# PART II

# SUMMARY

## OF THE REQUEST FOR AUTHORIZATION OF GM FOOD AND GM FEED IN ACCORDANCE WITH ATICLES 5 AND 17 OF REGULATION (EC) NO. 1829/2003

## GLUFOSINATE AMMONIUM-TOLERANT SOYBEAN TRANSFORMATION EVENT A2704-12

## A. GENERAL INFORMATION

### 1. Details of application

| |
|---|
| a) **Member State of application:** The Netherlands |
| b) **Application number:** Not available at the date of application |
| c) **Name of the product (commercial and other names):**<br>Genetically modified soybean (*Glycine max*) with tolerance to glufosinate ammonium, derived by traditional breeding methods from crosses between GM soybean transformation event A2704-12 (OECD code ACS-GMØØ5-3) and non-GM soybean cultivars. |
| d) **Date of acknowledgement of valid application:** Not available at the date of application |

### 2. Applicant

| |
|---|
| a) **Name of applicant:** Bayer CropScience GmbH |
| b) **Address of applicant:**<br>Bayer CropScience GmbH<br>Industriepark Höchst, K 607<br>D-65926 Frankfurt am Main<br>**E-mail address:** info@bayercropscience.com |
| 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)):**<br>A2704-12 derived seeds will be imported and processed in the EU by the same groups who import, process and distribute commodity soybean seed today. |

**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

☒ GM plants for feed use

☐ Feed containing or consisting of GM plants

☐ Feed produced from GM plants

☒ Import and processing (Part C of Directive 2001/18/EC)

☐ 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 ☐ | No ☒ |
| If *yes*, specify | |

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

| | |
|---|---|
| Yes ☐ | No ☒ |
| If *no*, refer to risk analysis data on the basis of the elements of Part B of Directive 2001/18/EC<br>This application requests import and processing only and is not intended for growing purposes in the EU. | |

**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 ☒ | No ☐ |
| If *yes*, specify:<br>Event A2704-12 has been notified according to Directive 90/220/EC in Belgium (C/B/98/01) and Portugal (C/PT/99/01) and according to Regulation 258/97 in Belgium. Due to the new regulations these notifications have been withdrawn and replaced by the current notification under Regulation (EC) No 1829/2003. | |

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

| | |
|---|---|
| Yes ☒ | No ☐ |

**If *yes*, specify:**

The environmental and/or food safety of glufosinate ammonium-tolerant soybean has been confirmed by positive review in the United States of America (USDA- cultivation, 1996; FDA-food and feed, 1998), in Canada: (CFIA- cultivation and feed, 1999, Health – food , 2000), in Japan (MAFF - environment, 1999, MHLW - food, 2002, MAFF – feed, 2003), in South Africa – food and feed (2001), in Russia (Min. of Health – food, 2002), in Mexico – feed (2000), food (2001), in Argentina (CONABIA - environment, 2001) and in Australia and New Zealand (ANZFA - food, 2004.).

## 8. General description of the product

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

The recipient plant belongs to the species, *Glycine max*. The genetic modification confers tolerance to the herbicide glufosinate ammonium by virtue of recombinant DNA technologies used to create a new transgenic event in soybean, A2704-12. The inserted *pat* coding sequence codes for the specific enzyme, phosphinothricin acetyl-transferase (PAT). PAT acetylates glufosinate ammonium and thereby detoxifies the herbicide.

Glufosinate ammonium-tolerant soybean and Liberty® herbicide work together in a weed control system with favourable environmental and safety characteristics. The system combines the broad spectrum, non-selective herbicide, Liberty® (active ingredient glufosinate ammonium) with soybean varieties which have a genetically-based tolerance to Liberty® Herbicide.

The use of Liberty® herbicide fits well with the new common agronomic practices for weed control in soybeans. These include less tillage, less herbicide combinations used pre-emergent and the increased use of broad-spectrum post-emergence herbicides. The option to wait for crop establishment to assess weed infestations and the need for weed control allows the grower flexibility and avoids blind application of pre-plant and pre-emergence herbicides. Liberty® allows the grower the option to delay herbicide application until the level of weed infestation is known. Liberty® herbicide's unique mode of action lends itself as an excellent herbicide rotational tool to prevent weed shifts and the need for new weed management systems.

Advantages for US and Canadian agriculture provided by the Liberty® soybean system include: 1) more options to rotate herbicides for resistance management programs; 2) control of less sensitive weeds (Morningglory); and 3) removal of difficult to control weeds (Ragweed). It thus provides more options for crop management, less pollution of soybean growing areas and potential implications for soil conservation through minimum tillage practices.

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

A2704-12 soybean will be imported, processed and distributed in the European Union for the same uses as any other soybean (food, feed and industrial uses) excluding cultivation.

**c) Intended use of the product and types of users:**

Soybeans derived from event A2704-12 will be grown in the United States of America (USA) and Canada and will enter the EU by import as commodity soybean and derived products and could be used for the same downstream purposes as non-GM soybeans. There are three major food/feed products derived from soybeans – whole soybeans, oil and meal.

This application requests import and processing only and is not intended for growing purposes in the EU. The milling, processing and consumer packaging however will be accomplished in the EU.

Therefore the intended categories of users belong to the soybean crushing and packaging industry and their customers, the consumers of soybean and soybean products.

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

No mandatory restrictions for use, storage and handling are proposed as a condition of the authorisation. All standard practices applicable to soybean today remain adequate for the handling of glufosinate ammonium-tolerant, event A2704-12 varieties.

When genetically modified soybean is placed on the EU market (including co-mingled with non-genetically modified soybean during use, storage and handling), the corresponding batch will be labelled and handled according to the legislation in application in the EU, in particular the Regulation No. 1830/2003 (EC).

**e) Any proposed packaging requirements:**

Soybean derived from event A2704-12 will be packaged as any other conventional soybean.

**f) A proposal for labelling in accordance with Articles 13 and Articles 25 of Regulation ((EC) 1829/2003. In the case of GMOs, food and/or feed containing or 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:**

Event A2704-12 does not have characteristics that require specific labelling. Therefore, no additional labelling is proposed in addition to the GM labelling requirements foreseen in regulations (EC) 1829/2003 and 1830/2003.

**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):**

ACS-GMØØ5-3

**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:**

No restrictions are necessary as varieties derived from event A2704-12 are suitable for food, feed and industrial uses in all regions of the European Union. This application requests import and processing only and is not intended for growing purposes in the EU.

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

Any unintended release or misuse will not have detrimental effects on the environment or on human and animal health as has been determined by the risk analysis. Therefore, no special measures are foreseen.

Soybeans derived from transformation event A2704-12 are tolerant to herbicide products having glufosinate-ammonium as the active ingredient. They remain susceptible to a wide variety of herbicides and can in this way (or mechanically) easily be eliminated.

No additional specific measures are suggested in case of waste disposal and treatment.

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

### 1. Complete name

| | |
|---|---|
| a) Family name: | *Leguminosae* |
| b) Genus: | *Glycine* |
| c) Species: | *max* |
| d) Subspecies: | Not applicable. |
| e) Cultivar/breeding line or strain: | A2704 |
| f) Common name: | soybean |

### 2 a. Information concerning reproduction

(i) Mode(s) of reproduction

Soybean is considered a self-pollinated species, propagated commercially by seed.

The soybean flower stigma is receptive to pollen approximately 24 hours before anthesis and remains receptive 48 hours after anthesis. The anthers mature in the bud and directly pollinate the stigma of the same flower. As a result, soybeans exhibit a high level of self-fertilisation and cross pollination is usually less than one percent.

(ii) Specific factors affecting reproduction

Soybeans are quantitative short day plants and thus flower more quickly under short days. As a result, photoperiodism and temperature response are important in determining areas of cultivar adaptation. Seed will germinate when the soil temperature reaches 10°C and will emerge in a 5-7 day period under favourable conditions. In new areas of soybean production an inoculation with *Bradyrhizobium japonicum* is necessary for optimum efficiency of the nodulated root system. Soybeans do not yield well on acid soils.

(iii) Generation time

Soybean is an annual crop. Generation time is 3 to 5 months in the primary areas of production.

### 2 b. Sexual compatibility with other cultivated or wild plant species

There is no evidence of genetic transfer and exchange with organisms other than those with which soybean is able to produce fertile crosses through sexual reproduction.

In Europe, the cultivated soybean is *G. max*. No wild relatives have been reported and *G. max* itself is not a wild species.

The subgenus *Soja*, to which *G. max* belongs, also includes *G. soja* Sieb. and Zucc. (2n=40) and *G. gracilis* Skvortz. (2n=40), wild and semi-wild annual soybean relatives from Asia. *Glycine soja* is a wild viny annual with small and narrow trifoliate leaves, purple flowers and small round brown-black

seeds. It grows wild in Korea, Taiwan, Japan, Yangtze Valley, N.E. China and areas around its western border. *Glycine gracilis*, an intermediate in form between *G. soja* and *G. max*, has been observed in Northeast China. Interspecific, fertile hybrids between *G. max* and *G. soja*, and between *G. max* and *G. gracilis* have been easily obtained.

In addition to the subgenus *Soja*, the genus *Glycine* contains also the subgenus *Glycine*. The subgenus *Glycine* consists of twelve wild perennial species, including *G. clandestina* Wendl., *G. falcata* Benth, *G. latifolia* Benth., *G. latrobeana* Meissn. Benth., *G. canescens* F.J. Herm., *G. tabacina* Labill. Benth., and *G. tomentella* Hayata. These species are indigenous to Australia, South Pacific Islands, China, Papua New Guinea, Philippines, and Taiwan. Species of the subgenus *Glycine* have chromosome complements of 2n=40 or 2n=80.

Early attempts to hybridise annual (subgenus *Soja*) and perennial (subgenus *Glycine*) species were unsuccessful. Although pod development was initiated, these eventually aborted and abscised. Intersubgeneric hybrids were later obtained *in vitro* through embryo rescue, between *G. max* and *G. clandestina* Wendl; *G. max* and *G. tomentella* Hayata; and *G. max* and *G. canescens*, using transplanted endosperm as a nurse layer. In all cases, the progeny of such intersubgeneric hybrids was sterile and obtained with great difficulty.

This application requests import and processing only and is not intended for growing purposes in the EU.

## 3. Survivability

**a) Ability to form structures for survival or dormancy**

Soybean, *Glycine max*, is a cultivated, self-pollinating annual species, propagated commercially by seed. Soybean seeds rarely display any dormancy characteristics and only under certain environmental conditions will soybeans emerge as a volunteer in the year following cultivation. The soybean plant is not weedy in character and is not found outside of cultivation. Aside from seed, soybean has no other structures for survival or dormancy.

**b) Specific factors affecting survivability**

Soybeans are adapted to agricultural regions from equatorial to temperate zones. They grow most rapidly when air temperatures are between 25 and 30 °C. They are very susceptible to frost damage and somewhat susceptible to excessive drought and extended flooding. Seeds of cultivated soybean survive poorly in soil, normally less than one year, and generally do not overwinter.

## 4. Dissemination

**a) Ways and extent of dissemination**

Soybean is considered a self-pollinated species, propagated commercially by seed. It exhibits a high percentage of self-fertilisation and cross pollination is usually less than one percent.

Seed may be dispersed during transport, at sowing or during harvest. Pods may also shatter under some climatic conditions if harvest is delayed, resulting in seed dispersal. However, soybean is not an invasive crop and is seldom observed as a volunteer plant after soil cultivation.

**b) Specific factors affecting dissemination**

No special factors affect dissemination. Dissemination is due primarily to human activity.

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

Historical and geographical evidence suggests that soybeans were first domesticated in eastern China, between the 17th and 11th century B.C. Today soybeans are grown as a commercial crop in more than 35 countries throughout the world. *G. max* is not found as a wild species.

FAO Agricultural Production Data indicates that during 2004, 206 million metric tons of soybean was harvested from 91 million hectares world-wide. Of that, almost 760,000 metric tons was produced on about 269,000 hectares in the European Union. FAO data indicates soybean production in the following Member States during 2004: Austria, Czech Republic, France, Germany, Greece, Hungary, Italy, Slovakia, Slovenia and Spain. Approximately 64% of all the soybeans produced in the EU were grown in Italy during that time period. France's production represented 20%, Hungary's 6.5% and Austria's about 5%.

During 2004, about 1.2 million hectares of soybean were harvested in Canada and 30 million in the USA. Canadian production amounted to about 3 million metric tons and USA production to about 86 million metric tons.

Wild relatives of soybean (*Glycine max*) are found only in Australia, China, Japan, Korea, Taiwan, the Philippines, Papua New Guinea and several South Pacific islands.

This application requests import and processing only and is not intended for growing purposes in the EU.

## 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

Soybean is cultivated by the Member States of Austria, Czech Republic, France, Germany, Greece, Hungary, Italy, Slovakia, Slovenia and Spain. *G. max* and its wild relatives are not indigenous to the EU.

## 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

As soybeans are legumes, they can fix atmospheric nitrogen as a source of nitrogen for growth and development in a symbiotic relationship with *Bradyrhizobium japonicum*. When soybeans are grown in new production areas, seeds are normally inoculated with *B. japonicum* prior to planting.

There are a few compounds in legumes, and therefore also in soybeans, which are not favourable for human or animal nutrition. However, their levels in soybeans derived from transformation event A2704-12 are not significantly different from those found in conventionally bred soybeans.

## C. INFORMATION RELATING TO THE GENETIC MODIFICATION

### 1. Description of the methods used for the genetic modification

Soybean tissue for transformation was obtained from shoot apices derived from surface sterilized soybean seeds. The genetic modification was made through particle bombardment. No carrier DNA was used in the process.

### 2. Nature and source of the vector used

The plasmid, pB2/35SAcK, is a derivative of the vector pUC19. It contains a Right Border fragment from the *Agrobacterium tumefaciens* Ti plasmid pTiAch5 and the synthetic *pat* gene fused to 35S-promotor and 35S-terminator from Cauliflower Mosaic Virus

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

The genetic elements to be transferred into the plant are described in Table 1.

The pUC sequences in the plasmid include a *β-lactamase* gene (*bla*) and a bacterial origin of replication. The *bla* gene is however not functional in transgenic soybean cells because prior to transformation the vector was digested with a restriction enzyme (*Pvu*I) to disrupt the coding sequence of the *bla* gene and thereby remove the possibility of its expression.

Table 1: Genetic elements of the Plasmid pB2/35SacK to be inserted

| Definition | Source | Size (bp) | Function |
|---|---|---|---|
| Sequence of the vector pUC19 | | 188 | Vector backbone |
| Right border repeat | Fragment of octopine plasmid TiAch5 | 55 | *Cis*-acting element for T-DNA transfer |
| Sequence of the vector pUC19 | | 217 | Vector backbone |
| Promoter | Cauliflower mosaic virus from the vector PDH51 | 543 | High level constitutive expression |
| Polylinker sequence | Synthetic | 8 | Plasmid cloning site |
| Synthetic *pat* gene | Synthetic (amino acid sequence from *Streptomyces viridochromogenes*) | 552 | Herbicide tolerance and selectable marker Stop signal |
| Polylinker sequence | Synthetic | 18 | Plasmid cloning site |
| Terminator | Cauliflower Mosaic Virus from the vector pDH51 | 203 | Stop signal |
| Sequence of the vector pUC19, including the polylinker, the origin of replication and the ***β-lactamase* (*bla*) gene** | | 2292 | Bacterial origin of replication and bacterial marker |

## D. INFORMATION RELATING TO THE GM PLANT

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

All LibertyLink® crops are tolerant to commercial herbicides containing glufosinate ammonium (active form is L-glufosinate). Their herbicide tolerance is based upon the naturally occurring *pat* gene, isolated from soil microbes that produce L-phosphinothricin, a bacterial metabolite with antimicrobal and herbicidal activity. Glufosinate ammonium is the synthetic salt of this natural herbicide. Activity of the *pat* gene protects the microbe as it makes L-phosphinothricin. In a similar manner, expression of the *pat* gene in plants allows survival after a foliar spray with glufosinate ammonium herbicide. The *pat* gene codes for the enzyme Phosphinothricin-Acetyl-Transferase (PAT) that acetylates L-phosphinothricin (also known as L-glufosinate) to an inactive form. The PAT protein is a highly specific enzyme with only this one function. If left in its L-isomer form, phosphinothricin disrupts the normal process of amino acid synthesis and results in a lethal build-up of ammonium in the microbe or plant cell. In a manner not unlike an inadvertent over-fertilisation of a plant, glufosinate ammonium herbicides cause sensitive plants to release internal ammonia, leading to rapid plant death.

LL Soybean varieties derived from event A2704-12 make the PAT protein mainly in their green leaf tissue. When sprayed with glufosinate ammonium herbicides, the A2704-12 plants can continue to grow while surrounding weeds rapidly die.

Several formulations of glufosinate ammonium are commercially used in many regions of the world. Registered trade/brand names include Liberty®, Ignite®, Finale® and Basta®. Registered uses in Europe include non-selective weed control in the floor of orchards and vineyards and desiccation of potatoes and oilseed rape prior to harvesting. LibertyLink® crops currently on the market in certain countries include varieties of corn, cotton and canola. None of them are currently cultivated in the European Union.

### 2. Information on the sequences actually inserted or deleted

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

Southern blot, PCR and sequence analysis demonstrated that the glufosinate ammonium-tolerant, soybean event A2704-12 contains two copies of the *pat* gene, joined by one copy of the 3' *bla* sequences and one copy of the 5' *bla* sequences. Both integrated parts of the *bla* gene do not constitute an intact, functional *bla* gene as the 5' *bla* sequences are integrated in an inverted orientation.

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

No deletion occurred.

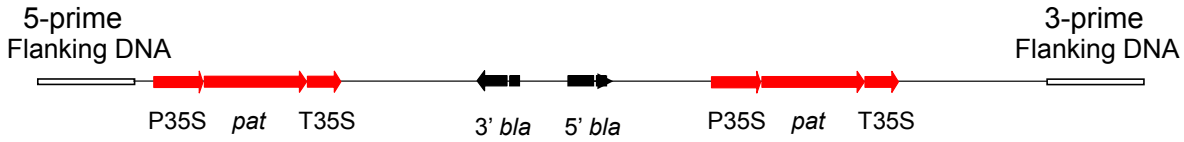
**c) Chromosomal location(s) of insert(s) (nucleus, chloroplasts, mitochondria, or maintained in a non-integrated form), and methods for its determination**

Based upon Southern blot and genetic segregation analysis, it was demonstrated that the DNA has integrated in a single genetic locus in the soybean nuclear genome (chromosome).

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

The inserts were completely sequenced and compared to the vector sequence.

The DNA sequences of event A2704-12 are completely identical to the corresponding transforming plasmid DNA sequences and the *β-lactamase* gene is disrupted into non-functional fragments. The characterization of the inserted sequences in event A2704-12 confirmed the presence of two copies of the *pat* gene cassette in a 'Head-to-Tail' configuration. The cassettes are joined by one copy of the 3' *bla* sequences and one copy of the 5' *bla* sequences. Both integrated parts of the *bla* gene do not constitute an intact *bla* gene as the 5' *bla* sequences are integrated in an inverted orientation.




## 3. Information on the expression of the insert

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

The type of promoter linked to the inserted plasmid DNA can predict the pattern of expression. Tissue specific promoters can be used to limit the expression to certain tissues of the plant, while constitutive promoters will cause expression of the inserted gene throughout the plant in all tissues. For transformation events A2704-12, the expression of the *pat* gene is regulated by the 35S promoter, a constitutive promoter isolated from the Cauliflower Mosaic Virus. Therefore expression of the PAT protein in all tissues was expected. The partial *bla* sequences are under control of bacterial transcription regulatory sequences and are not expressed in the plant.

The average amount of PAT protein in the leaves of event A2704-12 during the vegetative life cycle of the plant, measured at 4 growth stages, ranged from 8.5 µg/g to 28.2 µg/g fresh weight. PAT protein comprised an average of 0.010 – 0.035% of the total crude protein in the leaves of soybean event A2704-12.

In order to determine whether the *bla* sequences present in soybean event A2704-12 are expressed, a Northern blot analysis was performed on different tissues. This analysis confirmed that the *bla* sequences are not expressed in the tested plant tissues.

**b) Parts of the plant where the insert is expressed**

Linked to the plant promoter, 35S, the expression of the *pat* gene is targeted to green tissue of the plant. Expression level was measured by PAT protein specific ELISA. PAT levels measured in roots, stems and leaves ranged from 0.30 – 3.69 µg/g, 4.86 – 10.0 µg/g and 11.7 – 17.6 µg/g respectively in samples taken from a study in which plants were grown under greenhouse conditions and sampled at an early growth stage. The PAT levels found represent 0.011%, 0.021% and 0.024% of the total crude protein respectively in roots, stems and leaves of soybean derived from transformation event A2704-12.

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

**a) Reproduction**

The herbicide tolerance trait has no effect on the mode and rate of reproduction.

**b) Dissemination**

The introduction of tolerance to the herbicide glufosinate-ammonium has not affected agronomic characteristics. Soybeans derived from event A2704-12 retain the same growth rate and growth habit as non-transgenic soybeans, continue to be self-pollinating plants and disperse their seed in the same way as non-transgenic soybean.

**c) Survivability**

For cultivated soybean, survival is most determined by seed characteristics. There is no indication of changes in the seed characteristics as a result of the genetic modification.

**d) Other differences**

The only biologically significant difference observed in field evaluations is that soybean varieties derived from transformation event A2704-12 are tolerant to Liberty® herbicide, active ingredient glufosinate ammonium.

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

Southern analysis and sequencing of the insert show that event A2704-12 contains two *pat* gene cassettes joined by an inverted fragment from the transforming plasmid. The trait is inherited as a single locus (shown by Mendelian inheritance patterns and Southern analysis).

Stability of the transferred DNA was determined by Southern analysis. Genomic DNA from transformed plants of multiple generations descended from the initial transformation event was subjected to restriction enzyme cleavage. The digested DNA, blotted onto a solid matrix, was visualized by hybridization with specific DNA probes. The banding pattern, or 'fingerprint', should be identical if the introduced genetic elements are located in a single locus in the plant genome. The hybridization data revealed that all of the analyzed offspring had integration patterns identical to that observed for the primary transformation event.

Phenotypic stability of soybeans derived from event A2704-12 was also demonstrated by evaluating the inheritance pattern of tolerance to glufosinate ammonium through succeeding generations. Inheritance patterns are consistent with a single dominant gene locus.

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

**a) Plant to bacteria gene transfer**

The likelihood of the transfer of a functional *pat* or *bla* gene from soybeans derived from event A2704-12 to bacteria is extremely remote.

b) Plant to plant gene transfer

There is no evidence of genetic transfer and exchange under natural conditions with organisms other than those with which soybean is able to produce fertile crosses through sexual reproduction. There are no indications that the potential for successful exchange of genetic material has changed due to the genetic modification.

## 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 analysis compared soybean derived from event A2704-12 with its parent variety, A2704.

### 7.2 Production of material for comparative assessment

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

The number of locations, growing seasons, geographical regions represented and number of replicates varied between studies.

The reproductive biology study was conducted on material that was grown under green house conditions.

Several agronomic comparison studies were conducted throughout a cross section of the growing regions most suited to the germplasm background of A2704-12 and its parental line A2704, as well as the contra season country of Puerto Rico and in Brazil. Material has been field evaluated since 1995 and observations reported were made in the 1995 – 1997, 1998, 2000 and 2002 growing seasons.

Agronomic studies include evaluations conducted at sites in Ontario, Canada, in Paulinia, Brazil, in Puerto Rico and across the mid-West region of the United States of America. At each location, material derived from transformation event A2704-12 was evaluated against material of the parental line A2704. In some studies, genetically modified material was included that was sprayed with Liberty herbicide and some that was not.

The wholesomeness (feeding) study material for the poultry study was derived from A2704-12 and its parental line A2704.

The composition study included samples from both transgenic plants that had been sprayed with glufosinate ammonium and plants that had not and the parental, non-transgenic line. Material evaluated was produced in either 1999 or 2000, at one of 9 different sites located in the US states of Illinois, Iowa, Minnesota, Nebraska and Wisconsin or the Canadian Province of Ontario. At each site, plots were randomized, with three replicates of each "treatment" grown and from which samples were taken.

**b) The baseline used for consideration of natural variations**

In all the comparative studies, the soybeans derived from event A2704-12 were compared at least with soybeans of the non-transgenic parental line. In addition, the results of the composition study were also compared with information available in the literature about constituent levels in soybeans.

## 7.3 Selection of material and compounds for analysis

Bayer CropScience undertook a systematic review of the composition of the soybean derived from A2704-12. The direct comparator was seed from soybeans of the parental line A2704, grown under the same conditions as the transgenic plants. In addition, the component levels were compared with those reported in the literature for soybeans.

The components selected for compositional and nutritional analyses comprise the important nutrients of soybean. These are proximates, micronutrients such as vitamins and minerals, amino acids, fatty acids, anti-nutrients and isoflavones. The conclusion drawn from the comparative analyses is that LL Soybean event A2704-12 is found to be compositionally and nutritionally equivalent to its traditional non-transgenic counterpart and to other current commercial soybean varieties. There is no impact on the nutritional value of the soybean caused by the genetic transformation.

## 7.4 Agronomic traits

Soybean plants derived from transformation event A2704-12 are not significantly different from conventional soybeans in terms of reproduction, dissemination or survivability. Comparative field observations of plants derived from event A2704-12 and non-transgenic plants derived from the related cultivar A2704 were made as part of the event evaluation process.

Between 1995 and 1997, a number of field studies were conducted on soybeans derived from event A2704-12, primarily to evaluate efficacy of glufosinate ammonium. However, observations were also made on agronomic characteristics and disease and pest characteristics. No significant differences were noted.

Evaluations of yield, maturity date, plant height and lodging were made using data collected from 3 sites planted with soybeans derived from event A2704-12 and its nontransgenic parent line, during 1996. A 1998 Canadian field study evaluated height, yield, protein and oil content of plants derived from event A2704-12 in comparison with the related non-transgenic A2704 line. Soybeans were evaluated from three different Ontario locations. No significant differences were seen in the mean values of the evaluated parameters of the transgenic line when compared to the non-transgenic line, either within locations or across all locations.

Many of the traits for which observations were conducted in the mid-90's were carried out again, at one site in Iowa, in 2002. Samples evaluated included soybeans derived from event A2704-12 sprayed with glufosinate ammonium and not sprayed with glufosinate ammonium and soybeans from the parent line A2704. The soybeans were also evaluated on several agronomic characteristics including emergence, stand count, plant vigor and health, flowering date, plant height, days to maturity, yield and seed weight.

Overall, any differences between the transgenic and non-transgenic plants were minimal, less than 5% different from the A2704 line and well within the overall variation seen in Soybean crops.

## 7.5 Product specification

Soybean varieties derived from event A2704-12 belong to the species *Glycine max* and are distinguished from other soybeans only by tolerance to the herbicide glufosinate ammonium, the genetic locus defined as event A2704-12 and the presence of the PAT protein.

The imported commodity is soybean and derived food, feed and industrial products.

## 7.6 Effect of processing

The A2704-12 varieties are grown using the agronomic practices of the region of production with the one exception that A2704-12 plants can be sprayed with glufosinate ammonium herbicides during production. The soybeans are harvested, transported, stored and processed using the same processes as for soybeans currently in commerce. The genetic modification was not aimed at changing the processing methods.

PAT protein is not detectable in defatted, toasted meal, crude lecithin, refined oil or refined, bleached and deodorized oil. It is detectable in whole soybeans and hulls and at very low levels in defatted, non-toasted meal and soy isolate. On a percentage of crude protein basis, PAT represented 0.00056% and 0.00092% of the crude protein in the seed and hull samples respectively and less than 0.000002% of the crude protein in untoasted meal and soy isolate. Therefore, it is not likely to be a macroconstituent of food or feed.

Most soybeans are processed before feeding to animals. However, whole soybeans may be used in swine and poultry diets as a total protein supplement. The seed is typically heated to 100°C before use to destroy proteinase inhibitors and the temperatures used are high enough to inactivate the PAT protein. Any PAT protein that might remain in the animal feed after processing will be readily digested and/or degraded in the gut.

## 7.7 Anticipated intake/extent of use

The intake of soybean or derived products in the diet of the European Union is not anticipated to change with the introduction of A2704-12 varieties. Soybean and soybean products derived from A2704-12 varieties are not different in quality or nutritional composition from the Soybean products now consumed. No change in the use patterns for soybean is anticipated.

## 7.8 Toxicology

### 7.8.1 Safety assessment of newly expressed proteins

The PAT protein is not toxic for mammals and does not possess any of the characteristics associated with food allergens. Findings to support this conclusion include:

- The coding sequence of the *pat* gene is derived from a common soil microbe not known to be a pathogen.
- The PAT protein is quickly degraded and denatured in gastric and intestinal fluids of domestic animals and humans.
- The PAT enzyme is highly substrate specific. It acts on its target, glufosinate ammonium but it does not act on glutamate, the closest structural analogue of L-glufosinate.
- There were no adverse effects found in mice, even at a high dose level of the PAT protein, after intravenous administration.

#### 7.8.2 Testing of new constituents other than proteins

No constituent other than the PAT protein is novel and no changes in composition of the soybean were discovered by chemical analysis.

#### 7.8.3 Information on natural food and feed constituents

Natural constituents of soybean have not been changed in A2704-12. Extensive compositional analysis was undertaken and the conclusion drawn from the comparative analyses is that LL Soybean event A2704-12 is found to be compositionally and nutritionally equivalent to its traditional non-transgenic counterpart and to other current commercial soybean varieties. There is no impact on the nutritional value of the soybean seeds caused by the genetic transformation.

#### 7.8.4 Testing of the whole GM food/feed

In addition to the compositional analysis study, the nutritional value of feed derived from A2704-12 was assessed in a poultry feeding study.

The broiler chicken (*Gallus gallus domesticus*) is an economically significant and widely distributed food animal. The species used is based upon commercial practice and is very sensitive to detect differences in nutrient quality because of its rapid growth (15-fold increase in body weight during the first 18 days). This study showed there were no differences between groups of broiler chickens fed LL Soybean meal diet or an equivalent commercial parental soybean meal diet.

### 7.9 Allergenicity

#### 7.9.1 Assessment of allergenicity of the newly expressed protein

The PAT protein does not possess any of the characteristics associated with food allergens.

The PAT protein has no homology with any known allergens, toxins or antinutrients.

The PAT protein has no glycosylation sites present on certain food allergens.

The PAT protein forms only an extremely minor part of the crude protein fraction in A2704-12 event, making it unlikely to become a food allergen, which tends to be major proteins.

#### 7.9.2 Assessment of allergenicity of the whole GM plant or crop

An *in vitro* human allergenicity study was carried out to determine if genetically modified LLSoybean event A2704-12 has any increased activity as compared to non-genetically modified parental soybeans A2704. There was no significant difference observed in the endogenous soybean allergen content of the extract obtained from the genetically modified soybean event A2704-12 as compared to the extract obtained from traditional soybean variety A2704. Thus, there is no significant increased risk of allergenic potential of the transgenic soybean event A2704-12 as compared to the non-transgenic soybean variety A2704 in soy-allergenic subjects.

## 7.10 Nutritional assessment of GM food/feed

### 7.10.1 Nutritional assessment of GM food

The trait introduced in A2704-12 is intended for agronomic benefits. A compositional analysis of the raw commodity soybean was discussed within section D7.3. The conclusion drawn from the analyses is that LL Soybean event A2704-12 is compositionally and nutritionally equivalent to its traditional non-transgenic counterpart and to other current commercial soybean varieties. There is no impact on the nutritional value of the soybean caused by the genetic transformation.

In addition to analyses of the soybean seeds, hulls, defatted meal (toasted and untoasted), refined, bleached and deodorized oil and soy isolate were produced from soybean samples derived from A2704-12 plants (Liberty sprayed and non-Liberty sprayed) and its non-transgenic parental line A2704 and analyzed for key components. The hulls and both meals were analyzed for moisture, ash, fat, protein, acid detergent fiber and neutral detergent fiber. In addition, both meals were also analyzed for amino acids, trypsin inhibitor, phytic acid, lectins, and isoflavones. The oils were analyzed for fatty acids and the soy isolate was analyzed for crude proteins and amino acids, including tryptophan.

In most cases, the sample values were within the range of standard values reported in the literature. When differences were seen, both the transgenic and the non-transgenic samples tended in the same direction. There were no differences in composition found between the transgenic and the non-transgenic fractions that were considered to be biologically significant.

### 7.10.2 Nutritional assessment of GM feed

See chapter 7.10.1.

## 7.11 Post-market monitoring of GM food/feed

No post-market monitoring plan is required for food and feed derived from A2704-12 soybeans. Traditional comparators were used in the comparative analysis. The intent of the genetic modification was for agronomic benefit, no change in the nutritional composition or value was intended. No health claims are intended. Food derived from A2704-12 will not be marketed as an alternative to or replacement for traditional soybean food products. A2704-12 has no specific properties that might increase the dietary intake compared to conventional soybeans. There is no evidence that the long term nutritional and health status of some individuals of the European population could be impacted by the marketing of A2704-12 derived food products.

**Conclusion of the Risk assessment of food derived from A2704-12 seed**

| Consideration | Summary of findings | Hazard identified |
|---|---|---|
| Characteristics of the donor and recipient organisms | *pat* gene origin is common microbe, soybean is a food crop | None |
| Genetic modification and its functional consequences | Single well characterized insert with fragmented, non-expressing antibiotic resistance gene, expressing *pat* gene inherited as a dominant trait conferring tolerance to the herbicide active ingredient glufosinate ammonium | None |
| Potential environmental impact | Imported A2704-12 soybean and derived products will be handled in the same manner as non-GM soybean imports and | None |

| | | |
|---|---|---|
| | will not adversely impact the environment. | |
| Agronomic characteristics | Field and greenhouse evaluations have demonstrated bioequivalence for agronomic traits | None |
| Potential toxicity and allergenicity of gene products, plant metabolites and the whole GM plant | PAT protein is common in nature and in commercial use in other transgenic crops. Extensive safety review of PAT protein and substantial equivalence to non-GM soybean finds no cause for concern | None |
| Compositional, nutritional characteristics | Bioequivalence demonstrated for compositional and nutritional parameters | None |
| Influence of processing on the properties of the food or feed | No change in nutritional composition or bioavailability of key nutrients in processed products. | None |
| Potential for changes in dietary impact | No change in nutritional composition or bioavailability of key nutrients. | None |
| Potential for long-term nutritional impact | No change in nutritional composition or bioavailability of key nutrients, therefore, no long-term adverse impact anticipated | None |
| Intended and unintended effects due to the genetic transformation event | The intended effect, tolerance to the herbicide active ingredient glufosinate ammounium, has been demonstrated. No unintended effects have been observed | None |

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

The trait introduced in event A2704-12 is herbicide tolerance, not insect or disease resistance. Therefore, there are no target organisms to consider.

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

### 9.1 Persistence and invasiveness

A review of the reproductive and vegetative fitness finds that event A2704-12 compares to its parent variety A2704 in all aspects except the tolerance to glufosinate ammonium herbicide. The introduced trait in event A2704-12 does not affect the non-persistence and non-invasiveness of *Glycine max*.

### 9.2 Selective advantage or disadvantage

This application requests import and processing only and is not intended for growing purposes in the EU.

Soybeans derived from event A2704-12 have a seasonal advantage over weed competition only in concert with the use of a glufosinate ammonium herbicide to control weeds growing in the same field. A2704-12 soybeans, as all soybeans, are an annual, self-pollinating, cultivated crop without weedy characteristics and without wild relatives in the European Union.

Except for tolerance to glufosinate ammonium and thus the opportunity offered to use glufosinate ammonium herbicides as part of the seasonal crop protection regime, there are no significant phenotypic, genotypic, including reproductive biology differences between event A2704-12 and commercial soybean varieties developed solely through conventional breeding practices. Absent the use of glufosinate ammonium, any plants that might germinate from an accidental spill during import or transport of A2704-12 have no selective advantage over conventionally developed soybeans.

In addition the herbicide glufosinate ammonium is not likely to be used in the vicinity of seed storage facilities, processing plants or roadways, areas where an accidental spill might occur.

### 9.3 Potential for gene transfer

**Plant to Bacteria gene flow.** In order for any horizontal gene transfer to lead to a new type of micro-organism and, therefore, to introduce a significant impact, some of the following conditions would have to be fulfilled:

- The uptake would need to result in the incorporation of complete undegraded DNA
- The plant targeted genes would need to result in significant expression in a prokaryotic background
- The expression would need to represent a significant increase over the background level
- The trait would need to convey a competitive advantage to the strain in which it is incorporated.

Sequence analysis of event A2704-12 confirmed the presence of two *pat* gene cassettes joined by an inverted 957 bp *Pvu*I fragment from the transforming pB2/35SAcK plasmid. The *pat* gene is under the control of the 35S promoter, which is not functional in bacteria. The integrated 3' *bla (β-lactamase)* sequences and 5' *bla* sequences do not constitute an intact *bla* gene as the 5' *bla* sequences are

integrated in an inverted orientation. *β-lactamase* is not expressed, as was confirmed by Northern blot analysis. The likelihood of the transfer of a functional *pat* or *bla* gene from soybeans derived from event A2704-12 to bacteria is extremely remote.

**Plant to Plant gene flow.** As discussed under section D6(b), while this request does not cover cultivation of soybeans derived from event A2704-12, in theory cross pollination with other soybeans could occur if grain of A2704-12 was spilled and left in an area in which germination and soybean growth was possible and the opportunity for cross pollination presented itself. While possible, the likelihood of significant exposure of soybeans grown in the European Union to pollen from A2704-12 plants grown up as the result of spilled grain is extremely remote.

**Likelihood of gene flow.** Gene flow can occur into an adjacent soybean crop, however, the amount of cross-pollination to other soybean is generally considered to be less than 1%. Soybean anthers mature in the bud and directly pollinate the stigma of the same flower. As a result, soybeans exhibit a high level of self-fertilisation. Gene flow will not occur into wild related species because they are not present in the European Union.

**Consequence of gene flow.** In the improbable event it did occur, transfer of the *pat* gene into cultivated soybean will not exacerbate problems of weed control or adversely impact agriculture. Glufosinate ammonium is used mainly in agricultural areas in Europe, and the weed management of roadsides and the yards of processing facilities based on the use of glufosinate ammonium is not in practice.

This application requests import and processing only and is not intended for growing purposes in the EU and thus, this risk is only hypothetical. No adverse impact to biodiversity was identified.

### 9.4 Interactions between the GM plant and target organisms

The introduced trait is not a pesticidal trait. There are no target organisms.

### 9.5 Interactions of the GM plant with non-target organisms

Three possible interactions with other organisms were examined. The genetic modification, tolerance to the herbicide, glufosinate ammonium, does not change the interaction of A2704-12 soybean varieties with other organisms in the absence of herbicide application. Under agricultural conditions when the herbicide is used (a), some advantage may be gained in plant population dynamics (the intended effect is weed control). In habitats outside agriculture (b), the interaction with other plant communities is like any other soybean.

(a) Effects on biodiversity in the area of cultivation

A2704-12 soybeans will not be cultivated in the European Union.

(b) Effects on biodiversity in other habitats

Soybeans are a commodity crop, generally co-mingled after harvest for export or processing. The likelihood that seed spilled during transport from import locations or to transport facilities will germinate and establish itself is very low (section D.9.3). Any A2704-12 plants that would germinate would only have a selective advantage in those cases where the herbicide glufosinate ammonium is used. In all other cases, the likelihood A2704-12 would establish itself is no greater than for soybeans developed through conventional breeding programs.

c) Effects on non-target organisms

There are no non-target organisms specific to A2704-12 compared to non-genetically modified soybeans. There are no observed effects of the herbicide-tolerant soybean on beneficial or pest organisms. Field observations found no differences in insect populations, or reactions to natural infestation of soybean pathogens (D.7.4). A survey of beneficial and pest populations conducted at the final maturity stage during a soybean trial in Brazil found no difference in the presence or preference of pests or beneficials, which might be attributed to the genetic modification, when comparing soybeans derived from event A2704-12 with the non-genetically modified counterpart.

### 9.6 Effects on human health

No adverse effects on human health are indicated for people working with, coming into contact with or in the vicinity of an environmental release of A2704-12 soybeans. As discussed in section D.7, soybeans derived from transformation event A2704-12 have the same nutritional quality as soybeans in commerce, developed entirely through traditional breeding processes. The PAT protein, expressed in A2704-12 soybeans, is not a toxin or allergen and A2704-12 soybeans present no significant increased risk of an allergenic potential as compared to non-transgenic soybeans in soy-allergenic people.

### 9.7 Effects on animal health

No adverse effects on animal health are indicated when A2704-12 soybeans are used for feed purposes. Both seed and processed fractions are used in animal feed. Soybean hulls can make up to 20% of cattle and poultry diet and seed can make up 15 to 25% of animal diets. Soybean seed is typically heated to 100 °C before use to destroy proteinase inhibitors and the temperatures used are high enough to inactivate the PAT protein.

As indicated within section D7.3 and D7.10.1, the nutritional composition of seed and processed fractions of A2704-12 is substantially equivalent to that of soybeans developed solely through traditional breeding practices.

As discussed within section 7.8.4, the nutritional value was confirmed in a poultry conducted using diets containing meal derived from A2704-12.

There is no impact on the nutritional value of soybean seeds or processed fractions caused by the genetic transformation.

### 9.8 Effects on biogeochemical processes

Throughout the field testing history of transformation event A2704-12, no differences were noted that could be attributed to pleiotropic effects of the insertion. No differences were observed that would indicate an effect on biogeochemical processes resulting from the cultivation of A2704-12.

Chemical analysis of the components in soybeans found no significant differences in mineral composition and thus no reason to consider mineral utilization from the soil to be different than for conventional soybeans.

Nevertheless A2704-12 plants are not intended to be grown in the European Union. They will be grown commercially in the USA and Canada.

### 9.9 Impacts of the specific cultivation, management and harvesting techniques

A2704-12 varieties will be grown in the United States of America (USA) and Canada. Soybean seed and derived products produced in the USA enter the European Union (EU) by import as commodity soybean, meal, flakes or oil. Further processing and consumer packaging are accomplished in the EU. No new processing activities are required for A2704-12 soybeans.

Soybeans in agricultural production require weed control and successful weed control depends upon combinations of management practices. For soybean production, farmers use the planting of weed-free seed, crop rotation to break weed cycles, precision land levelling to aid irrigation, seed bed preparation, conservation tillage programs, irrigation and the application of one or more herbicides. Agronomic practice field studies with the Liberty® soybean system have been conducted in the USA and Canada using local practices. The focus was to define use parameters for the Liberty® soybean system in specific growing regions. Field research included soybean weed control in small plots with natural weed infestations. Tests were made with the weed spectrum typical for the region. Commercial-scale tests have confirmed the agronomic practice recommendations.

## 10. Potential interactions with the abiotic environment

No interaction with the abiotic environment is foreseen that would differ from soybean now in cultivation and in commerce. Less soil erosion may be a benefit of the cultivation of A2704-12 as farmers growing it will be able to practice minimum tillage and conservation tillage systems.

Moreover the scope of the present application does not include cultivation in Europe and is limited to "import and processing" in the EU of A2704-12 varieties.

## 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)

The scope of this application is the import of soybean derived from event A2704-12 for food, feed and industrial uses. No authorisation for growing is requested in the Member States of the European Union.

Environmental risk assessment for the import of A2704-12 into the European Union identified no potential risk, however a potential adverse effect could be anticipated if pollen from A2704-12 were to fertilise commercial soybean in European soybean production. The only foreseeable chance for A2704-12 to outcross to soybean in Europe would be if imported seed spilled in transit, if that seed was viable and plants established within a short distance of cultivated soybean.

### 11.2 Interplay between environmental risk assessment and monitoring

Because there are no adverse effects identified relating to import of herbicide-tolerant A2704-12, the resulting monitoring to perform is limited to a general surveillance of potential adverse effects, immediate or delayed, direct or indirect, of the GMO on human health and/or the environment which are not covered in the environmental risk assessment (e.r.a.).

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

Since no risk has been identified, there is no need for a case-specific monitoring plan.

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

The scope of this application is the import of soybean derived from A2704-12 for food, feed and industrial uses. No authorization for growing is requested in the Member States of the European Union. The general surveillance will be focused on those domains involved from import to crushing facilities. The identification of possible unanticipated adverse effects of the GMO on human or livestock health and/or the environment, which were not anticipated in the e.r.a., can be addressed under the general surveillance. The people and their networks participating in the surveillance plan would tend, although not exclusively, to be best suited to identify possible unanticipated adverse effects of the GMO to the receiving environment and/or human or livestock health.

*Background data*.

Of the current EU Member States that cultivate soybeans; Austria, Czech Republic, France, Germany, Greece, Hungary, Italy, Slovakia, Slovenia and Spain, only France, Germany, Italy and Spain have imported commodity soybean seed in the last five years in a reasonable amount.

The potential parameters determining a possible gene transfer are: a) seed spillage in ports, processing facilities, and along transit routes. However these sites do probably not provide an opportunity for volunteer soybean populations to establish and are generally far removed from soybean cultivation, b) the application of glufosinate ammonium herbicide, which could give A2704-12 plants an advantage, c) outcrossing happens only at a low frequency because of the highly self pollinating nature of soybeans, and d) soybeans are an annual, cultivated crop without weedy tendencies and generally do not overwinter.

Thus, if soybean were to spill at the port or along the roadside or at a crushing facility, it is very unlikely it would establish a weedy population or that it would outcross to commercial soybean. If A2704-12 were to spill in one of these environments, the result would be the same as for any other soybean. The only difference, tolerance to the herbicide glufosinate ammonium, would not provide a survival advantage as long as the herbicide glufosinate ammonium is not used in an attempt to destroy any volunteer plants that might germinate.

*Parameters to evaluate*

Different parameters influence the possible occurrence and/or establishment of feral soybean populations. Outcrossing possibilities and pollen viability are already discussed in detail in other papers and do not need to be repeated here. Remaining parameters to be used are: a) accidental spillage in ports, along transit routes and around crushing facilities, b) occurrence and/or establishment of feral LibertyLink populations of cultivated soybean, and c) usage frequency of glufosinate ammonium in harbours, along transport routes and around crushing facilities.

*Implementing general surveillance*

Upon approval of A2704-12 in the EU, Bayer CropScience will make available information to the stakeholders by providing key information, and will invite these stakeholders to participate in general surveillance:

- Inform European operators, especially traders and processors of bulk mixtures of soybean seed (grain), that A2704-12 has been authorized in the EU for import and use thereof as any other soybean, excluding cultivation in the EU;
- Supply European operators, especially traders and processors of bulk mixtures of soybean seed, with information about A2704-12 products and their safety in accordance with the requirements of Directive 2001/18/EC, relating to the Placing on the Market of the GM crop;
- Inform European operators involved in the import of soybean seed that labelling of products for the European market must be executed in accordance with article 4 and 5 of Regulation (EC) 1830/2003 of the European parliament and of the Council of 22 September 2003 concerning traceability and labelling of GMO's and traceability of food and feed products produced from GMOs and amending Directive 2001/18/EC;
- Supply European operators involved in the import of soybean seed with the OECD Unique Identifier Code: [A2704-12: ACS-GMØØ5-3]
- Review with European operators involved in the import and processing of soybean seed the existing measures to minimize grain spillage and clean-up practices in the frame of good manufacturing practices and environmental management systems already in place for crushing facilities and ports in the EU;
- Invite European operators involved in the import and processing of soybean seed, to provide regular feedback on the general surveillance;
- Request from European operators involved in the import and processing of soybean seed, to report in timely fashion any unanticipated adverse effects associated with the use of the product, so that decisive (if necessary remediating) action can be taken, including risk-reducing measures;

- In addition, company experts will actively screen for information on the product which could be publicly available on the web or published in literature and to inform CA and Commission in case adverse effects will be reported, in particular with respect to human, animal and/or environmental safety;
- Provide to European operators involved in the import and processing of soybean seed, the reference to the Register:

http://europa.eu.int/comm/food/food/biotechnology/authorisation/commun_register_en.htm

Further information on the product and relevant legislation will be available from a number of sources, including industry and government websites, official registers and government publications.

### 11.5 Reporting the results of monitoring

Bayer CropScience propose to submit general surveillance reports on an annual basis, following the initial placing on the market (first import). A final report will be made at the end of the consent.

Indirect effects refer to a causal chain of events with an effect on human health and the environment. Observations of indirect effects might, in some cases, be delayed. Since surveillance will also include the observation of potential indirect and/or delayed effects, we propose to include a report covering potential indirect or delayed effects at the stage of re-evaluation or at the end of a given consent in the case where Bayer CropScience does not apply for a renewal. An evaluation of the need for additional, post-consent surveillance will be included in such a report.

If information that confirms an adverse effect which alters the existing risk assessment becomes available to the notifier from users or other sources, Bayer CropScience is required immediately to inform the Competent Authority which gave consent for marketing of the GM crop, and in collaboration with the Competent Authority, to evaluate the information and, if necessary, to take proportional measures necessary to protect human or livestock health and/or the environment. Bayer CropScience will submit a Report, consisting of a scientific evaluation of the potential adverse effect and a conclusion on the safety of the product. The report will also include, where appropriate, the measures that were taken to ensure the safety of human or livestock health and/or the environment.

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

A discriminating PCR (dPCR) method and control materials have been provided to the DG Joint Research Centre – Community Reference Laboratory – as defined by EU Regulation 1829/2003.

## 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<br><br>Not applicable. |
| b) Conclusions of post-release monitoring<br><br>Not applicable. |
| 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)<br><br>Not applicable. |

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

**1) USA**

AgrEvo (now Bayer CropScience) USA Company submitted a safety assessment based upon studies conducted in the USA as part of the request for removal of LL soybeans A2704-12 from the USDA's list of regulated articles. When the agency's review was complete, notice of a Determination of Non-regulated Status was published as well as the issuance of an Environmental Assessment and a Finding of No Significant Impact (USDA, 1996). The conclusion of the assessment was that transformation event A2704-12 and progeny derived from crosses with other soybean varieties will be as safe to grow as soybean in traditional breeding programs. The USDA made an analysis of the biology of soybean. The agency's analysis led it to conclude that the cultivation of varieties based upon transformation event A2704-12 in the United States, its territories and in environments abroad would not have an adverse impact on the environment. The agency concurs that in all analyses conducted by AgrEvo, LL soybeans displayed no significant difference from their parent line except for tolerance to glufosinate.

Key findings of the USDA environmental assessment of transformation event A2704-12 includes:

No exhibition of plant pathogenic properties.

No more likelihood of becoming weeds than soybean lines developed by traditional plant breeding. Physical characteristics and pest susceptibility were compared to the attributes of non-transgenic soybean during field trials and no obvious differences were observed with respect to amount of seed produced, germination characteristics, final stand, or pathogen susceptibility.

Unlikely to increase the weediness potential of any other species by interbreeding. The only wild species that cross with the cultivated soybean are members of the genus *Glycine*. Soybean is not reported to cross with any extra-generic relatives. Hybridization is only known *in vitro* culture, i.e. under human intervention, and hence the probability of natural gene transfer is very low. Even when hybridization is achieved, the F1 plants obtained are generally sterile. Only the nearest wild relative of cultivated soybean, *G. soja*, is listed as a common weed in Japan. However, texts on weeds found in Japan place it neither among the harmful weeds on cultivated lands, nor among the weeds of pastures and meadows. Although natural hybridization is known to occur between cultivated soybean and the

wild, annual species *G. soja*, the latter is not found in the United States or its territories.

Cultivated soybeans are almost completely self-pollinated, with hybridization reported generally at less than 1%. Should movement of genetic material take place to any respective plants, and glufosinate resistance be transferred, no competitive advantage would be conferred because glufosinate is not used with these plants when they are found in non-agricultural areas. In agricultural areas such plants would be controlled by normal agronomic practices.

No impacts on non-target organisms, including threatened and endangered species or beneficial organisms, was found. Other than the production of the PAT enzyme, glufosinate tolerant soybean plants are the same as the commercial soybean varieties from which they were derived. Toxicology studies of the PAT enzyme have given no indication of harm for agricultural or natural organisms.

No damage to raw or processed agricultural commodities. No difference in any trait or characteristic that could have an indirect plant pest effect on any agricultural commodity or adverse impact on agricultural practices was observed.

**2) Japan MAFF environmental assessment for import of grain**

An environmental impact study was undertaken by soybean specialists at the National Institute of Agro-Environmental Science, Tsukuba, Japan. Following review of the data, the Ministry of Agriculture, Forestry and Fishery (MAFF) of Japan granted an environmental clearance for importing grain of soybean varieties based upon transformation event A2704-12 (http://www.s.affrc.go.jp/docs/sentan/).

a) Release country

**USA (field release since 1995, not regulated since 1998)**
Authority overseeing the releases: United States Department of Agriculture (USDA)
Information on the releases through www.aphis.usda.gov
**Canada** (field release since 1997, release and food and feed approvals in place since 2000)
Information on the environmental approval available through: http://www.inspection.gc.ca
**Argentina** (field releases in 1998, 1998, 2003, 2004. http://www.sagpya.mecon.gov.ar/new/0-0/programas/conabia/liberaciones_ogm.php; environmental approval in 2001) Authority overseeing the releases: Comisión Nacional Asesora de Biotecnología Agropecuaria (CONABIA).

**Brazil** (field release in 2000)
Authority overseeing the releases: Comissão Técnica Nacional de Biossegurança (CTNBio) www.ctnbio.gov.br

b) Authority overseeing the release

See E.2.a.

c) Release site

See C.7.2 and C.7.4 and a) above.

d) Aim of the release

See C.7.2 and C.7.4. for a summary of the field releases for substantial equivalence studies. In addition, field releases for breeding, seed increase and variety development have been conducted.

e) Duration of the release

The generation time for soybean. from planting to harvest, is 3 to 5 months in the primary growing

| |
|---|
| areas. |
| **f) Aim of post-releases monitoring**<br>No post release monitoring is required or conducted in countries with approval for commercial cultivation of soybeans derived from event A2704- 12 (the U.S. and Canada.) In countries in which the event is still regulated, fields are monitored for volunteer plants in at least one subsequent growing season. |
| **g) Duration of post-releases monitoring**<br>Generally one season. |
| **h) Conclusions of post-release monitoring**<br>Occurrence of volunteers is very infrequent and no different from soybean derived through conventional breeding practices. |
| **i) Results of the release in respect to any risk to human health and the environment**<br>No risk to human health or the environment has been indicated by the field release experience. |

## 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**<br>The JRC website http://gmoinfo.jrc.it/gmc_browse.asp provides publicly accessible links to up-to-date databases on the regulatory progress of notifications under Directive 2001/18/EC and Regulation (EC) No 1829/2003. |
| **b) Assessment Report of the Competent Authority (Directive 2001/18/EC)**<br>Not applicable. |
| **c) EFSA opinion**<br>Not yet available |
| **d) Commission Register (Commission Decision 2004/204/EC)**<br>Not yet available |
| **e) Molecular Register of the Community Reference Laboratory/Joint Research Centre**<br>Information on detection protocols will be posted at http://gmo-crl.jrc.it/ |
| **f) Biosafety Clearing-House (Council Decision 2002/628/EC**<br>http://bch.biodiv.org/ |
| **g) Summary Notification Information Format (SNIF) (Council Decision 2002/812/EC)**<br>http://gmoinfo.jrc.it/gmc_browse.asp |