

# GRAS Flavoring Substances 32

**32. GRAS Flavoring Substances.** This list of substances will appear in the 32<sup>nd</sup> publication authored by the Expert Panel of the Flavor and Extract Manufacturers Association on recent progress in the consideration of flavoring ingredients “generally recognized as safe” (GRAS) under conditions of their intended use in food flavorings in accordance with the 1958 Food Additives Amendment to the Federal Food, Drug and Cosmetic Act. For more information on FEMA GRAS see “About the FEMA GRAS Program” on the FEMA website.

## **FEMA EXPERT PANEL**

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*The Expert Panel of the Flavor and Extract Manufacturers Association of the United States (FEMA) has evaluated substances for GRAS status under their conditions of intended use as flavoring substances since the early 1960s. The regulations of the U.S. Food and Drug Administration (FDA), and U.S. law, require that determinations that flavor substances and other food ingredients are “generally recognized as safe” (GRAS) be done in such a way that all information related to GRAS determinations is publicly available. The FEMA Expert Panel has met this requirement by publishing the identity of all flavoring substances determined to be GRAS by the Panel, and submits all information related to the GRAS reviews on these substances to the FDA. The key findings related to the GRAS evaluations of these substances will be available in GRAS 32. The Expert Panel also publishes separate extensive reviews of scientific information on all FEMA GRAS flavoring substances in the peer-reviewed scientific literature on the safety of structurally-related groups of flavoring substances. These important actions assure that there is “general recognition” of the safety of these substances when used as flavors.*

*The FEMA Expert Panel has well-defined and published procedures to protect against potential bias and conflicts of interest in its evaluations of substances whose uses may be determined to be “generally recognized as safe” (GRAS) for use as flavor ingredients (Marnett et al., 2013). The uses of the flavor ingredients in this report that were determined to be GRAS were evaluated by the Expert Panel in accordance with the Panel’s bias and conflict of interest procedures. No conflicts or sources of potential bias were declared by any Panel members, or otherwise identified by the Expert Panel’s Legal Advisor, in the course of the evaluations of the uses of the flavor ingredients described in this report.*

*Marnett L.J., Cohen S.M., Fukushima S., Gooderham N.J., Hecht S.S., Rietjens I.M.C.M., Smith R.L., Adams T.B., Hallagan J.B., Harman C., McGowan M.M. and Taylor S.V. GRAS flavoring substances 26. Food Technology. 67(8), 38. 2013.*

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### **Change in GRAS Status of Propyl Paraben (FEMA 2951) and 2-Phenylphenol (FEMA 3959)**

The FEMA GRAS statuses of propyl paraben (FEMA No. 2951) and 2-phenylphenol (FEMA No. 3959) under their conditions of intended use as flavor ingredients were reviewed. There is little evidence that either propyl paraben or 2-phenylphenol are used for the technical effect of flavoring. Based on this lack of evidence, the Panel concluded that both should be removed from the FEMA GRAS list.

## Corrections and Errata to previous GRAS Publications

**Primary Name of FEMA 3089.** The primary name of FEMA 3089, Turpentine steam distilled (*Pinus palustris* Mill. and other *Pinus* spp.), has been changed to Pine resin oil (*Pinus palustris* Mill. and other *Pinus* spp.).

**Primary names of FEMA 3105 and 3106.** In GRAS 3 (Hall and Oser, 1965), the botanical names for FEMA 3105, Vanilla extract, and FEMA 3106, Vanilla oleoresin, were listed as (*Vanilla planifolia* Andrews, *V. tahitensis* J.W. Moore). The botanical *Vanilla pompona* is also considered FEMA GRAS under the identities of FEMA 3105 and FEMA 3106.

**Primary Name of FEMA 4878.** The primary name of FEMA 4878, *Cordyceps sinensis* fermentation product, has been changed to mushroom mycelia fermentation product.

**Primary Name and Identity Description of FEMA 4949.** The primary name of FEMA 4949, *Corynebacterium ammoniagenes* fermentation product, has been changed to *Corynebacterium stationis* cell free fermentation broth. Additionally, the identity description of FEMA 4949 has been updated to: “no more than 65% miscellaneous nitrogen-containing compounds (nucleotides); <10% of amino acids; <10% of minerals; <7% of simple carbohydrates, typically monosaccharides; The material may be standardized with an appropriate carrier such as dextrans”

**Identity Description of FEMA 4964.** The identity description of FEMA 4964, *Corynebacterium glutamicum* cell free fermentation product, has been updated to: “no more than 70% glutamic acid; <10% simple carbohydrates; <10% sum of other individual amino acids; <15% minerals; The material may be standardized with an appropriate carrier such as dextrans.”

Table 1. Primary names (in boldface) Synonyms (in lightface)

| FEMA No. | Primary Names and Synonyms  |
|----------|---|
| 5030     | <b>4-(1-Menthoxy)-2-methyl-2-butanol</b>  |
| 5035     | <b>Brazzein</b>   |
| 5038     | <b>Hexahydro-6a,7-dimethyl-2,5-methano-2H-cyclopenta[b]furan</b>  |
| 5040     | <b><i>Eucalyptus citriodora</i> oil</b>   |
| 5042     | <b>Heat-treated Glucosylated Steviol Glycosides 35% with Steviol Glycosides 10%</b>   |
| 5044     | <b>Sakura flower extract</b><br><i>Prunus serrulata</i> flower extract<br><i>Cerasus serrulata</i> flower extract   |
| 5045     | <b>Sakura flower distillate</b><br><i>Prunus serrulata</i> flower distillate<br><i>Cerasus serrulata</i> flower distillate  |
| 5046     | <b>Sakura leaf distillate</b><br>Oshima zakura cherry leaf distillate<br><i>Prunus speciosa</i> leaf distillate<br><i>Cerasus speciosa</i> leaf distillate  |
| 5047     | <b>Sansho pepper extract</b><br>Japanese pepper extract<br>Chopinamu extract<br><i>Fagara piperita</i> L. extract<br>Sanshou pepper extract<br>Sansyo pepper extract<br>Kona-zanshō extract   |
| 5048     | <b>Sansho pepper distillate</b><br>Japanese pepper distillate<br>Chopinamu distillate<br><i>Fagara piperita</i> L. distillate<br>Sanshou pepper distillate<br>Sansyo pepper distillate<br>Kona-zanshō distillate  |
| 5050     | <b>1-(tert-Butyl)-N-(4-methoxyphenyl)cyclohexane-1-carboxamide</b>  |
| 5054     | <b>Rosemary extract, rosmarinic acid 80%</b>  |
| 5060     | <b>Rosemary extract, rosmarinic acid 15%</b>  |
| 5061     | <b>Juniperberry oil, terpeneless</b>  |
| 5062     | <b>Celery seed oleoresin</b>  |
| 5064     | <b>Cumin oleoresin</b>  |
| 5066     | <b>4-(4-Methylpent-3-en-1-yl)thiophen-2(5H)-one</b>   |
| 5067     | <b><i>alpha</i>-Bisabolene</b><br><i>(E)</i> - <i>alpha</i> -bisabolene<br><i>trans</i> - <i>alpha</i> -bisabolene<br>1-Methyl-4-[(2 <i>E</i> )-6-methyl-2,5-heptadien-2-yl]cyclohexene<br>4-(1,5-Dimethyl-1,4-hexadienyl)-1-methyl cyclohexene<br>6-Methyl-2-(4-methylcyclohex-3-enyl)hept-2,5-diene<br>Cyclohexene, 4-(1,5-dimethyl-1,4-hexadienyl)-1-methyl-<br>Cyclohexene, 4-[(1 <i>E</i> )-1,5-dimethyl-1,4-hexadien-1-yl]-1-methyl |
| 5069     | <b>Rebaudioside M 70%</b>   |

**Table 1. Primary names (in boldface) Synonyms (in lightface)**

|             |  |
|-------------|--|
| <b>5072</b> | <b>Heat-treated Glucosylated Steviol Glycosides 15% with Steviol Glycosides 5%</b> |
| <b>5073</b> | <b><i>Corynebacterium glutamicum</i> Fermentation product</b>                      |
| <b>5074</b> | <b>Enzymatically modified rebaudioside A 85%</b>                                   |
| <b>5077</b> | <b><i>alpha</i> -Humulene<br/>(±)-<math>\alpha</math>-Humulene</b>                 |
| <b>5081</b> | <b><i>Corynebacterium glutamicum</i> Fermentation savory product</b>               |
| <b>5082</b> | <b><i>Corynebacterium stationis</i> Fermentation product</b>                       |

Table 2. Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgments that the substances are generally recognized as safe (GRAS)

|                                 | 4-(1-Menthoxy)-2-methyl-2-butanol | Brazzein | Hexahydro-6a,7-dimethyl-2,5-methano-2H-cyclopenta[b]furan | <i>Eucalyptus citriodora</i> oil | Heat-treated glucosylated steviol glycosides 35% with steviol glycosides 10% | Sakura flower extract |
|---------------------------------|-----------------------------------|----------|---|----------------------------------|--|-----------------------|
| Category/FEMA No.               | 5030                              | 5035     | 5038  | 5040                             | 5042   | 5044                  |
| Baked Goods                     |                                   | 7/7      | 0.5/5   |                                  | 50/100   |                       |
| Beverages Type I, Non-Alcoholic | 1/5                               | 7/7      | 0.1/1   | 280/280                          | 50/100   |                       |
| Beverages Type II, Alcoholic    | 1/5                               | 7/7      | 0.1/1   | 315/315                          | 50/100   | 1200/6000             |
| Breakfast Cereals               |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Cheeses                         |                                   |          | 0.2/2   |                                  | 50/100   |                       |
| Chewing Gum                     | 1/10                              | 30/30    | 5/50  |                                  | 50/100   |                       |
| Condiments and Relishes         |                                   | 7/7      | 0.2/2   |                                  | 50/100   |                       |
| Confections and Frostings       |                                   | 7/7      | 0.5/5   |                                  | 50/100   |                       |
| Egg Products                    |                                   |          |   |                                  | 50/100   |                       |
| Fats and Oils                   |                                   |          | 1/10  |                                  | 50/100   |                       |
| Fish Products                   |                                   |          |   |                                  | 50/100   |                       |
| Frozen Dairy                    |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Fruit Ices                      |                                   | 7/7      | 0.2/2   |                                  | 50/100   |                       |
| Gelatins and Puddings           |                                   | 7/7      | 0.5/5   |                                  | 50/100   |                       |
| Granulated Sugar                |                                   |          | 0.1/1   |                                  |  |                       |
| Gravies                         | 1/5                               |          | 0.2/2   |                                  | 50/100   |                       |
| Hard Candy                      |                                   | 7/7      | 0.5/5   |                                  | 50/100   |                       |
| Imitation Dairy Products        |                                   | 7/7      |   |                                  | 50/100   |                       |
| Instant Coffee and Tea          | 1/5                               | 7/7      |   |                                  | 50/100   |                       |
| Jams and Jellies                |                                   | 7/7      | 0.2/2   |                                  | 50/100   |                       |
| Meat Products                   |                                   |          |   |                                  | 50/100   |                       |
| Milk Products                   |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Nut Products                    |                                   | 7/7      | 0.2/2   |                                  | 50/100   |                       |
| Other Grains                    |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Poultry Products                |                                   |          |   |                                  | 50/100   |                       |
| Processed Fruits                |                                   | 7/7      | 0.2/2   |                                  | 50/100   |                       |
| Processed Vegetables            |                                   |          | 0.1/1   |                                  | 50/100   |                       |
| Reconstituted Vegetable Protein |                                   |          | 0.5/5   |                                  | 50/100   |                       |
| Seasonings and Flavors          |                                   | 7/7      | 1/10  |                                  | 50/100   |                       |
| Snack Foods                     |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Soft Candy                      | 1/5                               | 7/7      | 0.5/5   |                                  | 50/100   |                       |
| Soups                           | 1/5                               | 7/7      | 0.1/1   |                                  | 50/100   |                       |
| Sugar Substitutes               |                                   |          |   |                                  |  |                       |
| Sweet Sauces                    |                                   | 7/7      | 0.1/1   |                                  | 50/100   |                       |

Table 2. Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgments that the substances are generally recognized as safe (GRAS)

|                                 | Sakura flower distillate | Sakura leaf distillate | Sansho pepper extract | Sansho pepper distillate | 1-(tert-Butyl)-N-(4-methoxyphenyl)cyclohexane-1-carboxamide | Rosemary extract, rosmarinic acid 80% |
|---------------------------------|--------------------------|------------------------|-----------------------|--------------------------|---|---------------------------------------|
| Category/FEMA No.               | 5045                     | 5046                   | 5047                  | 5048                     | 5050  | 5054                                  |
| Baked Goods                     |                          |                        |                       |                          | 0.05/20   | 80/200                                |
| Beverages Type I, Non-Alcoholic |                          |                        |                       |                          | 0.15/10   | 55/150                                |
| Beverages Type II, Alcoholic    | 400/1000                 | 0.3/3.2                | 80/400                | 120/620                  |   | 55/150                                |
| Breakfast Cereals               |                          |                        |                       |                          |   | 50/100                                |
| Cheeses                         |                          |                        |                       |                          | 0.1/15  | 80/150                                |
| Chewing Gum                     |                          |                        |                       |                          | 0.05/100  | 200/500                               |
| Condiments and Relishes         |                          |                        |                       |                          | 0.05/40   | 100/200                               |
| Confections and Frostings       |                          |                        |                       |                          |   | 55/100                                |
| Egg Products                    |                          |                        |                       |                          | 0.05/50   | 55/100                                |
| Fats and Oils                   |                          |                        |                       |                          |   | 55/100                                |
| Fish Products                   |                          |                        |                       |                          | 0.05/40   | 100/200                               |
| Frozen Dairy                    |                          |                        |                       |                          | 0.05/20   | 25/125                                |
| Fruit Ices                      |                          |                        |                       |                          |   | 50/100                                |
| Gelatins and Puddings           |                          |                        |                       |                          |   | 50/100                                |
| Granulated Sugar                |                          |                        |                       |                          |   |                                       |
| Gravies                         |                          |                        |                       |                          | 0.05/50   | 80/200                                |
| Hard Candy                      |                          |                        |                       |                          |   | 100/150                               |
| Imitation Dairy Products        |                          |                        |                       |                          | 0.125/15  | 55/100                                |
| Instant Coffee and Tea          |                          |                        |                       |                          | 0.05/20   | 55/100                                |
| Jams and Jellies                |                          |                        |                       |                          |   | 100/150                               |
| Meat Products                   |                          |                        |                       |                          | 0.05/40   | 100/200                               |
| Milk Products                   |                          |                        |                       |                          | 0.075/40  | 50/100                                |
| Nut Products                    |                          |                        |                       |                          |   | 100/200                               |
| Other Grains                    |                          |                        |                       |                          |   | 100/200                               |
| Poultry Products                |                          |                        |                       |                          | 0.05/40   | 100/200                               |
| Processed Fruits                |                          |                        |                       |                          |   | 55/100                                |
| Processed Vegetables            |                          |                        |                       |                          |   | 100/200                               |
| Reconstituted Vegetable Protein |                          |                        |                       |                          | 0.05/50   | 100/250                               |
| Seasonings and Flavors          |                          |                        |                       |                          | 0.25/50   | 500/1000                              |
| Snack Foods                     |                          |                        |                       |                          | 0.25/50   | 100/200                               |
| Soft Candy                      |                          |                        |                       |                          | 0.05/20   | 80/150                                |
| Soups                           |                          |                        |                       |                          | 0.15/15   | 60/200                                |
| Sugar Substitutes               |                          |                        |                       |                          |   |                                       |
| Sweet Sauces                    |                          |                        |                       |                          | 0.05/20   |                                       |

**Table 2. Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgments that the substances are generally recognized as safe (GRAS)**

|                                 | Rosemary extract, rosmarinic acid 15% | Juniperberry oil, terpeneless | Celery seed oleoresin | Cumin oleoresin | 4-(4-Methylpent-3-en-1-yl)thiophen-2(5H)-one | alpha-Bisabolene |
|---------------------------------|---------------------------------------|-------------------------------|-----------------------|-----------------|--|------------------|
| Category/FEMA No.               | 5060                                  | 5061                          | 5062                  | 5064            | 5066   | 5067             |
| Baked Goods                     | 60/200                                | 4.4/7                         |                       | 0.5/50          | 0.01/0.1                                     | 10/50            |
| Beverages Type I, Non-Alcoholic | 50/120                                | 20/23                         |                       |                 | 0.001/0.01                                   | 5/25             |
| Beverages Type II, Alcoholic    | 50/120                                | 13/48                         |                       |                 | 0.001/0.01                                   | 10/50            |
| Breakfast Cereals               | 50/80                                 |                               |                       |                 | 0.01/0.1                                     | 5/25             |
| Cheeses                         | 60/100                                |                               |                       |                 | 0.1/1  |                  |
| Chewing Gum                     | 200/400                               | 0.5/0.5                       |                       |                 | 0.1/1  | 10/50            |
| Condiments and Relishes         | 100/150                               |                               |                       |                 |  |                  |
| Confections and Frostings       | 50/100                                |                               |                       |                 | 0.01/0.1                                     | 10/50            |
| Egg Products                    | 60/100                                |                               |                       |                 | 0.01/0.1                                     |                  |
| Fats and Oils                   | 60/100                                |                               |                       |                 | 0.1/1  | 5/25             |
| Fish Products                   | 100/200                               |                               |                       |                 |  |                  |
| Frozen Dairy                    | 20/80                                 | 1/2                           |                       |                 | 0.01/0.1                                     | 7/35             |
| Fruit Ices                      | 40/80                                 |                               |                       |                 | 0.01/0.1                                     | 10/50            |
| Gelatins and Puddings           | 40/80                                 | 1/3                           |                       |                 | 0.01/0.1                                     | 5/25             |
| Granulated Sugar                |                                       |                               |                       |                 |  |                  |
| Gravies                         | 60/200                                |                               |                       |                 | 0.1/1  |                  |
| Hard Candy                      | 60/150                                | 2/2                           |                       |                 | 0.01/0.1                                     | 10/50            |
| Imitation Dairy Products        | 40/100                                |                               |                       |                 | 0.01/0.1                                     |                  |
| Instant Coffee and Tea          | 40/100                                |                               |                       |                 | 0.001/0.01                                   |                  |
| Jams and Jellies                | 40/100                                |                               |                       |                 |  | 5/25             |
| Meat Products                   | 100/200                               | 0.5/10                        | 17/80                 |                 | 0.01/0.1                                     |                  |
| Milk Products                   | 40/80                                 |                               |                       |                 | 0.001/0.01                                   |                  |
| Nut Products                    | 60/120                                |                               |                       |                 |  |                  |
| Other Grains                    | 80/200                                |                               |                       |                 | 0.01/0.1                                     |                  |
| Poultry Products                | 80/200                                |                               |                       |                 |  |                  |
| Processed Fruits                | 40/100                                |                               |                       |                 | 0.01/0.1                                     | 7/35             |
| Processed Vegetables            | 60/200                                |                               |                       |                 | 0.01/0.1                                     |                  |
| Reconstituted Vegetable Protein | 80/250                                |                               |                       |                 | 0.01/0.1                                     |                  |
| Seasonings and Flavors          | 500/1000                              |                               |                       | 10/100          | 0.1/1  |                  |
| Snack Foods                     | 100/250                               |                               |                       | 10/100          | 0.01/0.1                                     |                  |
| Soft Candy                      | 60/100                                | 2/5                           |                       |                 | 0.01/0.1                                     | 10/50            |
| Soups                           | 60/150                                |                               | 100/120               | 5/100           | 0.01/0.1                                     |                  |
| Sugar Substitutes               |                                       |                               |                       |                 |  |                  |
| Sweet Sauces                    |                                       |                               |                       |                 | 0.01/0.1                                     | 5/25             |

Table 2. Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgments that the substances are generally recognized as safe (GRAS)

|                                 | Rebaudioside M 70% | Heat-treated Glucosylated Steviol Glycosides 15% with Steviol Glycosides 5% | <i>Corynebacterium glutamicum</i> fermentation product | Enzymatically modified rebaudioside A 85% | <i>alpha</i> -Humulene |
|---------------------------------|--------------------|---|--|---|------------------------|
| Category/FEMA No.               | 5069               | 5072  | 5073   | 5074                                      | 5077                   |
| Baked Goods                     |                    | 50/350  | 4400/4400  | 100/120                                   | 10/50                  |
| Beverages Type I, Non-Alcoholic | 15/20              | 50/350  |  | 100/120                                   | 5/25                   |
| Beverages Type II, Alcoholic    | 15/20              | 50/350  |  | 100/120                                   | 10/50                  |
| Breakfast Cereals               |                    | 50/350  | 4400/4400  | 100/120                                   |                        |
| Cheeses                         |                    | 50/350  | 4400/4400  |   |                        |
| Chewing Gum                     | 15/20              | 50/350  |  | 100/120                                   |                        |
| Condiments and Relishes         |                    | 50/350  | 5000/5000  | 100/120                                   |                        |
| Confections and Frostings       |                    | 50/350  |  | 100/120                                   | 10/50                  |
| Egg Products                    |                    | 50/350  | 2800/2800  |   |                        |
| Fats and Oils                   |                    | 50/350  | 5000/5000  |   | 7/35                   |
| Fish Products                   |                    | 50/350  | 3600/3600  |   | 2/10                   |
| Frozen Dairy                    | 15/20              | 50/350  |  | 100/150                                   |                        |
| Fruit Ices                      | 15/20              | 50/350  |  | 100/120                                   | 10/50                  |
| Gelatins and Puddings           |                    | 50/350  |  | 100/120                                   |                        |
| Granulated Sugar                |                    |   |  |   |                        |
| Gravies                         |                    | 50/350  | 2500/2500  |   |                        |
| Hard Candy                      |                    | 50/350  |  | 100/120                                   |                        |
| Imitation Dairy Products        | 15/20              | 50/350  | 4400/4400  | 100/100                                   |                        |
| Instant Coffee and Tea          | 15/20              | 50/350  |  | 100/120                                   |                        |
| Jams and Jellies                |                    | 50/350  |  | 100/120                                   |                        |
| Meat Products                   |                    | 50/350  | 2700/2700  |   | 2/10                   |
| Milk Products                   | 15/20              | 50/350  |  | 100/100                                   |                        |
| Nut Products                    | 15/20              | 50/350  | 1600/1600  | 100/120                                   |                        |
| Other Grains                    |                    | 50/350  |  | 100/120                                   |                        |
| Poultry Products                |                    | 50/350  | 2700/2700  |   | 2/10                   |
| Processed Fruits                | 15/20              | 50/350  |  | 100/120                                   | 7/35                   |
| Processed Vegetables            |                    | 50/350  |  | 100/120                                   |                        |
| Reconstituted Vegetable Protein |                    | 50/350  |  | 100/120                                   |                        |
| Seasonings and Flavors          | 15/20              | 50/350  | 4000/4000  | 100/120                                   |                        |
| Snack Foods                     | 15/20              | 50/350  | 4000/4000  | 100/120                                   |                        |
| Soft Candy                      |                    | 50/350  |  | 100/120                                   |                        |
| Soups                           |                    | 50/350  | 2500/2500  | 100/120                                   |                        |
| Sugar Substitutes               |                    |   |  |   |                        |
| Sweet Sauces                    | 15/20              | 50/350  |  | 100/120                                   |                        |

**Table 3. Updated Average Usual Use Levels/Average Maximum Use Levels**

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for flavoring substances previously recognized as FEMA GRAS

a represents a change from previous FEMA GRAS publications

|  | 4-Ethylguaiacol                   | Furfural                          | Heptanal                         | Methylcyclopentenolone            | Tartaric acid<br>(D-, L-, DL-, Meso-) |
|--|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|---------------------------------------|
| <b>GRAS Publication</b>                | <b>3</b>                          | <b>3</b>                          | <b>3</b>                         | <b>31</b>                         | <b>29</b>                             |
| <b>Category/FEMA No.</b>               | <b>2436</b>                       | <b>2489</b>                       | <b>2540</b>                      | <b>2700</b>                       | <b>3044</b>                           |
| <b>Baked Goods</b>                     | 14/18                             | 42/50                             | 8/12                             | 12/27                             | 0.9/1300                              |
| <b>Beverages Type I, Non-Alcoholic</b> | 2/4 <sup>a</sup>                  | 23/29                             | 3/5                              | 5 <sup>a</sup> /30 <sup>a</sup>   | 1/960                                 |
| <b>Beverages Type II, Alcoholic</b>    | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 4/4                              | 0.9/9                             | 5000/10000                            |
| <b>Breakfast Cereals</b>               | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 40/100                            |                                       |
| <b>Cheeses</b>                         | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              |                                       |
| <b>Chewing Gum</b>                     | 5/15                              | 50 <sup>a</sup> /200 <sup>a</sup> | 3 <sup>a</sup> /10 <sup>a</sup>  | 690/3560                          | 500/5000                              |
| <b>Condiments and Relishes</b>         | 10/12                             | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 3 <sup>a</sup> /15                | 2/10000                               |
| <b>Confections and Frostings</b>       | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 10 <sup>a</sup> /30 <sup>a</sup>  | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Egg Products</b>                    | 2.4 <sup>a</sup> /8 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.6 <sup>a</sup> /2 <sup>a</sup> | 5 <sup>a</sup> /15                |                                       |
| <b>Fats and Oils</b>                   | 2.4 <sup>a</sup> /8 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.6 <sup>a</sup> /2 <sup>a</sup> | 3 <sup>a</sup> /15                | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Fish Products</b>                   | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              |                                       |
| <b>Frozen Dairy</b>                    | 2/4 <sup>a</sup>                  | 39/45                             | 3/6                              | 5/17                              | 2/570                                 |
| <b>Fruit Ices</b>                      | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 5 <sup>a</sup> /15 <sup>a</sup>   | 100 <sup>a</sup> /500 <sup>a</sup>    |
| <b>Gelatins and Puddings</b>           | 2/4 <sup>a</sup>                  | 25/33                             | 3/6                              | 5/14                              | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Granulated Sugar</b>                | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 10 <sup>a</sup> /30 <sup>a</sup>  |                                       |
| <b>Gravies</b>                         | 2/6                               | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 4/30                              | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Hard Candy</b>                      | 3.6 <sup>a</sup> /12 <sup>a</sup> | 15/45 <sup>a</sup>                | 2/3 <sup>a</sup>                 | 17/18                             | 10/5400                               |
| <b>Imitation Dairy Products</b>        | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 5/50                             | 2/15                              | 60 <sup>a</sup> /300 <sup>a</sup>     |
| <b>Instant Coffee and Tea</b>          | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 10 <sup>a</sup> /30 <sup>a</sup>  | 100 <sup>a</sup> /500 <sup>a</sup>    |
| <b>Jams and Jellies</b>                | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 30 <sup>a</sup> /100 <sup>a</sup> | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Meat Products</b>                   | 3.6 <sup>a</sup> /12 <sup>a</sup> | 30/64                             | 3/10                             | 2/15                              | 0.01/0.02                             |
| <b>Milk Products</b>                   | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              | 60 <sup>a</sup> /300 <sup>a</sup>     |
| <b>Nut Products</b>                    | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 5 <sup>a</sup> /15 <sup>a</sup>   |                                       |
| <b>Other Grains</b>                    | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 5 <sup>a</sup> /15 <sup>a</sup>   | 0.2/0.2                               |
| <b>Poultry Products</b>                | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              |                                       |
| <b>Processed Fruits</b>                | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 10 <sup>a</sup> /30 <sup>a</sup>  | 10/10                                 |
| <b>Processed Vegetables</b>            | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 5 <sup>a</sup> /15 <sup>a</sup>   |                                       |
| <b>Reconstituted Vegetable Protein</b> | 3.6 <sup>a</sup> /12 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              |                                       |
| <b>Seasonings and Flavors</b>          | 12 <sup>a</sup> /40 <sup>a</sup>  | 50 <sup>a</sup> /200 <sup>a</sup> | 3 <sup>a</sup> /10 <sup>a</sup>  | 2/15                              |                                       |
| <b>Snack Foods</b>                     | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 20 <sup>a</sup> /45 <sup>a</sup>  | 0.3 <sup>a</sup> /1 <sup>a</sup> | 15 <sup>a</sup> /50 <sup>a</sup>  |                                       |
| <b>Soft Candy</b>                      | 17/22                             | 47/53                             | 7/9                              | 9/26                              | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Soups</b>                           | 1.2 <sup>a</sup> /4 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 2/15                              | 200 <sup>a</sup> /1000 <sup>a</sup>   |
| <b>Sugar Substitutes</b>               | 3.6 <sup>a</sup> /12 <sup>a</sup> | 50 <sup>a</sup> /200 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> | 30 <sup>a</sup> /100 <sup>a</sup> |                                       |
| <b>Sweet Sauces</b>                    | 3.6 <sup>a</sup> /12 <sup>a</sup> | 30/30                             | 0.9 <sup>a</sup> /3 <sup>a</sup> | 10/30                             | 60 <sup>a</sup> /300 <sup>a</sup>     |

**Table 3. Updated Average Usual Use Levels/Average Maximum Use Levels**

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for flavoring substances previously recognized as FEMA GRAS

a represents a change from previous FEMA GRAS publications

|  | <b>2,4-Nonadienal</b>            | <b>Dimethyl trisulfide</b>       | <b>L-Histidine</b>                  | <b>beta-Caryophyllene oxide</b>   | <b>5,7-Dihydroxy-2-(3-hydroxy-4-methoxyphenyl)chroman-4-one</b> |
|--|----------------------------------|----------------------------------|-------------------------------------|-----------------------------------|---|
| <b>GRAS Publication</b>                | <b>29</b>                        | <b>5</b>                         | <b>30</b>                           | <b>22</b>                         | <b>26</b>   |
| <b>Category/FEMA No.</b>               | <b>3212</b>                      | <b>3275</b>                      | <b>3694</b>                         | <b>4085</b>                       | <b>4313</b>   |
| <b>Baked Goods</b>                     | 2/7                              | 1/1                              | 10/150                              | 5 <sup>a</sup> /45 <sup>a</sup>   |   |
| <b>Beverages Type I, Non-Alcoholic</b> | 1/4                              | 0.3 <sup>a</sup> /1 <sup>a</sup> | 200/200                             | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/50   |
| <b>Beverages Type II, Alcoholic</b>    | 0.01/2                           | 0.6 <sup>a</sup> /2 <sup>a</sup> | 100 <sup>a</sup> /500 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/100  |
| <b>Breakfast Cereals</b>               | 0.2/0.2                          | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 30/60   |
| <b>Cheeses</b>                         | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/150  |
| <b>Chewing Gum</b>                     | 5/10                             | 2/5                              |                                     | 50 <sup>a</sup> /200 <sup>a</sup> |   |
| <b>Condiments and Relishes</b>         | 1/2                              | 1/1                              | 200 <sup>a</sup> /1000 <sup>a</sup> | 5/25                              | 10/100  |
| <b>Confections and Frostings</b>       | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> | 20/150                              | 3 <sup>a</sup> /20 <sup>a</sup>   | 408 <sup>a</sup> /816 <sup>a</sup>                              |
| <b>Egg Products</b>                    | 0.6 <sup>a</sup> /2 <sup>a</sup> | 0.6 <sup>a</sup> /2 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   |   |
| <b>Fats and Oils</b>                   | 0.6 <sup>a</sup> /2 <sup>a</sup> | 0.6 <sup>a</sup> /2 <sup>a</sup> | 200 <sup>a</sup> /1000 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   |   |
| <b>Fish Products</b>                   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3/20 <sup>a</sup>                 |   |
| <b>Frozen Dairy</b>                    | 2/7                              | 0.9 <sup>a</sup> /3 <sup>a</sup> | 60 <sup>a</sup> /300 <sup>a</sup>   | 5/25                              | 20/150  |
| <b>Fruit Ices</b>                      | 3 <sup>a</sup> /3 <sup>a</sup>   | 0.9 <sup>a</sup> /3 <sup>a</sup> | 100 <sup>a</sup> /500 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/100  |
| <b>Gelatins and Puddings</b>           | 1/5                              | 0.3 <sup>a</sup> /1 <sup>a</sup> | 200 <sup>a</sup> /1000 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/100  |
| <b>Granulated Sugar</b>                | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 100/250   |
| <b>Gravies</b>                         | 0.5/2                            | 1/1                              | 200 <sup>a</sup> /1000 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/100  |
| <b>Hard Candy</b>                      | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 10 <sup>a</sup> /45 <sup>a</sup>  | 50/100  |
| <b>Imitation Dairy Products</b>        | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> | 60 <sup>a</sup> /300 <sup>a</sup>   | 3 <sup>a</sup> /20 <sup>a</sup>   |   |
| <b>Instant Coffee and Tea</b>          | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> | 100 <sup>a</sup> /500 <sup>a</sup>  | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/50   |
| <b>Jams and Jellies</b>                | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> | 200 <sup>a</sup> /1000 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/50   |
| <b>Meat Products</b>                   | 100/120                          | 1/3 <sup>a</sup>                 | 30/150                              | 10 <sup>a</sup> /45 <sup>a</sup>  |   |
| <b>Milk Products</b>                   | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> | 60 <sup>a</sup> /300 <sup>a</sup>   | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/150  |
| <b>Nut Products</b>                    | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/50   |
| <b>Other Grains</b>                    | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 3/20 <sup>a</sup>                 | 30/60   |
| <b>Poultry Products</b>                | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   |   |
| <b>Processed Fruits</b>                | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/50   |
| <b>Processed Vegetables</b>            | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/50   |
| <b>Reconstituted Vegetable Protein</b> | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 3 <sup>a</sup> /20 <sup>a</sup>   | 20/50   |
| <b>Seasonings and Flavors</b>          | 3 <sup>a</sup> /10 <sup>a</sup>  | 3 <sup>a</sup> /10 <sup>a</sup>  |                                     | 50 <sup>a</sup> /200 <sup>a</sup> | 10/100  |
| <b>Snack Foods</b>                     | 0.3 <sup>a</sup> /1 <sup>a</sup> | 0.3 <sup>a</sup> /1 <sup>a</sup> |                                     | 20 <sup>a</sup> /45 <sup>a</sup>  | 60/120  |
| <b>Soft Candy</b>                      | 2/8                              | 0.9 <sup>a</sup> /3 <sup>a</sup> | 200 <sup>a</sup> /1000 <sup>a</sup> | 10 <sup>a</sup> /45 <sup>a</sup>  | 408 <sup>a</sup> /816 <sup>a</sup>                              |
| <b>Soups</b>                           | 0.2/0.2                          | 1/1                              | 200 <sup>a</sup> /1000 <sup>a</sup> | 3 <sup>a</sup> /20 <sup>a</sup>   | 10/100  |
| <b>Sugar Substitutes</b>               | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> |                                     | 50 <sup>a</sup> /200 <sup>a</sup> | 100/250   |
| <b>Sweet Sauces</b>                    | 0.9 <sup>a</sup> /3 <sup>a</sup> | 0.9 <sup>a</sup> /3 <sup>a</sup> | 60 <sup>a</sup> /300 <sup>a</sup>   | 3 <sup>a</sup> /20 <sup>a</sup>   | 408 <sup>a</sup> /816 <sup>a</sup>                              |

**Table 3. Updated Average Usual Use Levels/Average Maximum Use Levels**

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for flavoring substances previously recognized as FEMA GRAS

a represents a change from previous FEMA GRAS publications

|                                 | 3-(4-Hydroxy-phenyl)-1-(2,4,6-trihydroxy-phenyl)-propan-1-one | Mushroom mycelia fermentation product | <i>Corynebacterium stationis</i> cell free fermentation broth | <i>Corynebacterium glutamicum</i> cell free fermentation product | Yerba mate extract ( <i>Ilex paraguariensis</i> A. St.-Hil.) |
|---------------------------------|---|---------------------------------------|---|--|--|
| GRAS Publication                | 30  | 30                                    | 30  | 30   | 30   |
| Category/FEMA No.               | 4390  | 4878                                  | 4949  | 4964   | 4969   |
| Baked Goods                     | 50/150  | 30/50                                 | 400 <sup>a</sup> /3000 <sup>a</sup>                           | 600 <sup>a</sup> /6000 <sup>a</sup>                              | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Beverages Type I, Non-Alcoholic | 50/100  | 30/1000                               |   |  | 400/1000   |
| Beverages Type II, Alcoholic    | 15/50   | 10/1000                               |   |  | 400/1000   |
| Breakfast Cereals               | 50/100  | 10/100                                | 400 <sup>a</sup> /2000 <sup>a</sup>                           | 600 <sup>a</sup> /6000 <sup>a</sup>                              | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Cheeses                         | 10/50   |                                       | 800 <sup>a</sup> /3000 <sup>a</sup>                           | 1700 <sup>a</sup> /6000 <sup>a</sup>                             | 400/1000   |
| Chewing Gum                     |   | 20/100                                |   |  |  |
| Condiments and Relishes         | 10/100  | 1/30                                  | 1000 <sup>a</sup> /7500 <sup>a</sup>                          | 1700 <sup>a</sup> /10000 <sup>a</sup>                            | 400/1000   |
| Confections and Frostings       | 156 <sup>a</sup> /312 <sup>a</sup>                            | 1/150 <sup>a</sup>                    |   |  | 400/1000   |
| Egg Products                    |   | 1/30                                  | 400 <sup>a</sup> /4000 <sup>a</sup>                           | 600 <sup>a</sup> /4000 <sup>a</sup>                              |  |
| Fats and Oils                   |   |                                       |   |  |  |
| Fish Products                   |   | 1/30                                  | 1000 <sup>a</sup> /4000 <sup>a</sup>                          | 1700 <sup>a</sup> /5000 <sup>a</sup>                             | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Frozen Dairy                    | 10/50   | 10/100                                |   |  | 400/1000   |
| Fruit Ices                      | 20/50   |                                       |   |  | 400/1000   |
| Gelatins and Puddings           | 10/100  |                                       |   |  | 400/1000   |
| Granulated Sugar                | 20/100  |                                       |   |  |  |
| Gravies                         | 10/100  | 10/100                                | 1000 <sup>a</sup> /7500 <sup>a</sup>                          | 1700 <sup>a</sup> /6000 <sup>a</sup>                             | 400/1000   |
| Hard Candy                      | 20/100  | 1/150 <sup>a</sup>                    |   |  | 400/1000   |
| Imitation Dairy Products        | 50/100  | 10/150                                | 800 <sup>a</sup> /4000 <sup>a</sup>                           | 1700 <sup>a</sup> /6000 <sup>a</sup>                             | 400/1000   |
| Instant Coffee and Tea          | 15/50   | 10/150                                |   |  | 400/1000   |
| Jams and Jellies                | 20/50   | 10/100                                |   |  | 400/1000   |
| Meat Products                   | 50 <sup>a</sup> /150 <sup>a</sup>                             | 16/40                                 | 800 <sup>a</sup> /6000 <sup>a</sup>                           | 1700 <sup>a</sup> /6000 <sup>a</sup>                             | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Milk Products                   | 10/50   | 15/100                                |   |  | 400/1000   |
| Nut Products                    | 20/50   | 10/150                                | 400 <sup>a</sup> /4000 <sup>a</sup>                           | 600 <sup>a</sup> /2500 <sup>a</sup>                              |  |
| Other Grains                    | 50/100  | 50/150                                |   |  |  |
| Poultry Products                | 50 <sup>a</sup> /150 <sup>a</sup>                             | 10/150                                | 800 <sup>a</sup> /4000 <sup>a</sup>                           | 1900 <sup>a</sup> /4500 <sup>a</sup>                             | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Processed Fruits                | 20/50   | 20/50                                 |   |  | 400/1000   |
| Processed Vegetables            | 20/50   | 10/150                                |   |  | 400/1000   |
| Reconstituted Vegetable Protein | 50/150  | 10/150                                |   |  | 400/1000   |
| Seasonings and Flavors          | 10/100  | 10/1000 <sup>a</sup>                  | 2000 <sup>a</sup> /19500 <sup>a</sup>                         | 11000 <sup>a</sup> /85000 <sup>a</sup>                           | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Snack Foods                     | 50/100  | 10/150                                | 400 <sup>a</sup> /4000 <sup>a</sup>                           | 4500 <sup>a</sup> /11000 <sup>a</sup>                            | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Soft Candy                      | 156 <sup>a</sup> /312 <sup>a</sup>                            | 1/150 <sup>a</sup>                    |   |  | 400/1000   |
| Soups                           | 10/100  | 10/100                                | 1000 <sup>a</sup> /8000 <sup>a</sup>                          | 1900 <sup>a</sup> /11000 <sup>a</sup>                            | 400/1000   |
| Sugar Substitutes               | 20/100  | 1/30                                  |   |  | 400 <sup>a</sup> /1000 <sup>a</sup>                          |
| Sweet Sauces                    | 156 <sup>a</sup> /312 <sup>a</sup>                            | 1/30                                  |   |  | 400/1000   |

**Table 4. Identity for Natural Flavor Complexes as Evaluated by the FEMA Expert Panel**

| FEMA No. | FEMA Primary Name  | The Identification Description as Reviewed by the FEMA Expert Panel  |
|----------|--|--|
| 5040     | <i>Eucalyptus citriodora</i> oil   | Prepared from the leaves and twigs of the <i>E. maculata citriodora</i> (syn. <i>Corymbia citriodora</i> ) tree by steam distillation; 77-92% Unsaturated linear and branched-chain aliphatic, non-conjugated aldehydes, related primary alcohols, carboxylic acids and esters, including citronellal and citronellol; 2-11% Isopulegol; Up to 5% <i>p</i> -menthane-3,8-diol; Up to 3% eucalyptol   |
| 5042     | Heat-treated glucosylated steviol glycosides 35% with steviol glycosides 10% | Prepared from enzymatically modified and heated steviol glycosides; >95% of identified constituents inclusive of: supraglucosylated steviol glycosides 30-40%, steviol glycosides not further glucosylated 8-13% with each individually less than 4%, dextrans 25-40%, monosaccharides 3-8%, disaccharides less than 1.5%, water not more than 6%, and other non-volatiles 5-10% including sugar alcohols, amino acids, proteins and lipids  |
| 5044     | Sakura flower extract  | Aqueous ethanol solution of approximately 0.06% Sakura flower extract derived from the water and ethanol extraction of the flowers of <i>Prunus serrulata</i> Lindl. of which the major marker constituents are saturated aliphatic, acyclic, linear primary alcohols, aldehydes, carboxylic acids and related esters, including ethyl acetate and acetic acid.  |
| 5045     | Sakura flower distillate   | Aqueous ethanol solution of approximately 0.02% Sakura flower distillate derived from the water and ethanol extraction of the flowers of <i>Prunus serrulata</i> Lindl. of which the major marker constituents are saturated aliphatic, acyclic, linear primary alcohols, aldehydes, carboxylic acids and related esters, including ethyl acetate, acetaldehyde, methanol and propanol; benzyl derivatives including benzaldehyde.   |
| 5046     | Sakura leaf distillate   | Aqueous ethanol solution of approximately 0.02% Sakura leaf distillate derived from the water and ethanol extraction of the leaves of <i>Prunus speciosa</i> (Koidz.) Nakai. of which the major marker constituents are saturated aliphatic, acyclic, linear primary alcohols, aldehydes, carboxylic acids and related esters, including ethyl acetate, acetaldehyde, methanol and propanol; benzyl derivatives; and aliphatic, alicyclic, alicyclic-fused and aromatic-fused ring lactones.   |
| 5047     | Sansho pepper extract  | Aqueous ethanol solution of approximately 0.02% Sansho pepper extract derived from the water and ethanol extraction of the dried berries of <i>Zanthoxylum piperitum</i> of which the major marker constituents are saturated aliphatic, acyclic, linear primary alcohols, aldehydes, carboxylic acids and related esters, including ethyl acetate; unsaturated linear and branched-chain aliphatic, nonconjugated aldehydes, related primary alcohols, carboxylic acids and esters; aliphatic, alicyclic, alicyclic-fused and aromatic-fused ring lactones; and phenol derivatives. |

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| 5048 | Sansho pepper distillate  | Aqueous ethanol solution of approximately 0.01% Sansho pepper distillate derived from the water and ethanol extraction of the dried berries of <i>Zanthoxylum piperitum</i> of which the major marker constituents are saturated aliphatic, acyclic, linear primary alcohols, aldehydes, carboxylic acids and related esters, including propanol and ethyl laurate; aliphatic linear and branched-chain <i>alpha</i> , <i>beta</i> -unsaturated aldehydes and related alcohols acids and esters, including geraniol; unsaturated linear and branched-chain aliphatic, nonconjugated aldehydes, related primary alcohols, carboxylic acids and esters, including lavandulyl acetate. |
| 5054 | Rosemary extract, rosmarinic acid 80%                                       | Prepared from selective extraction of the aerial parts of rosemary ( <i>Rosmarinus officinalis</i> ); 83-96% Rosmarinic acid, up to 3% of other phenol derivatives and <0.5% of other volatile constituents.  |
| 5060 | Rosemary extract, rosmarinic acid 15%                                       | Prepared from selective extraction of the aerial parts of rosemary ( <i>Rosmarinus officinalis</i> ); 29-31% Carbohydrates, 15-16% rosmarinic acid, up to 25-31% of other phenol derivatives, <2% of other volatile constituents, 5-8% ash, 1-4% water, 1-2% protein, <2% fiber and <0.5% fat.  |
| 5069 | Rebaudioside M 70%  | 76-77% Rebaudioside M, 16-18% Rebaudioside A, 7-8% Rebaudioside B.  |
| 5072 | Heat-treated Glucosylated Steviol Glycosides 15% with Steviol Glycosides 5% | Prepared from enzymatically modified and heated steviol glycosides; >95% of identified constituents inclusive of: Supraglucosylated steviol glycosides 8-15%; steviol glycosides not further glucosylated 1-5% with each individually, less than 2%; dextrans 60-70%; monosaccharides 3-8%; water less than 6%; disaccharides less than 1%; and other non-volatiles 5-8% including sugar alcohols, amino acids, proteins, lipids and ash.   |

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| <b>5073</b>   | <i>Corynebacterium glutamicum</i> fermentation product           | 75-82% Protein, 9-15% carbohydrates, 3-5% ash, 3-5% water and <0.05% fat.   |
| <b>5074</b>   | Enzymatically modified rebaudioside A 85%                        | >95% Identified constituents inclusive of: Supraglycosylated rebaudioside A derivatives 76-88%; Rebaudioside A <7%; Other steviol glycosides not further glycosylated, each individually, less than 4%; Maltodextrin 5-15%.                               |
| <b>5081</b>   | <i>Corynebacterium glutamicum</i> fermentation savory product    | 73-76% Protein (composed of amino acids such as glutamic acid and lysine), 14-17% carbohydrates, <8% moisture, <5% ash, and <1% sodium.   |
| <b>5082</b>   | <i>Corynebacterium stationis</i> fermentation product            | 59-63% Protein (composed of amino acids such as glutamic acid, alanine and leucine), 15-20% carbohydrates, <5% moisture and <2% sodium. Disodium inosinate (IMP) content at 20-25%.   |
| <b>Corrections of FEMA GRAS Identity Descriptions</b> |  |   |
| <b>4949</b>   | <i>Corynebacterium stationis</i> cell free fermentation broth    | No more than 65% miscellaneous nitrogen-containing compounds (nucleotides); <10% of amino acids; <10% of minerals; <7% of simple carbohydrates, typically monosaccharides; The material may be standardized with an appropriate carrier such as dextrans. |
| <b>4964</b>   | <i>Corynebacterium glutamicum</i> cell free fermentation product | No more than 70% glutamic acid; <10% simple carbohydrates; <10% sum of other individual amino acids; <15% minerals; The material may be standardized with an appropriate carrier such as dextrans.  |