Application for renewal of the authorisation for continued marketing of existing MON 810 maize products that were authorized under Directive 90/220/EEC (Decision 98/294/EC) and subsequently notified in accordance to Article 20(1)(a) of Regulation (EC) No 1829/2003 on genetically modified food and feed

Part II

Summary

May 2007

A. GENERAL INFORMATION

1. Details of application

a) Member State of application

Not applicable.

b) Notification number

Not known at the time of application

c) Name of the product (commercial and other names)

The Monsanto development code for this genetically modified maize is: MON 810. In countries where MON 810 varieties are being cultivated, packages of seed of this maize are marketed under the name of the variety, in association with the trademark YieldGard® Corn Borer, indicating clearly to growers that this maize is protected from specific lepidopteran insect pests.

d) Date of acknowledgement of notification

Not known at the time of application

2. Applicant

a) Name of applicant

Monsanto Company, represented by Monsanto Europe S.A.

b) Address of applicant

Monsanto Europe S.A.
Avenue de Tervuren 270-272
B-1150 Brussels
BELGIUM

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63167
U.S.A

c) Name and address of the person established in the Community who is responsible for the placing on the market, whether it be the manufacturer, the importer or the distributor, if different from the applicant (Commission Decision 2004/204/EC Art 3(a)(ii))

MON 810 maize[1] will continue to be planted, traded and used in the European Union in the same manner as it was done prior to the submission of this renewal application, as current commercial maize and by the same operators currently involved in the trade and use of maize.

[1] Hereafter referred to as MON 810

3. **Scope of the application**

( ) GM plants for food use
( ) Food containing or consisting of GM plants
( ) Food produced from GM plants or containing ingredients produced from GM plants
(x) GM plants for feed use
(x) Feed containing or consisting of GM plants
( ) Feed produced from GM plants
(x) Import and processing (Part C of Directive 2001/18/EC)
(x) Seeds and plant propagating material for cultivation in Europe (Part C of Directive 2001/18/EC)

4. **Is the product being simultaneously notified within the framework of another regulation (e.g. Seed legislation)?**

Yes (x)	**No ( )**
If *yes*, specify MON 810 varieties have been registered into the E.U. common catalogue of varieties of agricultural plant species[2]	

5. **Has the GM plant been notified under Part B of Directive 2001/18/EC and/or Directive 90/220/EEC?**

Yes (x)	**No ( )**
If *no*, refer to risk analysis data on the basis of the elements of Part B of Directive 2001/18/EC	

[2] http://europa.eu.int/eur-lex/lex/JOHtml.do?uri=OJ:C:2006:146A:SOM:EN:HTM

6. Has the GM plant or derived products been previously notified for marketing in the Community under Part C of Directive 2001/18/EC or Regulation (EC) 258/97?

Yes (x)	No ( )

If *yes*, specify

On 22 April 1998 the import and cultivation of MON 810 in the E.U. was granted by the European Commission under Directive 90/220/EEC.

Based on the opinion of the UK Competent Authority, in 1997 Monsanto notified foods and food ingredients derived from the progeny of maize line MON 810 to the European Commission, according to Article 5 of Regulation (EC) No 258/97 on novel foods and novel food ingredients.

In addition, applications for renewal of the authorization for continued marketing of existing products produced from MON 810 have been submitted in April 2007 (*food additives, feed materials and feed additives* produced from MON 810 notified according to Articles 8(1)(b) and 20(1)(b) of Regulation (EC) No 1829/2003 on genetically modified food and feed; *food and food ingredients produced from MON 810* notified pursuant to Article 5 of Regulation (EC) No 258/97 and subsequently notified according to Article 8(1)(a) of Regulation (EC) No 1829/2003 on genetically modified food and feed).

7. Has the product been notified in a third country either previously or simultaneously?

Yes (x)	No ( )

If *yes*, specify

Cultivation of MON 810 is lawful in several countries across the world, including the U.S.A., Canada, Argentina, South Africa, Uruguay, the Philippines, the E.U., Colombia and Honduras, while importation of derived foods and feeds is lawful in Australia, China, Japan, Korea, Mexico, New Zealand, Russian Federation, Switzerland and Taiwan.

8. General description of the product

a) Name of the recipient or parental plant and the intended function of the genetic modification

MON 810 expresses the Cry1Ab protein, derived from *Bacillus thuringiensis* subsp. *kurstaki*, which confers protection against predation by certain lepidopteran insect pests, including the European Corn Borer (ECB) (*Ostrinia nubilalis*) and pink borers (*Sesamia* spp).

The use of MON 810 would enable farmers to effectively control ECB, providing protection of potential maize yield and a reduction in the use of chemical insecticides for this insect pest. MON 810 would provide benefits to growers, the general public, and the environment, including:

(1) a more reliable, economical, and less labour intensive means to control ECB, (2) insect control without harming non target species, (3) a means for growers to significantly reduce the amount of chemical insecticides now applied to the crop thereby achieving ECB control in a more environmentally compatible manner than is currently available, (4) a reduction in the manufacturing, shipment , and storage of chemical insecticides used in maize, (5) a reduction in the exposure of workers to the pesticide and pesticide spray solution, (6) a reduction in the number of empty pesticide containers and amount of spray solution that must be disposed of according to applicable environmental regulations, (7) a fit with integrated pest management (IPM) and sustainable agricultural systems, and (8) both large and small growers will benefit from the planting of MON 810 as no additional labour, planning, or machinery is required.

b) Types of products planned to be placed on the market according to the authorisation applied for

The scope of the current renewal application complements the scopes of the other MON 810 renewal applications already submitted to the European Commission in accordance with Articles 11 and 23 of Regulation (EC) No 1823/2003, and includes the GM plants for feed use, the feed containing or consisting of the GM plants, the import and processing of the GM and its cultivation in Europe.

The range of uses of MON 810 will continue to be identical to the full range of equivalent uses of current commercial maize.

c) Intended use of the product and types of users

MON 810 will continue to be planted, traded and used in the European Union in the same manner as it was done prior to the submission of this renewal application, as equivalent products from current commercial maize and by the same operators currently involved in the planting, trade and use of maize.

d) Specific instructions and/or recommendations for use, storage and handling, including mandatory restrictions proposed as a condition of the authorisation applied for

MON 810 is substantially equivalent to conventional maize, except for its introduced trait: protection against certain lepidopteran insect pests, which is a trait of agronomic interest. This maize was shown to be as safe and as nutritious as conventional maize. Therefore, MON 810 will be stored, packaged, transported, handled and used as it was done prior to this renewal application and in the same manner as current commercial maize. No specific conditions are warranted or required for MON 810 and the products containing or consisting of MON 810.

e) Any proposed packaging requirements

MON 810 is substantially equivalent to conventional maize (except for the introduced lepidopteran-protection trait). Therefore, MON 810 will continue to be used as it was done prior to this renewal application and in the same manner as other equivalent current commercial maize and no specific packaging is required (for the labelling, *see* question 8.(f)).

f) A proposal for labelling in accordance with Articles 13 and 25 of Regulation (EC) 1829/2003. In the case of GMOs, food and/or feed containing, consisting of GMOs, a proposal for labelling has to be included complying with the requirements of Article 4, B(6) of Regulation (EC) 1830/2003 and Annex IV of Directive 2001/18/EC.

In accordance with Regulations (EC) N° 1829/2003 and 1830/2003, a labelling threshold of 0.9 % is applied for the placing on the market of MON 810 grain and derived products.

Operators shall be required to label products containing or consisting of MON 810 with the words "genetically modified maize" or "contains genetically modified maize", and shall be required to declare the unique identifier MON-ØØ81Ø-6 in the list of GMOs that have been used to constitute a mixture that contains or consists of this GMO

Operators handling or using MON 810 in the E.U., are required to be aware of the legal obligations regarding traceability and labelling of these products. Given that explicit requirements for the traceability and labelling of GMOs and derived foods and feeds are laid down in Regulations (EC) No 1829/2003 and 1830/2003, and that authorized foods and feeds shall be entered in the Community Register, operators in the feed chain will be fully aware of the traceability and labeling requirements for MON 810. Therefore, no further specific measures are to be taken by the notifier.

g) Unique identifier for the GM plant (Regulation (EC) 65/2004; does not apply to applications concerning only food and feed produced from GM plants, or containing ingredients produced from GM plants)

MON-ØØ81Ø-6

h) If applicable, geographical areas within the EU to which the product is intended to be confined under the terms of the authorisation applied for. Any type of environment to which the product is unsuited

MON 810 is suitable for planting , trading and use, throughout the E.U.

9. Measures suggested by the applicant to take in case of unintended release or misuse as well as measures for disposal and treatment

Misuse of MON 810 is unlikely, as the proposed uses for this maize are included in the current uses of conventional maize. MON 810 is substantially equivalent to other maize except for the introduced trait: protection against certain lepidopteran insect pests, which is a trait of agronomic interest. This maize is shown to be as safe and as nutritious as conventional maize. Therefore, all measures for waste disposal and treatment of MON 810 are the same as those for conventional maize. No specific conditions are warranted or required for the continued marketing of MON 810.

B. INFORMATION RELATING TO (A) THE RECIPIENT OR (B) (WHERE APPROPRIATE) PARENTAL PLANTS

1. Complete name

a) Family name

Poaceae (formerly Gramineae)

b) Genus

Zea

c) Species

mays (2n=20)

d) Subspecies

N/A

e) Cultivar/breeding line

MON 810

f) Common name

Maize; Corn

2. a) Information concerning reproduction

(i) Mode(s) of reproduction

Maize (*Zea mays* L.) is an annual, wind-pollinated, monoecious species with separate staminate (tassels) and pistillate (silk) flowers. Self- and cross-pollination are generally possible, with frequencies of each normally determined by proximity and other physical influences on pollen transfer.

(ii) Specific factors affecting reproduction

Tasselling, silking, and pollination are the most critical stages of maize development and, consequently, grain yield may ultimately be greatly impacted by moisture and fertility stress.

(iii) Generation time

Maize is an annual crop with a cultural cycle ranging from as short as 60 to 70 days to as long as 43 to 48 weeks from seedling emergence to maturity.

2 b) Sexual compatibility with other cultivated or wild plant species

Out-crossing with cultivated *Zea* varieties

In Europe, the potential for genetic transfer and exchange with other organisms is limited to other maize plants. Maize is wind pollinated, and the distance that viable pollen can travel depends on prevailing wind patterns, humidity, and temperature. All maize will inter-pollinate, except for certain popcorn varieties and hybrids that have one of the gametophyte factors (Ga^S, Ga, and ga allelic series on chromosome 4). Maize pollen, therefore, moves freely within an area, lands on silks of the same variety or different varieties, germinates almost immediately after pollination, and within 24 hours completes fertilisation.

Out-crossing with wild *Zea* species

Wild relatives of maize do not exist in Europe.

3. Survivability

a) Ability to form structures for survival or dormancy

Maize is an annual crop and seeds are the only survival structures. Natural regeneration from vegetative tissue is not known to occur.

b) Specific factors affecting survivability

Maize cannot survive without human assistance and is not capable of surviving as a weed due to past selection in its evolution. Volunteer maize is not found growing in fencerows, ditches or roadsides as a weed. Although maize seed from the previous crop year can over-winter in mild winter conditions and germinate the following year, it cannot persist as a weed. The appearance of "volunteer" maize in fields following a maize crop from the previous year is rare under European conditions. Maize volunteers are killed by frost or, in the unlikely event of their occurrence, are easily controlled by current agronomic practices including cultivation and the use of selective herbicides.

Maize grain survival is dependent upon temperature, moisture of seed, genotype, husk protection and stage of development. Freezing temperatures have an adverse effect on maize seed germination and have been identified as being a major risk in seed maize production. Temperatures above 45 °C have also been reported as injurious to maize seed viability.

4. Dissemination

a) Ways and extent of dissemination

In general, dissemination of maize may occur by means of seed dispersal and pollen dispersal. Dispersal of the maize grain is highly restricted in domesticated maize due to the ear structure including husk enclosure. For maize pollen, the vast majority is deposited in the same field due to its large size (90 to 100 µm) with smaller amounts of pollen deposited usually in a downwind direction.

b) Specific factors affecting dissemination

Dispersal of maize seeds does not occur naturally because of the structure of the ears of maize. Dissemination of isolated seeds may result from mechanical harvesting and transport as well as insect or wind damage, but this form of dissemination is highly infrequent. Genetic material can be disseminated by pollen dispersal, which is influenced by wind and weather conditions. Maize pollen is the largest of any pollen normally disseminated by wind from a comparably low level of elevation. Dispersal of maize pollen is limited by its large size and rapid settling rate.

5. Geographical distribution and cultivation of the plant, including the distribution in Europe of the compatible species

Because of its many divergent types, maize is grown over a wide range of climatic conditions. The bulk of the maize is produced between latitudes 30° and 55°, with relatively little grown at latitudes higher than 47° latitude anywhere in the world. The greatest maize production occurs where the warmest month isotherms range between 21° and 27° C and the freeze-free season lasts 120 to 180 days. A summer rainfall of 15 cm is approximately the lower limit for maize production without irrigation with no upper limit of rainfall for growing maize, although excess rainfall will decrease yields.

There are no wild relatives of maize in Europe.

6. In the case of plant species not normally grown in the Member State(s), description of the natural habitat of the plant, including information on natural predators, parasites, competitors and symbionts

Maize is widely grown in the European Union. The most important areas of maize production in Europe include the Danube Basin, from southwest Germany to the Black Sea, along with southern France through the Po Valley of northern Italy.

7. Other potential interactions, relevant to the GM plant, of the plant with organisms in the ecosystem where it is usually grown, or used elsewhere, including information on toxic effects on humans, animals and other organisms

Maize is known to interact with other organisms in the environment including insects, birds, and mammals. It is susceptible to a range of fungal diseases and nematode, insect and mite pests. Maize has a history of safe use for human food and animal feed.

C. INFORMATION RELATING TO THE GENETIC MODIFICATION

1. Description of the methods used for the genetic modification

Particle acceleration transformation method was used in the development of MON 810.

2. Nature and source of the vector used

MON 810 was generated using the particle acceleration method, by the integration of sequences from the plasmid vector PV-ZMBK07, containing the *cry1Ab* coding sequence of interest, which was derived from *Bacillus thuringiensis* subsp. *kurstaki*.

3. Source of donor DNA, size and intended function of each constituent fragment of the region intended for insertion

The individual components of MON 810 insert and the function of these DNA sequences are given in Table 1.

Table 1. Genetic elements inserted in MON 810

Genetic Element	Source	Size (kb)	Function
P-*e35S*$^{\text{MON 810}}$	Cauliflower mosaic virus	0.3	Promoter
I-*Hsp70*	*Zea mays* L.	0.8	Stabilizes level of gene transcription.
CS-*cry1Ab*$^{\text{MON 810}}$	*Bacillus thuringiensis*	2.5	Encodes a variant of Cry1Ab1 protein, which targets specific lepidopteran insect pests

D. INFORMATION RELATING TO THE GM PLANT

1. Description of the trait(s) and characteristics which have been introduced or modified

MON 810 expresses the Cry1Ab protein derived from *Bacillus thuringiensis* subsp. *kurstaki*, which provides protection from certain lepidopteran insect pests, including European corn borer (*Ostrinia nubilalis*) and pink borers (*Sesamia* spp).

2. Information on the sequences actually inserted or deleted

a) The copy number of all detectable inserts, both complete and partial

MON 810 contains a single DNA insert containing a single copy of the introduced DNA fragment, and this at a single locus in the maize genome.

b) In case of deletion(s), size and function of the deleted region(s)

Not applicable

c) Chromosomal location(s) of insert(s) (nucleus, chloroplasts, mitochondria, or maintained in a non-integrated form), and methods for its determination

The Chi square analysis of the segregation pattern, according to Mendelian genetics, was consistent with a single site of insertion into the maize nuclear DNA.

d) The organisation of the inserted genetic material at the insertion site

Genomic DNA from MON 810 was analyzed by Southern blotting to determine the intactness of the genetic elements within the insert, and the presence or absence of plasmids backbone sequences. The organisation of the elements within the insert in MON 810 was further confirmed using PCR analysis and sequencing of the insert.

3. Information on the expression of the insert

a) Information on developmental expression of the insert during the life cycle of the plant

Expression level of the introduced protein was measured in grain and forage collected from MON 810 grown in the field.

The level of Cry1Ab in MON 810 plants is similar when plants are grown in different geographies and when the gene is present in different genetic backgrounds (range for grain: 0.19-0.69 µg/g fwt; range for forage: 4.00-5.56 µg/g fwt). The level of expression remains sufficient to provide season long control of the targeted insect pests.

b) Parts of the plant where the insert is expressed

Cry1Ab protein was estimated in forage and grain, which are the most relevant tissues in terms of food and feed safety.

4. Information on how the GM plant differs from the recipient plant in

a) Reproduction

Comparative assessments of the phenotypic and agronomic characteristics of MON 810 and conventional maize have been conducted at multiple sites in the field. MON 810 has been produced as a commercial product since 1997 in the U.S.A. and is also currently commercially produced in Canada, Argentina, South Africa, Uruguay, the E.U. and the Philippines.

The experience gathered from these plantings demonstrates that, except for the protection against target lepidopteran pests, there are no biologically significant differences in the reproductive capability, dissemination or survivability of MON 810 when compared to

conventional maize.

The agronomic equivalence between MON 810 and conventional maize (except for the introduced lepidopteran-protection trait) is further supported by the data demonstrating that MON 810 is compositionally equivalent to conventional maize.

It is concluded that MON 810 does not differ from conventional maize with regard to reproduction, dissemination, survivability or other agronomic and phenotypic traits.

b) Dissemination

The introduced lepidopteran-protection has no influence on maize reproductive morphology and hence no changes in seed dissemination are to be expected.

c) Survivability

Maize is known to be a weak competitor in the wild, which cannot survive in Europe outside cultivation without the aid of human intervention. Field observations have demonstrated that MON 810 has not been altered in its survivability when compared to conventional maize.

d) Other differences

Comparative observations of the phenotypic and agronomic characteristics did not reveal biologically significant differences between MON 810 and conventional maize, except for the introduced trait.

5. Genetic stability of the insert and phenotypic stability of the GM plant

The inserted *cry1Ab* gene has been shown to be stably integrated into the plant chromosome based on segregation data and Southern analysis.

6. Any change to the ability of the GM plant to transfer genetic material to other organisms

a) Plant to bacteria gene transfer

None of the genetic elements inserted in MON 810 has a genetic transfer function. Therefore, no changes are expected in the ability of these maize lines to transfer genetic material to bacteria.

b) Plant to plant gene transfer

Based on the observation that reproductive morphology in MON 810 is unchanged compared to conventional maize and that pollen production and pollen viability were unaffected by the genetic modification, the out-crossing frequency to other maize varieties or to wild relatives (which are not present in the E.U.) would be unlikely to be different for MON 810, when compared to conventional maize varieties.

7. Information on any toxic, allergenic or other harmful effects on human or animal health arising from the GM food/feed

7.1 Comparative assessment

Choice of the comparator

Compositional analyses were performed on forage and grain samples from MON 810, grown under representative field conditions in the U.S.A. and in the E.U., respectively in 2004 and 2005. The study also included compositional analyses of forage and grain collected from a control. The analytical results have shown that MON 810 is compositionally equivalent to the control comparator used in the study and is within the published and reported literature ranges for commercial hybrids.

7.2 Production of material for comparative assessment

a) number of locations, growing seasons, geographical spread and replicates

1994 U.S. FIELD SEASON

MON 810 and the conventional control maize were grown at six field sites in major maize-growing areas of the U.S.A (Illinois, Iowa, Indiana and Nebraska) during the 1994 field season. Each maize line was grown in a single replicate plot at all sites. All the plants were grown under normal agronomic field conditions for their respective geographic regions.

1995 EUROPEAN FIELD SEASON

Grain and forage from MON 810

MON 810 and the conventional control maize were grown at three field sites in major maize-growing areas of France during the 1995 field season.

Grain and forage of progeny of MON 810

MON 810 hybrids and the conventional control maize were grown in France and Italy during the 1995 field season.

b) the baseline used for consideration of natural variations

These studies compared MON 810 to controls that are similar in pedigree but are not an isogenic control because of the variability in the parental High-Type II.

7.3 Selection of material and compounds for analysis

Forage samples were analyzed for proximates (protein, fat, ash, and dry matter), ADF, NDF, and carbohydrates by calculation. Compositional analyses of the grain samples included proximates (protein, fat, ash, and moisture), ADF, NDF, amino acids, fatty acids, fiber, anti-nutrient, minerals and carbohydrates by calculation.

The results of these compositional analyses conducted for MON 810, compared to conventional maize hybrids, and the subsequent compositional analyses performed for MON 810 containing stacks

(MON 863 x MON 810 x NK603; MON 863 x MON 810 and NK603 x MON 810) do not indicate a need for further analysis of selected compounds in this maize.

7.4 Agronomic traits

Agronomic observations performed during field trials with MON 810 supports a conclusion that from an agronomic and phenotypic (morphological) point of view, MON 810 is equivalent to conventional maize, except for the introduced lepidopteran-protection trait.

This is also confirmed by the extensive commercial experience with MON 810, since 1997 and MON 810 containing stacks (NK603 x MON 810 since 2002; MON 863 x MON 810 since 2003 and MON 863 x MON 810 x NK603 since 2005).

7.5 Product specification

MON 810 is currently planted and imported into the E.U. in mixed shipments of maize products, produced in other world areas. These products are handled by operators that have traditionally been involved in the planting, commerce, processing and use of maize in the European Union.

The presence of MON 810 in maize grain or in maize derived products can be identified by employing different techniques. Southern blot or PCR techniques can identify the inserted nucleotide sequences, while specific ELISA has been developed to detect the presence of Cry1Ab protein in individual plants or in specific tissues. An event-specific PCR-assay allowing the detection and the quantification of MON 810 has been validated in a collaborative trial by the American Association of Cereal Chemist (AACC) in collaboration with the German Federal Institute of Risk Assessment (BfR), GeneScan and the Joint Research Center from the European Commission. This method has been included as Annex D 2 in the current CEN draft standard pr ISO 21570 "Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – Quantitative nucleic acid based methods"

7.6 Effect of processing

As MON 810 is substantially equivalent and as safe and as nutritious as conventional maize, the use MON 810 is not different from that of conventional maize. Consequently, any effects of the use of MON 810 are not expected to be different from the use of conventional maize

7.7 Anticipated intake/extent of use

MON 810 and the feed containing or consisting of MON 810 were first placed on the E.U. market in 1998. In July 2004 these products were notified to the European Commission, following Article 20(1)(a) of Regulation (EC) No 1829/2003, in order to allow for their continued marketing in the E.U. given that they had been lawfully placed on the market before Regulation (EC) No 1829/2003 came into force, on

18 April 2004.

MON 810 and the feed containing or consisting of MON 810 replace a portion of current commercial maize products. Anticipated dietary intake and/or extent of use of current commercial maize products is not expected to be altered upon renewal of the authorisation of existing MON 810 uses.

7.8 Toxicology

7.8.1 Safety assessment of newly expressed proteins

The Cry1Ab protein expressed in MON 810, present at low levels in the plant, has been reviewed and considered safe by the Scientific Committee on Plants and by EFSA.

The Cry1Ab protein has negligible potential to cause adverse effects to animal or human health. It has a highly specific, insecticidal mode of action in the gut of target insects that is based on binding to specific receptors for *Bt* proteins. The long history of safe use of this protein in microbial *Bt* products and its history of safe use in previously approved GM products, such as products derived from MON 810, further support its safety to humans and animals.

In addition to its long history of safe use, the acute toxicity of this protein was directly assessed in an acute oral gavage study. There were no indications of acute toxicity when administered by gavage to laboratory mice at doses which are orders of magnitude higher than expected consumption levels from food or feed products containing or consisting of MON 810. This lack of toxicity was expected based on the absence of a toxic mechanism in animals, the history of exposure, and the rapid degradation of this protein in simulated human gastric fluids. In addition, Cry1Ab is not homologous to any known toxins (except for the expected homology of Cry1Ab to other *Bt* proteins) or other biologically active proteins. Compared to other proteins, Cry1Ab is present at very low levels in MON 810.

7.8.2 Testing of new constituents other than proteins

Since maize is known as a common source of food and feed with a centuries-long history of safe use and consumption around the world, and as MON 810 was shown to be substantially equivalent to conventional maize, testing of any constituents other than the introduced proteins is not indicated.

7.8.3 Information on natural food and feed constituents

Maize is known as a common source of food and feed with a centuries-long history of safe use and consumption around the world. No particular natural constituents of maize are considered to be of significant concern to require additional information or further risk assessment.

7.8.4 Testing of the whole GM food/feed

The compositional and nutritional equivalence of grain and forage from MON 810 and conventional maize have been established by compositional analysis. In addition, the dietary safety of Cry1Ab protein within the maize matrix was further confirmed by animal feeding studies in the rat and in broiler chickens.

7.9 Allergenicity

7.9.1 Assessment of allergenicity of the newly expressed protein

The Cry1Ab protein was assessed for its potential allergenicity by a variety of tests, including a) whether the genes came from allergenic or non-allergenic sources, b) sequence similarity to known allergens, and c) pepsin stability of the protein in an *in vitro* digestion assay. In all cases, the proteins did not exhibit properties characteristic of allergens.

7.9.2 Assessment of allergenicity of the whole GM plant or crop

As the introduced protein does not have any allergenic potential, it was concluded that the use of MON 810 does not lead to an increased risk for allergenic reactions compared to the equivalent range of uses of conventional maize.

7.10 Nutritional assessment of GM food/feed

7.10.1 Nutritional assessment of GM food

The scope of the current renewal application covers the use of MON 810 for direct feed, the feed containing or consisting of MON 810, the import and the cultivation of the GM. The food aspects are covered in different renewal applications (Food additives, feed materials and feed additives produced from MON 810 maize that were notified according to Articles 8(1)(b) and 20(1)(b) of Regulation (EC) No 1829/2003 on genetically modified food and feed and food and food ingredients produced from MON 810 maize that were notified pursuant to Article 5 of Regulation (EC) No 258/97 and subsequently notified according to Article 8(1)(a) of Regulation (EC) No 1829/2003 on genetically modified food and feed)

7.10.2 Nutritional assessment of GM feed

A confirmatory feeding study in broiler chickens was conducted to compare the nutritional value of MON 810 and non-transgenic control grain, as well as commercial reference hybrids, and to provide additional confirmation of the safety of this maize. The results of this study show that there were no biologically relevant differences in the parameters tested between broilers fed the MON 810-containing diet and the non-transgenic control diet. The MON 810-diet was as wholesome as its corresponding non-transgenic control diet and commercially available reference diets regarding its ability to support the rapid growth of broiler chickens. This conclusion was consistent with the evaluation of the composition of MON 810, which showed that

there were no biologically relevant differences in nutritional and compositional properties relative to control and reference maize hybrids. These data confirm the conclusion that MON 810 and the feed containing or consisting of MON 810 are as safe and nutritious as conventional maize.

7.11 Post-market monitoring of GM food/feed

There are no intrinsic hazards related to MON 810 as no signs of adverse or unanticipated effects have been observed in a number of safety studies, including animal feeding studies using doses of administration that are orders of magnitude above expected consumption levels. The pre-market risk characterisation for food and feed use of MON 810 demonstrates that the risks of consumption of MON 810 and of foods containing or consisting of MON 810 are consistently negligible and not different from the risks associated with the consumption of conventional maize and products containing or consisting of conventional maize. As a consequence and as previously stipulated in the Community Register of GM food and feed, no specific risk management measures are indicated, and post-market monitoring of the direct use of MON 810 for feed and of the feed containing or consisting of this maize, is not appropriate.

8. Mechanism of interaction between the GM plant and target organisms (if applicable)

MON 810 expresses the Cry1Ab protein which confers protection against certain lepidopteran pests. In order to exert its toxic activity in a target organism, the following steps need to occur to the Cry1Ab protein: ingestion of the Cry1Ab protein crystals by the insect, solubilization of the crystals in the insect midgut, proteolytic processing of the released protein by digestive enzymes to activate the toxin, binding of the toxin to receptors on the surface of midgut epithelial cells of target organisms, formation of membrane ion channels or pores, and consequent disruption of cellular homeostasis. Electrolyte imbalance and pH changes render the gut paralyzed, which causes the insect to stop eating and die.

MON 810 has already been approved for cultivation and use under Directive 90/220/EEC since 1998.

9. Potential changes in the interactions of the GM plant with the biotic environment resulting from the genetic modification

9.1 Persistence and invasiveness

As for conventional maize, the likelihood of MON 810 adversely impacting the environment is negligible, as it has shown no ability to be persistent or invasive and these parameters are unaltered in MON 810 when compared to conventional maize. In the unlikely event of the establishment of a MON 810 plant in the environment, the introduced trait would confer only a limited selective advantage (protection from lepidopteran pests) of short duration, narrow spatial

context and have negligible consequences for the environment. Hence the risk to the environment from MON 810 through increased persistence and invasiveness of this maize is negligible.

9.2 Selective advantage or disadvantage

The risk of the introduced traits in MON 810 to be the cause of any adverse effects resulting from a competitive advantage or disadvantage in natural environments is negligible. Within commercial MON 810 fields, the maize plants theoretically have a selective advantage over unprotected traditional maize plants under specific conditions in the field (*i.e.* under actual herbivory by target insect pests). However, these conditions are predictable, spatially limited, short in duration and with negligible consequences to the environment. These "selective advantages" are limited to the agricultural field and the growing season of the MON 810 crop, and are considered of negligible risk to the agronomic and natural environment.

9.3 Potential for gene transfer

There is no potential for gene transfer from MON 810 to wild plant species in the E.U. There is a significant likelihood for gene transfer to other maize crops, depending on wind, flowering synchrony and distance between the crops. In the event that an introduced gene would outcross to other maize hybrids, its transfer would not confer a selective advantage as discussed in 9.2. Therefore, it is not considered to constitute an adverse environmental effect in itself. The environmental risk posed by this transfer, and hence by MON 810 is negligible.

9.4 Interactions between the GM plant and target organisms

The insecticidal trait in MON 810 is identical to that in MON 810, which was previously authorised for cultivation in the E.U.

The only identified potential adverse effect arising from the widespread cultivation of MON 810, if it occurs, would be the development of resistance in the target pests to the insecticidal Cry1Ab protein expressed in MON 810. However, in those countries where MON 810 has been planted, insect resistance management (IRM) plans have been put in place to minimize the risk of insect resistance evolving to Cry1Ab. This will continue to be the case wherever MON 810 is grown. Therefore, the risk of resistance evolving to the Cry1Ab protein in target organisms through the use of MON 810 is minimal.

9.5 Interactions of the GM plant with non-target organisms

The introduced Cry1Ab protein presents a negligible hazard to non-target organisms. Numerous studies have established that Cry1Ab exhibits toxicity to specific Lepidoptera, but not to other insect orders or other non-target organisms. As a consequence, there is negligible risk for harmful effects of MON 810 on non-target organisms (vertebrates and invertebrates), either through direct or indirect interactions with this maize or through contact with the newly expressed protein Cry1Ab. Higher trophic interactions between non-

target organisms would also not be negatively affected. Therefore, any risks for significant indirect effects on the population levels of non-target organisms in the receiving environment or their functioning in below- and above-ground ecosystems in the vicinity of the crop are equally negligible.

Furthermore, no evidence of any adverse effects was found since the commercial introduction of MON 810, and MON 810 containing stacked products in North America. No evidence has been brought forward by the many farmers and operators handling these products of any harmful or undesirable effects associated with this maize or with the introduced proteins.

9.6 Effects on human health

The likelihood for any adverse effects occurring in humans as a result of their contact with this maize is no different from conventional maize, as MON 810 contains the Cry1Ab protein, which has negligible potential to cause any toxic or allergenic effects in humans. The data demonstrating the safety of MON 810 for human health were summarized in Sections D.7.1 to D.7.11. Based on the extensive characterization of the inserted trait, and the safety demonstrated for the expressed protein, no adverse effects on human occupational health are to be expected. Therefore, the risk of changes in the occupational health aspects of this maize is negligible.

9.7 Effects on animal health

MON 810 is not substantially different from conventional maize except except for the introduced lepidopteran-protection trait, imparted by the expression of Cry1Ab protein. The Cry1Ab protein has an extensive history of safe use and did not show signs of toxicity when directly assessed in several feeding studies with animals, demonstrating the absence of any toxic or pleiotropic effects linked to the genetic modification. Therefore, based on the safety data presented in Sections D.7.1 to D.7.11, no adverse effects on animal health or in humans, consuming those animals, are to be expected and no risk for the feed/food chain is likely to occur from the use of MON 810.

9.8 Effects on biogeochemical processes

The risk for direct or indirect, immediate or delayed adverse effects on biogeochemical processes can be considered as negligible. It is highly unlikely that there is any difference between MON 810 and traditional maize with respect to its direct influence on soil nutrient levels and key processes, as MON 810 is compositionally equivalent and has equivalent growth and development, morphology, yield, plant health and survival characteristics to non-transgenic maize (*see* Sections D.4, D.7.1 and D.7.4). Furthermore, it is highly unlikely that the direct or indirect interaction between this maize and decomposers or detritivores in the receiving environment would cause any immediate or delayed adverse effects on the decomposition and nutrient recycling functions in the soil. Additionally, the Cry1Ab protein is subject to rapid

degradation in soil.

In conclusion, the environmental risk of adverse effects on biogeochemical processes, caused by the interaction of MON 810 with target and non-target organisms in the soil, is negligible.

9.9 Impacts of the specific cultivation, management and harvesting techniques

In comparison to any other maize, no typical characteristics of the genetically modified plant could be identified, which may cause adverse effects on the environment through a need to change management practices. Therefore, the environmental impact of farming practices (cultivation, crop management, harvesting and post-harvest storage techniques) to grow MON 810 in the E.U. is considered no different from any other maize.

It is actually expected that the production of MON 810 will positively impact current agronomic practices in maize and provide benefits to farmers and the environment in the E.U. The benefits of planting insect-protected maize include: 1) a reliable means to control the target lepidopteran maize pests; 2) control of target insects while maintaining beneficial species; 3) reduced use of chemical insecticides; 4) reduced applicator exposure to chemical pesticides; 5) good fit with integrated pest management (IPM) and sustainable agricultural systems; 6) reduced fumonisin mycotoxin levels in maize kernels; and 7) no additional labour or machinery requirements, allowing both large and small growers to maximize hybrid yields.

In order to secure the valuable agronomic and other benefits of insect-protected maize on a longer term, a harmonised Insect Resistance Management (IRM) stewardship programme was developed, aiming to delay the onset and development of possible resistance in target insect species. This stewardship plan is part of a larger stewardship effort in the E.U., which is currently being implemented for various insect-protected Bt maize varieties.

10. Potential interactions with the abiotic environment

MON 810 is substantially equivalent to conventional maize, with the exception of the introduced trait of agronomic interest, which is imparted by the expression of the Cry1Ab protein. The Cry1Ab protein has a history of safe use and has no known negative interactions with the abiotic environment.

As MON 810 was shown to be substantially equivalent to conventional maize, except for the introduced lepidopteran-protection trait, imparted by the expression of the Cry1Ab protein, there is no evidence that this maize would be any different from conventional maize with regard to its baseline interactions with the abiotic environment. Although the Cry1Ab is an introduced protein in maize, it has a safe history of use and no known negative effects on biochemical processes (see Sections D.7.8.1 and D.9.8 in this document). Therefore, no adverse impact on the abiotic environment is expected to result from the import of MON 810 and use for feed or from the

cultivation of MON 810 in the E.U.

11. Environmental monitoring plan (not if application concerns only food and feed produced from GM plants, or containing ingredients produced from GM plants and if the applicant has clearly shown that environmental exposure is absent or will be at levels or in a form that does not present a risk to other living organisms or the abiotic environment)

11.1 General (risk assessment, background information)

As the scope of this renewal application under Regulation (EC) No 1829/2003 includes the renewal of the use of MON 810 to the cultivation of varieties in the E.U., a general surveillance plan in accordance to Annex VII of Directive 2001/18/EC was included, as required by Articles 5(5) and 17(5) of the said Regulation.

11.2 Interplay between environmental risk assessment and monitoring

An environmental risk assessment (e.r.a.) for MON 810 was conducted as required by Articles 5(5) and 17(5) of Regulation (EC) No 1829/2003.

Analysis of the characteristics of MON 810 and comparison to the experience with cultivation of conventional maize within the E.U. has shown that the risk for potential adverse effects on human and animal health and the receiving environment, resulting from the use of MON 810 in the E.U., including the cultivation of MON 810 varieties and use thereof as any other maize, is consistently negligible

Therefore, the overall environmental risk posed by this genetically modified higher plant is negligible, and no specific strategies for risk management are required.

11.3 Case-specific GM plant monitoring (approach, strategy, method and analysis)

As the overall environmental risk posed by this genetically modified higher plant is negligible, and as the conclusions of the environmental risk assessment are derived from the results of scientific studies, rather than major assumptions, no case-specific post-market monitoring (CSM) actions, typically aimed at testing assumptions made in this assessment, would be warranted or required.

11.4 General surveillance of the impact of the GM plant (approach, strategy, method and analysis)

Any potential adverse effects of MON 810 on human health and the environment, which were not anticipated in the environmental risk assessment, are addressed by the general surveillance (GS) plan in accordance with the principles of Directive 2001/18/EC, Annex VII. General surveillance is largely based on routine observation and implies the collection, scientific evaluation and reporting of reliable

scientific evidence, in order to be able to identify whether unanticipated, direct or indirect, immediate or delayed adverse effects have been caused by the placing on the market of a genetically modified (GM) crop in its receiving environment.

For general surveillance of MON 810, the party placing MON 810 on the market uses several tools. The central tool is an annual farm questionnaire addressed to a subset of farmers cultivating MON 810. Additionally, information from other sources (company stewardship programmes, scientific literature, official websites and existing observation networks) will be incorporated, where appropriate.

Farmers are the closest observers of the cultivation of the GM plants and they already collect information on the cultivation and management of their crops at farm level. Therefore, they can give details on GM plant-based parameters (referring to species/ecosystem biodiversity, soil functionality, sustainable agriculture, or plant health) and on background and baseline environmental data (*e.g.* soil parameters, climatic conditions, general crop management data such as fertilisers, crop protection, crop rotations and previous crop history). Additionally, farmers may give empirical assessments which can be useful within general surveillance to reveal unanticipated deviations from baseline variation for the crop and cultivation area in question, based on their historical knowledge and experience on parallel non-GM cultivation. A questionnaire addressed to the GMO cultivating farmers is a monitoring tool that is specifically focused at farm level. EFSA explicitly considers questionnaires a useful method to collect first hand data on the performance and impact of a GM plant and to compare the GM plant with conventional plants[3].

Existing networks can be used to provide surveillance information and ensure that sufficient observers are available to identify and report possible unanticipated adverse effects. This would include existing observation programs in the fields of agriculture, the non-agricultural environment, occupational health and livestock welfare. As stated in the EFSA opinion on post-market environmental monitoring[4], the use of national environmental monitoring programmes is outside of the management and control by an individual applicant and thus it cannot be the task of an applicant alone to use, modify or improve existing surveillance systems. The party placing the GM plant on the market may therefore consider to use information from this type of networks on an ad hoc basis (e.g. if a potential adverse effect is reported in a subset of questionnaires in a certain region) to assess whether this effect is associated with the GM plant or with another influencing factor. The party placing the GM plant on the market also proposes to broaden the reporting obligations of the operators of these programmes to the Competent Authorities for GMO cultivation and risk management, who

[3] Opinion of the scientific panel on genetically modified organisms on a request from the Commission related to the notification (reference C/GB/02/M3/3) for the placing on the market of glyphosate-tolerant and insect-resistant genetically modified maize NK603 x MON 810, for import and processing, under Part C of Directive 2001/18/EC from Monsanto. The EFSA Journal, Question No EFSA-Q-2005-056, 1-22.

[4] Opinion of the Scientific Panel on genetically modified organisms on the post-market environmental monitoring (PMEM) of genetically modified plants. The EFSA Journal, Question No EFSA-Q-2004-061, 1-27.

can then consider any scientifically founded information from these regional agricultural and environmental surveys collected in the countries where MON 810 is grown together with the GS report of the party placing MON 810 on the market. Taken together, the information reported to them will allow the Competent Authority to evaluate potential adverse effects to identified protection goals in the broad environment. GMO-effects are assessed as one of the many potential influencing factors.

A continuous supply and distribution network extends from the technology provider, via intermediate distribution, to the end-user. Through their sales and technical organisations, key participants, especially those companies involved in farm sales, would be regular visitors to fields where GM plants would be cultivated. Experience has shown that this network ensures a continuous and efficient communication link from the grower to the technology provider, especially in relation to complaints about product performance, and thus would provide a key surveillance network for possible adverse effects. The stewardship commitment of the authorisation holder is detailed in the Technology Use Guide[5].

In addition to the above-mentioned general surveillance actions directed to MON 810 growers, international traders, grain processors, users of maize grain, and other stakeholders, the party placing MON 810 on the market would actively monitor existing information sources such as official websites, scientific publications and expert reports on GMOs in order to identify, collate and follow-up on potentially adverse observations made for this maize or any other relevant information, in particular with respect to occupational health, animal feed safety or putative ecological effects of the release of this maize.

11.5 Reporting the results of monitoring

Monsanto will submit an annual General Surveillance Report containing information obtained from participating networks, and/or in case of an effect that was confirmed.

Any recorded observations of adverse findings that are linked to the cultivation and/or use of this maize, which come to the attention of the party placing the GM plant on the market, will receive careful analysis in real time and re-mediating action, where applicable. Adverse reports will be discussed in the mandatory general surveillance report. The general surveillance reports will be sent to the European Commission, which will distribute to all Competent Authorities in the E.U. General Surveillance reports will be prepared on an annual basis, except in case of adverse findings that need immediate risk mitigation, which will be reported as soon as possible.

[5] http://www.monsanto.com/monsanto/us_ag/layout/stewardship/tug/default.asp

12. Detection and event-specific identification techniques for the GM plant

An event-specific PCR-assay allowing the detection and the quantification of MON 810 has been validated in a collaborative trial by the American Association of Cereal Chemist (AACC) in collaboration with the German Federal Institute of Risk Assessment (BfR), GeneScan and the Joint Research Center from the European Commission. This method has been included as Annex D 2 in the current CEN draft standard pr ISO 21570 "Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – Quantitative nucleic acid based methods"

E. INFORMATION RELATING TO PREVIOUS RELEASES OF THE GM PLANT AND/OR DERIVED PRODUCTS

1. History of previous releases of the GM plant notified under Part B of the Directive 2001/18/EC and under Part B of Directive 90/220/EEC by the same notifier

a) Notification number

B/FR/94.02.11; B/FR/94.02.16; B/FR/94.03.02; B/FR/95.03.06; B/FR/95.03.08; B/FR/95.03.09; B/FR/95.03.10; B/FR/95.03.11; B/FR/95.03.12; B/IT/95-38; B/IT/95-23

b) Conclusions of post-release monitoring

Post-release surveillance of trials performed in the E.U. provided no significant evidence that this maize would likely cause any adverse effects to human or animal health or to the environment.

c) Results of the release in respect to any risk to human health and the environment (submitted to the Competent Authority according to Article 10 of Directive 2001/18/EC)

Post-release surveillance from environments inside and outside the E.U. provided no significant evidence that MON 810 would pose any risk of adverse effects to human or animal health or to the environment.

2. History of previous releases of the GM plant carried out outside the Community by the same notifier

a) Release country

MON 810 was first commercialized in the U.S. in 1997 and approved for cultivation in the E.U. in 1998. In 2006, MON 810 was grown in the U.S.A., Canada, Argentina, South Africa, Uruguay, the Philippines, and the E.U. (Spain, France, Germany, Czech Republic, Portugal and Slovakia).

b)	**Authority overseeing the release** Agencies in charge of field release
c)	**Release site** Major maize growing regions within the different countries
d)	**Aim of the release** Commercial release for all uses as conventional maize.
e)	**Duration of the release** Please see Section E.2.(a)
f)	**Aim of post-releases monitoring** Extensive pre-market risk assessment did not provide evidence of adverse effects potentially associated with the cultivation, handling or use of MON 810, indicating that a requirement for post-release monitoring would not be appropriate. In addition, MON 810 is commercialized alongside stewardship programmes such as insect resistance management programmes, involving downstream stakeholders in the use of this maize, in order to ensure the implementation of good agricultural practice in its cultivation and to ensure a channel of communication in the unlikely event that unanticipated adverse effects might occur. However, no such unanticipated effects have been observed since the commercialization of MON 810.
g)	**Duration of post-releases monitoring** Please see Section E.2.(f)
h)	**Conclusions of post-release monitoring** Please see Section E.2.(f)
i)	**Results of the release in respect to any risk to human health and the environment** Field-testing and post-marketing experience provided no significant evidence that grain or derived products from MON 810 are likely to cause any adverse effects to human or animal health, or to the environment.

3. Links (some of these links may be accessible only to the competent authorities of the Member States, to the Commission and to EFSA):

a)	**Status/process of approval** The JRC websites http://gmoinfo.jrc.it/gmc_browse.aspx?DossClass=0 and http://gmo-crl.jrc.it/statusofdoss.htm and the EFSA website http://www.efsa.europa.eu/en/science/gmo/gm_ff_applications.html provide publicly accessible links to up-to-date databases on the regulatory progress of notifications under Directive 2001/18/EC and applications under Regulation (EC) No 1829/2003.
b)	**Assessment Report of the Competent Authority (Directive 2001/18/EC)** Not applicable in the context of the scope of this renewal application.
c)	**EFSA opinion** EFSA has issued opinions on MON 810-containing stacks (NK603 x MON 810, MON 863 x MON 810 and MON 863 x MON 810 x NK603) (http://www.efsa.europa.eu/en/science/gmo/gmo_opinions.html) .
d)	**Commission Register (Commission Decision 2004/204/EC)** http://ec.europa.eu/food/dyna/gm_register/index_en.cfm
e)	**Molecular Register of the Community Reference Laboratory/Joint Research Centre** Information on detection protocols is posted at http://gmo-crl.jrc.it/
f)	**Biosafety Clearing-House (Council Decision 2002/628/EC)** The publicly accessible portal site of the Biosafety Clearing-House (BCH) can be found at http://bch.biodiv.org/
g)	**Summary Notification Information Format (SNIF) (Council Decision 2002/812/EC)** This public summary of the renewal application of MON 810 under Regulation (EC) No 1829/2003 will be posted at the EFSA website (http://www.efsa.europa.eu/ en/science/gmo/gm_ff_applications.html).