application (EC-96/At.1-2), was information regarding molecular characterization, toxicity effects of unintended changes and compositional data requested by Gezondheitsraad (EC-96/At.7) necessary to ensure that conclusions of the safety assessment were valid?

46. Nk603 Roundup Ready corn is another instance where a CA requested additional feeding studies, when existing studies and all other available information indicated that no additional studies were required. As Professor Nutti explained,

> "Question 2 [of the Gezondheitsraad] concerning the request for a semi chronic toxicity study in mice or rats, using maize grain or meal, in order to rule out possible undesired effects of additional, unidentified changes. Based on the Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 34 to 43, Assessment of Possible Toxicity, we have at para 37 that the use of appropriate conventional toxicology or other studies on the new substance may be necessary, if taking into account its function and exposure, there are doubts on the safety of the new substance. In this case the applicant has provided in the dossier (EC-96/At.1-2) all the information usually requested for the food safety assessment, for toxicological assessment he presented safety studies on CP4EPSPS protein digestion in mammalian

[46] Healy Response, Question 46.
[47] Nutti Response, Question 49.

> gastric and intestinal systems, acute gavage studies in mice, homology to known toxins and allergens and exposure to human diet. It was also confirmed that the GM maize was equivalent in composition and nutrition to the conventional counterpart. Therefore, in my opinion, there was no need for requesting a semi chronic toxicity study in mice or rats, using maize grain or meal, in order to rule out possible undesired effects of additional, unidentified changes."[48]

Pioneer LibertyLink and Bt (T25 x MON 810) corn (stack), (EC chronology 101)

Question 57: Given the information before the Panel, including the application (EC-101/At.1-3) and the additional information provided by Pioneer (EC-101/At13), was additional information molecular characterization, field trials, secondary plant metabolites, and toxicological tests requested by the Netherlands (EC-101At.14) necessary to ensure that conclusions of the safety assessment were valid?

47. This product presents yet another example where the CA requested unnecessary semi-chronic oral toxicity studies. Both Professor Nutti and Professor Andow state their view that such studies were not required in light of the studies already provided showing the absence of toxicity.[49]

Monsanto/Syngenta Roundup Ready sugar beet (77), (EC chronology 102)

Question 58. Given the information before the Panel, including the application (EC-102At.1-20) and the information provided by Monsanto/Novartis (EC-102/At.22, 26 and 27-30), was additional information regarding food safety assessment of derived proteins requested by the Netherlands (EC-102/At.32) necessary to ensure that conclusions of the safety assessment were valid? Did the food safety assessments provided by the applicant follow the Codex Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants.

48. Again, the only expert to examine the issue – Professor Nutti – states that additional food safety data (in the form of semi-chronic toxicity studies) were not required. With respect to the second half of the question, Professor Nutti states her view that the applicant did in fact follow the relevant Codex guidelines:

> "Based on the Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 34 to 43, Assessment of Possible Toxicity, we have at para 37 that the use of appropriate conventional toxicology or other studies on the new substance may be necessary if, taking into account its function and exposure, doubts about the safety of the new substance remain. In this case, the applicant has provided in the dossier (EC-102/At.1-20) all the information usually requested for the food safety assessment. Also, for the toxicological assessment he presented safety studies on protein digestion in mammalian gastric and intestinal systems, acute gavage studies in mice, homology to known toxins and allergens, and exposure to hum-an diet.

[48] Nutti Response, Question 53.

[49] Nutti Response, Question 57 ("Therefore, the request from the Netherlands for semi-chronic oral toxicity study on mice or rats with maize grain, were not necessary to ensure that conclusions of the safety assessment were valid, as the data provided by the notifiers confirmed that T25 and MON 810 are substantially equivalent to other commercial maize."); Andow Response, Question 57 (semi-chronic study "not necessary to ensure conclusions of the safety assessment were valid.").

> Based on the Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 53, my understanding is that additional animal feeding studies may be warranted for GM foods if changes in the biovailability of the nutrients are expected or if the composition of the GM food is not comparable to conventional food, that is not the case of Monsanto/Syngenta Roundup Ready sugar beet ."[50]

C. ISSUE 2 (MEMBER STATE SAFEGUARD MEASURES)

Oilseed Rape MS1 x RF1 (notification C/UK/94/M1/1)

French Safeguard measure (Questions 59-61)

49. The United States notes several points of interest with respect to the experts' advice on this notification. First, the experts have confirmed that the evidence establishes that the French safeguard measure cannot be justified on the grounds of any potential risk to human or animal health. As Dr. Nutti has explained,

> "I would like to point out that there [was] no scientific evidence regarding to food and feed safety assessment, for animal and human consumption, on which France['s safeguard measure] could be based."[51]

50. In addition, the advice from the experts with respect to risk management indicates that the absence of a basis for a total product ban, and that instead risk management measures were available. In his response to question 61, Dr. Andow concludes that

> "Several other risk management options [than the French safeguard measure] could also have been justified in November 1998 and July 2001. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. In 1998 and 2001 mitigation and tolerance strategies were probably inappropriate....One risk avoidance strategy would have been to allow limited planting in a restricted region. In the first year, this could have been at a scale of a large field trial, and build up from there. This would allow determination of scale effects. Another strategy is outlined in paragraph 3.19.
>
> Today several alternative risk management options are available. In addition to risk avoidance as in the previous paragraph, risk mitigation strategies may also be possible to control HT volunteers and wild species. It would appear that France is now convinced that if HT volunteers or wild species occur that they can be detected rapidly enough and eliminated."[52]

51. Dr. Squire similarly concluded that "[t]he risk management options were and are similar to those indicated generally for oilseed rape at Responses 6d and 101."[53]

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[50] Nutti Response, Question 58.

[51] Dr. Marilia Regina Nutti's Answers to Questions to Experts, Q. 60. See also Dr. Nutti's responses to questions 59 and 61 in which she concludes that adequate information was available to allow France to assess the risks to human and animal health.

[52] Andow Response, Question 61.

[53] Dr. Squire's Answers to Questions to Experts Q. 61, p. 15.

52. As a final point, the United States notes that the EC has not even *attempted* to explain how this measure falls within the parameters of Article 5.7.[54]

Topas 19/2 (notification C/UK/95/M5/1)

French Safeguard Measure (Questions 62-66)

53. The experts' advice provides unanimous confirmation that the scientific evidence presented by the EC fails to demonstrate that the French safeguard measure is consistent with the relevant SPS disciplines.

54. The experts unanimously confirmed that the findings of the UK farm scale evaluation study were not relevant to evaluating this application for import and processing of this notification, and therefore, provided no scientific support for a prohibition on the import and processing of these oilseed rape seeds.[55]

55. The experts further confirmed that the available information provides no support for the French measure on the basis of any human or animal health risk. As Dr. Nutti explained,

> "[T]he scientific evidence submitted by France does not support a temporary prohibition on the import and processing of oilseed rape Topas 19/2."[56]

56. Nor did the experts believe that the available information was insufficient to permit either member State to evaluate the potential risks to human or animal health. Dr. Nutti explains that: "Based on the information presented by the notifiers and by the evaluation of SCP, my understanding is that there is NO reason to believe that the scientific evidence available to France in November 1998 and July 2001 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the import and processing of oilseed rape Topas 19/2."[57]

57. The experts also confirmed that the justification the member State offered to support the temporary prohibition had no scientific support. With respect to the French measure, Dr. Snow concluded that:

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[54] As the United States has previously stated, while the scientific experts can provide advice on specific scientific questions, they cannot be called upon to develop their own arguments, or otherwise speculate as to why a safeguard measure is consistent with the obligations under the SPS Agreement. Experts can provide a panel with vital perspectives, information, and advice on scientific and technical issues, but this advice cannot substitute for the risk assessment required by Article 5.1 of the SPS Agreement. Nor is such advice sufficient to demonstrate that a measure falls within the parameters of Article 5.7. For example, in this specific case, the EC has not identified any available pertinent information upon which the safeguard might be based; the EC has not explained how the information was insufficient for a risk assessment when the EC's own scientific committee completed a risk assessment; the EC has not shown that France "sought the information necessary for a more objective assessment of the risk," and the EC has not shown that France reviewed its ban "within a reasonable period of time." These same points regarding the respective roles of disputing Parties and scientific experts applies equally to all of the member State safeguard measures.

[55] Dr. Andow's Answers to Questions to Experts, para 62.01; Dr. Squire's Answers to Questions to Experts; Q. 62; Dr. Allison Snow's Answers to Questions to Experts; Q. 62, p. 24.

[56] Dr. Marilia Regina Nutti's Answers to Questions to Experts; Q. 65.

[57] Dr. Marilia Regina Nutti's Answers to Questions to Experts; Q. 63

> "I did not find any convincing arguments for why further scientific research would be needed to investigate environmental effects of a product that is only intended for import and processing and not for cultivation."[58]

58. Similarly, Dr. Andow concluded that "[t]he scientific evidence and other information submitted by France does not support the adoption of a temporary prohibition on the import and processing of oilseed rape Topas 19/2."[59] He explained as follows:

> "63.03. The argument used by France that was based on spatial scale does not hold for this case. With importation and processing, it is highly unlikely that large-scale production of GMHT oilseed rape is possible. Thus, the data on small-scale dispersal is probably sufficient to complete a risk assessment even in 1998.
>
> 63.04. Moreover, the hazard of widespread HT resistance in oilseed rape or related wild species does not hold for this case. This hazard is also scale-dependent, and with the small-scale releases and poor survival expected in spillage and other accidental releases, it is not feasible that this hazard will occur. Even if it were possible (see paragraph 62.01), there would many, many other possible ways to manage this risk short of a prohibition. Thus, the rationale stated by France does not argue that a risk exists that requires management."[60]

59. Although one expert attempted to suggest rationales on which France might have relied to support the safeguard measure,[61] the EC did not rely on these rationales and the EC has not explained them. In addition, this same expert goes on to note that France did not seek to obtain the additional information necessary for a more objective assessment of the risk. Dr. Andow explains:

> "However, I believe that had France collected the necessary data to complete this risk assessment promptly after implementing their temporary prohibition that they could have had sufficient data to make a decision in 2001."[62]

Greek Safeguard Measure

60. The experts unanimously confirmed that the findings of the UK farm scale evaluation study were not relevant to evaluating the application for import and processing of this notification, and therefore, provided no scientific support for a prohibition on the import and processing of these oilseed rape seeds.[63]

61. The experts further confirmed that the available information did not identify a human or animal health risk that would support the Greek safeguard measure. Dr. Nutti explained:

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[58] Dr. Allison Snow's Answers to Questions to Experts; Q. 62-66, pp. 24.-

[59] .Dr. Andow's Answers to Questions to Experts, paras. 63.01 p.

[60] Dr. Andow's Answers to Questions to Experts, paras. 63.03-63.04; see also Andow Answers to Q. 64 and 65.

[61] E.g., Dr. Andow's Answers to Questions to Experts, paras 63.05 and 65.01.

[62] Dr. Andow's Answers to Questions to Experts, paras 63.07.

[63] Dr. Andow's Answers to Questions to Experts, para 62.01; Dr. Squire's Answers to Questions to Experts; Q. 62; Dr. Allison Snow's Answers to Questions to Experts; Q. 62, p. 24.

> "[T]he scientific evidence submitted by Greece does not support a temporary prohibition on the import and processing of oilseed rape Topas 19/2."[64]

62. Nor did the experts believe that the available information was insufficient for Greece to evaluate the potential risks to human or animal health. Dr. Nutti explained:

> "[A]ll the information for the safety assessment of potential risks to human and animal health that was submitted by the applicants and evaluated by UK and SCP was adequate and in accordance to the Codex Guidelines (FAO/WHO Codex Principles for the Risk Analysis of Foods Derived from Modern Biotechnology; FAO/WHO Codex Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants; FAO/WHO Codex Annex on Possible Allergenicity Assessment)."[65]

63. The advice from the experts also confirms that environmental concerns would not justify the measure. Dr. Snow concluded that

> "I did not find any convincing arguments for why further scientific research would be needed to investigate environmental effects of a product that is only intended for import and processing and not for cultivation. The specific arguments provided by Greece seem flawed. I do not understand why Greece assumes that feral populations would become established or why they would cause environmental problems. Even if such populations become established, there is no scientific reason to expect that gene flow could harm the genetic diversity or abundance of wild relatives of oilseed rape in Greece."[66]

64. Although one expert attempted to suggest rationales that Greece might have cited to support the safeguard measure,[67] the EC did not rely on these rationales nor has the EC explained them. In any event, the same expert concludes that the current state of scientific knowledge would not support the Greek safeguard: "Even on these grounds, the temporary prohibition probably could not be justified past 2001."[68]

65. In addition, the same expert also concludes that instead of a total product ban, other, less drastic risk management measures were available to meet those concerns. In his advice, Dr. Andow states his view that such alternatives existed in 1998, and are currently available:

> "Several other risk management options [than the temporary prohibition] could have been justified in November 1998. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. In 1998 mitigation and tolerance strategies were probably inappropriate. Another risk avoidance strategy would have been to request additional molecular characterization data and allow limited importation with attendant monitoring so that the practical aspects of controlling escapes from spillage could experienced.

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[64] Dr. Nutti's Answers to Questions to Experts; Q. 65.
[65] Dr. Nutti's Answers to Questions to Experts; Q. 68
[66] Dr. Allison Snow's Answers to Questions to Experts; Q. 66
[67] Dr. Andow's Answers to Questions to Experts; paras 66.05 and 68.01
[68] Dr. Andow's Answers to Questions to Experts; para 68.01 (emphasis added).

> These options were available in 2001 and remain today. In addition risk mitigation strategies may also be possible to control HT volunteers and wild species."[69]

66. Finally, Dr. Andow notes that if Greece had in fact been concerned with such environmental issues, it had more than sufficient time to gather the necessary information to assess them, but Greece failed to do so: "I believe that had Greece collected the necessary data to complete this risk assessment promptly after implementing their temporary prohibition that they could have had sufficient data to make a decision in 2001."[70]

Maize Bt-176 (notification C/F/11-03)

Austrian Safeguard measure (Questions 69-71)

67. The expert advice confirmed that Austria's reliance on potential risks to human and animal health from the *bla* gene conferring ampicillin resistance as a justification for its safeguard measure is not supported by the scientific evidence. As Dr. Nutti explained,

> "Based on the information presented by the notifiers and by the evaluation of four different scientific committees, my understanding is there is NO reason to believe that the scientific evidence available to Austria in February 1997 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the importation and use of Maize Bt-176.[71]
>
> As far as my knowledge goes, concerning food safety and nutrition, the scientific evidence submitted by Austria does not support a temporary prohibition on the import and use of Maize Bt-176.
>
> In EC-144, Austrian Contribution for the WTO-Dispute-Expert-Meeting of the European Commission 14 January 2004 in Brussels, I found that Austria presents also issues related to allergenicity and toxicological risk assessment, but I cannot agree with the points raised, as they are not in accordance with the FAO/WHO Codex Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants; FAO/WHO Codex Annex on Possible Allergenicity Assessment."[72]

68. Although one expert attempted to offer rationales that the EC might have raised to support the safeguard measure,[73] the EC has not relied on these rationales nor has the EC explained them. Further, the same expert also concludes that instead of a total product ban, other, less drastic risk management measures were available to meet any such concerns. Dr. Andow makes clear that such alternatives existed in 1999, and are currently available:

> "Other risk management options could not have been justified in February 1997. However, had Austria worked to develop its own acceptable resistance management measures, perhaps by 1999 other risk management options would have been possible.

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[69] Dr. Andow's Answers to Questions to Experts; paras 68.02-68.03.
[70] Dr. Andow's Answers to Questions to Experts; para 66.05.
[71] Dr. Nutti's Answers to Questions to Experts; Q.69.
[72] Dr. Nutti's Answers to Questions to Experts; Q. 71.
[73] Dr. Andow's Answers to Questions to Experts; paras 69.16, and 71.03--71.04.

> Today several alternative risk management options are available. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. Tolerance strategies are probably inappropriate. One alternate risk avoidance strategy would be to implement country-specific resistance management measures, to limit planting to a restricted region, and to conduct intensive non-target experiments. This would allow progressive determination of non-target effects."[74]

German Safeguard measure (Questions 72-74)

69. The expert advice confirmed that Germany's reliance on potential risks to human and animal health resulting from the presence of an antibiotic resistance marker gene as a justification for its safeguard measure is not supported by the scientific evidence. As Dr. Nutti stated,

> "As far as my knowledge goes, regarding food safety and nutrition issues, the scientific evidence submitted by Germany does not support a temporary prohibition on the import and use of Maize Bt-176."[75]

70. The expert advice also makes clear that even if some risk had been identified, measures short of a wholesale ban existed in 2002, and are currently available. Dr. Andow explained:

> "Other risk management options could not have been justified in March 2000. However, had Germany worked to develop its own acceptable resistance management measures, perhaps by 2002 other risk management options would have been possible.
>
> Today several alternative risk management options may be available. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. Tolerance strategies are probably inappropriate. One alternate risk avoidance strategy would be to implement country-specific resistance management measures, to limit planting to a restricted region, and to conduct intensive non-target experiments. This would allow progressive determination of non-target effects."[76]

Luxembourg Safeguard measure (Questions 75-77)

71. The expert advice confirmed that Luxembourg's reliance on potential human health risks resulting from the presence of an antibiotic resistance marker gene as a justification for its safeguard measure is not supported by the scientific evidence. As Dr. Nutti stated,

> "Based on the information presented by the notifiers and by the evaluation of four different scientific committees, my understanding is there is NO reason to believe that the scientific evidence available to Luxembourg in February 1997 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the importation and use of Maize Bt-176.[77]

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[74] Dr. Andow's Answers to Questions to Experts; paras 71.03 and 71.04.
[75] Dr. Nutti's Answers to Questions to Experts; Q. 74.
[76] Dr. Andow's Answers to Questions to Experts; paras 74.03-74.04.
[77] Dr. Nutti's Answers to Questions to Experts; Q. 75.

> As far as my knowledge goes, regarding food safety and nutrition issues, the scientific evidence submitted by Luxembourg does not support a temporary prohibition on the import and use of Maize Bt-176."[78]

72. Although one expert attempted to offer rationales that the EC might have raised to support the safeguard measure,[79] the EC did not rely on these rationales nor has the EC explained them. Moreover, the same expert concluded that alternatives to a total ban existed potentially as early as 1999, and are currently available. Dr. Andow explained:

> "Other risk management options [than the temporary prohibition] probably could not have been justified in February 1997. However, Luxembourg could have proposed its own acceptable resistance monitoring measures, which perhaps by 1999 would have been possible to implement.
>
> Today several alternative risk management options are available for monitoring for resistance. Although there is still no scientific consensus around the best monitoring method, the cost-efficiency trade-offs are known, and considerable experience has accumulated so that several can be feasibly implemented."[80]

Maize Mon 810 (notification C/F/95/12-02)

Austrian safeguard measure (Questions 78-80)

73. The expert's advice confirmed that the scientific evidence does not support the existence of any human or animal health risk that would justify Austria's safeguard measure. Dr. Nutti concluded that

> "Based on the information presented by notifiers and by the scientific evaluation undertaken by France and by SCP, my understanding is there is no reason to believe that the scientific evidence available to Austria in June 1999 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the importation and use of Maize MON 810.[81]
>
> As far as my knowledge goes, the scientific evidence submitted by Austria does not support a temporary prohibition of the import and use of Maize MON 810."[82]

74. Although one expert suggested rationales that the EC might have raised to support the safeguard measure,[83] the EC did not rely on these rationales nor has the EC explained them. In addition, the same expert concludes that alternatives to a total product ban are likely to be available. Dr. Andow explains:

> "Other risk management options [than the temporary prohibition] may have been justified in June 1999. Because the full resistance management and monitoring

[78] Dr. Nutti's Answers to Questions to Experts; Q. 77.
[79] Dr. Andow's Answers to Questions to Experts; paras 75.09 and 75.12.
[80] Dr. Andow's Answers to Questions to Experts; paras 77.02-77.04.
[81] Dr. Nutti's Answers to Questions to Experts; Q. 78.
[82] Dr. Nutti's Answers to Questions to Experts; Q. 80.
[83] Dr. Andow's Answers to Questions to Experts; paras 78.05-78.06.

> measures were not before the Panel, the scientific basis for a concrete discussion of this is not possible.
>
> Today several alternative risk management options may be available. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. Tolerance strategies are probably inappropriate. Because the full resistance management and monitoring measures were not before the Panel, the scientific basis for a concrete discussion of this is not possible."[84]

Italian safeguard measure (Questions 81-83)

75. The advice from the experts confirms that the scientific evidence does not support Italy's safeguard measure with respect to Maize MON 810.

> "My opinion is that the Italian CA did not provide any scientific information that could change the evaluations done by the scientific committees (Food and Plant). It is important to point out that the information submitted by the applicant, covered all the items needed for the comparison of the GM maize and its conventional counterpart, not only with data on nutrients but also with animal feeding studies. The variation in levels of protein was in the range of natural variation, so the point raised by Italy referring to protein was not correct.
>
> I do not agree with opinion of the Italian CA regarding the ambiguity of the term "substantial equivalence", that, this concept could be defined differently, given the lack of clarity in the Community legislation. The way to proceed for the comparison between the GM and non GM has been presented not only at the Community legislation but also at the OECD consensus documents, FAO/WHO Expert Consultations 1996, 200, 2001 and Codex Alimentarius Guidelines.
>
> My understanding is there is NO reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from ... Maize MON 810."[85]

76. Taking this advice into account, it is clear that the scientific evidence does not support a finding that the Italian safeguard measure is based on legitimate scientific concerns.

Maize T25 (notification C/F/95/12-07)

Austrian safeguard measure (Questions 84-86)

77. The expert advice confirms that the scientific evidence provided by the EC does not support the Austrian safeguard measure. The only support for the measure is found in the statement made by one of the experts that scientific information did exist at the time the measure was adopted that *might* justify the measure.

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[84] Dr. Andow's Answers to Questions to Experts; paras 80.03-80.04.
[85] Dr. Nutti's Answers to Questions to Experts; Q. 81.

> "The adoption of a temporary prohibition was probably not justified on the basis of the scientific evidence and other information submitted by Austria. Austria needed to clarify the rationale and provide substantial scientific evidence. A temporary prohibition probably could have been justified at the time because the appropriate scientific information did exist."[86]

78. However – even if an SPS measure could be justified based on reasons not put forward by the member State (nor by the EC) – other conclusions of this expert make clear that alternatives existed in 2000, and are currently available, to manage the risks that might have been of concern to Austria.

> "Several other risk management options could also have been justified in April 2000. Risk management strategies include risk avoidance, risk mitigation, and risk tolerance. In 2000 mitigation and tolerance strategies were probably inappropriate. Here I consider only the resistance risk. One risk avoidance strategy would have been to allow limited planting in a restricted region. This would allow observing how T25 would be used and enable assessment of the selective pressure on weeds. Another approach would have been to limit use on any particular field to once every 4-5 years. This would reduce selection pressure for a long time, allowing alternative management measures to be developed."

Italian safeguard measure (Questions 87-89)

79. The advice from the experts confirms that the scientific evidence does not support Italy's safeguard measure with respect to Maize T25.

> "My opinion is that the Italian CA did not provide any scientific information that could change the evaluations done by the scientific committees (Food and Plant). It is important to point out that the information submitted by the applicant covered all the items needed for the comparison of the GM maize and its conventional counterpart, not only with data on nutrient but also with animal feeding studies. The variation in levels of protein was in the range of natural variation, so the point raised by Italy referring to protein was not correct.
>
> I do not agree with opinion of the Italian CA regarding the ambiguity of the term 'substantial equivalence', that this concept could be defined differently, given the lack of clarity in the Community legislation. The way to proceed for the comparison between the GM and non GM has been presented not only at the Community legislation but also at the OECD consensus documents, FAO/WHO Expert Consultations 1996, 200, 2001 and the Codex Alimentarius Guidelines.
>
> My understanding is there is NO reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from GM maize T25."[87]

80. Taking this advice into account, it is clear that the scientific evidence does not support the adoption of this safeguard measure.

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[86] Dr. Andow's Answers to Questions to Experts; paras 86.0.
[87] Dr. Nutti's Answers to Questions to Experts; Q. 87.

Maize Mon 809 (notification C/F/95/12-01/B)

Italian safeguard measure (Questions 90-92)

81. The advice from the experts confirms that the scientific evidence does not support Italy's safeguard measure with respect to Maize Mon 809.

> "My opinion is that the Italian CA did not provide any scientific information that could change the evaluations done by the scientific committees (Food and Plant). It is important to point out that the information submitted by the applicant, covered all the items needed for the comparison of the GM maize and its conventional counterpart, not only with data on nutrient but also with animal feeding studies. The variation in levels of protein was in the range of natural variation, so the point raised by Italy referring to protein was not correct.
>
> I do [not] agree with the opinion of the Italian CA regarding the ambiguity of the term 'substantial equivalence', that this concept could be defined differently, given the lack of clarity in the Community legislation. The way to proceed for the comparison between the GM and non GM has been presented not only at the Community legislation but also at the OECD consensus documents, FAO/WHO Expert Consultations 1996, 200, 2001 and the Codex Alimentarius Guidelines.
>
> My understanding is there is NO reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from GM maize MON 809."[88]

82. Taking this advice into account, it is clear that the scientific evidence does not support the adoption of this safeguard measure.

Maize Bt-11 (reference C/GB/96/M4/1)

Italian safeguard measure (Questions 93-95)

83. The advice from the experts confirms that the scientific evidence does not support Italy's safeguard measure with respect to Maize Bt-11.

> "My opinion is that the Italian CA did not provide any scientific information that could change the evaluations done by the scientific committees (Food and Plant). It is important to point out that the information submitted by the applicant, covered all the items needed for the comparison of the GM maize and its conventional counterpart, not only with data on nutrient but also with animal feeding studies. The variation in levels of protein was in the range of natural variation, so the point raised by Italy referring to protein was not correct.
>
> I do not agree with the opinion of the Italian CA regarding the ambiguity of the term 'substantial equivalence', that this concept could be defined differently, given the lack of clarity in the Community legislation. The way to proceed for the comparison between the GM and non GM has been presented not only at the Community

[88] Dr. Nutti's Answers to Questions to Experts; Q. 90.

> legislation but also at the OECD consensus documents, FAO/WHO Expert Consultations 1996, 200, 2001 and the Codex Alimentarius Guidelines.
>
> My understanding is there is NO reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from GM maize Bt-11."[89]

84. Taking this advice into account, it is clear that the scientific evidence does not support the adoption of this safeguard measure.

D. ADDITIONAL QUESTIONS

General Questions

Question 110. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that animal feed made from biotechnology plants alters the composition of the food derived from animals consuming the feed?

(a) If so, what is the likelihood that this event could lead to adverse effects on human or animal health? (see, inter alia, exhibit US-144)

(b) What risk management options are available to mitigate any resulting risks and what is their efficacy?

85. Dr. Nutti's response supports the US position: "I am not aware of any scientific evidence that supports the hypothesis that animal feed made from biotechnology plants alters the composition of the food derived from animals consuming the feed."[90] Dr. Nutti also cites several scientific papers showing no compositional changes in food derived from animals that consumed biotech animal feeds.

Question 112. Please provide an assessment of the statements regarding chronic toxicity testing in paragraph 43 of Canada's Third Submission and paragraphs 134-138 of the US Supplementary Rebuttal Submission. What relevance does the foreseen end product use(s) have in the context of the evaluation of the toxicity of that product?

86. Dr. Nutti agrees with the scientific position put forth by the United States:

> "As I had pointed out in several answers, and based on the Codex Alimentarius Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003), paragraphs 34 to 43, Assessment of Possible Toxicity, we have at paragraph 37 that the use of appropriate conventional toxicology or other studies on the new substance may be necessary if, taking into account its function and exposure, doubts about the safety of the new substance remain. My understanding is that if the toxicological assessment has conducted acute gavage studies in mice, homology to known toxins and allergens with no indication of adverse effects, chronic toxicity tests shall not be required."[91]

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[89] Dr. Nutti's Answers to Questions to Experts; Q. 93.
[90] Nutti Response, Answer 110.
[91] Nutti Response, Answer 112.

Question 113. Please provide an assessment of the statements regarding the purpose and use of whole food studies in paragraphs 142-144 of the US Supplemental Rebuttal Submission. What relevance does the foreseen end product use(s) have in the context of using whole food studies in the evaluation of the safety of that product?

87. Dr. Nutti agrees with the scientific position expressed by the United States:

> "My understanding is that if the comparison of the composition of the GM product and its conventional counterpart has shown to be substantially equivalent, the 90-day oral study and at least one more feeding study (usually 48 day broiler chicken) has provided information on the consumption of the whole food, the request for multiple whole food studies in different species does not have scientific support."[92]

Product-Specific Questions

Monsanto Roundup Ready corn (NK603), C/ES/00/01 (EC chronology 76)

Question 39bis: Given the information before the Panel, including the notification and additional letter from Monsanto providing additional information (previously referenced and EC-76/At.11-12), was additional information regarding allergenicity studies and PCR tests requested by Austria (EC-76/At.44) necessary or useful to ensure that conclusions of the safety assessment were valid?

88. Dr. Nutti agrees with the US view that the additional information requested by Austria was not needed for a safety assessment:

> "Based on EC-76/At.11-12 and the request by the lead CA in EC-76/At.44, regarding to allergenicity studies and PCR tests, my opinion is that such a request was not necessary to ensure that conclusions of the safety assessment were valid."[93]

Monsanto Roundup Ready corn (GA 21), C/ES/98/01 (EC chronology 78), C/GB/97/M3/2 (EC chronology 85)

Question 40bis: Given the information before the Panel, including the first whole food study and agronomic performance tests (attached, cover letter provided in EC 78/85/At. 19), was a second animal whole food study requested by Denmark, Austria and Italy (EC-78/85 /At. 67, 40 and 72) necessary or useful to identify potential adverse effects that had not been previously identified?

89. Dr. Nutti, citing Codex guidelines, agrees with the United States that a request for "a second animal whole feeding study" was not needed for a food safety assessment.[94]

Monsanto MaisGard Roundup Ready (MON 810 & GA21) corn (stack), C/ES/99/02 (EC chronology 94)

Question 44bis: Given the information before the Panel, including the first whole food study and agronomic performance tests (EC 94/At.3, pp. 40), was a second animal whole food study

[92] Nutti Response, Answer 113.
[93] Nutti Response, Answer 39bis.
[94] Nutti Response, Answer 40bis.

(EC 94/At.12) necessary or useful to identify potential adverse effects, including those associated with small random DNA insertions, that had not been previously identified?

90. Dr. Nutti agrees with the position expressed by the United States, stating her "opinion is that such a request was not necessary to ensure that conclusions of the safety assessment were valid."

Question 44ter: In the context of this corn product which was produced through conventional breeding from biotech parents, is data regarding the safety of the biotech parent plants relevant to the safety assessment of the hybrid plant products? Given the results of the risk assessment studies of the biotech parents, were additional studies necessary or useful to ensure that the conclusions of the safety assessment related to the hybrid plants were valid?

91. Dr. Nutti agrees with the position of the United States. She explains that

> "In this case I believe that given the results of the risk assessment studies of the biotech parents, no additional studies were necessary or useful to ensure that the conclusions of the safety assessment related to the hybrid plants were valid."[95]

Monsanto Roundup Ready corn (NK603), (EC chronology 96)

Question 53bis: Given the information before the Panel, including the first whole food study and agronomic performance tests (EC 96/At.2, pp. 102-103), was a second animal whole food study (EC 96/At. 7) necessary or useful to identify potential adverse effects, including those associated with small random DNA insertions, that had not been previously identified ?

92. Dr. Nutti agrees with the position of the United States. Citing to Codex standards, Dr. Nutti states that "such a request [for a second animal whole food study] was not necessary to ensure that conclusions of the safety assessment were valid."[96]

[95] Nutti Response, Answer 44ter.
[96] Nutti Response, Answer 53bis.

ANNEX I-2

COMMENTS BY CANADA ON THE REPLIES BY THE SCIENTIFIC EXPERTS TO THE QUESTIONS POSED BY THE PANEL 31 JANUARY 2005

INTRODUCTION

1. Canada is pleased to have this opportunity to comment on the answers given by the experts to the Panel's questions. The experts undoubtedly had a difficult task before them, and Canada expresses its appreciation to them for their willingness to undertake this task, and for the laudable effort that they have made to respond to the Panel's questions.

2. Canada's comments on the responses to the Panel's questions provided by Drs. Andow, Healy, Nutti, Snape, Snow and Squire are submitted with a view to assisting the Panel in understanding Canada's position on the specific matters addressed by the experts. Canada's comments do not note each and every instance where it agrees with the experts. Rather, they seek to identify where the experts agree, point out what Canada considers to be inconsistencies among the experts' responses and confirm which position Canada supports, elaborate on some of the responses that Canada believes require clarification or amplification, and respond to assertions with which Canada disagrees.

3. Canada is also pleased to note that, overall, the answers provided by the experts are consistent with Canada's views and positions on the scientific issues raised by the Panel's questions. The advice provided by the experts indicates, for the most part, that little or no scientific evidence exists with respect to risks to human, animal or plant life or health, or to the environment, to justify the, in many cases inordinate, delays by the European Communities (EC) with respect to the approval of a host of biotech product applications. Similarly, the answers of the experts reinforce the scientific validity of Canada's position that the EC Member State prohibitions on approved biotech products of interest to Canada have no scientific basis. They are not supported by evidence demonstrating a risk, either from a food and feed standpoint, or in relation to the environment, nor can they be justified on precautionary grounds.

4. Canada also draws the Panel's attention to the fact that some of the experts occasionally stray beyond their respective spheres of competence in responding to the Panel's questions. In addition, in some areas, the experts express views on issues that do not fall within the scope of the Panel's questions, either because the issues are not scientific in nature, or because the answers, while science-oriented, go beyond the ambit of the question. This leads some of the experts to engage in unwarranted speculation in a number of places. Canada trusts that the Panel will disregard these aspects of the experts' replies in so far as they cannot assist the Panel in resolving the issues before it.

5. For example, some of the experts express their views on Canada's regulatory regime for approving the environmental release of agricultural biotech products. In this regard, Canada is bound to note that: (1) none of the experts have provided any indication that they are thoroughly familiar with Canada's regulatory regime; (2) the characterization of Canada's regulatory regime by the experts is inaccurate in important respects; and (3) Canada's regulatory regime is not in issue in this proceeding nor is it relevant to the questions that have been asked of the experts. If the Panel believes it to be necessary to develop a greater understanding of Canada's regulatory regime in order to make its findings in this dispute, Canada would be pleased to provide additional information in order to enhance that understanding, and to correct the inaccuracies found in the opinions of some of the experts.

6. Canada takes this opportunity to observe that some of the experts' answers question or challenge the analyses and conclusions of the relevant European Communities scientific committees directly. It is unfortunate that the members of these committees are unlikely to be present at the hearing or to have an opportunity to respond to the experts' observations in this regard.

7. More generally, Canada is compelled to emphasize that the current proceedings depart from previous SPS-related disputes in that the scientific opinions of the responding party are not being challenged by the complainants; to the contrary, it is the respondent that seeks to minimize their impact on the outcome of the proceedings. In this context, it is useful to recall that it is not the function of either the Panel's scientific advisors or the Panel itself to conduct a *de novo* examination of the scientific assessments that have been conducted by the relevant Member State Competent Authorities, the Community scientific committees or the European Food Safety Authority. Rather, it is for the EC and its Member States to show that they have based their measures on scientific risk assessments, and that if they have chosen to disregard the scientific opinions of the Community scientific committees, they did it on the basis of other, more compelling risk assessments. The EC has not offered any concrete evidence that this is the case.

8. In this submission, Canada comments on the experts' answers to the following questions only: Q1-9 (General Questions); Q14-20 (oilseed rape Ms8xRf3); Q26-28 (oilseed rape GT73); Q59-68 and Q81-95 (safeguard measures except those pertaining to maize Bt-176 and Austria's prohibition on MON810); Q96-106 (General Questions); and Q110 and 112 (Additional Questions). However, Canada reserves its right to comment on the experts' answers to any of the other questions at the meeting with the experts. Canada also reserves its right to comment further on the experts' answers in subsequent submissions.

9. Canada looks forward to meeting with the experts and to the opportunity to discuss the scientific issues raised by experts' answers to the Panel's questions in more detail at that meeting.

General Questions

1. the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that antibiotic resistance marker genes (ARMG) pass from a biotech food or feed product to bacteria or other micro-organisms present in the human or animal gut?

(a) If scientific evidence indicates that such an event could occur, what risks, if any, would arise from that event? What is the comparative relevance or magnitude of this risk in relation to the likelihood of such a transfer from other sources of antibiotic resistance not involving the use of recombinant DNA technology?

(b) If such risks have been identified, what is the likelihood of adverse effects to human or animal health, in light of the processing of raw biotech products into human food or animal feedstuffs?

(c) Are these consequences relevant to the specific types of ARMG currently used in the products at issue in this dispute? Please explain.

(d) If such risks have been identified, what risk management options are available to mitigate those risks and what is their efficacy?

10. In her reply to this question, Dr. Nutti states that, despite "numerous experiments aimed at evaluating the possibility of transfer of plant DNA to microbes and mammalian cells…there are no reports that marker genes in plant DNA transfer to these cells."[1]

11. Dr. Nutti also says that even if such transfers were to take place for marker genes that confer resistance to kanamycin, ampicillin or streptomycin, they are "unlikely to present a significant health impact since bacteria resistant to these antibiotics are already spread all over or are naturally found in the human gastrointestinal tract."[2] Finally, and in any event, many of these antibiotics are rarely used on humans due to their negative side effects.

12. Dr. Nutti's conclusions are amply supported by the literature she references, as well as by other sources.[3]

13. Dr. Nutti's advice fully supports the argument that there is no scientific evidence that would support a refusal to approve, or to suspend the marketing of, a GM product on the grounds that the presence of an antibiotic resistance marker (ABRM) gene constitutes a risk to human or animal health.

2. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that antibiotic resistance develops through ways other than the uptake of food or feed by humans or animals, that is, due to the potential persistence of plant-derived DNA in the environment during crop cultivation and harvesting, and in soil residues?

(a) If scientific evidence indicates that such an event could occur, what risks, if any, would arise from that event? What is the comparative relevance or magnitude of this risk in relation to the likelihood of such a transfer from other sources of antibiotic resistance not involving the use of recombinant DNA technology?

(b) Are these consequences relevant to the specific types of ARMG currently used in the products at issue in this dispute?

(c) If such risks have been identified, what risk management options are available to mitigate those risks and what is their efficacy?

14. Although Dr. Squire and Dr. Nutti indicated that they intended to answer this question, their reports do not contain answers to it. Dr. Squire's report contains no answer at all, and Dr. Nutti indicates that she will not answer because the question pertains to "environmental safety".

15. Nevertheless, in an effort to advance the Panel's understanding, Canada notes the existence of studies pertaining to this issue. In addition to the already cited article in the *Journal of Antimicrobial*

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[1] Answers to the Panel's Questions from Dr. Marilia Regini Nutti, 6 January 2005, p. 2. [hereinafter Nutti]

[2] *Ibid*.

[3] See, for example, Bennett, P.M., et al., "An assessment of the risks associated with the use of antibiotic resistance genes in genetically modified plants: report of the Working Party of the British Society for Antimicrobial Chemotherapy" *Journal of Antimicrobial Chemotherapy* (2004) 53, 418-431. (Exhibit CDA – 172).

Chemotherapy,[4] published work by Dr. Abigail Salyers[5] and Dr. K. Smalla[6] indicate that this is a low probability event and that it would pose a minimal risk even if it were to occur.

16. Dr. Salyers provides an extensive theoretical examination of the issue, which considers all potential mechanisms and refutes most of them as unlikely. Dr. Smalla has conducted field studies that demonstrate that under normal field conditions this event is unlikely, and that even if it were to occur it would be at such low frequency that it would pose minimal risk compared to natural mechanisms (of gene transfer between soil pathogens) or any therapeutic use.

17. Canada requests that the experts provide their comments, if any, on the relevant scientific information in these studies to the extent that it falls within their field of expertise.

3. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that wide-spread cultivation of Bt crops such as biotech maize of the Bt variety adversely affects non-target organisms which may be exposed to such crops under typical agricultural practice? (See, *inter alia*, EC-149, EC-150, EC-151, EC-152) If so, how does this risk compare with risks to non-target organisms arising from non-biotech applications for Bt toxins (i.e., the use of Bt toxin as an insecticide in conventional and organic farming)? What risk management options are available to mitigate any resulting risks and what is their efficacy?

18. Dr. Squire responds to this question by saying that current experimental evidence is insufficient to confirm whether widespread cultivation would affect non-target organisms. Importantly, he observes that the weight of evidence suggests little immediate toxic effect, although he also "admits the possibility" of chronic effects following long-term exposure. He concludes that the question can only be conclusively answered following long-term studies and the development of a comparator.[7]

19. Dr. Squire also points out that any damage to in-field biodiversity can be reversed by rotating crops.[8] This would suggest that, to the extent that a risk exists, it can be managed relatively easily using proven agronomic management practices.

20. Dr. Andow focuses his comments on the studies found in Exhibits EC-149, EC-150, EC-151, and EC 152. Dr. Andow begins his analysis by stating that there is some evidence to support the hypothesis that wide-spread cultivation of Bt crops adversely affects non-target organisms but this evidence is insufficient to establish the hypothesis that such adverse effects are expected to occur.

21. Regarding Exhibit EC-149, Dr. Andow looks at the analysis of the studies reviewed in the exhibit, and concludes that "there is a possible hazard to collembola [*Folsomia candida*]" but concedes that he cannot conclude that there is a potential risk. He also concludes that there is a

[4] Exhibit CDA-172.

[5] Salyers, Abigail, "Genetically Engineered Foods: Safety Issues Associated with Antibiotic Resistance Genes" *Alliance for the Prudent Use of Antibiotics* (Exhibit CDA-173).

[6] Smalla**,** Kornelia et al., "Monitoring the identity and survival of genetically modified or non-modified plant growth promoting bacteria and their impact on soil microbial communities" (Paper presented to the 7th International Symposium on the Biosafety of Genetically Modified Organisms, Beijing, China October 2002). (Exhibit CDA-174).

[7] Answers to Questions 3 to 5 from Dr. Geoff Squire, 6 January 2005, p. 3. [hereinafter Answers to Questions 3 to 5, Squire]

[8] *Ibid*., p. 2-3.

potential risk to *C. carnea*".[9] However, regarding the the Collembola study, it must be said that it is, at best, inconclusive. Dr. Andow cites no other studies with respect to this organism that have reproduced the results of the study reviewed in the exhibit, and without further details about that study, which, according to Exhibit EC-149, was not published, or a copy of the study itself, Canada is not in a position to evaluate its methodological soundness or the validity of its conclusions. In fact, other studies suggest that the risk of an adverse impact of Bt on *Folsomia candida* is negligible.

22. As for the studies relating to the putative impact of Bt on *C. carnea* (Lacewing), Dr. Andow neglects to mention that the cited studies have been effectively refuted by more recent work.[10] In fact, although it may be true, as Dr. Andow indicates, that there have been "numerous" studies – disregarding for the moment the indeterminate nature of the word "numerous" – majority scientific opinion is that there is no significant adverse effect, and there has been no observed effect under field conditions.

23. Dr. Andow also notes later in his answer that any risk to Lacewing under field conditions is unlikely to be large; according to him, any adverse effect will be subtle and difficult to detect in the field. However, his opinion that there will be any effect at all is largely speculative, and ties into his later statement with respect to the absence of evidence of adverse effects: "the US experience [i.e. no observed adverse effects] does not imply that there are no adverse effects on non-target species."[11] Of course, it is also true that the US experience cannot in any way be said to represent evidence of such adverse effects so it is not clear how Dr. Andow's statement can be of assistance to the Panel.

24. The SCP opinion on the *Bt11* application for cultivation in 2000 took into account some of the studies reviewed in Exhibit EC-149 in its analysis, and the Hilbeck studies in particular.[12] The SCP evidently did not consider that these studies presented a serious impediment to its conclusion that "there is no evidence to indicate that the placing on the market for cultivation purposes of maize line Bt-11…is likely to cause adverse effects on human health and the environment".[13] The SCP did, however, recommend monitoring of the fields to provide reassurance that there are no effects at the extended field scale.

25. The SCP also notes in its opinion that "laboratory feeding studies have not shown toxicity to earthworms and at field concentrations to Collembola [*Folsomia candida*]".[14] Its finding with respect to earthworms appears to contradict the Hilbeck study in Exhibit EC-150, cited by Dr. Andow. Although Dr. Andow states that there are other studies that support Dr. Hilbeck's conclusions with respect to earthworms, he provides no references.

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[9] Answers to the Panel's Questions from Dr. David A. Andow, 6 January 2005, p. 1. [hereinafter Andow]

[10] See, for example, Romeis, Jorg, et al., "*Bacillus thuringiensis* toxin (Cry1Ab) has no direct effect on larvae of the green lacewing *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae)" *Journal of Insect Physiology* 50 (2004) 175-183 (Exhibit CDA-175); Dutton, Anna, et al., "Assessing the risks of insect resistant transgenic plants on entomophagous arthropods: Bt-maize expressing Cry1Ab as a case study" *BioControl* 48: 611-636,2003 (Exhibit CDA-176).

[11] Andow, p. 4.

[12] EC, Scientific Committee on Plants, *Opinion on the submission for placing on the market of genetically modified insect resistant and Glufosinate ammonium tolerant (Bt-11) maize for cultivation. Notified by Novartis Seeds SA Company (Notification No. C/F/96/05-10)*, adopted 30 November 2000, p. 8 (Exhibit CDA-84).

[13] *Ibid*.

[14] *Ibid*.

26. In any event, it is also noteworthy that any adverse effects can, as Dr. Squire advises,[15] be reversed fairly easily through crop rotation.

27. Dr. Andow concludes, in paragraph 3.10, "that possible hazards have been identified and potential risks are evident."[16] Although the lack of evidence means that an actual non-target risk cannot be fully characterized, he believes that if the analysis is completed, "there will be a documented risk of some Bt maize events to monarch butterflies".[17] This latter statement is completely speculative. The vast majority of the scientific literature on Bt and monarch butterfly populations states unequivocally that there is no significant adverse effect on monarch butterfly populations under field conditions.[18]

28. Bt corn has been grown widely across Canada and the United States for eight years. Despite this fact, there is still no scientific evidence of significant non-target adverse effects under field conditions. If, as Dr. Andow states, that even after all this time and widespread environmental exposure, no one has observed significant adverse non-target effects, it is quite plausible, and even reasonable, to draw an inference that such significant effects are not occurring. While such an inference must be considered speculative, it is no more, and probably less, speculative than the views expressed by Dr. Andow. And to assert that no effects have been noted because nobody is looking is incorrect. There are in fact a number of groups conducting such work, the Canadian Corn Pest Coalition being one of them.[19]

4. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that the wide-spread cultivation of Bt maize or other, non-biotech applications of Bt toxins, leads to the emergence of Bt-resistant target organisms under field conditions? If so, what risk management options exist to mitigate any resulting risks and what is their efficacy?

29. In his reply, Dr. Squire first notes that the emergence of pest insect resistance to pesticides varies widely from context to context, and depends on a range of factors, such as the exposure to and strength (dosage) of the toxin, the movement of insect populations, and the genetics and mating system of the insect.[20] He observes that resistance to Bt crops (cotton) has occurred and is influenced by the "dose" of toxin delivered to the pest and the genetic nature of the pest, among other factors.[21] However, he suggests that managing the emergence of Bt resistance under field conditions is not

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[15] Answers to Questions 3 to 5, Squire, p. 2.
[16] Andow, p. 4.
[17] *Ibid*.
[18] See, for example, Oberhauser, Karen S. et al., "Temporal and spatial overlap between monarch larvae and corn pollen" *PNAS*, Oct 2001; 98: 11913 – 11918 (Exhibit CDA-178); Pimentel, David S. et al., "Bt corn pollen impacts on nontarget Lepidoptera : Assessment of effects in nature" *PNAS*, July 2000; 97: 8198 – 8199 (Exhibit CDA-179); Sears, Mark K. et al., "Impact of *Bt* corn pollen on monarch butterfly populations: A risk assessment" *PNAS*, Oct 2001; 98: 11937 – 11942 (Exhibit CDA-180); Stanley-Horn, Diane E. et al., "Assessing the impact of Cry1Ab-expressing corn pollen on monarch butterfly larvae in field studies" *PNAS*, Oct 2001; 98: 11931 – 11936 (Exhibit CDA-181); Wraight, C.L. et al., "Absence of toxicity of *Bacillus thuringiensis* pollen to black swallowtails under field conditions" *PNAS*, Jul 2000; 97: 7700-7703 (Exhibit CDA-182); Zangerl, A.R. et al., "Effects of exposure to event 176 *Bacillus thuringiensis* corn pollen on monarch and black swallowtail caterpillars under field conditions" *PNAS*, Oct 2001; 98: 11908 – 11912 (Exhibit CDA-183).
[19] *Canadian Corn Pest Coalition* "BT CORN STEWARDSHIP INFORMATION NOW AVAILABLE ONLINE" 2003; available online http://www.cornpest.ca/lib/news.cfm?id=9 (Exhibit CDA-184).
[20] Answers to Questions 3 to 5, Squire, p. 3.
[21] *Ibid*.

problematic. According to Dr. Squire, "the processes involved in Bt resistance and its management are generally appreciated by scientists, and mitigation strategies that have a strong scientific basis have been considered. …Sound scientific knowledge has been applied to this problem for several years".[22]

30. Dr. Andow is of the view that the emergence of resistance cannot be prevented, only delayed, and he characterizes Bt resistance in pests as an "environmental risk". The characterization of the emergence of Bt resistant pests, however, is misleading. The emergence of resistance largely poses an agronomic management problem for farmers in that it will discourage them from using Bt crops.

31. Dr. Snow seems to agree that the main issue in the emergence of resistance is the "loss of a benefit" rather than the creation of a risk.[23] She summarizes the benefits of Bt crops, including benefits to workers' health, benefits to populations of non-target and beneficial insects, low toxicity, and agronomic benefits of Bt proteins.

32. Although Dr. Andow claims that "there is scientific consensus that resistance to Bt maize is inevitable", he concedes that despite eight years of widespread cultivation throughout North America, "it has still not been detected in the field".[24] In fact, in contrast to chemical applications of Bt, mitigation measures used for Bt crops have delayed emergence of resistant pests far beyond that normally seen with chemical applications. Hence, Dr. Andow's statement that "widespread non-biotech applications of Bt toxins have resulted in the Bt-resistant target pests organisms under field conditions"[25] is not really relevant in this particular context.

33. It is also important to note that Dr. Andow does not provide any reference to a time horizon. It must be taken as a given that, if enough time passes, virtually anything can be characterized as inevitable. It is fair to say that very few experts expect Bt crops to remain fully resistant to target pests indefinitely.

34. As Dr. Squire noted, resistance management measures are available to minimize the likelihood of Bt-resistant pest insects emerging. Dr. Andow summarizes the current thinking around the most widely used method, that is the use of refuges, and notes that there is some evidence to support the hypothesis that the high dose/refuge strategy has been effective in delaying the emergence of Bt-resistant insect pests.[26] In fact, because of on-going debates about optimum refuge size, the current refuge sizes are conservative. In other words, they are probably larger than they need to be to be effective.

35. In summary, the key points about the possible emergence of pest resistance to Bt crops seem to be the following:

– in principle, it is taken as a given;
– however, time frame is variable;
– effective resistance management measures are available that can delay it;
– the science underlying these measures is fairly well understood;
– to date, no organisms that have evolved resistance to Bt maize have been found; and

[22] *Ibid*.
[23] Answers to the Panel's Questions from Dr. Allison A. Snow, 6 January 2005, p. 9. [hereinafter Snow]
[24] Andow, p. 6.
[25] *Ibid*.
[26] *Ibid*., p. 9.

– it does not really constitute an environmental risk; it is an agronomic management issue.

5. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that Bt maize varieties are any more toxic to humans or animals than conventional maize under field conditions? If so, what risk management options exist to mitigate any resulting risks and what is their efficacy?

36. Dr. Squire says assessing product toxicity to ecological processes is more complicated than assessing toxicity as a food or feedstuff. The contention that nothing adverse has occurred when growing Bt maize in, say, North America, should not be taken as definitive evidence by itself that nothing will occur in Europe, where the organisms and their interactions are different. Taken as a whole, experiments at the scale of small field plots and one season's exposure indicate no acute toxicity to animals other than the pest. Evidence, either way, of harm to animals arising from growing Bt crops in the field in Europe is therefore inconclusive at present. Longer term studies are needed.[27]

37. Dr. Nutti indicates that, based on the information before the Panel, there is no evidence to support the hypothesis that Bt maize varieties are more toxic to humans or animals (as feed) than conventional maize under field conditions.[28]

38. Canada considers that there may be some confusion as to the scope of this question among the experts. As written, the question can be understood as pertaining to Bt toxicity only from the standpoint of food and feed. Conversely, it can be taken to cover Bt toxicity to animals beyond domesticated animals. Dr. Squire appears to understand the question to be focussing on "ecological processes", noting the added complexities when you go beyond food and feed. To the extent that the focus is ecological rather than food and feed, Question 5 seems to be at least partly repetitive of Question 3. Hence, Dr. Squire notes in parentheses that in some respects his answer repeats his response to the earlier question.

39. Concerning food and feed, it is noteworthy that the Scientific Committee on Food (SCF), in its 2002 opinion on Bt-11 for food and feed, came to the conclusion that Bt11 sweet maize is as safe for human food use as its conventional counterparts.[29] None of the experts has challenged this conclusion.

6. On the basis of the information before the Panel, is there any scientific evidence to suggest that herbicide tolerant crops (whether biotech or developed through mutagenesis) are more persistent in the agricultural environment or more persistent in the non-agricultural environment than their conventional counterparts? If so, do herbicide tolerant crops qualify as a potential "pest" as the term is used in International Standard for Phytosanitary Measures (ISPM) 11?

(a) What is the potential for the establishment and spread of herbicide tolerant plants arising from handling, spillage during transport of the plant/plant parts, or any other means outside of cultivation in the absence of application of the herbicide? How is any potential for establishment and spread affected by environmental conditions, the presences of wild or conventional relatives of the herbicide tolerant plants in an area, or other factors?

[27] Answers to Questions 3 to 5, Squire, p. 4.
[28] Nutti, p. 4.
[29] EC, Scientific Committee on Food, *Opinion on a request to place genetically modified sweet maize line Bt11 on the market*, expressed 17 April 2002 (Exhibit CDA-35-J).

(b) What is the potential for the establishment and spread of herbicide tolerant plants in the presence of herbicide application (in fields, urban, domestic or other environments)? How is any potential affected by the existence of feral related plant species; infertile wild relatives; seed survival in relevant pedoclimatic conditions; the reproduction biology of the species; or other factors?

(c) Is this potential different for biotech crops tolerant to two wide-spectrum herbicides? Please explain.

(d) If significant risks of establishment and spread have been identified, what risk management options exist to mitigate any resulting risks and what is their efficacy?

(e) What types of post-market monitoring and data collection activities could be envisaged on the basis of the monitoring and review principles described in ISPM 11?

40. Drs. Snow, Squire and Andow conclude that herbicide tolerant (HT) crops have the potential to become "pests", supporting Canada's assertion to that effect.[30] Although the crop itself is not "injurious to plants or plant products," Annex 3 of ISPM No. 11 lists potential phytosanitary risks for LMOs including changes in adaptive characteristics which may increase the potential for introduction or spread including alterations in "pesticide (including herbicide) resistance."[31] Drs. Snow and Squire conclude that in the absence of herbicide, the HT crop should be no more persistent in the environment than non-HT crops, a conclusion that is seemingly at odds with Dr. Andow (para. 6.02).

41. Dr. Andow's view that "GMHT oilseed rape may be more persistent … than their conventional HT oilseed rape" appears to be based on the fact that the GMHT varieties are more commonly used.

42. Drs. Snow and Squire conclude that the application of an herbicide to an HT plant that is resistant to that herbicide would favour that plant; consequently the HT plant may become more abundant. The more extensively the herbicide is used the stronger the selection pressure favouring the HT plants. Thus, whether or not an HT crop is considered a "pest" depends in large part on the extent and nature of herbicide use.

43. Canada asks that Drs. Squire and Snow clarify whether this argument would apply equally to crops that are *naturally* resistant to certain herbicides (*e.g.* wheat and barley are naturally resistant to fenoxaprop-p-ethyl+safener (PUMA), trialcoxidim, dicolfop-methyl (ACCase mode of action - these herbicides are used throughout Europe to control grassy weeds in wheat and barley)). For those crops that are *naturally* HT, would the application of the herbicide to which they are tolerant confer a selective advantage over other plants? Thus, would feral populations of wheat have a selective advantage when sprayed repeatedly with fenoxaprop-p-ethyl? Is a solution to this problem to use a different herbicide or mix of herbicides? Is not the nature of herbicides to provide a selective advantage to certain plants that are resistant to those herbicides?

[30] Canada Third Written Submission, para. 73.

[31] ISPM N° 11: Pest risk analysis for quarantine pests, including analysis of environmental risks and living modified organism, FAO, April 2004 , p. 36 (Exhibit EC-130).

44. Does the agronomic usage of the herbicides glyphosate and glufosinate-ammonium differ? While glyphosate has multiple uses (pre-seeding burn-off, post-emergence, desiccation), glufosinate-ammonium primarily is used as a selective herbicide on tolerant crops, with some exceptions.[32] What impact do these different uses have on the potential for glufosinate-tolerant crops to become pests? Could the "problem" of HT volunteers be addressed by restricting the types of uses of the herbicide?

45. The experts' opinion supports Canada's assertion that risk management measures mitigate any "problems" associated with herbicide tolerance.[33] However, on p. 15, Dr. Snow states that "by the time the spread of herbicide resistance is detected in free-living pest populations, it may be too late to prevent these plants from proliferating further." She then cites a "problem" that has arisen in Canada in relation to the widely spread transgene conferring tolerance to glyphosate. However, there is little evidence in the literature of herbicide-resistance in weeds from the use of herbicides associated with GMHT crops. To the best of Canada's knowledge, there are few reported weeds resistant to glyphosate[34] and no reported weeds resistant to glufosinate-ammonium.[35] Indeed, resistance in weed populations to herbicides used in conjunction with non-GMHT crops developed through mutagenesis (*e.g.* varieties tolerant to imidazolinone) is a far greater problem.[36]

46. In terms of managing this "problem", the scientific literature suggests that multiple herbicide-resistant oilseed rape can be controlled by alternative herbicides.[37] Thus, the "problems" identified relate solely to the loss of efficacy of one type of weed management option, namely the application of the herbicide to which the plant is tolerant. This does not necessarily imply the weeds are harder to control. Can the experts confirm that the standard herbicide control measure for non-HT and HT oilseed rape (both biotech and mutation induced) is the application of phenoxy herbicides?

47. Canada would be grateful if the experts could clarify to what extent these "problems" are comparable to problems that may be encountered with the use of herbicides generally. Would it be fair to conclude that one of the purposes of sound agricultural management is to prolong the efficacy of the herbicide in question? Is this an environmental issue or an agronomic issue?

48. Dr. Squire indicates that more serious problems relating to the persistence of biotech HT crops will arise if labelling or marketing 'rules' require non-biotech crops to meet high purity levels.[38]

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[32] To Canada's knowledge, glufosinate-ammonium is used for weed control in orchards, vineyards, vegetable cultivation and as a desiccant for potatoes and oilseed rape.

[33] Canada Second Written Submission, para. 162.

[34] Glyphosate mode of action is Glycine. GLYCINES (G/9) Resistant Weeds by species and country, *Weed Science.org* "Glyphosate" 2003; available online http://www.weedscience.org/summary/ChemFamilySum.asp?lstActive=162&btnSub1=Go&lstHRAC= (Exhibit CDA-185).

[35] Glufosinate-ammonium mode of action is Glutamine synthase inhibitors. There are currently no reported cases of weed resistance to GA.

[36] Imidazolinone mode of action is ALS inhibitor. ALS INHIBITORS (B/2) Resistant Weeds by species and country, *Weed Science.org* "Imazamox" 2003; available online http://www.weedscience.org/summary/ChemFamilySum.asp?lstActive=265&btnSub1=Go&lstHRAC= (Exhibit CDA-186).

[37] Beckie H, (2004), *Multiple herbicide-resistant canola (Brassica napus) can be controlled by alternative herbicides*. (Exhibit CDA-127). Also see, Senior, I.J., et al, "Herbicide sensitivity of transgenic multiple herbicide-tolerant oilseed rape" *Pest Management Science* 58:405-412 (2002) Pest Management Science 58, 405-412, Section 4 - Conclusion (Exhibit CDA-187) and Sweet, J., et al, "Botanical and rotational implications of genetically modified herbicide tolerance in winter oilseed rape and sugar beet (BRIGHT Project)" *Home-Grown Cereals Authority (HGCA)*, Project Report No. 353 (2004), Chapters 1, 2, 3, 7, and 8 (Exhibit CDA-188).

[38] Answers to the Panel's Questions from Dr. Geoff Squire, 6 January 2005, p. 8. [hereinafter Squire]

In the light of the definition of "pest" in ISPM No. 11, Canada would be grateful if Dr. Squire could clarify whether labelling or coexistence requirements alone can affect whether a plant could be considered a "pest" under the ISPM No. 11. In other words, could the mere presence of a transgene be considered to be "injurious to plants or plant products"? Does Dr. Squire agree or disagree with Dr. Snow's statement that "gene flow does not represent an environmental concern *per se*, unless it results in unwanted biological consequences"?[39]

49. In terms of post-market monitoring, Dr. Squire indicates that the type of monitoring would differ depending on the purpose of the monitoring, whether for the presence or abundance of HT crops or for the impact of HT cropping on biodiversity and ecosystem functioning. Canada agrees that the monitoring provisions of ISPM No. 11 are applicable to monitoring for the establishment and spread of potential "pests" including HT plants. However, as Dr. Squire acknowledges, the impacts on biodiversity or the ecosystem of HT cropping are not caused by the GM crop *per se*, but the weed management program, including the mode of action, dosage and timing of herbicides. Could Dr. Squire clarify why he considers the ISPM No. 11 relevant to the monitoring of impacts on biodiversity and the ecosystem arising from the application of herbicides? In Canada's view, the monitoring plans adopted in this regard should not differ from monitoring plans for assessing the impact of changes in agronomic practices on biodiversity generally.

7. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that repeated use of a given biotech herbicide tolerant crop has adverse effects on flora and fauna, including soil micro- and macro-fauna? If so, how does this compare with any similar risks of adverse effects from the repeated use of a non-biotech herbicide tolerant crop (i.e, one developed through mutagenesis)?

50. Drs. Squire and Andow respond to this question. Dr. Squire discusses the Farm Scale Evaluation (FSE), noting that "the difference in weed management rather than the GM or conventional crop plants *per se* was the effective agent." Whether GMHT cropping resulted in a negative or positive impact on biodiversity depended on the "severity of the conventional management." Dr. Squire concludes that "in principle, there should be no difference between the effects of GMHT cropping and non-biotech HT cropping". Canada would be grateful if Dr. Squire could indicate whether he agrees that the conclusions of the BRIGHT project report, to which he refers, are valid.[40]

51. In terms of impacts on biodiversity, it is important to recognize that the very purpose of agriculture is to reduce biodiversity in the area under cultivation in order to favour one species over other species that compete for nutrients, moisture etc. However, biodiversity can be preserved by adopting sound agronomic practices such as crop rotation and leaving fields fallow. Indeed, a far more dramatic impact on biodiversity in the UK has been the widespread adoption of autumn-sown crops (such as winter oilseed rape), which reduces the amount of time a field is left fallow. The point here is that changes in agronomic practice affect biodiversity. There is no principled reason to subject GMHT cropping to disproportionately greater scrutiny than other agronomic practices (in particular, non-GMHT cropping).

52. Dr. Squire also concludes that "[a]ll evidence from small-scale work in field plots and containers points to the herbicides glyphosate or glufosinate-ammonium being much less directly toxic to soil fauna than other agrochemicals and the GMHT plants themselves having no effect on soil

[39] Snow, p. 5.
[40] Exhibit CDA-188.

organism different from that of non-GM plants."[41] In Canada's view this conclusion is consistent with relevant scientific evidence.

53. Dr. Andow provides a somewhat more qualified response stating that "if all the factors in paragraphs 07.09 through 07.13 are equivalent between the GMHT and non-GMHT crop, then there will be no predicted differences in the risks of adverse effects from the repeated use of a GMHT or non-GMHT crops."[42]

54. Nonetheless, Dr. Andow raises a number of either irrelevant or scientifically unsupported propositions to suggest that GMHT crops may cause "adverse effects", without regard for potential adverse effects caused by non-GMHT crops. First, Dr. Andow implies that a GMHT and its related herbicide use are "so tightly correlated" that adverse effects of herbicide use should be attributed to the GMHT crop. He fails to indicate whether the same concern holds true for non-GMHT crops and associated herbicides. Moreover, Dr. Andow fails to point out that there are many variables that influence the effectiveness of an herbicide in controlling weeds (e.g. mode of action, dosage, timing and frequency of application).

55. Second, Dr. Andow states that "[t]here is abundant evidence that repeated use of a given biotech herbicide tolerant crop would likely result in the evolution of resistance in weeds to the herbicide." As Canada has indicated under Question 6, there is little evidence in the literature of herbicide-resistance in weeds from the use of herbicides associated with GMHT crops. Indeed, the fastest growing problem for resistance in weed populations is for those tolerant to herbicides used in conjunction with non-GMHT crops developed through mutagenesis (*e.g.* varieties tolerant to imidazolinone).

56. Third, Andow questions the conclusions of the FSE and states that "I believe that it is likely that additional adverse effects on non-target organism may be reported in the future."[43] Dr. Andow does not provide support for this belief nor does he evaluate whether the same proposition holds true for non-GMHT crops.

57. Fourth, Dr. Andow asserts that "[g]ene flow from a GMHT crop to a weed relative can create weeds that are more difficult to control" and claims that "[t]his occurred in GMHT oilseed rape in Canada." However, he cites no evidence to support this assertion. The claim that weeds are more difficult to control is without foundation.[44] The standard herbicide control measure for non-HT and HT oilseed rape (both GM and mutation induced) is the application of a phenoxy herbicide.

58. Fifth, Dr. Andow raises the issue of so-called "contamination" of conventional crops resulting from gene flow from a GMHT (the "co-existence" issue). As Dr. Andow acknowledges in his response to Question 103, whatever "economic loss" that may result is not associated with damage to plant life or health.[45] For instance, in response to Question 103, he argues that the definition of "adverse effects" is a relative concept and cites the example of the organic farmer who perceives "contamination" to be an adverse effect because "it removes his or her product from the organic food stream." However, this has nothing to do with adverse effects on the environment. Even the European Commission has acknowledged that "co-existence" concerns the "potential *economic*

[41] Squire, p. 10.
[42] Andow, para. 7.14.
[43] Andow, para. 7.03.
[44] Beckie et al. *Multiple herbicide-resistant canola can be controlled by alternative herbicides*, Exhibit CDA-127.
[45] Andow, para. 103.03

impact of the admixture of GM and non-GM crops."[46] The economic impact of the admixture of GM and non-GM crops is not a relevant consideration under *Directive 2001/18*, as this directive is concerned with the adverse effects on the environment.[47] Importantly, this "potential *economic impact*" is a result, not of damage to plant life of health, but by the supposed inability of European farmers to satisfy either low tolerances for adventitious GM presence set for maintaining "organic" status or low thresholds for GM labelling requirements. For instance, in terms of organic agriculture, as no threshold has been set for adventitious presence of GM products, the general threshold of 0.9% applies.[48] However, organic regulations in the EC permit the use of seeds developed through mutagenesis, while GMO seeds are seen as antithetical to the philosophy of organic agriculture.

59. In any event, Dr. Andow is not qualified to provide expert advice on the extent of "economic loss", if any, that may be sustained by the organic or conventional farmer arising from the admixture of GM and non-GM products. Indeed, the EC in this proceeding, while referring to the "risk" of co-existence, has notably failed to put forth any analysis of the extent of any potential economic harm in this regard.

60. Sixth, although Dr. Andow acknowledges that "there are no reports of adverse effects on soil-micro- or macro-flora or fauna…"[49], he advises the Panel "not [to] infer that the absence of information implies an absence of effect." Nowhere does Dr. Andow discuss whether the same proposition holds true for non-GMHT crops.

61. Seventh, whatever the merits of Dr. Andow's theoretical argument that hemizygous traits are more dominant that heterozygous, Dr. Andow is simply incorrect when asserting that "GMHT are typically hemizygous."[50] It is common knowledge among experts that crops that are not hybrid crops (e.g. canola, cotton, soybean) are homozygous, not hemizygous. For instance, GT73 oilseed rape is homozygous. Conversely, hybrid crops may be a combination of hemizygous and homozygous. In Ms8/Rf3, half the plants are hemizygous and half homozygous for the HT trait. In any event, Dr. Andow's argument appears to be so qualified as to be speculative.

62. Eighth, Dr. Andow argues in para. 7.10 that GMHT transgenes are expressing all the time, while non-GMHT transgenes *may or may* not be, and therefore this may enable the herbicide to be used for a longer period of time resulting in a greater degree of weed reduction. However, as Dr. Andow points out, the weed reduction is a function of herbicide use. The simple solution is to use less herbicide.

63. As a general comment, nowhere does Dr. Andow refer to the fact that, in Europe at least, HT crops developed through mutagenesis are not subject to detailed risk assessments, and so the potential concerns about unintended effects, adverse effects on flora and fauna and "biogeochemical cycles", and adverse effects caused by the herbicides associated with these crops (imidazolinone and sulfonylurea) go practically ignored by European regulators. Moreover, nowhere does Dr. Andow acknowledge the environmental benefits of glyphosate and glufosinate-ammonium over other conventional herbicides. In Canada's view, his response to Question 9 is unbalanced and speculative.

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[46] *Commission Recommendation of July 2003 on guidelines for the development of national strategies and best practices to ensure the coexistence of genetically modified crops and organic farming*, p. 6 (Exhibit CDA-165). [emphasis in original]

[47] *Ibid*, p. 7.

[48] *Ibid*, p. 12.

[49] Andow, para. 7.06.

[50] Andow, para. 7.09.

8. What are the different detection methods currently available for testing for the presence of material from genetically modified plants?

(a) Have commercially available detection methods changed since the mid- 1990's? Were methods available in the mid-90's event specific?

(b) Please outline the steps necessary to validate a detection method, including the determination of what types of reference materials needed and differences in validation steps for qualitative and quantitative detection methods.

(c) What are the differences in the intended uses of qualitative and quantitative detection methods? What are the differences between event specific and non-event specific detection methods? How does the availability of different types of detection methods relate to risk assessment and risk management processes?

64. Only Dr. Nutti provided a response to Question 8. Dr. Nutti indicates that protein-based and DNA-based detection methods became available in the beginning of the 1990s. Both methods can be used in a qualitative and a quantitative fashion. Qualitative methods indicate the presence or absence of an analytical target (analyte) while quantitative methods measure the quantity of the analyte present.[51] Dr. Nutti states that protein-based methods can confirm the presence or absence of specific proteins expressed by different transgenic events and, while not event-specific, can identify uniquely most commercial events.

65. Dr. Nutti indicates that the type of detection method selected depends on the intended purpose of the detection. She concludes "[d]etection methods as applied to food or feed labelling do not have a direct role in risk assessment or risk management". Protein-based detection methods may be relevant to assess dietary intake and exposure to expressed proteins, but the "common understanding of detection methods is that they are used to describe the presence or absence of GMO grain (seed) in the context of conventional grain (seed)."[52] Hence, DNA-based event-specific quantitative detection is not necessary to conduct a risk assessment.

66. Dr. Healy, in answering Question 17, also confirms that quantitative detection "is not a necessary component of a safety assessment" although it is an integral part of enforcement capabilities especially for consumer labelling regulations.[53] Thus, to the extent that the approval procedures under *Directive 2001/18* and *Regulation 258/97* were delayed on the basis of the need for a quantitative event-specific detection method, these delays are not justified.

9. In what ways does molecular characterization inform the risk assessment for any particular biotech product? Can a risk assessment be carried out in the absence of a comprehensive molecular characterization of each transformation event?

67. All experts who responded agreed that molecular characterization was an important component of the risk assessment process. All the experts, save Dr. Andow, refer to *Codex Guidelines for the Conduct of Food Safety Assessment in Foods Derived from Recombinant DNA Plants*. In Canada's view, Dr. Healy's response most clearly articulates the importance of molecular characterization for a risk assessment. As Dr. Healy states:

[51] Nutti, p. 9.
[52] Nutti, p. 10. Also see Dr. Nutti's response to Question 17, p. 15.
[53] Healy, p. 12.

> The molecular characterisation is considered to be a very important part of the safety assessment of a biotech product. It provides information about the number of copies of the transgene(s) that have been inserted, presence of any multiple copies at the same or dispersed insertion site(s) and the structural organisation of the inserted transgene(s). The molecular characterisation also includes an analysis of the stability of the inserted DNA. Together this information provides verification that the intended genetic modification has occurred and provides some indication as to the likelihood of any unintended changes. However, the molecular characterisation is not the only mechanism for identifying unintended effects and the information from such studies should be considered in conjunction with the information from the other elements of the safety assessment.[54]

68. Dr. Healy also addresses the issue as to how comprehensive the molecular characterization should be in order to fulfill the requirements of an appropriate safety assessment. In this regard, she emphasizes that the "answer to this question depends on the type and quality of information available for the three elements of the safety assessment, the information revealed from these studies and the state of the scientific knowledge about the gene(s) to be transferred, the donor organism and the recipient organism."[55] She also recognizes that over time, technologies to analyse the molecular biological and biochemical characteristics of biotech products improve. However, this does not mean that products that were approved before such technologies were developed are any less safe. Canada shares this view. The tools that will be available in future for assessing molecular biological and biochemical characteristics will likely make today's tools seem rudimentary. However, the inevitability of future technological innovation should not paralyze decision-making today.

ISSUE 1

Questions:

Bayer hybrid oilseed rape (MS8/RF3)
C/BE/96/01 (EC chronology 63)

14. Given the information before the Panel, including the conclusions of the EC SCP (EC-63/At.54) in relation to the potential persistence or invasiveness of Bayer hybrid oilseed rape (MS8/RF3), would this product qualify as a potential pest according to ISPM 11? If so, are the proposed post-market monitoring plans consistent with the monitoring and review principles described in ISPM 11?

69. Both Drs. Snow and Squire agree that Ms/Rf3 has the potential to be a pest on the basis that oilseed rape generally leaves volunteer and feral descendents, which can be considered pests.[56] Similarly, both experts agree Ms8/Rf3 is no more likely to be a pest than conventional oilseed rape, except where the herbicide glufosinate-ammonium is used. Dr. Snow concludes if glufosinate-ammonium became widely used resulting in an increase in herbicide-resistant volunteers and weeds, "other methods of weed control" could be used to manage the problem.

70. Dr. Andow appears to disagree, claiming that there is not sufficient information before the Panel to determine whether Ms8/Rf3 qualifies as a pest. Specifically, he states that the SCP failed to consider whether Ms8/Rf3 had a higher release rate or determine "whether contamination of

[54] Healy, p. 2.
[55] Healy, pp. 2-3.
[56] Snow, p. 17, Squire, p. 12.

conventional varieties was an injury to plants."[57] In relation to the higher release rate, it is noteworthy that the SCP considered various factors affecting the persistence of Ms8/Rf3 and concluded that "the dispersal of transgenic rape seed should not be significantly different from that of the untransformed plants" and "[m]odified rape is no more invasive than unmodified plants."[58] In relation to the issue of "contamination of conventional varieties", it would be helpful if Dr. Andow could distinguish between injury to plant health or life and potential "economic loss" resulting from the "co-existence issue".[59]

71. In terms of post-marketing monitoring, Drs. Andow, Snow and Squire conclude that the proposed monitoring plans are consistent with the monitoring and review principles described in ISPM No. 11. While Dr. Andow indicates that the proposed plan is "the most thorough and well-considered of any of the monitoring plans in the material before the panel", both he and Dr. Squire suggest more information should be required. It may be useful, however, for the experts to indicate precisely what they view the objectives of the monitoring plans to be and thus what specific additional information is lacking. Moreover, in order to place the information requirements into context, it may be useful to compare what they consider to be appropriate monitoring requirements in this situation with monitoring requirements to detect the spread of resistance to herbicides more generally.

15. Given the information before the Panel, including the conclusions of the EC SCP, was the information regarding the assessment of the long-term effect of the newly expressed protein on the biogeochemical cycle and the food chain requested by the Italian CA (EC-63/At.87) necessary to ensure that conclusions of the safety assessment were valid?

72. Canada agrees with Dr. Nutti's analysis that the request by the Italian authorities cited in Question 15 was not necessary to ensure that the conclusions of the safety assessment of the newly expressed protein in the food chain.[60] Canada also notes that Dr. Andow concludes that the request was "not clear or specific enough to be considered necessary."[61] This underscores Canada's argument that certain EC Member States appear to have been stalling the approval process for biotech products by submitting vague and unjustified requests for additional information. Canada agrees with Dr. Andow that requests for additional information in the context of an approval procedure should be "clear and specific". A request for additional information should be based on a rational assessment of the information included in an application. If that information, or prevailing scientific knowledge, does not suggest any risk, additional requests for information are not warranted.

16. Given the information before the Panel, including the conclusions of the SCP, was the information regarding molecular characterization of this product requested by the lead CA (EC-63/At.107) necessary to ensure that conclusions of the safety assessment were valid?

73. The two experts responding to this question reach similar conclusions. Dr. Healy directly answers the question posed by the Panel: "The additional molecular characterization data sought by the lead CA in 2002 were not required to demonstrate the safety of food products derived from MS8, RF3, or MS8xRF3 hybrids…The totality of information provided in the dossier to that point in time contained sufficient information to support the validity of the conclusions of the safety assessment

[57] Andow, p. 27. Also see, Andow's response to Question 13, pp. 25-26.
[58] Pending notification - Bayer hybrid oilseed rape (MS8/RF3) – C/BE/96/01 p. 6 (Exhibit EC-63 – attachment 54).
[59] See Canada's comments under Question 7.
[60] Nutti, p. 14.
[61] Andow, p. 29

without the need for the additional molecular characterization data [requested by the Biosafety Council]."[62]

74. Dr. Snape does not respond to the question posed by the Panel concerning whether the additional information requested by the lead competent authority was necessary to ensure the validity of the conclusions of the safety assessment. Dr. Snape's review of the information examined for line Ms8 has led him to conclude that no further information is needed to approve these lines in the European Union. However, in relation to Rf3, Dr. Snape suggests that more information on structural analysis of progeny plants is needed to ensure that there is structural stability across generations. In essence, he argues that the developer should have evaluated stability of integrated sequences in Rf3 using molecular analysis (genotypic data) in addition to determining stability of inheritance using segregation studies (phenotypic data). Canada would like to highlight that in the original submission evaluated by regulatory authorities, the developer addressed stability of integrated sequences in Rf3 using both molecular analysis (Southern blot) and segregation data. Moreover, in Exhibit EC-83/At. 107, the Biosafety Council indicated that "[t]he documents are well documented and the experiments and the results are of a high standard." Unlike Dr. Healy, who considered the totality of the information, Dr. Snape does not appear to have considered that the two copies of the barstar gene contained in Rf3 are linked nor has he given due consideration to the segregation data.

17. Were detection methods commercially available in 2001 sufficient to enable the detection of the transgenic proteins expressed by the plant line hybrid oilseed rape MS8/RF3? Given the information before the Panel, including the SNIF (EC-63/At.109) and the updated environmental risk assessment (EC-63/At.110-140), was additional information regarding a quantitative detection method (EC-63/At.141) necessary to ensure that conclusions of the safety assessment were valid?

75. Dr. Healy's conclusions support Canada's position that the delay in the processing of Ms8/Rf3 occasioned by EC requests for an "event-specific" quantitative detection method is not justified on the basis of safety considerations. Dr. Healy concludes that quantitative immunoassay methods to detect the PAT protein were available as early as 2000. She also clarifies that "event-specific quantitative" detection methods are not necessary in order to determine the validity of a safety assessment, although such methods may be required for enforcement of labelling regulations. However, as Canada previously has argued, the wholesale suspension of an SPS procedure pending the adoption of labelling regulations unrelated to food safety is not a justifiable delay.[63] Accordingly, requiring the submission of a detection method, the sole purpose of which is to facilitate enforcement of labelling regulations unrelated to food safety, is not a justifiable request in the context of a safety assessment.

18. Given the information before the Panel, including the SNIF and the updated environmental risk assessment (referenced above), was the information regarding molecular data requested by the CA (EC-63/At.144) necessary to ensure that conclusions of the safety assessment were valid?

76. Again, Dr. Healy responds to this question in a clear and concise fashion. She concludes that the request for additional information was "simply" to update the dossier to conform to the new Belgian guidelines and that the additional information did not add substantially to the weight of evidence that supports the conclusions concerning the safety of Ms8/Rf3. Thus, contrary to the EC's assertion, this information was not necessary in order to conduct the risk assessment. It is noteworthy as well that Dr. Healy found it "surprising" that this additional information was only requested in July

[62] Healy, pp. 9-10.
[63] Canada Third Written Submission, para. 209.

2003, over a year after the guidelines had been adopted, despite the fact that the development of the guidelines proceeded in parallel with the ongoing assessment of this application. This supports Canada's argument that any resulting delay occasioned by this request should be attributed to the EC, not the notifier.[64]

19. Given the information before the Panel, including the SNIF, the updated environmental risk assessment and the clarification provided by the notifier (EC-63/At.147), was the information regarding ecological effects of this product on agricultural systems requested by the lead CA (EC-63/At.149) necessary to ensure that conclusions of the safety assessment were valid?

77. The views expressed by Drs. Snow and Squire support the conclusion that the request by the Belgian authorities for more information about effects on "farmland diversity (macro-fauna, weed flora and microbial soil ecosystem), food web integrity (trophic structure), population dynamics of key species, life-cycles etc." is not only vague, but impossible to answer without multi-year, large scale experiments. It is reasonable to infer that given the impossibility of conducting such experiments prior to approval of the product, the effect, if not the intent, of this request was to thwart the application.

78. Dr. Snow suggests that the concerns giving rise to these questions are related to the use of the associated herbicide with HT crops, *i.e.* that the use of glufosinate in conjunction with HT oilseed rape may be more effective at controlling weeds, which may have a deleterious effect on fauna and flora. Dr. Squire underscores the need for a "standard or comparator." Canada agrees and submits that the "standard or comparator" should be other weed management strategies, both herbicide and non-herbicide based.

79. Dr. Snow indicates that some of the data sought by the Belgian authorities seems "unnecessary".[65] It may be helpful if she could elaborate. It also may be helpful for either expert to identify whether similar types of information is sought in determining whether to approve other herbicide-based weed management strategies generally, including the type of herbicide (e.g. modes of action[66]), appropriate uses (e.g. pre-seeding burn-off[67], pre-emergent and post-emergent in-crop weed control) and desiccation[68].

80. Dr. Andow responds by indicating that some of the additional information requested by the Belgian CA may be necessary and some not necessary. In paragraph 19.04 of his report, Dr. Andow states that the notifier's response is "insufficient" and therefore a request for additional information necessary. However, point 4 refers to "direct and indirect interactions between the GMHP and target organisms…(if applicable)." Point 4 appears to be relevant only to those crops specifically developed for pesticidal qualities; consequently it is inapplicable in the context of this application.

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[64] Canada's Third Written Submission, para. 231.

[65] Snow, p. 18.

[66] There are several types of modes of action for herbicides, including amino acid synthesis inhibitiors, growth regulators, growing point disintegrators, seedling growth inhibitors, photosynthetic inhibitors cell membrane disruptors, and pigment inhibitors.

[67] "Pre-seeding burn-off" refers to the application of herbicides to destroy established vegetation prior to seeding.

[68] "Desiccation" refers to the application of a substance (desiccant) to a crop to accelerate the drying of plant tissue in order to aid in the harvest operation. Desiccants are typically applied to increase the uniformity of the moisture content in seeds.

81. In relation to the Belgian CA's request for additional information concerning "biogeochemical cycles", Dr. Andow appears to misstate the notifier's claim. The notifier did not claim that oilseed rape "does not participate in any biogeochemical cycles", but only that "oilseed rape has not been identified as serving a key function in such cycles."[69] Moreover, Dr. Andow's response appears to be inconsistent with his earlier conclusions in para. 10.13.[70] In March 2000, the Italian CA had requested additional information on the impact of glufosinate-tolerant oilseed rape on "biogeochemical cycles".[71] In dismissing that request as unclear, unspecific and scientifically unjustified, Dr. Andow concludes that:

> …[t]he request by the Italian CA [for information on biogeochemical cycles] is not clear or specific enough to be considered necessary. There are hundreds of possible processes in biogeochemical cycles that could be investigated…Unless the Italian CA can point to prior regulatory precedents where these terms are clarified, the phrasing of the request is not scientifically justified.

82. However, when the same request for additional information on the possible immediate and/or delayed effects on biogeochemical cycles was made by the Belgian CA nearly three years later in October 2003, Dr. Andow appears to conclude that the request for additional information was necessary. No explanation is provided for the apparent inconsistency in Dr. Andow's views. Moreover, while Dr. Andow concludes that 269 days seems "excessively long to complete the review and articulate questions", he does not comment on the fact that the first request for information on "biogeochemical cycles" was made in March 2000 by Italy, to which the notifier responded in November 2000.[72] It should be noted that neither the Italian nor Belgian CA, or any other EC Member State for that matter, raised concerns about the perceived inadequacy of the notifier's reply. There is no reason why Dr. Andow's conclusion with respect to Roundup Ready fodder beet – that a failure to follow-up on a reply indicates that the response was satisfactory[73] – should not apply here.

83. Dr. Andow cites the fact that root and leaf litter participate in carbon cycles and that this "may" have subtle effects on phosphorous cycles. However, Dr. Andow does not cite any scientific research to support this supposition nor does he point to any information in the dossier that would provide a compelling reason to suspect that the presence of the transgene would materially affect phosphorous cycles. The notifier first addressed this issue in its response to the Italian CA's initial request in March 2000[74] and then reiterated its response in its December 2002 updated Environmental Risk Assessment, stating that "there are no reasons to expect that the newly inserted traits alter the cycling of elements or organic nutrients…".[75] The rationale for this conclusion was in part that "the PAT enzyme that is produced in the glufosinate-tolerant oilseed rape is highly specific for its only known substrate, phosphinotricin" and extensive studies on the comparison of bacterial rhizosphere populations of transgenic and non-transgenic oilseed rape.

84. Dr. Andow's response to this question raises a general issue of the sufficiency of information required to conduct a risk assessment. It is quite possible to continue to pose questions regarding virtually any possible ecological interaction, leading to an endless series of studies, of no or limited

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[69] Exhibit EC-63- attachment 112, p. 40.
[70] Andow, p. 29, para. 19.10.
[71] The Italian CA requested this information for both oilseed rape Falcon GS40/90 and Ms8/Rf3. Dr. Andow's response is the same for both products.
[72] Exhibit EC-63 – attachment 88.
[73] Andow, para. 22.05.
[74] Exhibit EC-63 – attachment 88.
[75] Exhibit EC-63 – attachment 112, p. 40.

value in assessing the risks of a particular product. As Dr. Snow indicates, it is not always clear how to distinguish between what regulators "need to know" and what is "nice to know".[76] It might be helpful if Dr. Andow could explain why of all the "hundreds of possible processes in biogeochemical cycles that could be investigated",[77] he singled out the impact of phosphorous cycles as justifying a request for additional information. It might also be useful if Dr. Andow could identify criteria that in his view would be suitable for determining when additional information was necessary to conduct a risk assessment. Lastly, Canada would appreciate Dr. Andow's views on whether the degree of information necessary to conduct a risk assessment should be consistent across comparable situations and whether the fact that the EC does not even require a superficial environmental risk assessment for herbicide-tolerant crops developed through mutagenesis informs the level of information that should be sought in assessing risk.

85. In terms of Point 9, Dr. Andow concludes that, in part, the failure by the notifier to address changes in tillage practices justifies the request for additional information. This is a surprising remark given that one of the benefits of herbicide-tolerant crops is that it enables farmers to adopt low-tillage or no tillage farming practices, practices that are wide-acknowledged to be environmentally beneficial by reducing soil erosion, moisture loss and siltation.[78] It is curious that Dr. Andow would consider the failure to identify a widely-recognized environmental benefit as justification for delaying the processing of an application.

86. Lastly, Dr. Andow states that the notifier failed to address whether the "associated herbicide use would have adverse environmental effects."[79] To the contrary, the notifier indicated that registration for the specific use of glufosinate-ammonium with the crop in question would be addressed under the applicable legislation in accordance with *EC Directive 91/414/EEC*. Building on his comments in para. 6.15, Dr. Andow appears to assume that the specific use of herbicides in conjunction with GMHT crops should be considered under *Directive 2001/18* and not under *Directive 91/414/EEC*, the legislation specifically established to regulate plant protection products and their uses.[80] The impact of the use of herbicides is not relevant to a safety assessment of the crop in question.

20. Are the conclusions and recommendations in the Report of the Group of Experts Mandated by the Belgian Biosafety Advisory Council (EC-63/At.167 pp.20-21) regarding the agricultural guidelines proposed by the applicant consistent with the Belgian Biosafety Advisory Council's conclusion that the agricultural guidelines are "impracticable, hardly workable and hard to control"?

87. Both Drs. Andow and Squire responded to this question. Unfortunately, there appears to be some confusion as to the meaning of the Panel's question and as what the Belgian Biosafety Advisory Council was referring to when it stated that "a number of recommendations of the agricultural guidelines are impracticable, hardly workable and hard to control in current agricultural practices." It is clear that the Group of Experts considered the agricultural guidelines proposed by the notifier and made recommendations to apparently strengthen the guidelines. What is not clear is what the BBAC is referring to in reaching its conclusion. Dr. Squire lists several issues that he considers to present practical problems in implementing the guidelines.[81] However, these issues refer to recommendations

[76] Snow, p. 6.
[77] Andow, p. 23, para. 10.13.
[78] Snow, p. 9.
[79] Andow, para. 19.12.
[80] Canada Third Written Submission, paras. 77 and 245.
[81] Squire, p. 13.

made by the Group of Experts not the agricultural guidelines proposed by the notifier. Dr. Squire does not identify specific problems with what the notifier proposed. Dr. Andow attempts to divine whether the Group of Experts considered the guidelines proposed by the notifier to be "impracticable, hardly workable and difficult to control", despite the fact that they made no such finding.

88. The Panel's question appears to be whether the conclusion of the BBAC that the agricultural guidelines proposed by the notifier are "impracticable, hardly workable and hard to control" is consistent with the conclusions and recommendations of the Group of Experts. Given the fact that the Group of Experts did not express such a conclusion and in fact made recommendations to augment the proposed agricultural guidelines, it is difficult to conclude that the BBAC based its conclusion on the Report of the Group of Experts. To the contrary, the BBAC appears to have reached its own conclusion without providing any analysis.

89. In any event, what appears to be lost in this discussion is an evaluation of whether any risks associated with the cultivation of Ms8/Rf3 can be managed by the adoption of the proposed agriculture guidelines. Drs. Snow and Squire indicate that risk management options are available to address any issues that may arise, although they indicate that this will depend on local conditions and agronomic practices.[82] What is missing from the BBAC analysis is what elements of the proposed agricultural guidelines and recommendations are "impracticable, unworkable and difficult to control". These elements do not relate to risk management, but to the "co-existence" issue.

Monsanto Roundup Ready oilseed rape (GT73)
C/NL/98/11 (EC chronology 70)

26. Given the information before the Panel, including the notification (EC-70/At.1-3), was the information regarding molecular characterization of this product requested by the Dutch CA and by the UK (EC-70/At.4, 7, and 8) necessary to ensure that conclusions of the safety assessment were valid?

90. No expert has responded to this question. In any event, Canada does not contest that these early requests for additional information were scientifically justified and thus, pursuing this issue does not appear necessary.[83] The more important issue is whether the objections raised by EC Member States after the notification was circulated at the community-level were scientifically justified in the light of the favourable advice of the Netherlands scientific body (COGEM) in January 2001 and Netherlands Competent Authority's favourable assessment.[84] Canada submits that these objections were not justified, a conclusion consistent with the findings of the EFSA GMO Panel that "sufficient molecular characterization has been carried out."[85]

[82] Snow, p. 14. Squire, p. 9.

[83] Canada's Suggestions Regarding Questions to be submitted to Experts, 16 August 2004, para. 11. Following the Netherlands' request for additional information regarding molecular characterization (attachments 4, 7 and 8), the notifier submitted supplementary molecular analysis (attachment 10).

[84] Those objections and the notifier's response are summarized in Exhibit EC-70 – attachment 103, pp. 4-5.

[85] EC, EFSA, Scientific Panel on Genetically Modified Organisms, *Opinion on a request from the Commission related to the Notification (Reference C/NL/98/11) for the placing on the market of herbicide-tolerant oilseed rape GT73, for import and processing, under Part C of Directive 2001/18/EC from Monsanto (Question No. EFSA-Q-2003-078)*, adopted 11 February 2004, online: http://www.efsa.eu.int/science/gmo/gmo_opinions/catindex_en.html, p. 14 (Exhibit CDA-35-N).

27. Given the information before the Panel, including the notification, was the information regarding feed safety aspects of this product requested by the Netherlands (EC-70/At.8 and 13) necessary to ensure that conclusions of the safety assessment were valid?

91. Only Dr. Nutti responded to this question. For the sake of clarity, it may be helpful if Dr. Nutti could specify the information provided by the applicant to which she refers, given that she appears to have mistakenly cited exhibits that contain the request by the Netherlands – RIKILT-DLO, (attachments 8 and 13), not the information originally provided by the notifier (attachments 1 to 3). In addition, Canada requests that Dr. Nutti identify the "analysis done by the EC SCP" to which she refers. To Canada's knowledge, the SCP did not analyze this application. The only analysis undertaken by a Community-wide scientific committee was by the EFSA GMO Panel in February 2004, well after the Netherlands – RIKILT-DLO's initial request for additional information regarding feed safety.

28. Given the information before the Panel, including the notification and the SNIF (EC-70/At.49-53), was the additional information provided in Monsanto's submission to the Commission (EC-70/At.84-97) necessary to ensure that conclusions of the safety assessment were valid?

92. Drs. Andow and Nutti responded to this question. The question is intended to determine whether the information that was considered by the Netherlands Competent Authority (including the updated notification) was sufficient to support the authority's favourable risk assessment. Put another way, were the objections raised by EC Member States after the favourable assessment by the Netherlands Competent Authority unjustified. If such objections were justified, then presumably, the information supplied by the notifier in response to those objections (Exhibit EC-70 – attachments 84-97) was necessary to ensure that the conclusions of the safety assessment were valid.

93. Canada has no comments in relation to Dr. Nutti's evidence, which supports Canada's position that the objections by the EC Member States were not necessary to ensure the validity of the risk assessment.

94. Canada has the following comments on Dr. Andow's answer, which focuses only on monitoring. By way of background, the notifier proposed a monitoring plan to identify the occurrence of adverse effects not anticipated in the environmental risk assessment.[86] In its favourable assessment report, the Netherlands Competent Authority stated that, since the notification for GT73 oilseed rape only covers import and processing and does not include cultivation, post-market monitoring of the product and its effects on the environment is not an issue. Nevertheless, given that a monitoring plan is required under *Directive 2001/18*, the competent authority recommended that the company provide data of sales on an annual basis and amounts imported at key ports for each Member State, apparently in addition to what the notifier had already proposed.[87] EC Member States objected to the adequacy of the monitoring plan insisting on more onerous conditions. The notifier responded to these objections[88] and submitted an updated monitoring plan.[89] The EFSA, taking all of the information into consideration, concluded that the proposed monitoring plan was acceptable in the light of the intended use of GT73.

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[86] Pending notification - Monsanto Roundup Ready oilseed rape (GT73) – C/NL/98/11 (Exhibit EC-70 – attachment 51).

[87] Exhibit EC-70 – attachment 66.

[88] Exhibit EC-70 – attachment 85, p. 22.

[89] Exhibit EC-70 – attachment 92, being Appendix 9 to Monsanto's response to reactions of EC Member States (attachment 85)

95. Question 28 does not seek to determine whether the monitoring plan accepted by EFSA is adequate or meets the requirements of *Directive 2001/18*. The issue is the adequacy of the initial monitoring plan proposed by the notifier in the SNIF and whether the objections by the EC Member States to that initial plan were justified. It is important to emphasize that the underlying issue in respect of the monitoring plan is not whether the monitoring plan complies with *Directive 2001/18* or how to interpret the provisions of that Directive (whether something is case-specific or not), but whether the proposed SPS measure (*i.e.* the monitoring plan) is "based on" the risk assessment.

96. Dr. Andow appears to assume that the adequacy of the monitoring plan is to be determined by reference to the aims proposed by the EC Member States. Canada disagrees. The monitoring plan is to identify the occurrence of adverse effects on human health or the environment not anticipated in the environmental risk assessment. The conclusions of the risk assessment are not based simply on "exposure", *i.e.* the likelihood of spillage, but the consequences for the environment in the event of unanticipated spillage, *i.e.* "adverse effect" or harm. Given the conclusions of the risk assessment summarized succinctly by the UK competent authority - "the risk assessment does not identify risks in relation to human health or the environment from the use of GT73 oilseed rape as defined in the notification (i.e. for import and processing)" – there is no justification for imposing a monitoring plan to monitor so-called "contamination of other agricultural systems".[90]

97. Dr. Andow appears to accept as justifiable Italy's concern with possible effects of glyphosate and its metabolites.[91] Dr. Andow does not elaborate on this concern, which Canada understands as a concern that the residues of glyphosate sprayed on the oilseed rape may remain on the seeds and may cause adverse effects to the environment should the seeds be accidentally spilled. Given that glyphosate metabolizes rapidly in the soil and is widely used in the EC (indeed it is approved in most EC Member States), glyphosate residue cannot be a serious concern.

98. Lastly, given that most of the processing facilities for oilseed rape are located in port areas, away from areas under cultivation, the probability of the establishment and spread of oilseed rape into the environment is very remote.

ISSUE 2

Oilseed rape MS1 x RF1 (notification C/UK/94/M1/1)

Safeguard measure of France

59. Given the information before the Panel, including the evaluations undertaken by the UK (EC-161/At.1), the Scientific Committee on Plants in May 1998 and May 1999 (CDA-35-A and CDA-69, respectively), and the European Commission in its Decision of February 1996 (CDA-62), as well as the information submitted by France with respect to its safeguard measure (EC - 161/At. 3 to 11; CDA-68, CDA-70, CDA-71), is there any reason to believe that the scientific evidence available to France in November 1998 and July 2001 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the growing for seed production of oilseed rape MS1 x RF1? If so, what scientific evidence do you believe was insufficient?

[90] *Commission Recommendation on Co-existence*, p. 6 and 7. "It is important to make a clear distinction between the economic aspects of co-existence and the environmental and health aspect dealt with under Directive 2001/18/EC on the deliberate release of GMOs into the environment." (Exhibit EC-165).

[91] Andow, para. 28.04, 28.22 and 28.26.

(a) If the evidence was not sufficient in November 1998 and/or in July 2001, was there sufficient evidence available to France in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from the growing for seed production of oilseed rape MS1 x RF1? If not, what scientific evidence do you believe was insufficient?

99. In his reply to this question, Dr. Squire says that France was concerned about the up-scaling issue (the uncertainty of what might occur if GMHT crops were grown widely in the country) and that there was in fact insufficient information available at that time to be able to predict accurately, for a country such as France, what the rates of spread and cross-pollination would be (GM to non-GM) if a large part of the rapeseed areas were GM.[92] Dr. Squire states that even by the end of 2003 there was uncertainty as to what the field-to-field cross-pollination might be.[93]

100. In her reply, Dr. Snow expresses the view that the SCP's assumption that the risk of establishment was low is not supported by the evidence, including evidence that became available during 1998-2003.[94] She concludes that France had valid reasons in 1998 to follow the advice of the CGB to carry out more research.[95] According to Dr. Snow, France needed more information about the rate at which the transgene for glufosinate tolerance would spread to volunteer plants and related weeds. By 2003, more scientific knowledge was available but new information was still coming to light about the spread and persistence of genes for herbicide tolerance.[96]

101. Dr. Andow takes the position that the scientific evidence in 1998 on dispersal of oilseed rape pollen was not sufficient to complete an accurate assessment of dispersal probability, but that "sufficient data appeared by the end of 2002".[97]

102. Both Dr. Squire and Dr. Andow reference an article published in *Science*.[98] However, there were methodological problems with that study. Specifically, the authors did not determine background levels of the ALS2 mutation prior to the experiment; considering the extremely low levels obtained, what is ascribed by the authors to long distance pollen flow could just as easily be ascribed to population background levels of the mutation.

103. Dr. Andow also speculates about the possibility that fields of HT oilseed rape might not be harvested, with the result that that entire crop goes to seed – asserting this may require "exceptional" agricultural practices to control volunteers/weeds. He states that "such possibilities were not considered by the SCP, and France may be concerned about such scenarios."[99] However, apart from being purely speculative both as to the occurrence of the scenario and France's concerns, the putative problem he describes is not a problem specific to transgenic oilseed rape. In any event, control measures would be similar as between transgenic and non-transgenic varieties, and effective mitigation measures exist, and tillage can always be employed as a last resort.

104. Dr. Andow indicates that "in 2001 the French Biomolecular Engineering Committee (BEC) called for additional research in this area, but by the middle of 2003, the BEC believed that it had

[92] Squire, p. 15.
[93] *Ibid*.
[94] Snow, p. 19.
[95] *Ibid*., p. 21.
[96] *Ibid*.
[97] Andow, p. 81.
[98] Squire, p. 15; Andow, fn. 25.
[99] *Ibid*.

sufficient information to complete an assessment".[100] This view seems to be borne out by the BEC's February 2004 opinion.[101]

105. In contrast with Drs. Snow and Squire, and consistent with Dr. Andow's views, Canada considers that ample scientific evidence existed by the end of 2003 for France to complete a risk assessment. The BEC seems to share that view given the opinion that it issued in February 2004. In short, there is ample evidence on pollen flow, volunteer persistence and management strategies at this time for France to have made a decision. International seed certifying bodies have devoted extensive time and effort to examine issues of seed purity, hence proper management practices are well described.

106. Dr. Andow also posits what France could have argued – but did not – in 1998 in support of its prohibition on the marketing of oilseed rape Ms1/Rf1: that there was insufficient data to identify all of the possible environmental hazards of GMHT oilseed rape; that the molecular characterization was insufficient; that the risk of evolution of resistance in weeds not related to the *Brassicae* had been incompletely assessed and management of these risks required additional scientific data; and that the data on non-target effects was insufficient.[102] Given that he also notes that sufficient information was available by October 2003 to assess these risks, even assuming that he is correct – a matter that is not clear given the absence of any supporting references or other documentation – it is not clear what value this information has in the context of this proceeding.

60. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by France evaluate the relevant risks to human, plant or animal health, and the environment from the growing of oilseed rape MS1 x RF1 for seed production?

(a) How does the scientific evidence and other documentation submitted by France compare with the relevant international guidelines for risk assessment and analysis identified above?

107. Dr. Andow expresses the view that scientific evidence and other information submitted by France probably did not meet requirements for a risk assessment as defined in the *SPS Agreement* or ISPM No. 11.[103] He asserts, however, that the science, documentation and reasoning of France is consistent with Annex III of BSP. Be that as it may, Annex III of the BSP is not an international standard or guideline as that term is defined in the *SPS Agreement*.

108. Dr. Squire indicates that "it could be argued" that France's position was compatible with the "tone" of the definition of a risk assessment in the *SPS Agreement*, and compatible also with ISPM No. 11.[104] Aside from the uncertain meaning of "it could be argued" and "tone", Dr. Squire does not really explain in what way exactly his view is supported by the facts.

61. Does the scientific evidence and other information submitted by France support the adoption of a temporary prohibition on the growing of oilseed rape MS1 x RF1 for seed

[100] *Ibid*.
[101] French Commission du génie biomoléculaire (CGB) released a scientific opinion addressing the potential impacts on the environment arising from the cultivation of genetically modified oilseed/rape, 13 February 2004 (Exhibit CDA-169).
[102] Andow, p. 81.
[103] Andow, p. 82.
[104] Squire, p. 15.

production? In light of any potential risks identified by France, what other risk management options were available in November 1998 and/or July 2001? What other risk management options are now available?

109. Dr. Snow considers that she does not have enough information to answer the question.[105] She indicates that seed production on a small scale probably would not justify a temporary prohibition; however, if the plants are grown on a fairly large scale (1000+ hectares/yr) she appears to be of the view that a temporary prohibition was justified.[106] According to her, the basic concern is that herbicide resistance genes would spread in conjunction with wider use of the herbicide over time and other herbicide resistance genes might be approved in the future (e.g. glyphosate resistance) thereby compounding the problem.[107] She does not respond to the question about the availability of risk management options.

110. In contrast, Dr. Squire says that risk management options exist to reduce the risk of spread and cross-pollination, but it cannot be eliminated.[108]

111. In his answer, Dr. Andow expresses the view that the adoption of a temporary prohibition can be justified on the basis of the scientific evidence and other information submitted by France.[109] However, he seems to suggest that less restrictive risk management options were available to France in 1998 and 2001, such as phased-in cultivation, which would have allowed for a determination of scale effects.[110] He also appears to agree with Canada's position that the maintenance of the French prohibition is not justified when he says that "today several alternative risk management options are available…it would appear that France is now convinced that if HT volunteers or wild species occur that they can be detected rapidly enough and eliminated."[111] This view also appears to be borne out by the BEC opinion of February 2004.[112]

Topas 19/2 (notification C/UK/95/M5/1)

62. Given that oilseed rape Topas 19/2 was only approved for import of seeds for processing, what is the relevance of the findings of the UK farm scale evaluation study (EC-38) in terms of the assessment of potential risks from Topas 19/2?

112. The experts all agree that the UK farm scale evaluation study (FSE) is not relevant to assessing the potential risks arising from the import and processing of Topas 19/2.[113]

113. Their conclusions strongly support the argument that there is no scientific evidence regarding environmental risks to support either France's or Greece's prohibition on the marketing of this product. In fact, France's own scientists agree that the environmental risks associated with importing and processing Topas 19/2 are no different from those associated with importing and processing conventional oilseed rape.[114]

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[105] Snow, p. 23.
[106] *Ibid*.
[107] *Ibid*. p. 24.
[108] Squire, p. 15.
[109] Andow, p. 83.
[110] *Ibid*.
[111] *Ibid*.
[112] Exhibit CDA-169.
[113] Squire, p. 15; Andow, p. 84; Snow, p. 24.
[114] Exhibit CDA-169, pp. 10-11 (translation).

Safeguard measure of France

63. Given the information before the Panel, including the evaluations undertaken by the UK (EC-162/At.1 to 3), and the Scientific Committee on Plants in February 1998 (CDA-63), May 1999 (CDA-65 and CDA-73), and the European Commission in its Decision of April 1998 (CDA-61), as well as the information submitted by France with respect to its safeguard measure (EC-162/At. 5, EC-161/At. 3 to 11, CDA-64, CDA-66, CDA-67), is there any reason to believe that the scientific evidence available to France in November 1998 and July 2001 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the import and processing of oilseed rape Topas 19/2? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in November 1998 and/or in July 2001, was there sufficient evidence available to France in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from the import and processing of oilseed rape Topas 19/2? If not, what scientific evidence do you believe was insufficient?

114. The experts appear to share the view that sufficient scientific evidence was available to France to undertake an appropriate assessment of the potential risks associated with the import and processing of Topas 19/2, although they differ on when that evidence was available.

115. Dr. Snow indicates that she found no convincing arguments for why further scientific research would be needed to investigate environmental effects of a product that is only intended for import and processing and not for cultivation.[115] She states that "any seed spillage that might occur when the seeds are delivered could be managed and that it is extremely unlikely that the seeds would be cultivated inadvertently."[116]

116. Dr. Andow states his view that "the rationale put forward by France does not argue that a risk exists that requires management."[117] However, Dr. Andow goes on to list putative arguments that France could have made. This is the same list as for Ms1/Rf1, including insufficiency in the molecular characterization and possible contamination of conventional oilseed rape varieties. On the basis of that list, Dr. Andow asserts that, "given the information before the Panel, France could have argued in November 1998 that there was insufficient evidence to complete a risk assessment. However, I believe that had France collected the necessary data to complete this risk assessment promptly after implementing their temporary prohibition that they could have had sufficient data to make a decision in 2001".[118]

117. Apart from the questionable assertions regarding molecular characterization and the contamination issue, for which Dr. Andow does not advance any evidence, and with which Canada does not agree, Dr. Snow and Dr. Andow express views that support Canada's position that the French prohibition on the import and processing of Topas 19/2 is not justifiable on scientific grounds.

64. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation

[115] Snow, p. 25.
[116] *Ibid*.
[117] Andow, p. 84.
[118] *Ibid*., p. 85.

submitted by France evaluate the relevant risks to human, plant or animal health, and the environment from the import and processing of oilseed rape Topas 19/2?

(a) How does the scientific evidence and other documentation submitted by France compare with the relevant international guidelines for risk assessment and analysis identified above?

118. Although Dr. Snow does not appear to answer the question directly, her answer, which states that no further scientific research was needed,[119] implies that France's scientific evidence and other documentation was irrelevant.

119. Dr. Andow expresses the view that France scientific evidence and other documentation did not meet requirements of a risk assessment as defined in the *SPS Agreement* or the requirements of ISPM No.11.[120] Dr.Andow does express the view that the "science, documentation and reasoning of France are consistent with Annex III of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity."[121] Dr. Andow refers specifically to section 8(f) of Annex III, which is concerned with situations "where there is uncertainty regarding the level of risk". Canada, however, is of the view that Annex III of the Cartagena Protocol does not constitute an "international standard" as that term is defined in the *SPS Agreement*. In any event, the scientific evidence does not disclose that "uncertainty regarding the level of risk" existed. Hence, Section 8(f) would not be relevant in this particular context.

65. Does the scientific evidence and other information submitted by France support the adoption of a temporary prohibition on the import and processing of oilseed rape Topas 19/2? In light of any potential risks identified by France, what other risk management options were available in November 1998 and/or July 2001? What other risk management options are now available?

120. The experts support the argument that there is no scientific justification for maintaining the French ban on Topas 19/2. This contention is also supported by France's own scientists.[122]

121. In particular, Dr. Andow states that the scientific evidence and other information submitted by France do not support the adoption of a temporary prohibition.[123] He also asserts that other scientific evidence and information before the Panel could have been used to support a temporary prohibition. However, it is unclear what other "scientific evidence and other information" he has in mind in making this assertion. In any event, he concedes that, even on these grounds, a prohibition would probably not be justifiable past 2001.

122. In contrast to Dr. Andow's equivocation, Dr. Snow states clearly that she "did not find any convincing arguments for why further scientific research would be needed to investigate environmental effects of a product that is only intended for import and processing and not for cultivation."[124]

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[119] Snow, p. 26.
[120] Andow, p. 85.
[121] Andow, pp. 85-86.
[122] Exhibit CDA-169, pp. 10-11 (translation).
[123] Andow, p. 86.
[124] Snow, p. 26.

Safeguard measure of Greece

66. Given the information before the Panel, including the evaluations undertaken by the UK (EC-162/At.1 to 3), and the Scientific Committee on Plants in February 1998 (CDA-63), May 1999 (CDA-65 and CDA-73), and the European Commission in its Decision of April 1998 (CDA-61), as well as the information submitted by Greece with respect to its safeguard measure (EC-162/At. 4, CDA-72), is there any reason to believe that the scientific evidence available to Greece in September 1998 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from the import and processing of oilseed rape Topas 19/2? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in September 1998, was there sufficient evidence available to Greece in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from the import and processing of oilseed rape Topas 19/2 (EC-162/At.6 to 13)? If not, what scientific evidence do you believe was insufficient?

123. The experts agree that the Greek prohibition on the importation of oilseed rape Topas 19/2 is not scientifically justified.

124. Although Dr. Andow asserts that Greece's third reason for banning Topas 19/2 (increased difficulty in managing farmland because GMHT oilseed rape winters better in Greece and could spread faster and is hard to eliminate once established as a weed) has some merit as a risk, he also notes that risk management options other than a ban are available to address this problem.[125]

125. Dr. Andow also suggests that there were other arguments that Greece could have made to support the ban in 1998 on grounds of insufficient scientific evidence to complete a risk assessment. He does not specify what the insufficiencies were, but, in any event, he concludes that, had Greece collected the necessary data, it would have been able to make a decision by 2001 at the latest.[126]

126. Again, Dr. Snow is unequivocal in rejecting the idea that Greece did not have sufficient scientific evidence available to it to complete a risk assessment.[127] Dr. Snow indicates that she does not understand why Greece assumes feral populations would become established or why they would become environmental problems, and that even if such populations became established there is no scientific reason to expect that gene flow would harm the genetic diversity or abundance of wild relatives.[128]

67. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Greece evaluate the relevant risks to human, plant or animal health, and the environment from the import and processing of oilseed rape Topas 19/2?

[125] Andow, p. 87.
[126] *Ibid*., pp. 87-88.
[127] Snow, p. 27.
[128] *Ibid*.

(a) How does the scientific evidence and other documentation submitted by Greece compare with the relevant international guidelines for risk assessment and analysis identified above?

127. Dr. Andow is of the view that Greece failed to follow the requirements of either the *SPS Agreement* or ISPM No.11 but that the science, reasoning and documentation of Greece was consistent with Annex III of the BSP.[129] As was noted earlier, Canada is of the view that Annex III of the BSP does not constitute an international standard or guideline as those terms are defined in the *SPS Agreement*.

128. Dr. Snow repeats her answers to questions 63-66.[130]

68. Does the scientific evidence and other information submitted by Greece support the adoption of a temporary prohibition on the import and processing of oilseed rape Topas 19/2? In light of any potential risks identified by Greece, what other risk management options were available in September 1998? What other risk management options are now available?

129. The experts agree that the Greek import prohibition is not scientifically justified,[131] although Dr. Andow appears to be of the view that it was scientifically justified in 1998.

130. The advice of the experts supports the argument that the Greek import prohibition cannot be justified on the basis of scientific evidence.

Maize MON 810 (notification C/F/95/12-02)

Safeguard measure of Italy

78. Given the information before the Panel, including the evaluations undertaken by France (EC-159/At.1 and 2); and the Scientific Committee on Plants in February 1998 (CDA-82), September 1999 (US-55), and September 2000 (CDA-86), and the European Commission in its Decision of April 1998 (CDA-81), as well as the information submitted by Italy with respect to its safeguard measure (EC-157/At. 1 and 2, CDA-78), is there any reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from Maize MON 810? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in August 1988, was there sufficient evidence available to Italy in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from Maize MON 810? If not, what scientific evidence do you believe was insufficient?

131. Dr. Nutti indicates in her reply that the information provided by the applicant covered all the items needed for the comparison of the GM maize and its conventional counterpart.[132] According to

[129] Andow, p. 88.
[130] Snow, p. 27.
[131] Andow, p. 88; Snow, p. 27.
[132] Nutti, p. 58.

her, the variation in the levels of protein was in the range of natural variation so the point raised by Italy regarding protein levels was not correct.[133]

132. In conclusion, Dr. Nutti states that "there is NO reason to believe that the scientific evidence available to Italy in August [1998] was NOT sufficient to permit it to undertake an appropriate assessment of the potential risks to human, plant and animal health…from Maize MON810".[134]

133. The expert's advice is fully consistent with the argument that the Italian ban on MON810 was not scientifically justified.

79. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Italy evaluate the relevant risks to human, plant or animal health, and the environment from Maize MON 810?

(a) How does the scientific evidence and other documentation submitted by Italy compare with the relevant international guidelines for risk assessment and analysis identified above?

134. Dr. Nutti indicates that the information for the safety assessment provided by the applicant and evaluated by France and the SCP and SCF were adequate and in accordance with Codex guidelines.[135] In contrast, the information and arguments submitted by Italy were not.[136]

135. In this regard, also, the expert's advice is fully consistent with the argument that there is a virtually complete absence of scientific justification for Italy's ban on MON810.

80. Does the scientific evidence and other information submitted by Italy support the adoption of a temporary prohibition on Maize MON 810? In light of any potential risks identified by Austria, what other risk management options were available in August 1988? What other risk management options are now available?

136. Dr. Nutti concludes that the scientific evidence submitted by Italy does not support a temporary prohibition on Maize MON810.[137]

137. The expert's advice supports Canada's position.

Maize T25 (notification C/F/95/12-07)

Safeguard measure of Austria

84. Given the information before the Panel, including the evaluations undertaken by France (EC-160/At.1 and 2); the Scientific Committee on Plants in September 2000 (CDA-75) and September 2001 (CDA-86 and CDA-77), and the European Commission in its Decision of April 1998 (CDA-74), as well as the information submitted by Austria with respect to its safeguard measure (EC-160/At.3 and 5, CDA-76, EC-144, EC-153), is there any reason to believe that the

[133] *Ibid*.
[134] *Ibid*.
[135] Nutti, p. 58
[136] *Ibid*.
[137] Nutti, p. 59.

scientific evidence available to Austria in April 2000 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from Maize T25? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in April 2000, was there sufficient evidence available to Austria in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from Maize T25 (EC-158/At.30-42)? If not, what scientific evidence do you believe was insufficient?

138. Dr. Nutti states that, based on the information presented by the notifier and the scientific evaluation undertaken by France and by the SCP, there is no reason to believe that the scientific evidence available to Austria in 1999 was insufficient to allow it to undertake an appropriate assessment of potential risks to human, plant and animal health from maize T25.[138]

139. From the standpoint of environmental risks, according to Dr. Andow, Austria presented six reasons for its safeguard measure:

- environmental risks had not been sufficiently evaluated under realistic conditions;
- no post-commercialization program;
- potential risk of harm from pollen transfer, though likely absent, should be monitored;
- no measures to protect ecologically sensitive areas;
- a need for "good farming practice" guidelines to minimize risk of resistance; and
- the need to assess long-term and secondary ecological effects.[139]

140. Dr. Andow says (1), (3), (5) and (6) present possible justification for the safeguard measure. He then discards (6) on the grounds that assessing long-term effects is impossible in pre-commercial assessments. He discards (3) on the grounds that Austria does not specifically identify the possible harm. He also dismisses (1) on the grounds that Austria does not provide any scientific evidence that such harms might exist, with the exception of resistance risk. Notably, he says that "a risk assessment cannot be considered insufficient if all concrete possible risks are addressed".[140]

141. This leaves only the issue of the evolution of resistance in weeds as a secondary environmental effect. Dr. Andow says that the amended SCP opinion (CDA-77) does not provide an assessment of this risk even though resistance risks are widely recognized and the consistent use of glufosinate with T25 would result in such a risk. Thus, according to Andow, "there was insufficient scientific evidence available to the SCP and Austria to assess weed resistance risk and appropriate risk management measures."[141]

142. Dr. Andow acknowledges, however, that managing resistance risk in maize should be easier than for oilseed rape, and says that adequate information for a risk assessment would have been available by 2003 had the parties made concerted efforts to bring it together.[142] However, it is not clear to Canada what the environmental risk is, or why adequate information to complete a risk

[138] *Ibid*. p. 60.
[139] Andow, p. 110.
[140] *Ibid*. pp. 111-12.
[141] *Ibid*.
[142] *Ibid*.

assessment would not have been available until 2003. Clearly, resistance management strategies were well-understood and practised before 2003.

143. Dr. Andow then goes on to offer his views on shifting evidentiary standards for what constitutes an objective environmental risk assessment, particularly in relation to the molecular basis of transformation, and regarding the emergence of contamination of conventional production as possible new grounds for the safeguard measure. He concedes that scientific evidence to support risk management measures to address the coexistence "risk" were available in 2003, and concludes that Austria could also argue that T25 was "inadequately characterized".

144. In reality, Dr. Andow's focus on the possible emergence of resistant weeds as an environmental risk – and, moreover, one that could not be adequately addressed until 2003 – flies in the face of the fact that the emergence of herbicide resistance is an endemic issue wherever herbicides are used. Furthermore, the herbicide in question – glufosinate-ammonium – has proved to be remarkably resilient when it comes to the emergence of resistance. Despite extensive use, there is no recorded case of weeds becoming resistant to this herbicide.

145. Canada also fails to understand Dr. Andow's comment that, "in 2003, Austria could also argue that T25 was inadequately characterized."[143] The fact that molecular characterization techniques may have improved in the intervening years between the Community-wide approval of T25 in 1998 and 2003, to argue five years after the fact that molecular characterization was inadequate while relying on technology that did not even exist at the time the product was approved is to invite the perpetual delay of product approvals. The question has to be asked, is there a valid scientific reason to do so in absence of a demonstrable risk.

85. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Austria evaluate the relevant risks to human, plant or animal health, and the environment from Maize T25?

(a) How does the scientific evidence and other documentation submitted by Austria compare with the relevant international guidelines for risk assessment and analysis identified above?

146. Dr. Nutti is of the view that the information for the safety assessment of potential risks to human and animal health that was submitted by applicants and evaluated by French CA met international guidelines (Codex) was adequate and in accordance with the relevant international standard.[144]

147. Dr. Andow expresses doubt that Austria's scientific evidence and other information meets the requirements of the *SPS Agreement* or ISPM No. 11, but he is of the view that it is "probably" consistent with the Annex III of the BSP.[145]

86. Does the scientific evidence and other information submitted by Austria support the adoption of a temporary prohibition on Maize T25? In light of any potential risks identified by Austria, what other risk management options were available in April 2000? What other risk management options are now available?

[143] *Ibid*.
[144] Nutti, p. 60.
[145] Andow, p. 112-13.

148. Dr. Nutti says that, from the perspective of food and feed safety, the Austrian prohibition on maize T25 was not scientifically justified.[146]

149. Dr. Andow says that the adoption of the prohibition was "probably" not justified on the basis of the scientific evidence and other information provided by Austria.[147] At the same time, he claims that "a temporary prohibition probably could have been justified at the time because the appropriate scientific information did exist".[148] Dr. Andow does not specify to what "appropriate scientific information" he is referring, nor does he indicate the nature of the risk to which that information would pertain. Without knowing this, Canada is not in a position to comment on Dr. Andow's response.

150. In the following paragraph, Dr. Andow offer the opinion that "several other risk management options could also have been justified in April 2000", focusing on the resistance risk, and suggests a few.[149] It is not clear what distinction Dr. Andow draws between "risk mitigation" and "risk avoidance". What is clear is that well-understood, scientifically verified risk management measures did exist in 2000 to address any concerns about weed resistance that Austria might have had at that time, including proper crop and herbicide management. In any event, the evolution of resistant weeds is only an issue if (1) the weed is economically important, and (2) no other suitable, sustainable control measures exist (e.g., alternative herbicide applications).

Safeguard measure of Italy

87. Given the information before the Panel, including the evaluations undertaken by France (EC-160/At.1 and 2); the Scientific Committee on Plants in September 2000 (CDA-75) and September 2001 (CDA-86 and CDA-77), and the European Commission in its Decision of April 1998 (CDA-74), as well as the information submitted by Italy with respect to its safeguard measure (CDA-78, EC-157/At. 1 and 2), is there any reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from Maize T25? If so, what scientific evidence do you believe was insufficient?

> **(a) If the evidence was not sufficient in August 1988, was there sufficient evidence available to Italy in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from Maize T25? If not, what scientific evidence do you believe was insufficient?**

151. Dr. Nutti indicates that there is no reason to believe that the scientific evidence available to Italy in August 2000 was insufficient to allow an appropriate assessment of potential risks to human, plant and animal health from maize T25.[150]

152. The expert's advice supports Canada's position that there was no scientific reason for Italy to impose a prohibition on maize T25 for food and feed.

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[146] Nutti, p. 61.
[147] Andow, p. 113.
[148] *Ibid*.
[149] *Ibid*.
[150] Nutti, p. 62.

88. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Italy evaluate the relevant risks to human, plant or animal health, and the environment from Maize T25?

(a) How does the scientific evidence and other documentation submitted by Italy compare with the relevant international guidelines for risk assessment and analysis identified above?

153. Dr. Nutti concludes that the scientific evidence submitted by Italy does not meet the requirements of the relevant international guidelines (Codex).[151]

89. Does the scientific evidence and other information submitted by Italy support the adoption of a temporary prohibition on Maize T25? In light of any potential risks identified by Italy, what other risk management options were available in August 1988? What other risk management options are now available?

154. Dr. Nutti is of the view that the scientific evidence submitted by Italy does not support a temporary prohibition on GM maize T25.[152]

155. The expert's advice supports Canada's position.

Maize MON 809 (notification C/F/95/12-01/B)

Safeguard measure of Italy

90. Given the information before the Panel, including the evaluations undertaken by the Scientific Committee on Plants in May 1998 and September 2000 (CDA-85 and CDA-86), as well as the information submitted by Italy with respect to its safeguard measure (CDA-78, EC-157/At. 1 and 2), is there any reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from Maize MON 809? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in August 1988, was there sufficient evidence available to Italy in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from Maize MON 809? If not, what scientific evidence do you believe was insufficient?

156. Dr. Nutti indicates that the information submitted by the applicant covered all the items needed for the comparison of the GM maize and its conventional counterparts, not only for with data on nutrients, but also with animal feeding studies.[153] The variation in levels of protein was in the range of natural variation, so Italy's point concerning protein levels was not correct. She concludes that "there is NO reason to believe that the scientific evidence available to Italy in August [2000] was

[151] *Ibid*., p. 63.
[152] *Ibid*.
[153] Nutti, p. 64.

NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health".[154]

157. In this regard, the expert's advice supports the position of Canada that Italy was not scientifically justified in imposing a safeguard measure on precautionary grounds.

91. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Italy evaluate the relevant risks to human, plant or animal health, and the environment from Maize MON 809?

(a) How does the scientific evidence and other documentation submitted by Italy compare with the relevant international guidelines for risk assessment and analysis identified above?

158. Dr. Nutti says that the information submitted by the applicants and evaluated by the French CA met the requirements of international guidelines (Codex). In contrast, "the information and arguments provided by Italy were not in accordance with those guidelines."[155]

92. Does the scientific evidence and other information submitted by Italy support the adoption of a temporary prohibition on Maize MON 809? In light of any potential risks identified by Italy, what other risk management options were available in August 1988? What other risk management options are now available?

159. Dr. Nutti says that the scientific evidence submitted by Italy does not support a temporary prohibition of GM Maize MON 809.[156] As noted earlier, Dr. Nutti's expert advice supports Canada's position in this regard.

Maize Bt-11 (reference C/GB/96/M4/1)

Safeguard measure of Italy

93. Given the information before the Panel, including the evaluations undertaken by Great Britain (EC-163(At.1 to 3), the Scientific Committee on Plants in February 1998 (CDA-83), November 2000 (CDA-84), and April 2002 (CDA-35-J), and the European Commission in its Decision of April 1998 (CDA-80), as well as the information submitted by Italy with respect to its safeguard measure (CDA-78, EC-157/At. 1 and 2), is there any reason to believe that the scientific evidence available to Italy in August 1988 was NOT sufficient to permit it to undertake an appropriate assessment of potential risks to human, plant and animal health, and the environment from Maize Bt-11? If so, what scientific evidence do you believe was insufficient?

(a) If the evidence was not sufficient in August 1988, was there sufficient evidence available to Italy in August 2003 to permit it to undertake a more objective assessment of potential risks to human, plant and animal health, and the environment from Maize Bt-11? If not, what scientific evidence do you believe was insufficient?

[154] *Ibid*., pp. 64-65 (emphasis in the original).
[155] *Ibid*., p. 65.
[156] *Ibid*., p. 65.

160. Dr. Nutti says that that information submitted by the applicant covered all the items needed for the comparison of the GM maize and its conventional counterpart, not only with data on nutrients but also with animal feeding studies. The variation in levels of protein was not statistically significant, so Italy's point about protein levels was not correct.[157]

161. She concludes that there is no reason to believe that the scientific evidence available to Italy in August 2000 was insufficient to permit an appropriate assessment of potential risks to human, plant and animal health from GM maize Bt11.

162. Dr. Nutti's advice supports the argument that Italy was not scientifically justified in imposing a safeguard measure banning maize Bt11 in food and feed on precautionary grounds.

94. With reference to the definition of a risk assessment in the SPS Agreement (see Background above), to what extent does the scientific evidence and other documentation submitted by Italy evaluate the relevant risks to human, plant or animal health, and the environment from Maize Bt-11?

(a) How does the scientific evidence and other documentation submitted by Italy compare with the relevant international guidelines for risk assessment and analysis identified above?

163. According to Dr. Nutti, the information submitted by the applicant met all requirements of international guidelines (Codex). In contrast, the information and arguments of Italy did not meet those requirements.[158]

95. Does the scientific evidence and other information submitted by Italy support the adoption of a temporary prohibition on Maize Bt-11? In light of any potential risks identified by Italy, what other risk management options were available in August 1988? What other risk management options are now available?

164. Dr. Nutti concludes that the scientific evidence submitted by Italy does not support a temporary prohibition on GM maize Bt11.[159]

165. The expert's advice supports the argument that the Italian ban on maize Bt11 was not scientifically justified.

ISSUE 3

Products of biotechnology approved by the European Communities prior to October 1998

96. Has there been a significant change in the understanding of physical, chemical and biological characteristics of biotech products, gene interactions, gene expression, gene silencing, molecular characterization, and product specific detection since 1998?

166. Canada has no comments on the responses to this question by Drs. Squire and Nutti.

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[157] *Ibid*., p. 67.
[158] Nutti, p. 68.
[159] *Ibid*.

97. On the basis of the information before the Panel, is there new scientific evidence since 1998 that would suggest that the potential risks to human, plant or animal health, or to the environment, from any of the specific biotech products subject to this dispute (including products subject to the member State safeguard measures), are different in nature or magnitude as compared to the scientific understanding of the risks associated with such biotech products prior to 1998, taking into account:

- **the intended use of each product (direct human or animal consumption, further processing for consumption, planting or any other specified use);**
- **any potential risks that may arise from the combination or successive use of biotech products.**

Does the information before the Panel support the view that the potential risks from the products in this dispute should be assessed differently than the risks from biotech products approved prior to 1998?

167. Canada notes that this question concerns whether or not the risks associated with biotech products approved prior to 1998 are different in nature or magnitude to those biotech products that have been in the approval process since 1998 (*i.e.* those products subject to the *moratorium*). With some exceptions, the biotech products approved prior to the implementation of the *moratorium* are either Bt crops or crops resistant to glyphosate and glufosinate-ammonium. The biotech products subject to this dispute are substantially the same of those approved prior to 1998 – namely, Bt crops and glyphosate and glufosinate-ammonium tolerant crops.

168. It appears that Drs. Andow, Snow and Squire did not address the issue of whether the risks between these two categories of products are different in nature or magnitude. The experts discuss the development of new scientific information (e.g. gene flow amongst HT crops, potential impact on non-target organisms of Bt crops), but this new information applies equally to biotech crops approved prior to 1998 and those subject to the moratorium. Similarly, Dr. Andow discusses changes in the approaches to risk assessment and management, but while these changes may have led to refinements in assessment and management procedures, they have not revealed differences in the nature and magnitude of risks as between the two categories of products. Risks of the development of resistance in pests to Bt toxins or the development of resistance to herbicides apply equally to all these products.

169. Consequently, as the biotech products subject to the *moratorium* are substantially the same as those approved prior to 1998, the nature and magnitude of the risks between the two categories are no different.

170. With respect to food and feed, Dr. Nutti concludes that there is no new evidence that would suggest potential risks are different in nature or magnitude as between products approved prior to 1998 and those subject to the *moratorium*.

171. In terms of the specific issues raised by the experts, Canada directs the Panel to Canada's comments on Questions 2 through 8.

98. From a scientific perspective, is there a significant difference in risks to human, animal or plant health or the environment arising from the use of a bacterial antibiotic resistance marker gene, or part thereof, in any biotech product at issue in this dispute (eg, Monsanto Bt cotton (531), Monsanto Roundup Ready cotton (RRC1445), Amylogene starch potato)

compared to those products of biotechnology approved by the European Communities prior to October 1998?

172. Dr. Nutti states that, from a food and feed perspective, based on the existing literature and knowledge of the subject, and from a scientific perspective, there is no new evidence that would suggest that the potential risks to human, animal or plant health arising from the use of a bacterial antibiotic resistance marker gene, or part thereof, from any biotech product at issue in this dispute are different in nature or magnitude as compared to those products of biotechnology approved by the European Communities prior to October 1998.[160]

99. For those biotech products at issue in this dispute for which no significantly different nature or level of risk has been identified, does the information before the Panel provide a scientific or technical rationale for monitoring the occurrence of potential adverse effects, or of unintentional effects, arising from the consumption or use of these products compared to those products of biotechnology approved by the European Communities prior to October 1998?

173. Dr. Snow asserts that "with regard to environmental effects, if this question pertains only to products that have no identified environmental risks, then there is no scientific rationale for obligatory monitoring." Moreover, it is not logical to require monitoring of every transgenic crop, regardless of its phenotypic traits. Dr. Snow concludes that "specific and plausible environmental harms should be identified before allocating time and money to these efforts." Canada agrees.

174. Dr. Nutti concludes that the products at issue should be treated the same as biotech products approved prior to 1998.

175. Only Dr. Andow attempts to construct an argument for imposing monitoring on post-1998 products and not pre-1998. First, he appears to suggest that disagreements amongst Member States concerning risks would justify monitoring. Second, Dr. Andow states that "[a]ll of these possible sources unanticipated [sic] effects are equally likely to occur for plant biotech products before 1998 and plant biotech products after 1998. It is possible that more recent events (after 2001) are less likely to have such unanticipated effects than those prior to 1998."[161] Dr. Andow then asserts that changes in methods and standards for assessing the possibilities of unanticipated effects justifies monitoring. However, by his own logic, it would appear to make as much sense, if not more, to impose monitoring requirements on pre-1998 biotech products.

100. For those biotech products at issue in this dispute for which an approval has been sought for environmental release (notifications submitted under Directives 90/220 or 2001/18), and for which no significantly different nature or level of risk has been identified, does the information before the Panel provide a scientific or technical rationale for requiring specific agricultural management practices that differ from those for products of biotechnology approved by the European Communities prior to October 1998?

176. Dr. Squire states that while the "innate biological qualities and behaviour of a product may not have changed", it is possible the context within which the product operates may have. He cites changes in the physical or agronomic environment, such as the proportion of autumn-sown crops, the area covered by oilseed rape and the increase in the use of certain pesticides (glyphosate). He also indicates that our understanding of the GM product's role in the ecosystem has changed. What was not thought to be important at that time is considered important now.

[160] Nutti, p. 72.
[161] Andow, para. 99.04.

177. Canada submits that, while changes in context may require an adjustment in agricultural management practices, there is no reason to limit any such changes to post 1998 biotech products. For instance, if management measures for effectively controlling the spread of herbicide-resistance become necessary due to changes in context, these measures should be adopted for *all* HT plants in cultivation.

101. Does the information before the Panel support the argument that any potential risks from any of the biotech products at issue in this dispute should be mitigated in a manner different than the products of biotechnology approved by the European Communities prior to October 1998? If so, what means of risk mitigation might be envisaged?

178. Dr. Squire states that, while products may have very similar qualities, mitigation might differ as a result of new information informing risk or a new perception of the importance of a particular risk. The perceived need to reduce the "severity" of a risk to biodiversity and ecosystem functioning has changed because of a greater appreciation that arable systems have been affected by intense agriculture. The general thrust of Dr. Squire's response is that mitigation measures should evolve to meet changing circumstances and new information. Canada agrees. However, this would apply equally to pre-1998 products.

179. Dr. Snow states that several of the products that were approved before 1998 are the same or similar to those in this dispute. She lists several oilseed rape and maize varieties approved prior to 1998. She then postulates that the answer to the question hinges on which potential environmental risks might require mitigation, and whether any new scientific knowledge has become available to justify changes to any mitigation plans that were required prior to 1998. She then points to new knowledge relating to gene flow (in the context of HT oilseed rape) and the evolution of resistance in target pests of Bt crops. She also notes that in the case of oilseed rape approved for import and processing only, she cannot see any new scientific reasons for different mitigation plans as between products approved prior to 1998, and those subject to the dispute (*e.g.* GT73).

180. Canada notes that even if new information came to light concerning the risks associated with Bt or HT crops, the mitigation measures to address these new risks should apply equally to pre-1998 Bt and HT crops. Indeed, *Directive 2001/18* specifically provides for the reconsideration of the original consent by the EC in the event of "new or additional information made available since the date of the consent and affecting the environmental risk assessment."[162] However, in no cases of pre-1998 approved products, has the EC revoked, rescinded or modified, the original consent.

Comparable novel non-biotech products, (such as plant products produced by selective breeding, cross-breeding and induced mutagenesis)

102. Does the information before the Panel support the view that the biotech products at issue in this dispute (including products subject to the member State safeguard measures) give rise to the same types of potential risks to human, plant or animal health or to the environment as novel non-biotech products, such as plant products produced by selective breeding, cross-breeding and induced mutagenesis? If so, for any biotech product at issue in this dispute are there significant differences, from a scientific perspective, in the nature or magnitude of any potential risks from these products compared to comparable novel non-biotech products taking into account:

- **the specific genetic modification introduced and the resulting product;**

[162] *Directive 2001/18*, Art. 23.

- **the intended use of each product (direct human or animal consumption, further processing for consumption, planting or other use);**

- **any potential risks that may arise from the combination or successive use of biotech products or comparable novel non-biotech products.**

Please explain with reference to specific products at issue in this dispute.

181. Drs. Nutti, Snow and Andow respond to this question. Dr. Nutti indicates that novel non-biotech products have not been subject to any extensive safety assessment, and she is of the opinion that both novel non-biotech products and biotech products should be assessed in a comprehensive, scientific, step-by-step, case-by-case basis, so the same safety assessment principles should be applied in all cases. She appears to share the widely held consensus that the technology used to develop biotech products does not give rise to different potential risks to human and animal health.

182. On the other hand, Dr. Snow suggests that biotech products in this dispute "*could be considered as* different from non-biotech novel products *in some cases*." Dr. Snow cites as an example glyphosate-tolerant crops. She says that glyphosate resistance has not been introduced into crops using non-transgenic methods, so this particular trait is linked solely to novel transgenic crops. She suggests that extensive use of glyphosate could lead to weedy *Brassica rapa* populations that have acquired the trangene through gene flow to become more common in and around farmers' fields. She speculates about this transfer of resistance could occur to many types of crops. However, she then says "[t]hese problems are possible with all types of herbicide-tolerant crops" but "unique features of glyphosate make it a special case". Thus, Dr. Snow appears to acknowledge that the same types of potential risks to human, plant, animal health or to the environment exist for all HT crops, regardless of the technology used. However, she distinguishes one type of HT crop on the basis that the herbicide to which the crop is tolerant is widely used. This may be an argument for why glyphosate-tolerant crops require more robust management procedures, but it is not an argument for why biotech HT crops are different from non-biotech HT crops. Unfortunately, Dr. Snow does not discuss in any detail the types of potential risks to human, plant or animal health or to the environment from other biotech HT crops tolerant (*e.g.* those tolerant to glufosinate-ammonium) or non-biotech HT crops developed through mutagenesis (*e.g.* those tolerant to imidazolinone).

183. Dr. Andow acknowledges that there are no differences in the types or kinds of risks posed by biotech crops as compared to their non-biotech counterparts: toxicity to humans and animals; allergenicity; nutritional qualities; potential for producing disease; gene flow; non-target and biodiversity risks; and resistance risks. However, he claims that within these risks, there are new kinds of risks associated with biotech plants.

184. Dr. Andow asserts that transgenesis does not allow more precise control than selective breeding. According to Dr. Andow, because both transgenic and conventional varieties undergo selective breeding, the comparison is inappropriate. However, while both undergo selective breeding, it is for different purposes. In the former case, the selective breeding is random, through mutagenesis, chance mutation or the introduction of new germplasm in order to achieve a desired phenotype; in the latter, the selective breeding involves the introduction of the transgene into an "elite" germplasm background; thus the breeding is usually into well established well-adapted lines.

185. Dr. Andow claims the magnitude of the open reading frames (ORF) and insertional mutagenesis introduced by transgenesis is higher than that for adapted materials. It may also be higher than deliberate or spontaneous mutations in cell culture, though Dr. Andow is less certain on

this point. However, the presence of an open reading frame is not the issue; the issue is whether there is an expressed protein. Furthermore, these types of effects would be eliminated by subsequent breeding during the development of the product, and the risk of new open reading frames and chimeric proteins is effectively addressed during the molecular characterization.

186. Unfortunately, Dr. Andow does not compare the risks associated with induced mutagenesis to the risks associated with biotech products.

103. Does the information before the Panel support the view that any of the biotech products at issue in this dispute poses a substantially greater risk as regards the direct or indirect consequences of unintentional "contamination" of other plant varieties than a comparable novel non-biotech products, such as one of the 2300 different crop varieties that have been developed using induced mutagenesis?[163] If so, what means of risk mitigation might be envisaged?

187. Dr. Squire does not appear to answer the specific question posed, which focuses on the risks arising from contamination rather than the risk of contamination.

188. In any event, he observes that a certain level of impurity seems to have been generally accepted for many years.[164] The specific level of impurity varied from crop to crop. Impurity is common in oilseed rape, less common in beet and maize. The potential for a crop variety to convey an impurity depends on several factors, such as the proportion of seeds that enter dormancy, the persistence of seeds in the soil, and the relative pollen strength of potential donor and recipient fields. Dr. Squire indicates that these factors may differ between GM and non-GM varieties but should not differ because one is GM and the other not. He concludes that there is no reason to suppose that biotech crops confer different degrees of impurity compared with crops produced from, say, induced mutagenesis.[165]

189. Dr. Snow also appears not to give a definitive answer to the specific question asked. She suggests that the answer depends on "what types of risks each party is trying to avoid".[166] According to her, if standard thresholds have been established to allow for coexistence, then by definition contamination is an issue for all biotech products. In Canada's view, the question then becomes what is the nature of the risk that would arise from that contamination.

190. Dr. Snow also notes that labelling and traceability have not been required for novel non-biotech products such as those developed using mutagenesis, nor would any high-resolution identifying markers be available for these types of crops.[167]

191. She says another way to answer this question is to focus on phenotypes; this is more appropriate if the goal is to avoid direct or indirect harm to human, plant or animal health, or the environment.[168] She points to Part I of her answers, and her answer to Question 6 "for examples of risks that are greater in certain GM crops as compared to their non-GM predecessors",[169] but recourse to these passages does not appear to provide any substantially greater clarity in terms of a response to the specific question asked.

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[163] FAO/IAEA (Food and Agriculture Organization of the United Nations/International Atomic Energy Agency). 2001. *FAO/IAEA Mutant Varieties Database*. Available online at http://www-infocris.iaea.org/MVD/.
[164] Squire, p. 17.
[165] *Ibid*.
[166] Snow, p. 33.
[167] *Ibid*.
[168] *Ibid*. P. 34.
[169] *Ibid*.

192. Dr. Andow says it depends on the scale of release and the nature of the adverse effect.[170] Furthermore, the definition of an adverse effect entails specification of whom or what will be affected and how is this effect considered adverse. He adds further complexity when he notes that "there has been little discussion and less agreement over the nature of the adverse effects of contamination", and muses that "it is not clear to [him] that there is agreement that these kinds of perceived risks should be considered."[171]

193. Dr. Andow then posits that an organic farmer might find contamination to be an adverse effect because of the economic impact. Dr. Andow says that in this example at least, the risk associated with biotech crops is substantially greater than the risk associated with conventional varieties (based on the definition of harm).[172] However, Canada does not understand why this would be true. Whether an organic crop is contaminated with a transgenic seed or a conventional non-organic seed ought not to matter provided that the risks to human or animal health or the environment are the same.

194. In short, none of the three experts on environmental risks appear to have a clear or unequivocal answer to the question as posed. Of course, the question does not specify what it means when it uses the term "risk"; is it confined to risks of environmental harm, or harm to human or animal plant life or health? Does it encompass what might be called pure economic loss? It may be that the ambiguity of the question prevented the experts from expressing themselves clearly and unequivocally.

195. In contrast, Dr. Nutti is of the firm view that crop varieties that have been developed using induced mutagenesis can pose the same risks to human or animal health as plants produced from Recombinant-DNA technology, and should be assessed in the same manner.[173]

104. From a scientific perspective, is there a significant difference in risks to human, animal or plant health or the environment arising from the use of a bacterial antibiotic resistance marker gene, or part thereof, in any biotech product at issue in this dispute (eg, Monsanto Bt cotton (531), Monsanto Roundup Ready cotton (RRC1445), Amylogene starch potato) compared to novel non-biotech products, such as comparable plant products produced by selective breeding, cross-breeding and induced mutagenesis?

196. Dr. Nutti indicates that the use of antibiotic resistance marker genes has been recognized as a safe tool and its employment should be evaluated on a case by case basis. The same rule should be applied to novel non-biotech products, such as comparable plant products produced by selective breeding, cross-breeding and induced mutagenesis.[174]

105. For those biotech products at issue in this dispute for which no significantly different nature or level of risk has been identified, is there a scientific or technical rationale for monitoring the occurrence of potential adverse effects, or of unintentional effects, arising from the consumption or use of these products compared to novel non-biotech products, such as plant products produced by selective breeding, cross-breeding and induced mutagenesis? If so, would such monitoring relate to the specific genes or traits introduced into a biotech product, and how would this compare with the monitoring of induced changes in novel non-biotech products?

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[170] Andow, p. 127.
[171] *Ibid*.
[172] *Ibid*.
[173] Nutti, p. 75.
[174] *Ibid*.

197. All three experts who responded to this question appear to agree that transgenic and non-transgenic plants may result in unintended effects and that monitoring may be justified. Dr. Snow concludes that both transgenic methods and other methods of crop breeding can result in unintended effects and that there is no basis to assume that these unintended effects would be substantially greater in transgenic plants.[175] Moreover, she states that "it does not seem logical to require monitoring if no risk has been identified."[176]

198. Andow also points to "unanticipated effects" and agrees that some "conventional non-transgenic plants have risks, some of which may justify monitoring (and management)."[177] Lastly, Dr. Nutti indicates that monitoring should be used in the same manner for biotech and novel non-biotech based on scientific parameters.

106. For those biotech products at issue in this dispute for which an approval has been sought for environmental release (notifications submitted under Directives 90/220 or 2001/18), and for which no significantly different nature or level of risk has been identified, does the information before the Panel provide any scientific or technical rationale for requiring specific agricultural management practices that differ from those for novel non-biotech products, such as plant products produced by selective breeding, cross-breeding and induced mutagenesis?

199. Dr. Squire indicates that, provided no significant level or type of risk has been detected, then no particular change in practice above the highest recommended existing practice to ensure a high purity should be needed. If thresholds are imposed, for whatever reason, then there will need to be different agricultural practices for those GM varieties that leave volunteers or spread genes by pollen to neighbouring sexually compatible crops.[178] According to Dr. Squire, these different practices are well-appreciated, by which Canada takes him to mean that they are well-understood and of proven effectiveness.

200. Dr. Squire also says that, under a system of coexistence in which a threshold (GM in non-GM) was imposed, the agricultural practice might well have to change in a crop such as oilseed rape to ensure that threshold would be met. Importantly, he adds that, "given present knowledge, these changes would be in consequence of an imposed threshold of GM in non-GM products, not of any inherent food-risk in the GM product itself."[179]

201. The basic point here is that any difference required in the agronomic management to preserve purity is a consequence of a policy decision to segregate GM crops from non-GM crops. It would not be based on any scientific evidence demonstrating risks to human, animal or plant health or safety.

General Questions

110. On the basis of the information before the Panel, is there any scientific evidence to support the hypothesis that animal feed made from biotechnology plants alters the composition of the food derived from animals consuming the feed?

[175] Snow, p. 34.
[176] *Ibid*.
[177] Andow, p. 105.10.
[178] Squire, p. 17.
[179] Squire, p. 18.

(a) If so, what is the likelihood that this event could lead to adverse effects on human or animal health? (see, *inter alia*, exhibit US-144)

(b) What risk management options are available to mitigate any resulting risks and what is their efficacy?

202. Dr. Nutti states in her response that she is "not aware of any scientific evidence that supports the hypothesis that animal feed made from biotechnology plants alters the composition of the food derived from animals consuming the feed".[180] She then refers to several studies that suggest there is no relationship between the use of biotech feed and the composition of food derived from animals given such feed.[181]

112. Please provide an assessment of the statements regarding chronic toxicity testing in paragraph 43 of Canada's Third Submission and paragraphs 134-138 of the US Supplementary Rebuttal Submission. What relevance does the foreseen end product use(s) have in the context of the evaluation of the toxicity of that product?

203. Dr. Nutti states in her answer that "if the toxicological assessment has conducted acute agave studies in mice, homology to known toxins and allergens with no indication of adverse effects, chronic toxicity tests shall not be required".[182] She points to the relevant Codex Guidelines, which indicate that such tests may be necessary only if doubts about the safety of the new substance remain. It should be added that such doubts must have an empirical foundation, and cannot simply arise on the basis of speculation.

[180] Nutti, p. 79.
[181] *Ibid*., p. 80.
[182] *Ibid*., p. 81.