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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

MEMORANDUM

DATE: 13-FEB-2001

SUBJECT: PP# 9F6032. Sulfosate (Glyphosate-trimesium) in/on Cotton, Root and Tuber Vegetables, Pistachio, Grain Sorghum, and Sweet Corn. **Evaluation of Residue Data and Analytical Methods.** MRID#s 448721-01 thru -13 and 453158-01). Chemical 128501. Barcode D263247. Case 292164. Submission# S565507.

FROM: Jennifer R. Tyler, Chemist
Registration Action Branch 1 (RAB1)
Health Effects Division (HED) (7509C)

THRU: G. Jeffrey Herndon, Acting Branch Senior Scientist
RAB1/HED (7509C)

TO: Jim Tompkins/Tobi Colvin-Snyder, PM Team 25
Registration Division (7505C)

BACKGROUND

Syngenta, formerly Zeneca Ag Products, has submitted a petition for a Section 3 registration and permanent tolerances for residues of the nonselective systemic herbicide sulfosate (glyphosate-trimesium) in or on cotton, root and tuber vegetables, pistachio, grain sorghum, and sweet corn. The proposed tolerances, expressed as sulfosate (sulfonium, trimethyl- salt with N-(phosphonomethyl) glycine (1:1)), are as follows:

Cotton, gin byproducts	120 ppm
[of which no more than 35 ppm is trimethylsulfonium (TMS)]	
Cotton, undelinted seed	40 ppm
(of which no more than 10 ppm is TMS)	
Leaves of Root and Tuber Vegetables Group, except Radish	0.25 ppm
(of which no more than 0.2 ppm is TMS)	
Milk	2.0 ppm
Pistachio	0.05 ppm
Potato, flakes	2.0 ppm
(of which no more than 1.5 ppm is TMS)	
Poultry, mbyp	0.5 ppm
Radish, roots	16 ppm
(of which no more than 15 ppm is TMS)	

Radish, tops ..... 10 ppm
(of which no more than 8 ppm is TMS)
Root Vegetables, except Radish ..... 0.15 ppm
(of which no more than 0.1 ppm is TMS)
Sorghum, grain ..... 35 ppm
(of which no more than 15 ppm is TMS)
Sorghum, forage ..... 0.2 ppm
(of which no more than 0.1 ppm is TMS)
Sorghum, stover ..... 140 ppm
(of which no more than 60 ppm is TMS)
Sweet corn, forage ..... 20 ppm
(of which no more than 5 ppm is TMS)
Sweet corn, kernels + cob with husks removed (K+CWHR) ..... 0.15 ppm
(of which no more than 0.1 ppm is TMS)
Sweet corn, stover ..... 165 ppm
(of which no more than 65 ppm is TMS)
Tuberous and Corm Vegetables Subgroup ..... 1 ppm
(of which no more than 0.5 ppm is TMS)

Attached is a Residue Chemistry review of the Syngenta petition for the use of sulfosate on the above commodities. This information was compiled by Dynamac Corporation under supervision of RAB1/HED. This review has undergone secondary review by RAB1 and has been revised to reflect current HED policies.

Executive Summary of Chemistry Deficiencies

Revised Section B.
Revised Section F.

RECOMMENDATIONS

Provided revised Sections B (Conclusion 2) and Section F (Conclusions 9g, 10c, 11c, 12c, 16, and 18) are submitted, the HED residue chemistry database supports the establishment of tolerances for sulfosate (sulfonium, trimethyl- salt with N-(phosphonomethyl) glycine (1:1)) in/on the following commodities (Note: some of the tolerance levels and commodity definitions recommended by HED are different than those proposed by the petitioner):

Cotton, gin byproducts ..... 120 ppm
[of which no more than 35 ppm is trimethylsulfonium (TMS)]
Cotton, undelinted seed ..... 40 ppm
(of which no more than 10 ppm is TMS)
Pistachio ..... 0.05 ppm
Poultry, meat byproducts ..... 0.50 ppm
Radish, roots ..... 16 ppm
(of which no more than 15 ppm is TMS)

Radish, tops ..... 10 ppm
(of which no more than 8.0 ppm is TMS)
Vegetable, root, except radish, subgroup ..... 0.15 ppm
(of which no more than 0.10 ppm is TMS)
Vegetables, tuberous and corm, subgroup ..... 1.0 ppm
(of which no more than 0.50 ppm is TMS)
Vegetable, leaves of root and tuber, except radish, group ..... 0.30 ppm
(of which no more than 0.20 ppm is TMS)
Sorghum, grain, grain ..... 35 ppm
(of which no more than 15 ppm is TMS)
Sorghum, grain, forage ..... 0.20 ppm
(of which no more than 0.10 ppm is TMS)
Sorghum, grain, stover ..... 140 ppm
(of which no more than 60 ppm is TMS)
Corn, sweet, forage ..... 20 ppm
(of which no more than 5.0 ppm is TMS)
Corn, sweet, kernels plus cob with husks removed ..... 0.15 ppm
(of which no more than 0.10 ppm is TMS)
Corn, sweet, stover ..... 170 ppm
(of which no more than 65 ppm is TMS)

A human health risk assessment will be performed in a separate document.

cc: J. Tyler (RAB1)
RDI: G. Herndon (2/12/01), RAB1 Chemists (2/8/01), G. Kramer (2/8/01)
J. Tyler: 806W: CM#2: (703)305-5564: 7509C: RAB1

GLYPHOSATE-TRIMESIUM (SULFOSATE)

PC Code 128501

(DP Barcode D263247)

Permanent Tolerance Petition (PP#9E06032) For Uses On Cotton, Root and Tuber Vegetables, Pistachio, Grain Sorghum, and Sweet Corn

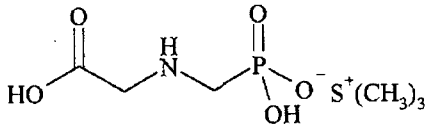
November 6, 2000

Contract No. 68-W-99-053

Submitted to:
U.S. Environmental Protection Agency
Arlington, VA

Submitted by:
Dynamac Corporation
1910 Sedgwick Road
Building 100, Suite B
Durham, NC 27713

GLYPHOSATE-TRIMESIUM (SULFOSATE)



Permanent Tolerance Petition (PP#9E06032) For Uses On Cotton, Root and Tuber Vegetables, Pistachio, Grain Sorghum, and Sweet Corn

PC Code 128501

(DP Barcode D263247)

BACKGROUND

Glyphosate-trimesium (sulfosate), a nonselective systemic herbicide which is active against a broad range of weeds, is being developed for agricultural use in a wide range of crops. Syngenta has submitted a petition to establish the following permanent tolerances for sulfosate (sulfonium, trimethyl- salt with N-(phosphonomethyl) glycine (1:1)):

Cotton, gin byproducts ..... 120 ppm
[of which no more than 35 ppm is trimethylsulfonium (TMS)]
Cotton, undelinted seed ..... 40 ppm
(of which no more than 10 ppm is TMS)
Leaves of Root and tuber Vegetables Group, except Radish ..... 0.25 ppm
(of which no more than 0.2 ppm is TMS)
Milk ..... 2.0 ppm
Pistachio ..... 0.05 ppm
Potato, flakes ..... 2.0 ppm
(of which no more than 1.5 ppm is TMS)
Poultry, mbyp ..... 0.5 ppm
Radish, roots ..... 16 ppm
(of which no more than 15 ppm is TMS)
Radish, tops ..... 10 ppm
(of which no more than 8 ppm is TMS)
Root Vegetables, except Radish ..... 0.15 ppm
(of which no more than 0.1 ppm is TMS)
Sorghum, grain ..... 35 ppm
(of which no more than 15 ppm is TMS)
Sorghum, forage ..... 0.2 ppm
(of which no more than 0.1 ppm is TMS)
Sorghum, stover ..... 140 ppm
(of which no more than 60 ppm is TMS)
Sweet corn, forage ..... 20 ppm

Sorghum, stover ..... 140 ppm
(of which no more than 60 ppm is TMS)
Sweet corn, forage ..... 20 ppm
(of which no more than 5 ppm is TMS)
Sweet corn, kernels + cob with husks removed (K+CWHR) ..... 0.15 ppm
(of which no more than 0.1 ppm is TMS)
Sweet corn, stover ..... 165 ppm
(of which no more than 65 ppm is TMS)
Tuberous and Corm Vegetables Subgroup ..... 1 ppm
(of which no more than 0.5 ppm is TMS)

Sulfosate (the trimethylsulfonium salt of glyphosate) is a 1:1 molar salt of the N-(phosphonomethyl)glycine anion (PMG) and the trimethylsulfonium cation (TMS) and is formulated as either a 5 or 6 lb/gal soluble concentrate/liquid (SC/L) (Touchdown® 5 Herbicide, EPA Reg. No. 10182-429; and Touchdown® Herbicide, EPA Reg. No. 10182-324). Tolerances for sulfosate have been established for the following crops or commodities [40 CFR §180.489(a)]: almond hulls, aspirated grain fractions, bananas (import only), citrus fruits, field and pop corn, grapes, pome fruits, prunes, raisins, soybeans, stone fruits, tree nuts, and wheat. Tolerances have also been established for residues in meat, milk, poultry and egg commodities.

HED has recommended in favor of a petition (PP#7F04876) for sulfosate uses on fruiting vegetables pending revisions of the proposed labels (DP Barcode D243450, 9/28/98, J. Rowell and G. Kramer). In addition, HED concluded in the same memorandum that sufficient data are available to support the proposed increase (to 8 lb ai/A/year) in the application rate of sulfosate on citrus, grapes, pome fruit group, tree nut group, soybeans, and stone fruit group.

CONCLUSIONS

OPPTS 830 Series GLNs: Product Properties

1. Product chemistry data for sulfosate were previously submitted and reviewed by RD. No additional product chemistry data are required in support of this petition.

OPPTS GLN 860.1200: Proposed Uses

2. The amended label (Touchdown® 5 Herbicide, 5 lb/gal SC/L formulation, EPA Reg. No. 10182-429) adequately delineates the proposed use pattern for sulfosate on pistachios, root and tuber vegetables, and sweet corn. **However,** the proposed grain sorghum use directions should be amended to include a statement prohibiting the use of sulfosate on sweet sorghum or forage sorghum. **In addition, the proposed use directions for cotton should be amended to specify a maximum of two preharvest broadcast applications at up to 1.0 lb ai/A/application with a minimum retreatment interval of 7 days between the two preharvest applications. A revised Section B should be submitted with these changes.**

OPPTS GLN 860.1300: Nature of the Residue - Plants

3. No new metabolism studies were submitted with this petition. Sulfosate metabolism studies in plants have been submitted in conjunction with previous petitions. The nature of the residue in plants is understood based on metabolism studies on corn, grapes, and soybeans. HED concluded that the parent ions are the residues of regulatory concern for sulfosate in these crops.

OPPTS GLN 860.1300: Nature of the Residue - Livestock

4. Sulfosate metabolism studies in livestock have been submitted in conjunction with a previous corn tolerance petition. The nature of the residue is considered to be understood in ruminants and poultry. HED concluded that the parent ions are the residues of regulatory concern for sulfosate in meat, milk, and eggs.

OPPTS GLN 860.1340: Residue Analytical Methods-Plant Commodities

5a. Enforcement analytical methods have previously been submitted for residues of sulfosate in/on crops. The petitioner used the previously submitted enforcement methods (Methods RR 92-042B RES and RR 93-105B RES) for data collection in the submitted field trial studies on cotton, root and tuber vegetables, grain sorghum, and sweet corn. Concurrent method recoveries demonstrated that methods RR 92-042B RES and RR 93-105B RES are adequate for data collection in/on these crops.

5b. Enforcement of the proposed tolerances requires two enforcement methods: one method for PMG and one method for TMS. The revised method RR 92-042B RES was approved by HED for the enforcement of proposed tolerances for residues of the PMG ion of sulfosate in/on crops (DP Barcode D215869, 7/6/95, G. Kramer). The revised method, RR 93-105B RES was accepted by HED for the enforcement of proposed tolerances for residues of TMS in/on crops (DP Barcode D221382, 1/22/96, G. Kramer). Both methods have been submitted to the FDA for inclusion in PAM II.

OPPTS GLN 860.1340: Residue Analytical Methods-Livestock Commodities

6. Method validation and successful petition method validation (PMV) by the Analytical Chemistry Laboratory (ACL) of Methods RR 93-104B for the determination of PMG and RR 93-100B for the determination of TMS (originally submitted with PP#9F03796) have been completed. The methods were revised to incorporate revisions required by HED, and revised methods (RR 93-104B RES and RR 93-100B RES) were approved by HED for the enforcement of tolerances for residues of the PMG and TMS ions of sulfosate in meat, milk, poultry and eggs. The methods have been submitted to the FDA for inclusion in PAM II.

OPPTS GLN 860.1360: Multiresidue Method

7 A report on the behavior of TMS and PMG in FDA Multiresidue protocols I, II, III, and IV, has been forwarded to the FDA for inclusion in PAM I (Memo dated 10/29/90, S. Koepke).

OPPTS GLN 860.1380: Storage Stability Data

8a. The interim data from the storage stability study on potatoes are adequate and indicate that residues of PMG are stable in potatoes at -18 C for at least 16 months and residues of TMS are stable in potatoes stored at -18 C for at least 15 months. This study is scheduled to provide data on storage intervals up to 3 years.

8b. The RAC and processed samples from the submitted field trials and processing studies were stored frozen for a maximum of ~13 months from harvest to extraction for analysis. Previously, the petitioner demonstrated that residues of TMS and PMG are stable for up to 2 year in frozen grapes, oranges, soybean seeds and straw, and wheat grain, and for up to 4 years in frozen grain sorghum grain. Together with the data on potatoes, these data support the storage intervals for the submitted field trials and processing studies.

OPPTS GLN 860.1500: Crop Field Trials

Root Vegetables (Crop Group 1A) and Leaves of Root and Tuber Vegetables (Crop Group 2)

9a. **Carrots.** The petitioner provided data from carrot growing regions accounting for 91% of U.S. production with six trials conducted in Region 3 (1 trial), Region 5 (1 trial), Region 6 (1 trial) and Region 10 (3 trials). Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to carrots at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.12 ppm in/on 12 samples of carrots harvested at maturity from six field trails. Maximum residues of TMS were 0.07 ppm.

9b. **Radishes.** The petitioner provided data from radish growing regions accounting for 96% of U.S. production with five trials conducted in Region 1 (1 trial), Region 3 (2 trials), Region 5 (1 trial), and Region 10 (1 trial). Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to radishes at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.1-15.1 ppm in/on 10 samples of radish roots and <0.1-7.68 ppm in/on 10 samples of radish tops harvested at maturity from five field trials. Maximum residues of TMS were 15 and 7.6 ppm in/on radish roots and tops, respectively.

9c. **Sugar beets.** The petitioner provided data from sugar beet growing regions accounting for 95% of U.S. production with nine trials conducted in Region 5 (5 trials), Region 7 (1 trial), Region 8 (1 trial), Region 10 (1 trial) and Region 11 (1 trail). Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to sugar beets at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.1 ppm (<LOQ) in/on 18 samples

of sugar beet roots and 18 samples for sugar beet tops harvested at maturity from 9 field trials. Maximum residues of TMS were <0.05 ppm on/on both sugar beet roots and tops.

9d. **Turnips**. The petitioner provided data from turnip growing regions accounting for 78% of U.S. production with six trials conducted in Region 2 (2 trials), Region 4 (1 trial), Region 5 (1 trial), Region 6 (1 trial) and Region 10 (1 trial). Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to turnips at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.1 ppm (<LOQ) in/on 12 samples of turnip roots and <0.1-<0.25 ppm in/on 12 samples of turnip tops harvested at maturity from six field trials. Maximum residues of TMS were <0.05 and 0.2 ppm in/on turnip roots and tops, respectively.

9e. The number and geographic representation of the carrot, radish, sugar beet, and turnip field trials are adequate to support the proposed tolerances for residues of sulfosate in/on radish and the root vegetable, except radish, subgroup.

9f. The submitted residue data support the following tolerances for residues on sulfosate: 16 ppm (of which no more than 15 ppm is TMS) in/or on radish, roots; 10 ppm (of which no more than 8 ppm is TMS) in/on radish, tops; 0.15 ppm (of which no more than 0.10 ppm is TMS) in/on vegetable, root, except radish, subgroup; 0.30 ppm (of which no more than 0.20 ppm is TMS) in/on vegetable, leaves of root and tuber, except radish, group.

9g. The correct commodity definitions are "Vegetable, root, except radish, subgroup" and "Vegetable, leaves of root and tuber, except radish, group." **The petitioner should submit a revised Section F with the above tolerances and commodity definitions.**

Tuberous and Corm Vegetables (Crop Group 1C)

10a. **Potatoes**. The number and geographic representation of the potato field trials are adequate. The petitioner provided data from potato growing regions accounting for 95% of U.S. production with 12 tests conducted in Region 1 (2), Region 2 (1), Region 3 (1), Region 5 (2), Region 9 (1), Region 10 (1) and Region 11 (4).

10b. The submitted potato field trial data indicate the residues of sulfosate will not exceed 1.0 ppm (of which no more than 0.50 ppm is TMS) in/on tuberous and corm vegetables. Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to potatoes at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.1-<0.46 ppm in/on 24 samples of potatoes harvested at maturity from 12 field trials. Maximum residues of TMS in/on potatoes were 0.41 ppm. The submitted residue data support the following tolerances for residues on sulfosate: 1.0 ppm (of which no more than 0.50 ppm is TMS) vegetables, tuberous and corm, subgroup.

10c. The correct commodity definition is "Vegetables, tuberous and corm, subgroup". **The petitioner should submit a revised Section F.**

Cereal Grains (Crop Group 15) and Forage, Fodder and Straw of Cereal Grains (Crop Group 16)

11a. **Sweet corn.** The number and geographic representation of the sweet corn field trials are adequate. The submitted sweet corn field trials were conducted in Regions 1 (2 trials), 2 (1 trial), 3 (1 trial), 5 (5 trials), 10 (1 trial), 11 (1 trial), and 12 (1 trial), which together account for 96% of the U.S. sweet corn production. Following a preemergence broadcast application of sulfosate at 8 lb ai/A and a spot application (5% v/v) prior to silking, residues of PMG and TMS were each <0.05 ppm in/on 24 treated samples of sweet corn K+CWHR harvested 13-41 days post-treatment. Residues in/on 24 treated samples of forage harvested 13-41 days post-treatment were <0.05-10.9 ppm for PMG and <0.05-3.8 ppm for TMS, for combined residues of <0.1-13.8 ppm. Residues in/on 24 treated samples of sweet corn stover harvested 31-73 days post-treatment were <0.05- 98 ppm for PMG and <0.5-63 ppm for TMS, for combined residues of <0.1-157 ppm.

11b. The submitted sweet corn residue data are adequate and support the proposed tolerances of 170 ppm (of which no more than 65 ppm is TMS) in/on corn, sweet, stover; 0.15 ppm (of which no more than 0.10 ppm is TMS) in/on corn, sweet, kernel plus cob with husks removed; and 15 ppm (of which no more than 5.0 ppm is TMS) in/on corn, sweet, forage.

11c. The correct commodity definitions are "corn, sweet, stover", "corn, sweet, kernel plus cob with husks removed", and "corn, sweet, forage". **The petitioner should submit a revised Section F.**

12a. **Grain Sorghum.** The number and geographic representation of the grain sorghum field trials are adequate. The submitted grain sorghum field trials were conducted in Regions 2 (1), 4 (1), 5 (4), 6 (2), 7 (1), and 8 (3) which account for 100% of the U.S. grain sorghum production. Grain sorghum was treated with a combination of a preemergence broadcast application at 6 lb ai/A, a late season spot application and wiper application, and a broadcast preharvest application at 2 lb ai/A 7 days prior to harvest of the grain. Residues in/on 48 samples of grain sorghum forage harvested at 76-100 days following the preemergence application were comprised of <0.05 ppm of PMG and <0.05-0.09 ppm of TMS, for combined residues of <0.1 ppm. Residues in/on 48 treated samples of grain sorghum grain harvested at 7 days after the preharvest application were comprised of 0.55-18.7 ppm of PMG and 1.47-11.5 ppm of TMS, for combined residues of 1.5-24.6 ppm. Residues in/on 48 treated samples of grain sorghum stover harvested at 7-18 days post-treatment were comprised of 1.6-70.1 ppm of PMG and 2.98-59.2 ppm of TMS, for combined residues of 4.6-125.1 ppm.

12b. The submitted grain sorghum field trail data are adequate to support the proposed tolerances of 35 ppm (of which no more than 15 ppm is TMS) in/on sorghum, grain, grain; 0.20 ppm (of which no more than 0.10 ppm is TMS) in/on sorghum, grain, forage; and 140 ppm (of which no more than 60 ppm is TMS) in/on sorghum, grain, stover harvested following the maximum proposed application rate.

12c. The correct commodity definitions are "sorghum, grain, grain", "sorghum, grain, forage", and "sorghum, grain, stover". The petitioner should submit a revised Section F.

12d. The aspirated grain fractions (AGF) data submitted for grain sorghum are adequate and indicate that the combined residues of PMG and TMS in/on AGF derived from grain sorghum grain are significantly less (maximum of 151 ppm) than the established 1300 ppm tolerance for AGF, which is based on data from soybeans (DP Barcode D243318, 4/23/99, G. Kramer). Therefore, no change in the AGF tolerance is required.

Miscellaneous Commodities

13a. **Cotton.** The number and geographic representation of the cotton field trails are adequate. The submitted field trials were conducted in Regions 2 (1 trial in NC), 4 (4 trials in LA (1), MS (1), TN (1), AR(1)), 6 (2 trials in OK (1) and TX (1)), 8 (3 trials in NM (1) and TX (2)), and 10 (3 trials in AZ (1) and CA (2)). Following a combined application of a preemergence broadcast application at 4 lb ai/A, two directed applications at 1 lb ai/A/application, a spot application prior to boll opening, a broadcast application at 1.0 lb ai/A at 60% boll opening, a late season wiper application, and a final broadcast application at 1.0 lb ai/A at 85% boll opening, residues in/on 26 treated samples of undelinted cotton seed harvested at 7 days post-treatment were comprised of 0.4-25.8 ppm of PMG and 0.26-9.42 ppm of TMS, for combined residues of 0.7-35.2 ppm. Residues in/on 12 samples of cotton gin by-products harvested at 7 days post-treatment were comprised of 15.6-84.1 ppm of PMG and 13.1-32.3 ppm of TMS, for combined residues of 28.7-116.4 ppm.

13b. The submitted cotton residue data are adequate and support the proposed tolerance of 40 ppm (of which no more than 10 ppm is TMS) in/on undelinted cotton seeds and the proposed tolerance of 120 ppm (of which no more than 35 ppm is TMS) in/on cotton gin by-products. However, the proposed use directions for cotton should be amended to specify a maximum of two preharvest broadcast applications at up to 1.0 lb ai/A/application with a minimum retreatment interval of 7 days between the preharvest applications.

14. **Pistachios.** No residue data on pistachios were submitted with the current petition. However, the existing sulfosate residue data on almonds, pecans, and walnuts, which reflect the same use pattern as proposed for pistachios, will be translated to support a separate 0.05 ppm tolerance for residues in/on pistachios.

<u>OPPTS GLN 860.1520: Processed Food/Feed</u>

15. **Cotton.** Tho cotton processing study is adequate and indicates that the combined residues of PMG and TMS do not concentrate in cotton hulls, meal, or refined oil. Separate tolerances for cotton processed fractions are not required.

16. **Potato.** The potato processing study is adequate and indicates that the combined residues of PMG and TMS do not concentrate in wet peel and concentrate only slightly in

flakes (1.7x) and chips (1.1x). Based on the combined highest average field trial (HAFT) residues of <0.37 ppm from the potato field trials and the observed concentration factors for flakes and chips, the maximum expected combined residues of PMG and TMS in potato flakes and chips would be 0.63 and 0.41 ppm, respectively. As these residue levels are below the 1 ppm tolerance proposed for the potato RAC, separate tolerances for residues in potato flakes and chips are not required. **A revised Section F should be submitted with the tolerance for potato, flakes deleted.**

17. **Sugar beet.** The submitted sugar beet processing study is adequate and indicates that detectable levels of sulfosate residues are not likely to occur in commodities processed from sugar beets treated in accordance with the proposed use directions. Therefore, no tolerances are required for sulfosate residues in sugar beet processed commodities.

OPPTS GLN 860.1480: Meat, Milk, Poultry, Eggs

18. An adequate ruminant feeding study has been previously reviewed. Based on a calculated maximum theoretical dietary burden (MTDB) of 438 ppm for cattle and the results of the earlier feeding study, the current 1.5 ppm tolerance for milk and the tolerances for residues in fat (0.5 ppm), kidneys (6.0 ppm), and meat byproducts, except kidney (1.5 ppm), and meat (1.0 ppm) of cattle, goats, hogs, horses, and sheep are adequate. The proposed tolerance increase for residues in milk is not necessary. **A revised Section F should be submitted with the proposed tolerance increase for milk deleted.**

19. An adequate poultry feeding study has been previously reviewed. Based on a calculated MTDB of 37 ppm for poultry and the results of the earlier feeding study, the current 0.05 ppm tolerance for eggs and the 0.05 ppm tolerances for residues in poultry fat and meat are adequate. The tolerance for residues in poultry meat by products should be increased to 0.50 ppm as proposed by the petitioner.

OPPTS GLN 860.1850 and 860.1900: Confined/Field Accumulation in Rotational Crops

20. HED has previously reviewed two confined rotational crop studies for sulfosate and concluded that rotational crop restrictions were not required for uses on crops in which the total seasonal application rate does not exceed 8.0 lbs. a.i./A. No additional rotational crop data are required to support this petition.

Executive Summary of Chemistry Deficiencies

Revised Section B.
Revised Section F.

RECOMMENDATIONS

Provided revised Sections B (Conclusion 2) and Section F (Conclusions 9g, 10c, 11c, 12c, 16, and 18) are submitted, the HED residue chemistry database supports the establishment of tolerances for sulfosate (sulfonium, trimethyl- salt with N-(phosphonomethyl) glycine (1:1)) in/on the following commodities (Note: some of the tolerance levels and commodity definitions recommended by HED are different than those proposed by the petitioner):

Cotton, gin byproducts	120 ppm
[of which no more than 35 ppm is trimethylsulfonium (TMS)]	
Cotton, undelinted seed	40 ppm
(of which no more than 10 ppm is TMS)	
Pistachio	0.05 ppm
Poultry, meat byproducts	0.50 ppm
Radish, roots	16 ppm
(of which no more than 15 ppm is TMS)	
Radish, tops	10 ppm
(of which no more than 8.0 ppm is TMS)	
Vegetable, root, except radish, subgroup	0.15 ppm
(of which no more than 0.10 ppm is TMS)	
Vegetables, tuberous and corm, subgroup	1.0 ppm
(of which no more than 0.50 ppm is TMS)	
Vegetable, leaves of root and tuber, except radish, group	0.30 ppm
(of which no more than 0.20 ppm is TMS)	
Sorghum, grain, grain	35 ppm
(of which no more than 15 ppm is TMS)	
Sorghum, grain, forage	0.20 ppm
(of which no more than 0.10 ppm is TMS)	
Sorghum, grain, stover	140 ppm
(of which no more than 60 ppm is TMS)	
Corn, sweet, forage	20 ppm
(of which no more than 5.0 ppm is TMS)	
Corn, sweet, kernels plus cob with husks removed	0.15 ppm
(of which no more than 0.10 ppm is TMS)	
Corn, sweet, stover	170 ppm
(of which no more than 65 ppm is TMS)	

A human health risk assessment will be performed in a separate document.

DETAILED CONSIDERATIONS

OPPTS 830 Series GLNs: Product Properties

No new studies were submitted with this petition. Product chemistry data were reviewed by RD and found to be adequate (Memo dated 3/17/87, K. Liefer) when sulfosate was initially submitted

for a nonfood use. There are no product chemistry data gaps (Letter dated 2/15/89, R. Taylor); no additional product chemistry data are required to support this petition.

OPPTS GLN 860.1200: Proposed Uses

Syngenta provided a copy of an amended label for a 5 lb/gal SC/L formulation of sulfosate (Touchdown ® 5, EPA Reg. No. 10182-429) proposed for use on cotton, pistachios, sweet corn, grain sorghum, and root and tuber vegetables for the control of broadleaf and grass weeds.

The 5 lb/gal SC/L is currently registered for control of annual and perennial weeds in bananas, citrus fruits, coffee, corn (field, pop, and seed), grapes, pome fruits, soybeans, stone fruits, tree nuts, and wheat using ground or aerial equipment. The 5 lb/gal SC/L can be applied to these crops as preplant or preemergence broadcast applications, as a postemergence directed applications, directed spot applications, or a wiper/wick application. The use on soybeans also allows for a pre-harvest broadcast application as a harvest aid at up to 1 lb ai/A.

For broadcast and directed applications, the maximum single application rates specified for control of annual and perennial weeds are 2 and 4 lb ai/A, respectively. Spot applications may be made using 0.4-3% v/v solutions (0.02-0.16 lb ai/gal solution), and wiper/wick applications may be made using a 1.25 lb ai/gallon solution. Retreatment intervals of 14-21 days are specified for postemergence spot applications. The maximum seasonal application rate is 8 lb ai/A/year, except for use on corn and any use in New York, for which the maximum is 4 lb ai/A/year.

Broadcast ground and aerial applications should be made in 3-40 and 3-15 gallons water per acre, respectively, and applications may include a nonionic surfactant or wetting agent at up to 0.25% v/v. Applications through any type of irrigation system are prohibited.

The general use directions specify a restricted entry interval (REI) of 12 hours and prohibit the grazing or harvest of cover crops for feed. The label also specifies a 35-day rotational crop restriction for any crops not listed on the label.

The proposed uses on sweet corn, cotton, grain sorghum, root and tuber vegetables, and pistachios are presented below.

Corn (sweet corn). The 5 lb/gal SC/L is proposed for broadcast preplant, at planting, or preemergence applications to corn at 0.5-4 lb ai/A/application using ground or aerial equipment. It is also proposed for postemergence directed spot applications at the concentrations specified above. The specified maximum seasonal rate is 8 lb ai/A/season for sweet corn (except in NY) and 4 lb ai/A/season for all other types of corn. For the postemergence spot applications, a 13-day preharvest interval (PHI) is proposed for harvest of sweet corn (ears) or sweet corn forage, a 31-day PHI is proposed for harvest of sweet corn fodder, and a 90-day PHI is listed for harvest of grain and fodder from all other types of corn.

Cotton. The 5 lb/gal SC/L is proposed for preplant or preemergence broadcast applications to cotton at 0.5-4.0 lb ai/A/application using ground or aerial equipment. It is also proposed for postemergence directed applications to cotton using shielded/hooded sprayers at up to 2 lb ai/A/application, or recirculating sprayers, spot sprays, or a wiper/wick applicator at the concentrations specified above. For defoliation and desiccation of cotton to aid in harvest, the 5 lb/gal SC/L is also proposed for use as a broadcast preharvest application at 0.5-2.0 lb ai/A after bolls have matured. The label specifies that spot applications must be made prior to boll opening, and proposes a 7-day PHI following wiper/wick application or a preharvest application. The use directions specify a maximum seasonal rate of 8 lb ai/A, and prohibit preharvest application to cotton grown for seed.

Grain Sorghum. The 5 lb/gal SC/L is proposed for preplant or preemergence broadcast applications and for postemergence directed applications at 0.5-4.0 lb ai/A/application. The postemergence applications may also include directed spot applications or a wiper/wick applications at the concentrations specified above. To aid in harvest, a broadcast preharvest application of the 5 lb/gal SC/L is also proposed for grain sorghum at 0.5-2.0 lb ai/A, after the majority of seed heads have matured. A 28-day PHI is proposed for harvest of grain and stover following postemergence spot, wiper, or wick applications, and a 7-day PHI is proposed for grain sorghum following a broadcast preharvest application. The use directions specify a maximum seasonal rate of 8 lb ai/A, and prohibit preharvest application to grain sorghum grown for seed.

Root and Tuber Vegetables. The 5 lb/gal SC/L is proposed for broadcast preplant, at planting, or preemergence applications to root and tuber vegetables at 0.5-4 lb ai/A/application using ground or aerial equipment. The label specifies a maximum of 8 lb ai/A/season. A PHI and minimum retreatment interval are not specified.

Pistachio (Included under Tree Nuts). The 5 lb/gal SC/L is proposed for directed applications to orchard floors at 0.5-4 lb ai/A/application using ground. The label specifies a maximum of 8 lb ai/A/season and a PHI of 20 days for harvest of nuts. A minimum retreatment interval is not specified.

Conclusions: The amended label (Touchdown® 5 Herbicide, 5 lb/gal SC/L formulation, EPA Reg. No. 10182-429) adequately delineates the proposed use pattern for sulfosate on pistachios, root and tuber vegetables, and sweet corn. **However,** the proposed use directions should be amended to include a statement prohibiting the use of sulfosate on sweet sorghum or forage sorghum. **In addition, the proposed use directions for cotton should be amended to specify a maximum of two preharvest broadcast applications at up to 1.0 lb ai/A/application with a minimum retreatment interval of 7 days between the two preharvest applications. A revised Section B should be submitted with these changes.**

OPPTS GLN 860.1300: Nature of the Residue - Plants

No new metabolism studies were submitted with this petition. Sulfosate metabolism studies in plants have been submitted in conjunction with previous petitions. The nature of the residue is

considered to be understood in grapes (DP Barcode D182279, 12/7/93, G. Otakie), corn (DP Barcode D171509, 9/30/92, F. Griffith) and soybeans (DP Barcode D208740, 4/4/95, G. Kramer). HED concluded that the parent ions are the residues of regulatory concern for sulfosate in these crops; these data will be translated other crops. The parent ions are considered to be the residues of concern.

HED has previously determined that the tolerance expression for sulfosate must include both of the parent ions (DP Barcode D211742, 2/9/95, G. Kramer, et al.). Tolerances for sulfosate should be expressed as "residues of sulfosate (sulfonium, trimethyl-salt with N-(phosphonomethyl)glycine (1:1)) in or on..." In situations where the levels of both ions are expected to be below the levels of quantitation (0.05 ppm), tolerances should be established as:

RAC = 0.05 ppm

In cases where quantifiable residues are expected, tolerances should be established as:

RAC (of which no more than x ppm is trimethylsulfonium) = y ppm, where x is the maximum expected residue of TMS and y is the maximum expected total of TMS and PMG.

OPPTS GLN 860.1300: Nature of the Residue - Livestock

Sulfosate metabolism studies in livestock have been submitted in conjunction with a previous corn tolerance petition. The nature of the residue is considered to be understood in ruminants and poultry (DP Barcode D205472, 4/4/95, G. Kramer). HED concluded that the parent ions are the residues of regulatory concern for sulfosate in meat, milk, poultry and eggs.

OPPTS GLN 860.1340: Residue Analytical Method - Plant Commodities

Enforcement analytical methods have previously been submitted for proposed tolerances; the petitioner used the previously submitted enforcement methods (Methods RR 92-042B RES and RR 93-105B RES) for data collection in the submitted field trial studies on cotton, root and tuber vegetables, pistachio, grain sorghum, sweet corn, leaves of root and tuber vegetables, root vegetables, and tuberous and corm vegetables.

Method validation and successful PMV by ACL of Method RR 92-042B (originally submitted with PP#3F04238 and PP#4F04343), for the determination of PMG, and Method RR 93-105B (originally submitted with PP#1F03950), for the determination of TMS, have been completed. The methods were revised to incorporate revisions required by HED, and the revised methods (RR92-042B RES and RR 93-105B RES) were approved by HED for the enforcement of tolerances for residues of the PMG and TMS ions of sulfosate in/on crops (DP Barcode D215869, 7/6/95, G. Kramer and D219447, 1/23/96, G. Kramer). The methods have been submitted to the FDA for inclusion in PAM II (DP Barcode D248046, 8/17/98, G. Kramer).

Concurrent method recoveries were generated in conjunction with the submitted field trials. Untreated samples of each commodity were fortified with PMG and TMS at levels of 0.05-150 ppm and analyzed concurrently with the treated samples using GC/MS methods RR 92-042B RES and RR 93-105B RES. The recoveries of the fortified samples are reported in Table 1. The concurrent method recoveries demonstrate that methods RR 92-042B RES and RR 93-105B RES are adequate for data collection in/on RACs of root and tuber vegetables, sweet corn, grain sorghum, and cotton, and processed commodities of potatoes and cotton.

Table 1. Recovery of PMG and TMS fortified crop control samples analyzed by GC/MS methods (RR92-042B RES and RR 93-105B RES).

Crop (MRID)	Matrix	Fortification level (ppm)	# of samples [a]	% Recovery			
				PMG		TMS	
				Range	Ave. ± SD	Range	Ave. ± SD
Root and Tuber Vegetables (Crop Groups 1 and 2)							
Carrots (44872112)	roots	0.05, 0.5	2/3	101, 103	102	100-108	104 ± 4
Potatoes (44872110)	tubers	0.05-0.5	6/7	79-104	87 ± 9	91-109	96 ± 6
Potato (44872111)	tubers	0.05-5.0	3/2	81-108	91 ± 15	91, 92	92
	flakes	0.05, 0.5	2/2	70, 77	74	85, 92	89
	chips	0.05-0.5	2/2	87, 94	91	86, 97	92
	wet peel	0.05, 0.5	1/2	98	--	96, 87	92
Radishes (44872109)	roots	0.05-5.0	3/2	89-105	99 ± 9	86, 114	100
	tops	0.05-10	4/8	89-108	98 ± 8	88-100	93 ± 4
Sugar beets (44872107)	roots	0.05-0.15	4/4	78-91	86 ± 6	86-108	97 ± 9
	tops	0.05-0.25	4/2	87-119	107 ± 15	88, 101	95
Turnips (44872106)	roots	0.05-1.0	5/4	87-118	99 ± 12	79-88	83 ± 4
	tops	0.05-1.0	3/4	78-93	87 ± 8	84-120	104 ± 15
Cereal grains, forage, fodder and straw (Crop Groups 15 and 16)							
Sweet corn (44872105)	K+CWHR	0.05-0.5	3/4	78-107	96 ± 13	81-104	94 ± 9
	forage	0.05-100	3/7	78-109	91 ± 11	70-103	86 ± 11
	stover	0.05-100	2/4	84-114	95 ± 11	80-114	94 ± 10
Grain sorghum (44872104)	grain	0.05-100	5-7	74-94	85 ± 6	71-118	96 ± 15
	forage	0.05-5	5-7	74-109	98 ± 12	85-111	96 ± 8
	stover	0.05-100	5-7	70-115	93 ± 17	74-109	90 ± 10
	AGF's	10-150	1	88-89	88 ± 0.6	95-101	97 ± 3
Miscellaneous Crops							
Cotton (44872102)	gin by-products	0.05-100	4	70-91	81 ± 8	72-95	82 ± 8
	undelinted seed	0.05-20	9	73-105	93 ± 10	82-118	93 ± 10
Cotton processing (44872103)	undelinted seed	0.05-20	2/3	108, 110	109	82-110	94 ± 14
	hulls	0.05-15	2	101, 103	102	74, 90	82

Crop (MRID)	Matrix	Fortification level (ppm)	# of samples [a]	% Recovery			
				PMG		TMS	
				Range	Ave. ± SD	Range	Ave. ± SD
	meal	0.05-5	2	85, 86	86	87, 102	95
	refined oil	0.05-0.5	1/2	113	--	82, 95	89

[a] Number of control samples fortified with PMG/TMS, respectively.

OPPTS GLN 860.1340: Residue Analytical Methods - Livestock Commodities

Enforcement analytical methods have previously been submitted for proposed tolerances. Method validation and successful PMV by ACL of Methods RR 93-104B for the determination of PMG and RR 93-100B for the determination of TMS (originally submitted with PP#9F03796) have been completed (DP Barcode D219447, 1/23/96, G. Kramer). The methods were revised to incorporate revisions required by HED and revised methods (RR 93-104B RES and RR 93-100B RES) were approved by HED for the enforcement of tolerances for residues of the PMG and TMS ions of sulfosate in meat, milk, poultry and eggs (DP Barcode D242217, 4/4/98, G. Kramer). The methods have been submitted to the FDA for inclusion in PAM II (DP Barcode D248043, 8/17/98, G. Kramer).

OPPTS GLN 860.1360: Multiresidue Method

The report on the behavior of PMG and TMS in FDA protocols I, II, III and IV, has been forwarded to the FDA for inclusion in PAM I (Memo dated 10/25/90, S. Koepke).

OPPTS GLN 860.1380: Storage Stability Data

Syngenta submitted interim data (cited below) depicting the frozen (-18 C) storage stability of PMG and TMS in potatoes for up to 16 months.

> 44872113 Wiebe, L. (1998) Glyphosate-Trimesium: Stability of Glyphosate-Trimesium in Frozen Potato (Interim Report): Lab Project Number GLYP-96-SS01. Unpublished study prepared by Zeneca Ag Products. p. 27.

Commercially purchased potatoes were homogenized with dry ice, weighed into glass jars, and fortified separately with either PMG or TMS at 0.5 ppm. Samples were then placed in storage at -18 ± 5 C. At each sampling interval, a control sample, a freshly-fortified sample for each analyte, and two stored fortified samples for each analyte were analyzed using Syngenta's GC/MS method described above. Sample extracts were analyzed within 1-13 days of extraction. Residues in all control samples were <0.05 ppm (LOQ). Adequate representative chromatograms and data worksheets were provided.

The results of the storage stability study are presented in Table 2. The data indicate that residues of both PMG and TMS are stable at -18 C in potatoes for at least 16 and 15 months, respectively. The current study is designed to provide data on frozen storage stability in potatoes for intervals up to 3 years.

Table 2. Stability of PMG and TMS residues in frozen potatoes fortified with each analyte at 0.5 ppm and stored at -18 C.

Analyte	Storage Interval (months)	Fresh Fortification % Recovery	Stored Sample % Recovery	Stored Sample [a] Corrected % Recovery
PMG	0	107	91, 83	85, 78 (82)
	3	92 [b]	93, 72	101, 78 (90)
	8	69	72, 78	104, 113 (109)
	16	80	85, 80	106, 100 (103)
TMS	1 [c]	100	99, 98	99, 98 (99)
	3	93	95, 90	102, 97 (100)
	8	84	78, 83	93, 99 (96)
	15	104	97, 93	93, 89 (91)

[a] Percent recovery of stored samples corrected for average fresh fortification recoveries; average corrected recovery is presented in parentheses.

[b] Fresh sample was fortified at 5 ppm by mistake.

[c] Initial zero time point analysis for TMS was unsuccessful.

The petitioner has previously demonstrated that residues of TMS and PMG are stable in frozen soybean seed and straw for up to 2 years (CBTS Nos. 6814, 6815, and 6816, 5/9/91, S. Koepke); in frozen grain sorghum grain for up to 4 years and in frozen wheat grain for up to 2 years (CBTS Nos. 6200, 6201, and 6202, 12/21/90, S. Koepke); in frozen orange fruit for up to 2 years (CBTS No. 6962, 10/10/91, S. Malik); and in frozen grapes for up to 2 years (Memo dated 10/30/91, B. Schneider).

In the submitted field trial and processing studies, the maximum sample storage intervals (Table 3) prior to extraction for analysis of PMG and TMS were generally 1 to 13 months. Table 3 lists the storage intervals for various commodity samples from the submitted field trials and processing studies.

Table 3. Storage intervals for various commodity samples from the submitted field trials and processing studies.

Crop MRID	Matrix	Storage Interval (days) [a]	
		PMG	TMS
Carrots 44872112	roots	92-358	41-294
Cotton 44872102	undelinted seeds	14-92	16-73
	gin byproducts	20-194	29-63
Cotton (processing) 44872103	undelinted seed	21	24
	hulls, meal, and oil	17-31	14-24
Potatoes 44872110	tubers	168-309	156-309

Crop MRID	Matrix	Storage Interval (days) [a]	
		PMG	TMS
Potato (processing) 44872111	tubers	22-155	146
	flakes, chip, wet peel	204	148
Radishes 44872109	roots	98-174	99-180
	tops	86-167	105-181
Grain sorghum 44872104	forage	28-76	29-83
	grain	41-116	34-125
	stover	28-112	34-106
	aspirate grain fractions	111-121	115-121
Sugar beets 44872107	roots	120-173	99-154
	tops	138-195	114-166
Sugar beets (processing) 44872108	roots	171	139
Sweet corn 44872105	K+CWHR	236-359	278-399
	forage	76-345	148-335
	stover	202-380	42-278
Turnips 44872106	roots	72-235	90-239
	tops	72-101	91-120

[a] Sampling to extraction interval; extracts were analyzed within 0-11 days.

Conclusions: The interim data from the storage stability study on potatoes are adequate and along with the previously submitted storage stability data support the integrity of samples from the current field trials and processing studies that were stored at -18 for up to 13 months prior to extraction for analysis.

The RAC and processed samples from the submitted field trials and processing studies were stored frozen for a maximum of 13 months from harvest to extraction for analysis. Previously, the petitioner demonstrated that residues of TMS and PMG are stable for up to 2 year in frozen grapes, oranges, soybean seeds and straw, and wheat grain, and for up to 4 years in frozen grain sorghum grain. Together with the data on potatoes, these data support the storage intervals for the submitted field trials and processing studies.

OPPTS GLN 860.1500: Crop Field Trials

Root Vegetables (Crop Subgroup 1A) and Leaves of Root and Tuber Vegetables (Crop Group 2)

Syngenta submitted data from 26 trials conducted during 1997 depicting residues of sulfosate in/on carrots (6 trials), radishes (5 trials), turnips (6 trials) and sugar beets (9 trials). Results of these trials are reported in:

44872106 Iwata, Y. (1998) Glyphosate-Trimesium: Residues Levels in Turnips from Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-13. Unpublished study prepared by Zeneca Ag Products. 54 p.

44872107 Iwata, Y. (1998) Glyphosate-Trimesium: Residues Levels in Sugar Beets from Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-09. Unpublished study prepared by Zeneca Ag Products. 54 p.

44872109 Iwata, Y. (1998) Glyphosate-Trimesium: Residues Levels in Radishes from Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-07. Unpublished study prepared by Zeneca Ag Products. 54 p.

44872112 Iwata, Y. (1998) Glyphosate-Trimesium: Residues Levels in Carrots from Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-02. Unpublished study prepared by Zeneca Ag Products. 40 p.

Carrots. The petitioner conducted six trials on carrots during 1997 in CA (3), FL, MI, and TX. In each test, sulfosate (6 lb/gal SC/L) was applied as a preemergence broadcast application to carrots at 8 lb ai/A (1x the proposed maximum rate) with ground equipment using 3-29 gallons of water per acre. Applications also included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gallons.

One control and two treated samples of carrots were collected from each site 74-148 days following treatment. Samples of carrot root were frozen within 1 hour of collection and shipped by either freezer truck or by overnight carrier on dry ice to Syngenta's Western Research Center (WRC), Richmond, CA. At the WRC, carrot root samples were stored at -18 C for 41-358 days until extraction for analysis. These storage intervals are supported by the available storage stability data on potatoes.

Carrot root samples were analyzed for residues of PMG and TMS using the adequate GC/MSD methods described above. The reported LOQ for each analyte was 0.05 ppm in/on carrots, and apparent residues of each analyte were <0.05 ppm in/on all 6 control samples. Adequate representative chromatograms, sample calculations, and raw data were provided. Residues of PMG and TMS were <0.05 ppm in/on 12 treated samples of carrots, with the exception of one sample from the FL test which had TMS residues at 0.07 ppm (Table 4). The combined residues of PMG and TMS were <0.10-<0.12 ppm in/on 12 treated samples of carrots harvested at maturity following a single preemergence application of sulfosate at 8 lb ai/A (1x). A summary of the residues of PMG and TMS in carrots is provided in Table 4.

Radishes. The petitioner conducted five trials on radishes during 1997 in CA, FL (2), MI, and NY. In each test, sulfosate (6 lb/gal SC/L) was applied as a preemergence broadcast application to radishes at 8 lb ai/A (1x the proposed maximum rate) with ground equipment using 3-29 gallons of water per acre. Applications also included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gallons.

One control and two treated samples of radishes were collected from each site 25-40 days following treatment and were separated into roots and tops. Samples were frozen within 2 hours of collection and shipped by freezer truck to the WRC, Richmond, CA. At the WRC, samples were stored at -18 C for 86-181 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Radish roots and tops were analyzed for residues of PMG and TMS using the adequate GC/MSD methods described above. The reported LOQ for each analyte was 0.05 ppm in/on roots and leaves, and apparent residues of each analyte were <0.05 ppm in/on all control samples of roots (n=5) and tops (n=5). Adequate representative chromatograms, sample calculations, and raw data were provided.

Residues of PMG were 0.05 ppm in/on 10 samples of roots and <0.05-0.31 ppm in/on 10 samples of tops from all trials. With the exception of one of the FL trials, residues of TMS were <0.05-0.44 ppm in/on eight treated samples of roots and <0.05-1.4 ppm in/on 8 treated samples of tops. TMS residues were unusually high in the duplicate samples of both roots (7.3, 7.6 ppm) and tops (14, 15 ppm) from one of the FL trials. The petitioner indicated that the high residues observed in this trial were the result of the growing conditions; the radishes were grown in a sand soil with underground seep irrigation. These conditions maximized the bioavailability of the test substance because residues were not leached from the root zone and there was no absorption to clay or organic matter. The combined residues of PMG and TMS were <0.10-15 ppm in/on 10 treated samples of radish roots and <0.10-7.68 ppm in/on 10 treated samples of radish tops harvested 25-40 days following a single preemergence application of sulfosate at 8 lb ai/A (1x). A summary of the residues of PMG and TMS in radishes is provided in Table 4.

Sugar beets. The petitioner conducted nine trials on sugar beets during 1997 in CA, ID, MI, MN (2), MT, ND, NE, and TX. In each test, sulfosate (6 lb/gal SC/L) was applied as a preemergence broadcast application to sugar beets at 8 lb ai/A/application (1x the proposed maximum rate) with ground equipment using 3-27 gallons of water per acre. Applications also included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gallons.

One control and two treated samples of sugar beets were collected from each test 113-195 days following treatment, and separated into roots and tops. Samples were frozen within 3 hours of collection and shipped by either freezer truck or by overnight carrier on dry ice to the WRC, Richmond, CA. At the WRC, samples were stored at -18 C for 99-195 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Sugar beet roots and tops were analyzed for residues of PMG and TMS using the adequate GC/MSD methods described above. The reported LOQ for each analyte is 0.05 ppm in/on roots and tops, and apparent residues of each analyte were <0.05 ppm in/on all control samples of roots (n=9) and tops (n=9). Adequate representative chromatograms, sample calculations, and raw data were provided. Residues of PMG and TMS were each <0.05 ppm in/on all treated samples of sugar beet roots (n=18) and tops (n=18). The combined residues of PMG and TMS were <0.10 ppm in/on 18 samples each of sugar beet roots and tops harvested at maturity following a

single preemergence application of sulfosate at 8 lb ai/A (1x). A summary of the residues of PMG and TMS in sugar beets is provided in Table 4.

Turnips. The petitioner conducted six trials on turnips during 1997 in CA, GA, IL, MS, NC, and TX. In each test, sulfosate (6 lb/gal SC/L) was applied as a preemergence broadcast application to turnips at 8 lb ai/A (1x the proposed maximum rate) with ground equipment using 4-20 gallons of water per acre. Applications also included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gallons.

One control and two treated samples of turnips were collected from each site 52-75 days following treatment, and separated into roots and tops. Samples were frozen within 1 hour of collection and shipped by freezer truck to the WRC, Richmond, CA. At the WRC, samples were stored at -18 C for 72-239 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Turnip roots and tops were analyzed for residues of PMG and TMS using the adequate GC/MSD methods described above. The reported LOQ for each analyte is 0.05 ppm in/on roots and tops, and apparent residues of each analyte were <0.05 ppm in/on all control samples of roots (n=6) and tops (n=6). Adequate representative chromatograms, sample calculations, and raw data were provided. Residues of PMG and TMS were each <0.05 ppm in/on 12 samples of turnip roots. Residues of PMG were also <0.05 ppm in/on the 12 samples of turnip tops; whereas, TMS residues were <0.05-0.20 ppm in/on 12 samples of tops. The combined residues of PMG and TMS were <0.10 ppm in/on 12 samples of turnip roots and <0.1-<0.25 ppm in/on 12 samples of turnip tops harvested at maturity following a single preemergence application of sulfosate at 8 lb ai/A (1x). A summary of the residues of PMG and TMS in turnips is provided in Table 4.

Table 4. Residues of PMG and TMS in/on representative root vegetables harvested at maturity following a single preemergence broadcast application of sulfosate (6 b/gal SC/L) at 8 lb ai/A/application (1x). [a]

Crops MRID	Commodity	Location (EPA region)	PHI [b] (days)	Residues (ppm) [c]		
				PMG	TMS	Total [d, e]
Carrots 44872112	Roots	Oviedo, FL (3)	74	<0.05, <0.05	0.07, 0.07	**<0.12, <0.12**
		Grant, MI (5)	107	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		St. Paul, TX (6)	119	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Bakersfield, CA (10)	114	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		El Centro, CA (10)	148	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	78	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
Radishes 44872109	Roots	North Rose, NY (1)	31	0.05, <0.05	0.49 [0.43], 0.44	0.51, <0.49
		Oviedo, FL (3)	28	<0.05, <0.05	14, 15	14, **15**
		Belle Glade, FL (3)	25	<0.05, <0.05	0.25, 0.28	<0.30,<0.33
		Riga, MI (5)	40	<0.05, <0.05	0.41, 0.39	<0.46, <0.44
		Visalia, CA (10)	34	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
	Tops (leaves)	North Rose, NY (1)	31	0.31, 0.28	0.77, 0.74	1.08, 1.02
		Oviedo, FL (3)	28	0.08, 0.05	7.6, 7.3	**7.68**, 7.35
		Belle Glade, FL (3)	25	<0.05, <0.05	1.5 [1.2], 0.58 [0.63]	1.4, 0.66
		Riga, MI (5)	40	0.06, 0.31	1.09, 0.97	1.15, 1.28
		Visalia, CA (10)	31	<0.05, <0.05 [0.05]	<0.05, <0.05 [<0.05]	<0.10, <0.10
Sugar beets 44872107	Roots	Riga, MI (5)	175	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Wheaton, MN (5)	113	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Mooreton, ND (5)	139	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		York, NE (5)	184	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Sunborn, MN (5)	125	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Pompay Pillar, MT (7)	139	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Plainview, TX (8)	180	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	195	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Parma, ID (11)	151	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
	Tops (leaves)	Riga, MI (5)	175	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Wheaton, MN (5)	113	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Mooreton, ND (5)	139	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		York, NE (5)	184	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Sunborn, MN (5)	125	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Pompay Pillar, MT (7)	139	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Plainview, TX (8)	180	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	195	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Parma, ID (11)	151	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10

(Continued; footnotes follow)

Crops MRID	Commodity	Location (EPA region)	PHI [b] (days)	Residues (ppm) [c]		
				PMG	TMS	Total [d, e]
Turnips 44872106	Roots	Girard, GA (2)	75	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Whitakers, NC (2)	58	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Leland, MS (4)	52	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Champaign, IL (5)	61	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		St. Paul, TX (6)	64	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	54	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
	Tops (leaves)	Girard, GA (2)	75	<0.05, <0.05	<0.05, 0.06	<0.10, <0.11
		Whitakers, NC (2)	58	<0.05, <0.05	0.20, 0.08	**<0.25**, <0.13
		Leland, MS (4)	52	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Champaign, IL (5)	61	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		St. Paul, TX (6)	64	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	54	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10

[a] Applications included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.

[b] PHI = pre-harvest Interval.

[c] The Method LOQ is 0.05 ppm for each analyte; bracketed values are the repeat analysis of a single sample.

[d] For samples analyzed repeatedly, the average residue value is used to calculate total residues.

Conclusions: In reviewing the residue field trial data in support of the root and tuber vegetables, HED noticed that residues radish field trial data, in particular from trials conducted in Oviedo, FL had higher residues than other representative members of the root and tuber vegetables and the leaves of root and tuber vegetables. Carrot and potato trials were also performed in Oviedo, FL during the same year, and the resulting residues in these commodities were not as high as the radish residues. According to OPPTS GLN 860.1500, if maximum residues for the representative crops vary by more than a factor of 5 from the maximum value observed for any crop in the group, then a group tolerance will ordinarily not be established. The maximum total sulfosate residues in/on radish roots (15.1 ppm) and tops (7.68 ppm) are greater than the maximum total residues on the roots (<0.12 ppm) and tops (<0.25 ppm) of the remaining representative crops by more than a factor of 5.

In order to explain why the residue in radishes from the Oviedo, FL field trials had higher residues, HED requested additional information on growing conditions (i.e., soil type, irrigation practices, weather patterns) of the Florida trials as well as sulfosate environmental fate data (half-life, soil dissipation, etc.). Syngenta responded by submitting additional data (MRID# 453158-01) and offered the following explanations:

1. The radish, potato and carrot trials in Oviedo, FL were conducted on a soil of the textural classification sand (85-100% sand; 0-10% clay; 0-10% silt by definition) with underground seep irrigation. The half-life in two EPA accepted soil dissipation studies with a similar soil type of sandy loam (54-64% sand, 6-19% clay, and 27-31% silt, as characterized) at application rates of 8-10.6 lbs ai/A resulted in half-lives of 13-57 days. While this is a short soil half-life, the majority of the sulfosate was likely in the upper 0-3.5-inch soil zone during the short 28-day radish growing season in these trials.

2. Sulfosate is not volatile and is essentially resistant to photodegradation. Since sulfosate degrades primarily by adsorption to soil colloids and microbial degradation, the lack of clay in the Oviedo, FL sand and the steady supply of moisture from underground seep irrigation maximized bio-availability for the short 28 day growing

season of the radish crop as compared to the longer 74 day growing season for carrots and potatoes at the Oviedo, FL trial locations. The longer growing season in the Oviedo, FL potato and carrot trials allowed time for degradation of the broadcast soil applied residues. However, please note that phytotoxicity to carrots and detectable residues were observed at the Oviedo, FL trial location. Additionally the Oviedo, FL potato results for TMS were the highest in the potato trial set.

3. Additionally, the growing habit of the radish crop, very small root and top growing close to the ground, as compared to the larger root (tuber) and top of potatoes and carrots allowed more growth dilution from any residues taken up from the 0 3.5 inch sandy soil zone or splashing on leaf surfaces from the soil; and translocating throughout the plants.

HED concurs that, radishes are likely to be unique amongst the root and tuber vegetable crop group because they have a short growing season and much of the root is exposed above the soil surface. Therefore, HED concludes that the additional data and the number and geographic representation of the carrot, radish, sugar beet, and turnip field trials are adequate to support the proposed tolerances for residues of sulfosate in/on radish and the root vegetable, except radish, subgroup (see Table 5).

Table 5. Number and geographic representation of submitted and recommended field trials.

Commodity	Recommended Field Trials		Submitted Field Trials
	Crop Group Tolerance	Individual Tolerance	
Root Crop Tolerance			
Carrots	6 trials - Regions 3 (1), 5 (1), 6 (1), 10 (3)	8 trials - Regions 3 (1), 5 (1), 6 (1), 10 (4), 11 (1)	6 trials - Regions 3 (1), 5 (1), 6 (1), 10 (3)
Radishes	5 trials - Regions 1 (1), 3 (2), 5 (1), 10 (1)	5 trials - Regions 1 (1), 3 (2), 5 (1), 10 (1)	5 trials - Regions 1 (1), 3 (2), 5 (1), 10 (1)
Sugar Beets	9 trials - Regions 5 (5), 7 (1), 8 (1), 10 (1), 11 (1)	12 trials - Regions 5 (5), 7 (1), 8 (1), 9 (1), 10 (2), 11 (2)	9 trials - Regions 5 (5), 7 (1), 8 (1), 10 (1), 11 (1)
Turnip root	Not Required	5 trials - Regions 2 (2), 5 (1), 6 (1), 10 (1)	5 trials - Regions 2 (2), 5 (1), 6 (1), 10 (1)
Potatoes	12 trial - Regions 1 (2), 2 (1), 3 (1), 5 (2), 9 (1), 10 (1), 11 (4)	16 trial - Regions 1 (2), 2 (1), 3 (1), 5 (4), 9 (1), 10 (1), 11 (6)	12 trial - Regions 1 (2), 2 (1), 3 (1), 5 (2), 9 (1), 10 (1), 11 (4)
Leaves of Root and Tuber Vegetables			
Sugar Beets	9 trials - Regions 5 (5), 7 (1), 8 (1), 10 (1), 11 (1)	12 trials - Regions 5 (5), 7 (1), 8 (1), 9 (1), 10 (2), 11 (2)	9 trials - Regions 5 (5), 7 (1), 8 (1), 10 (1), 11 (1)
Turnip Tops (Leaves)	5 trials - Regions 2 (2), 5 (1), 6 (1), 10 (1)	5 trials - Regions 2 (2), 5 (1), 6 (1), 10 (1)	5 trials - Regions 2 (2), 5 (1), 6 (1), 10 (1)

The submitted residue data for carrots, radishes, sugar beets, and turnips are adequate. Following a preemergence application of sulfosate at 8 lb ai/A (1x), the combined residues of PMG and TMS were 0.12 ppm in/on 12 samples of carrots and <0.10 ppm in/on 18 samples of sugar beet roots and 12 samples of turnip roots harvested at maturity; TMS residues in/on these samples were 0.07 ppm. These data indicate that the residues will not exceed the proposed

tolerance of 0.15 ppm tolerance (of which no more than 0.10 ppm is TMS) in/on root vegetables, except radish.

In the same sugar beet and turnip field trails, the combined residues of PMG and TMS were <0.10 ppm in/on 18 samples of sugar beet tops and <0.25 ppm in/on 12 samples of turnip tops harvested at maturity; TMS residues in/on these samples were 0.2 ppm. These data indicate that the sulfosate residues will not exceed 0.30 ppm (of which no more than 0.25 ppm is TMS) in/on leaves of root and tuber vegetables, except radish.

Following a preemergence application of sulfosate at 8 lb ai/A (1x) to radishes, the combined residues of PMG and TMS were <0.1-15.1 ppm in/on 10 samples of radish roots and <0.1-7.68 ppm in/on 10 samples of radish tops; and maximum TMS residues in radish roots and tops were 15 and 7.6 ppm, respectively. These data indicate that the sulfosate residues will not exceed the proposed separate tolerances for radish roots (16 ppm, of which no more than 15 ppm is TMS) and radish tops (10 ppm, of which no more than 8.0 ppm is TMS).

The submitted residue data support the following tolerances for residues on sulfosate:

Radish, roots	16 ppm
(of which no more than 15 ppm is TMS)	
Radish, tops	10 ppm
(of which no more than 8 ppm is TMS)	
Vegetable, root, except radish, subgroup	0.15 ppm
(of which no more than 0.10 ppm is TMS)	
Vegetable, leaves of root and tuber, except radish, group	0.30 ppm
(of which no more than 0.20 ppm is TMS)	

The correct commodity definitions are "Vegetable, root, except radish, subgroup" and "Vegetable, leaves of root and tuber, except radish, group." **The petitioner should submit a revised Section F with the above tolerances and commodity definitions.**

Tuberous and Corm Vegetables (Crop Subgroup 1C)

Potatoes. Syngenta submitted data from 12 trials (cited below) conducted during 1997 in CA, CO, FL, ID (2), ME, MN, NY, NC, WA (2), and WI depicting residues of sulfosate in/on potatoes, the representative crop for the tuberous and corm vegetables crop subgroup.

44872110 Iwata, Y. (1998) Glyphosate-Trimesium: Residue Levels in Potatoes from Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-06. Unpublished study prepared by Zeneca Ag Products. 49 p.

In each trial, sulfosate (6 lb/gal SC/L) was applied as a preemergence broadcast application to potatoes at 8 lb ai/A (1x the proposed maximum rate) with ground equipment using 3-30 gallons

of water per acre. Applications also included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gallons.

One control and two treated samples of potatoes were collected from each test 74-130 days following treatment. Samples were frozen within 3.5 hours of collection and shipped by freezer truck or by overnight carrier on dry ice to the WRC, Richmond, CA. Samples were stored at --18 C for 156-309 days until extraction for analysis. These storage intervals are supported by the available storage stability data on potatoes.

Potato tubers were analyzed for residues of PMG and TMS using the adequate GC/MSD methods described above. The reported LOQ for each analyte is 0.05 ppm in/on potatoes, and apparent residues of each analyte were <0.05 ppm in/on all control samples (n=12). Adequate representative chromatograms, sample calculations, and raw data were provided. Residues of PMG were <0.05 ppm in/on all 24 treated samples of potato tubers, and residues of TMS were <0.05-0.41 ppm. The combined residues of PMG and TMS were <0.10-<0.46 ppm in/on 24 potato samples harvested at maturity following a single preemergence application of sulfosate at 8 lb ai/A (1x). A summary of the residues of PMG and TMS in potatoes is provided in Table 6.

Table 6. Residues of PMG and TMS in/on potatoes harvested at maturity following a single preemergence broadcast application of sulfosate (6 b/gal SC/L) at 8 lb ai/A/application (1x). [a]

Crops MRID	Commodity	Location (EPA region)	PHI [b] (days)	Residues (ppm) [c]		
				PMG	TMS	Total [d, e]
Potatoes 44872110	Tubers	Exeter, ME (1)	107	<0.05, <0.05	0.12 [0.13, 0.13], <0.05 [<0.05,<0.05]	<0.18, <0.10
		North Rose, NY (1)	99	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Whitakers, NC (2)	87	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Oviedo, FL (3)	74	<0.05, <0.05	0.41, 0.22 [0.22]	**<0.46**, <0.27
		Brownton, MN (5)	119	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Hancock, WI (5)	88	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Center, CO (9)	95	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Visalia, CA (10)	122	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Caldwell, ID (11)	121	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Nuacyes, ID (11)	121	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10
		Walla Walla, WA, (11)	120	<0.05, <0.05	0.06, 0.05	<0.10, <0.10
		Ephrata, WA (11)	130	<0.05, <0.05	<0.05, <0.05	<0.10, <0.10

[a] Applications included a non-ionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.
[b] PHI = pre-harvest Interval.
[c] The Method LOQ is 0.05 ppm for each analyte; bracketed values are the repeat analysis of a single sample.
[d] For samples analyzed repeatedly, the average residue value is used to calculate total residues.
[e] The highest average total residue value is bolded.

Conclusions: The number and geographic representation of the potato field trials are adequate. The petitioner provided data from potato growing regions accounting for 95% of U.S. production

with 12 tests conducted in Region 1 (2), Region 2 (1), Region 3 (1), Region 5 (2), Region 9 (1), Region 10 (1) and Region 11 (4).

The submitted potato field trial data indicate the residues of sulfosate will not exceed 1.0 ppm (of which no more than 0.50 ppm is TMS) in/on tuberous and corm vegetables. Following a preemergence broadcast application of sulfosate (6 lb/gal SC/L) to potatoes at 8 lb ai/A (1x), the combined residues of PMG and TMS were <0.1-<0.46 ppm in/on 24 samples of potatoes harvested at maturity from 12 field trials. Maximum residues of TMS in/on potatoes were 0.41 ppm. The submitted residue data support the following tolerances for residues on sulfosate:

Vegetables, tuberous and corm, subgroup ..... 1.0 ppm
(of which no more than 0.50 ppm is TMS)

The correct commodity definition is "Vegetables, tuberous and corm, subgroup". **The petitioner should submit a revised Section F.**

Cereal Grains (Crop Group 15) and Forage, Fodder and Straw of Cereal Grains (Crop Group 16)

Sweet corn. Syngenta submitted sweet corn field trial data (cited below) to support tolerances for residues of sulfosate (PMG and TMS) in/on sweet corn (K+CWHR) at 0.15 ppm (of which no more than 0.1 ppm is TMS), sweet corn forage at 20 ppm (of which no more than 5 ppm is TMS), and sweet corn stover at 165 ppm (of which no more than 65 ppm is TMS).

44872105 Iwata, Y. (1999) Glyphosate Trimesium: Residue Levels in Sweet Corn From Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-12: WINo 21779. Unpublished study prepared by Zeneca Ag Products. 81 p.

Twelve field residue trials were conducted in 1997 on sweet corn in CA, FL, IL (2), MN, NC, NY, OH, OR, PA, WA, and WI. In each test, sulfosate (6 lb/gal SC/L) was applied twice; first as preemergence broadcast application at 8 lb ai/A, and again just prior to silking as spot applications of a 5% v/v solution to 10% of the plot area. The broadcast applications were made using ground equipment in 3.3-35 gal/A of water and included a nonionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Single control and duplicate treated samples of sweet corn ears (K+CWHR) and forage were harvested from each test 13-41 days after the spot application, with most trials (10 out of 12) being harvested between 18-28 days post-treatment. Single control and duplicate treated samples of stover were also harvested from each test 31-74 days following the spot application, with most trials (10 out of 12) being harvested between 51-74 days post-treatment. Samples were collected either mechanically or by hand, frozen within 3 hours, and shipped by either freezer truck or overnight carrier on dry ice to Syngenta, WRC, Richmond, CA. Samples were stored at -18 C for 73-399 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Samples were analyzed for residues of PMG and TMS using Methods RR 92-042B RES and RR 93-105B RES, respectively. The method LOQ for each analyte is 0.05 ppm in/on each sweet corn commodity. Apparent residues of PMG and TMS were each <0.05 ppm in/on 12 untreated samples each of sweet corn, forage and stover. Adequate representative chromatograms, sample calculations, and raw data were provided.

Residues of PMG and TMS were each <0.05 ppm in/on 24 treated samples of sweet corn K+CWHR harvested 13-41 days after the last treatment, for combined residues of <0.1 ppm. Residues in/on 24 treated samples of sweet corn forage harvested 13-41 days post-treatment were <0.05-10.9 ppm for PMG and <0.05-3.8 ppm for TMS, for combined residues of <0.1-13.8 ppm. With the exception of the one test in CA, residues in/on 22 treated samples of sweet corn stover harvested 31-73 days post-treatment were <0.05- 1.4 ppm for PMG and <0.5-0.51 ppm for TMS, for combined residues of <0.1-1.9 ppm. However, in the CA test, residues of PMG were 98 and 83 ppm and residues of TMS were 47-63 ppm in/on the two stover samples harvested 74 days post-treatment, for combined residues of 135 and 157 ppm. Residues levels in/on stover from the CA location were 100x higher than the other locations. The petitioner accounted for the usually high residue value by noting the CA test site was the only site which do not receive either rainfall or sprinkler irrigation. To explain this large difference in stover residues on this one test, the petitioner indicated that as restricted wash-off due to furrow irrigation and no rainfall in CA. A summary of the residues of PMG and TMS in sweet corn is provided in Table 7.

Table 7. Residues of PMG and TMS in/on sweet corn commodities harvested following one preemergence broadcast application at 8 lb ai/A of sulfosate (6 lb/gal SC/L) and a spot application of sulfosate at 5% v/v respectively (1x the maximum proposed rate).

Crop MRID	Trial Location (EPA Region)	Matrix	PHI [a] (days)	Residues, ppm [b]		
				PMG	TMS	Total [c]
Sweet Corn 44872105	North Rose, NY (1)	K+CWHR	24	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	24	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	51	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
	Ephrata, PA (1)	K+CWHR	25	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	25	1.7, <0.05	0.7, <0.05	2.4, <0.1
		stover	61	<0.05, <0.05	0.09, 0.1	<0.1, <0.2
	Whitakers, NC (2)	K+CWHR	13	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	13	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	31	0.09, 0.1	0.05; 0.05, 0.06 (0.06)	0.1, 0.2
	Oviedo, FL (3)	K+CWHR	27	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	27	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	57	<0.05, <0.05	0.06, <0.05	<0.1, <0.1
	Champaign, IL (5)	K+CWHR	17	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	18	15, 6.7 (10.9); 14, 5.9 (10)	2.0, 3.8	12.9, **13.8**
		stover	53	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1

Crop MRID	Trial Location (EPA Region)	Matrix	PHI [a] (days)	Residues, ppm [b]		
				PMG	TMS	Total [c]
	Brimfield, IL (5)	K+CWHR	23	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	23	2.8, 3.2, 3.3, 4.3, 6.1 (3.9); 0.27, 0.28, 0.42, 0.54, 0.86 (0.5)	0.86, 0.76	4.7, 1.3
		stover	67	0.12, 0.09	0.06; <0.05, <0.05,(<0.05)	0.2, 0.1
	Sanborn, MN (5)	K+CWHR	25	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	25	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	58	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
	Bluffton, OH (5)	K+CWHR	28	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	28	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	52	<0.05, 0.07	<0.05, 0.07	<0.1, 0.1
	Delavan, WI (5)	K+CWHR	27	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	27	3.3, 0.38	1.8; 0.55, 0.57 (0.56)	5.1, 0.9
		stover	71	0.19, 0.23	0.10, 0.11	0.3, 0.3
Sweet Corn 44872105	Visalia, CA (10)	K+CWHR	22	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	22	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	74	98, 83	54, 63 (59); 47, 56 (52)	**157**, 135
	Ephrata, WA (11)	K+CWHR	33	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	33	0.11; 0.65, 0.7 (0.67)	<0.05, 0.22	<0.2, 0.9
		stover	35	0.44, 1.4	0.23, 0.51	0.7, 1.9
	Hillsboro, OR (12)	K+CWHR	41	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		forage	41	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	73	<0.05, <0.05, <0.05 (<0.05)	<0.05, <0.05	<0.1, <0.1

[a] PHI=pre-harvest interval, days after last application.

[b] Values in parenthesis represent average of samples analyzed more than once. Averages were used to calculate total.

[c] The highest average total residue value is bolded.

Conclusions: The number and geographic representation of the sweet corn field trials are adequate. The submitted sweet corn field trials were conducted in Regions 1 (2 trials in NY (1) and PA (1)), 2 (1 trial in NC), 3 (1 trial in FL), 5 (5 trials in OH (1), IL (2), WI (1), and MN (1)), 10 (1 trial in CA), 11 (1 trial in WA), and 12 (1 trial in OR), which together account for 96% of the U.S. sweet corn production (See Table 5).

The submitted sweet corn residue data are adequate and support the following proposed tolerances for residues in/on sweet corn:

Corn, sweet, stover ..... 170 ppm
(of which no more than 65 ppm is TMS)
Corn, sweet, kernel plus cob with husks removed ..... 0.15 ppm
(of which no more than 0.10 ppm is TMS)
Corn, sweet, forage ..... 15 ppm
(of which no more than 5.0 ppm is TMS)

The correct commodity definitions are "corn, sweet, stover", "corn, sweet, kernel plus cob with husks removed", and "corn, sweet, forage". **The petitioner should submit a revised Section F.**

Grain sorghum. Syngenta submitted grain sorghum field trial data (cited below) to support the proposed tolerances for residues of sulfosate (PMG and TMS) in/on grain sorghum grain at 35 ppm (of which no more than 15 ppm is TMS), grain sorghum forage at 0.2 ppm (of which no more than 0.1 ppm is TMS), and grain sorghum stover at 140 ppm (of which no more than 60 ppm is TMS).

44872104 Iwata, Y. (1998) Glyphosate Trimesium: Residue Levels in Sorghum From Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-08. Unpublished study prepared by Zeneca Ag Products. 133 p.

Twelve field residue trials were conducted in 1997 on grain sorghum in CO, IL, KS (2), MO, MS, NC, NE (2), and TX (3). Each test site include two treated plots using different application regimes for sulfosate, 6 lb/gal SC/L (Table 8). Treatment #1 included a preemergence broadcast application at 8 lb ai/A, and a spot application and wiper application 28 days prior to harvest of the grain/stover. Treatment #2 included a preemergence broadcast application at 6 lb ai/A, a spot application and wiper, and a broadcast application at 2 lb ai/A 7 days prior to harvest of the grain/stover. A total of 8 lb ai/A/season was applied in both treatment regimes; however, Treatment #2 reflected the worse-case scenario and most closely approximated the proposed label directions. All spray applications were made using ground equipment in 3.3-40 gal/A water and included a nonionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Table 8. Application regimes for sulfosate (6 lb/gal SC/L) to grain sorghum.

Appl. Number	Retreatment Interval (days)	Treatment # 1			Treatment # 2 [a]		
		Rate (lb ai/A)	Method	Timing	Rate (lb ai/A)	Method	Timing
1	--	8.0	broadcast	preemergence	6.0	broadcast	preemergence
2	92-119	5% v/v	spot	28 days PHI	5% v/v	spot	28 days PHI
3	--	33% v/v	wiper/wick	28 days PHI	33% v/v	wiper/wick	28 days PHI
4	21	--	--		2.0	broadcast	7 days PHI

[a] Treatment #2 represents the worse-case scenario and most closely approximated the proposed label directions.

Single control and duplicate treated samples of forage were harvested from each test at the soft dough stage (76-100 days after the preemergence application). Mature grain sorghum grain samples were harvested either 7 days after the preharvest application (Treatment #2) or 28 days after the spot application (Treatment #1), and mature stover samples were harvested either 7-18 days after the preharvest application (Treatment #2) or 28-39 days after the spot application (Treatment #1). At the IL site, grain and stover samples were also collected at 1, 3, 7, 14, and 19 days after the last application (Treatment #2 only) to measure residue decline. Samples were collected at normal harvest time either mechanically or by hand, bagged, and frozen (-10 C) within 3 hours of harvest, and transported frozen to the WRC, where they were stored at -18 C until analysis.

Grain sorghum grain samples from one of the TX trials, which were used for generating grain sorghum AGF, were shipped the Univ. of Texas, Food Protein Research and Development Center (FPRDC) and frozen (-10 F), until AGF were generated and shipped back to the WRC. Samples were stored at -18 C for 28-125 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Samples were analyzed for residues of PMG and TMS using Methods RR 92-042B RES and RR 93-105B RES, respectively. The method LOQ for both PMG and TMS in grain sorghum grain, forage, and stover was 0.05 ppm, and in AGF's was 10.0 ppm. Apparent residues of PMG and TMS were each <0.05 ppm in/on 11 untreated samples each of grain sorghum grain and forage, and 10 untreated samples of stover. Adequate representative chromatograms, sample calculations, and raw data were provided.

In Treatment #2, which approximates the worse-case use, residues in/on 48 samples of grain sorghum forage harvested at 76-100 days following the preemergence application were comprised of <0.05 ppm of PMG and <0.05-0.09 ppm of TMS, for combined residues of <0.1 ppm (Table 8). Residues in/on 48 treated samples of grain sorghum grain harvested at 7 days after the preharvest application were comprised of 0.55-18.7 ppm of PMG and 1.47-11.5 ppm of TMS, for combined residues of 1.5-24.6 ppm. Residues in/on 48 treated samples of grain sorghum stover harvested at 7-18 days post-treatment were comprised of 1.6-70.1 ppm of PMG and 2.98-59.2 ppm of TMS, for combined residues of 4.6-125.1 ppm.

In Treatment #1, residues in/on 48 samples of grain sorghum forage harvested at 76-100 days following the preemergence application were comprised of <0.05 ppm of PMG and <0.05-0.08 ppm of TMS, for combined residues of <0.1 ppm. Residues in/on 48 treated samples of grain sorghum grain harvested at 28 days post-treatment were comprised of <0.05-1.73 ppm of PMG and <0.05-2.79 ppm of TMS, for combined residues of <0.1-4.5 ppm. Residues in/on 48 treated samples of grain sorghum stover harvested at 28-39 days post-treatment were comprised of <0.05-9.3 ppm of PMG and <0.05-9.9 ppm of TMS, for combined residues of <0.1-19.2 ppm. A summary of the residues of PMG and TMS in grain sorghum is listed in Table 9.

The residue decline tests on both grain and stover indicate that residues of PMG and TMS decline at longer post treatment intervals.

Table 9. Residues of PMG and TMS in grain sorghum following 3-4 applications of sulfosate at 8 lb ai/A (1x).

Crop MRID	Trial Location (EPA Region)	Matrix	Treatment type [a]	PHI (days) [b]	Residues, ppm [c]		
					PMG	TMS	Total [d]
Grain sorghum 44872104	Whitakers, NC (2)	grain	1	28	0.08, 0.09	<0.05, 0.16	<0.1, 0.25
			2	7	0.7, 0.55	1.47, 1.52	1.5, 2.1
		forage	1	100	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	100	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	0.57, 0.68	0.71, 0.56	1.3, 1.2
			2	9	1.6, 1.93	2.98, 3.21	4.6, 5.1
	Desoto, KS (5)	grain	1	27	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	7	18.6, 18.7	6.02; 5.59, 6.27 (5.9)	**24.6, 24.6**
		forage	1	99	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	99	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	10	70.1, 37.1	50.7, 59.2 (55.0); 25.7, 27.9 (26.8)	**125.1**, 63.9
Grain sorghum 44872104	Champaign, IL (5)	grain	1	28	0.86, 0.82	1.32, 1.25	2.2, 2.1
			2	1	9.05	5.55	14.6
				3	8.03	4.81	12.8
				7	1.34, 1.45	2.93, 3.0	4.3, 4.5
				14	1.39	3.57	5.0
				19	1.22	3.01, 3.03 (3.02)	4.2
		forage	1	95	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	95	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	33	4.4, 5.68	1.86; 2.43, 3.52 (3.0)	6.3, 8.7
			2	1	60.8	29.4	90.2
				3	48.9	29.8	78.7
				7	15.5, 13.0	14.3, 13.7	29.8, 26.7
				14	10.3	11.1	21.4
				19	9.7	12.8	22.5
	Gower, MO (5)	grain	1	27	0.11, 0.47	0.06, 0.12	0.2, 0.6
			2	7	4.58, 6.07	2.59, 4.86	7.2, 10.9
		forage	1	100	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	100	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	0.38, 0.12	0.44, 0.48 (0.46); 0.17, 0.23 (0.2)	0.8, 0.3
			2	10	9.68; 11.8, 9.76 (10.8)	6.47, 6.5 (6.5); 7.48, 7.97 (7.7)	16.2, 18.5

Crop MRID	Trial Location (EPA Region)	Matrix	Treatment type [a]	PHI (days) [b]	Residues, ppm [c]		
					PMG	TMS	Total [d]
	York, NE (5)	grain	1	28	1.73, 1.42	1.81, 1.31	3.5, 2.7
			2	7	13.2, 12.5	7.31, 6.5	20.5, 19.0
		forage	1	81	<0.05, <0.05	0.077, 0.063	<0.1, <0.1
			2	81	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	0.87, 1.33	0.9, 0.9 (0.9); 1.5	1.8, 2.8
			2	9	14.2; 13.5, 14.5 (14.0)	17.7, 9.1	31.9, 23.1
Grain sorghum 44872104	Brookshire,TX (6)	grain	1	28	0.39, <0.05	1.11, 0.12	1.5, <0.2
			2	7	6.88, 6.77	11.5, 10.3	18.4, 17.1
		forage	1	92	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	92	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	39	1.94, 1.5	2.65, 1.96	4.6, 3.5
			2	18	6.31, 2.62	11.6, 3.73	17.9, 6.4
	Grande Island, NE (7)	grain	1	28	0.89, 0.96	1.74, 1.1	2.6, 2.1
			2	7	12.0, 12.6	6.11, 6.03	18.1, 18.6
		forage	1	83	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	83	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	3.64, 1.58	5.76, 2.13	5.2, 3.7
			2	9	29.9, 26.1	26.7, 25.8	56.6, 51.9
	Eaton, CO (8)	grain	1	28	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	7	7.4, 8.6 (8.0); 7.2, 7.7 (7.5)	3.4, 3.5	11.4, 11.0
		forage	1	92	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	92	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	30	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	7	35.9, 43.5 (39.7); 29.3	23.9, 22.2	63.6, 51.5
	Larned, KS (8)	grain	1	28	0.22, 0.88	0.18, 0.63	0.4, 1.5
			2	7	2.46; 2.65, 3.02 (2.8)	1.75; 2.08, 2.1 (2.1)	4.2, 4.9
		forage	1	80	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	80	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	36	0.68, 0.75 (0.72); 0.12	1.34, 0.15	2.1, 0.3
			2	15	4.2; 5.02, 5.35 (5.2)	5.75, 3.92	10.0, 9.1
	Plainview, TX (8)	grain	1	28	<0.05, <0.05	0.24, 0.21	<0.3, <0.3
			2	7	6.89, 5.44	4.11, 3.68	11.0, 9.1
		forage	1	76	<0.05, <0.05	0.072, 0.078	<0.1, <0.1
			2	76	<0.05, <0.05	0.089, <0.05	<0.1, <0.1

Crop MRID	Trial Location (EPA Region)	Matrix	Treatment type [a]	PHI (days) [b]	Residues, ppm [c]		
					PMG	TMS	Total [d]
		stover	1	28	<0.05, <0.05	0.08, 0.11	<0.1, <0.2
			2	7	34.6, 21.0	16.2, 10.7	50.8, 31.7
Grain sorghum 44872104	Brookshire, TX (6)	grain	1	28	0.21, 0.29	0.2, 0.24	0.4, 0.5
			2	7	10.9, 10.9	9.51, 9.38	20.4, 20.3
		forage	1	95	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	95	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	39	0.18, 0.52	0.17, 1.02	0.4, 1.5
			2	18	5.54; 4.1, 4.16 (4.1)	8.1, 6.5	13.6, 10.6
	Leland, MS (4)	grain	1	28	1.71, 1.67	2.27, 2.79	4.0, **4.5**
			2	7	7.03, 6.71	7.88, 7.97	14.9, 14.7
		forage	1	82	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
			2	82	<0.05, <0.05	<0.05, <0.05	<0.1, <0.1
		stover	1	39	9.3, 7.56	9.89, 7.05	**19.2**, 14.6
			2	18	53.3, 42.9	40.5, 31.3	93.8, 74.2

[a] See Table 7 for description of Treatments #1 and #2; Treatment #2 included a preharvest broadcast application and reflected the worse-case scenario.

[b] Forage harvested at soft dough stage.

[c] Values in parenthesis represent average of samples analyzed more than once. Averages used to calculate total.

[d] The highest average total residue value for each commodity is bolded.

AGF of grain sorghum were generated using grain harvested from both Treatments #1 and #2. Combined residues in/on grain used to generate the AGF were <0.1 ppm and 25 ppm from Treatments #1 and #2, respectively (Table 10). The 25 ppm residue level in/on grain from Treatment #2 reflects the highest residue level observed on grain sorghum grain in the field trails. Residues in/on grain sorghum AGFs ranging in size from >2030 m to <425 m were comprised of 36.8-133 ppm of PMG and 16.8-38.9 ppm of TMS, for combined residues of 53.6-170.4 ppm.

Table 10. Residues of PMG and TMS in AGF generated from grain sorghum grain harvested following 3 or 4 applications of sulfosate 6 lb/gal SC formulation at 8 lb ai/A (1x the maximum proposed seasonal rate).

Tmt. Type	RAC	Particle size (m)	Particle size Distribution (%)	Residues (ppm) [a]		
				PMG	TMS	Combined
1	grain	--	--	<0.05	<0.05	<0.1
	AGF	2540-2030	11.0	<10	<10	<20
		2030-1180	6.3	<10	<10	<20
		1180-850	2.9	<10	<10	<20
		850-425	37.1	<10	<10	<20
		<425	42.8	<10	<10	<20
2	grain	--	--	14.3, 15.7 (15)	10.0	25

Tmt. Type	RAC	Particle size (m)	Particle size Distribution (%)	Residues (ppm) [a]		
				PMG	TMS	Combined
	AGF	2540-2030	3.2	37, 38, 52 (42)	16.8, 18.2, 19.4 (18)	60
		2030-1180	44.7	116, 130, 100 (115)	36, 36, 37 (36)	151
		1180-850	31.1	111, 133, 98 (114)	37, 37, 38 (37)	151
		850-425	15.7	105, 120, 82 (102)	35, 35, 39 (36)	138
		<425	5.2	101, 110, 96 (102)	35, 36, 36 (36)	138

[a] Average values in parenthesis used to calculate combined residues.

Conclusions: The number and geographic representation of the grain sorghum field trials are adequate. The submitted grain sorghum field trials were conducted in Regions 2 (1 trial in NC), 4 (1 trial in MS), 5 (4 trials in IL (1), KS (1), MO (1), NE (1)), 6 (2 trials in TX), 7 (1 trial in NE), and 8 (3 trials in CO (1), KS (1), TX (1)) which account for 100% of the U.S. grain sorghum production.

The submitted grain sorghum field trail data are adequate to support the following proposed tolerances for residue in/on grain sorghum:

sorghum, grain, grain ..... 35 ppm
(of which no more than 15 ppm is TMS)
sorghum, grain, forage ..... 0.20 ppm
(of which no more than 0.10 ppm is TMS)
sorghum, grain, stover ..... 140 ppm
(of which no more than 60 ppm is TMS)

The correct commodity definitions are "sorghum, grain, grain", "sorghum, grain, forage", and "sorghum, grain, stover". The petitioner should submit a revised Section F.

The AGF data submitted for grain sorghum are also adequate and indicate that the combined residues of PMG and TMS in/on AGF derived from grain sorghum grain are significantly less than the established 1300 ppm tolerance for AGF, which is based on data from soybeans (DP Barcode D243318, 4/23/99, G. Kramer). Therefore, no change in the AGF tolerance is required.

Miscellaneous Commodities

Cotton. Syngenta submitted cotton field trial (cited below) data to support the proposed tolerances for residues of sulfosate (PMG and TMS) in/on cotton gin byproducts at 120 ppm (of which no more than 35 ppm is TMS) and undelinted cotton seed at 40 ppm (of which no more than 10 ppm is TMS).

44872102 Iwata, Y. (1998) Glyphosate Trimesium: Residue Levels in Cotton From Trials Conducted in the USA: Lab Project Number: GLYP-97-MR-03: WINo 16858. Unpublished study prepared by Zeneca Ag Products. 122 p.

Thirteen field residue trials were conducted in 1997 on cotton grown in AR, AZ, CA (2), LA, MS, NC, NM, OK, TN, and TX (3). Each test site include two treated plots using different application regimes for sulfosate, 6 lb/gal SC/L (Table 11). Treatment #1 included a preemergence broadcast application at 6 lb ai/A, two directed applications at 1 lb ai/A/application, a spot application prior to boll opening, and a late season wiper application. Treatment #2 included a preemergence broadcast application at 4 lb ai/A, two directed applications at 1 lb ai/A/application, a spot application prior to boll opening, a broadcast application at 1.0 lb ai/A at 60% boll opening, a late season wiper application, and a final broadcast application at 1.0 lb ai/A at 85% boll opening. A total of 8 lb ai/A/season was applied in both treatment regimes; however, Treatment #2 reflected the worse-case scenario and most closely approximates the proposed label directions. All spray applications were made using ground equipment in 2.5-39 gal/A water and included a nonionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.

In each test, a single control and duplicate treated samples of mature cotton were harvested either by hand or mechanically 7 days following the final application. For generation of gin trash samples, cotton was harvested using a mechanical picker at three of the test sites and using a mechanical stripper at three other test sites. At one of the CA sites, samples were also collected at 1, 3, 7 and 14 days after the last application to examine residue decline. Samples were bagged, and frozen (-10 C) within 4.5 hours of harvest and shipped to Texas A&M University, FPRDC, Bryan, TX for ginning. After ginning, samples of undelinted seed and gin byproducts were ground and shipped on dry ice by overnight carrier to Syngenta WRC, Richmond, CA, where samples were stored at -18 C until analysis. Samples were stored at -18 C for 14-194 days until extraction for analysis. These storage intervals are supported by the available storage stability data.

Table 11. Application regimes for sulfosate (6 lb/gal SC/L) to cotton.

Appl. Number	Retreatment Intervals (days)	Treatment #1			Treatment #2 [a]		
		Rate (lb ai/A)	Method	Timing	Rate (lb ai/A)	Method	Timing
1	--	6.0	broadcast	preemergence	4.0	broadcast	preemergence
2	27-58	1.0	shielded	cotton 8-10"	1.0	shielded	cotton 8-10"
3	8-41	1.0	shielded	cotton 24-28"	1.0	shielded	cotton 24-28"

Appl. Number	Retreatment Intervals (days)	Treatment #1			Treatment #2 [a]		
		Rate (lb ai/A)	Method	Timing	Rate (lb ai/A)	Method	Timing
4	28-64	5% v/v soln. to 10% area	spot	just prior to boll opening	5% v/v soln. to 10% area	spot	just prior to boll opening
5	17-84[b], 10-43[c]	33% v/v	wiper/wick	7 days preharvest [d]	1.0	broadcast	60% boll opening
6	7-42	--	--	--	33% v/v	wiper/wick	7 days preharvest [d]
7	0	--	--	--	1.0	broadcast	7 days preharvest [d]

[a] Treatment #2 represents the worse-case scenario and most closely approximated the proposed label directions.
[b] Treatment #2
[c] Treatment #1
[d] At 7 days preharvest, 85% of the bolls were open.

Samples (undelinted seed and gin by-products) were analyzed for residues of PMG and TMS using Methods RR 92-042B RES and RR 93-105B RES, respectively. The method LOQ in 0.05 ppm for each analyte in/on undelinted seeds and for PMG in/on gin by-products; the method LOQ is 0.25 ppm for TMS in gin by-products. Apparent residues of PMG and TMS were each less than the <0.05 ppm in/on 11 untreated samples of undelinted cotton seed. Apparent residues of PMG and TMS were 0.07-0.08 ppm and <0.05-0.07 ppm, respectively, in/on two other untreated samples. Apparent residues of PMG were <0.05 ppm in/on 2 untreated cotton gin by-products samples, and 0.06-0.18 ppm in/on 6 untreated gin by-products samples; and apparent residues of TMS were <0.25 ppm in/on 6 untreated gin by-product samples. Adequate representative chromatograms, sample calculations, and raw data were provided.

In Treatment #2, which approximates the worse-case use, residues in/on 26 treated samples of undelinted cotton seed harvested at 7 days post-treatment were comprised of 0.4-25.8 ppm of PMG and 0.26-9.42 ppm of TMS, for combined residues of 0.7-35.2 ppm (Table 11). Residues in/on 12 samples of cotton gin by-products harvested at 7 days post-treatment were comprised of 15.6-84.1 ppm of PMG and 13.1-32.3 ppm of TMS, for combined residues of 28.7-116.4 ppm.

In Treatment #1, residues in/on 26 treated samples of undelinted cotton seed were comprised of <0.05-17.6 ppm of PMG and <0.05-5.6 ppm of TMS, for combined residues of <0.1-22.3 ppm. Residues in/on 12 samples of cotton gin by-products harvested at 7 days post-treatment were comprised of 0.2-29.8 ppm of PMG and <0.25-13.4 ppm of TMS, for combined residues of <0.48-43.2 ppm. Table 12 is a summary of the residues of PMG and TMS in/on undelinted cotton seed and gin by-products.

The residue decline tests on both undelinted seeds and gin by-products from both treatments indicate that residues of PMG and TMS decline at longer post-treatment intervals.

Table 12. Residues of PMG and TMS in/on undelinted cotton seed and gin byproducts harvested at maturity following 5 or 7 applications of sulfosate (6 lb/gal SC/L) totaling 8 lb ai/A (1x the maximum proposed seasonal rate).

Crop MRID	Matrix	Trial Location (EPA Region)	PHI (days)	Treatment type [a]	Residues, ppm		
					PMG	TMS	Total [d]
Cotton 44872102	undelinted seed	Whitakers, NC (2)	7	1	3.18, 1.44	2.07, 1.49	5.3, 2.9
				2	1.00, 3.33	1.15, 3.27	2.2, 6.6
		Cheneyville, LA (4)	7	1	0.06, <0.05	0.06, <0.05	0.1, <0.1
				2	2.69, 2.47	1.29, 1.83	4.0, 4.3
		Leland, MS (4)	7	1	0.96, 1.99	0.96, 1.21	1.9, 3.2
				2	3.13, 7.95	2.3, 7.15	5.4, 15.1
		Portales, NM (8)	7	1	0.07, 0.05	0.07, 0.08	0.1, 0.1
				2	0.99, 0.94	0.57, 0.62	1.6, 1.6
		Colony, OK (6)	10	1	0.08, 0.19	0.06, 0.23	0.1, 0.4
				2	3.79, 5.54	1.95, 3.89	5.7, 9.4
		Halfway, TX (8)	7	1	14.6, 17.6	5.6, 4.74	20.2, **22.3**
				2	25.8, 22.4	9.42, 7.48	35.2, 29.9
		Lubbock, TX (8)	7	1	<0.05, <0.05	0.34, 0.06	<0.4, <0.1
				2	2.0, 2.74	2.27, 2.09	4.2, 4.8
		Yuma, AZ (10)	7	1	1.64, 0.36	0.8, 0.26	2.4, 0.6
				2	0.75, 1.71	0.53, 1.02	1.3, 2.7
		Visalia, CA (10)	1	1	0.29	0.37	0.7
				2	5.15	3.87	9.0
			3	1	0.11	0.13	0.2
				2	2.38	2.14	4.5
			7	1	0.10, 0.16	0.09, 0.23	0.2, 0.4
				2	0.89, 2.53	0.69, 1.95	1.6, 4.5
			14	1	0.19	0.21	0.4
				2	2.46	2.12	4.6
		Madera, CA (10)	7	1	0.32, 0.17	0.20, 0.15	0.5, 0.3
				2	0.40, 0.59	0.26, 0.41	0.7, 1.0
		St. Paul, TX (6)	7	1	0.85, 0.58	0.87, 0.65	1.7, 1.2
				2	8.24, 7.58	2.12, 3.56	10.4, 11.1
		Finley, TN (4)	7	1	0.59, 0.61	0.90, 0.84	1.5, 1.5
				2	1.53, 0.95	1.48, 0.78	3.0, 1.7
		Tillar, AR (4)	7	1	1.68, 1.46	1.92, 1.94	3.6, 3.4
				2	4.08, 3.27	4.95, 4.21	9.0, 7.5
Cotton 44872102	gin by-products	Leland, MS [b] (4)	7	1	7.03, 6.06	4.48, 5.04	11.5, 11.1
				2	36.0, 33.1	31.4, 27.5	67.4, 60.6
		Colony, OK [c] (6)	10	1	0.23, 0.20	<0.25, 0.31	<0.48, 0.51
				2	18.7, 15.6	16.7, 13.1	35.4, 28.7
		Halfway, TX [b] (8)	7	1	29.8, 20.6	13.4, 10.8	**43.2**, 31.4
				2	66.4, 65.1	30.3, 31.2	96.7, 96.3

Crop MRID	Matrix	Trial Location (EPA Region)	PHI (days)	Treatment type [a]	Residues, ppm		
					PMG	TMS	Total [d]
		Yuma, AZ [b] (10)	7	1	3.13, 3.26	3.40, 2.85	6.5, 6.1
				2	26.0, 29.0	22.7, 24.3	48.7, 53.3
		Visalia, CA [c] (10)	1	1	7.68	7.64	15.3
				2	81.1	59.8	140.9
			3	1	2.77	2.42	5.2
				2	36.1	38.1	74.2
			7	1	2.33, 3.57	2.59, 3.08	4.9, 6.7
				2	18.1, 18.7	19.4, 20.6	37.5, 39.3
			14	1	4.94	3.68	8.6
				2	35.0	26.7	61.7
		St. Paul, TX [c] (6)	7	1	3.44, 2.20	2.07, 2.15	5.5, 4.4
				2	70.5, 84.1	28.9, 32.3	99.4, 116.4

[a] See Table 11 for description of treatment regimes #1and #2. Treatment #2 included a preharvest broadcast application and reflected the worse-case scenario.

[b] Harvested with a spindle picker.

[c] Harvested with a mechanical stripper.

[d] The highest average total residue value for each commodity is bolded.

Conclusions: The number and geographic representation of the cotton field trails are adequate. The submitted field trials were conducted in Regions 2 (1 trial in NC), 4 (4 trials in LA (1), MS (1), TN (1), AR(1)), 6 (2 trials in OK (1) and TX (1)), 8 (3 trials in NM (1) and TX (2)), and 10 (3 trials in AZ (1) and CA (2)), which account for 97% of the U.S. cotton production.

The submitted residue data on cotton are adequate and support the proposed tolerance of 40 ppm (of which no more than 10 ppm is TMS) in/on undelinted cotton seeds and the proposed tolerance of 120 ppm (of which no more than 35 ppm is TMS) in/on cotton gin by-products. However, the preharvest broadcast applications used in the cotton field trials differed from the proposed use directions. The proposed label directions for cotton allows for an unspecified number of preharvest broadcast applications at 0.5-2 lb ai/A; however, the field trail data support the use of up to two preharvest broadcast applications each at 1 lb ai/A with a minimum retreatment interval of 7 days between broadcast applications.

Pistachios. A 0.05 ppm tolerance has been established for the combined residues of PMG and TMS in/on the tree nut group [40 CFR §180.439].

No residue data on pistachios were submitted with the current petition. Rather, the petitioner is proposing that the existing sulfosate residue data on almonds, pecans, and walnuts be translated to support a separate tolerance. These data were originally reviewed in conjunction with the proposed use on tree nuts (PP# 4F04343; DP Barcode D201499 and D2011513, 9/22/94 G. Kramer).

A total of 15 field trials have been conducted on members of the tree nuts crop group, including: 6 field trials on almonds in CA; 5 field trails on pecans in GA (2), MS, NM, and TX; and 4 field

trails on walnuts in CA (3) and OR. Each field trail consisted of two tests. At each site, sulfosate (6 lb/gal SC/L) was applied either once as a broadcast application to the orchard floor at 8 lb ai/A (1x) 20 days prior to harvest or as two broadcast applications at 4 lb ai/A/application with the second application being applied 20 days prior to harvest. These use patterns reflect the current label directions for tree nuts.

Residues of PMG and TMS were each <0.05 ppm in/on all nutmeat samples of almond (n=12), pecan (n=10), and walnut (n=8) from the above field trials.

Conclusions: The available almond, pecan, and walnut will be translated to support the proposed 0.05 ppm tolerance on pistachios.

OPPTS GLN 860.1520: Processed Food/Feed

Cotton. Syngenta submitted a processing study (cited below) on cotton treated with sulfosate at 1x the maximum proposed seasonal rate.

44872103 Iwata, Y. (1998) Glyphosate Trimesium: Processing Study on Cotton From a Trial Conducted in Texas: Lab Project Number: GLYP-97-PR-01: WINo 16884. Unpublished study prepared by Zeneca Ag Products. 70 p.

In a single field trial in TX during the 1997 growing season, seven applications of sulfosate (6 lb/gal SC) were applied to cotton (Table 13). All spray applications were made using ground equipment in 2.5-13 gal/A of water and included a nonionic surfactant at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Table 13. Application data for sulfosate treatment of cotton for processing study.

Application number	Application Rate (lb ai/A)	Application method	Application timing
1	4.0	broadcast	preemergence to cotton
2	1.0	shielded	8-10" cotton growth stage
3	1.0	shielded	24-28" cotton growth stage
4	--	spot	just prior to boll opening
5	1.0	broadcast	60% open boll
6	--	wiper	7 days before harvest
7	1.0	broadcast	7 days before harvest

Single bulk control and treated samples of mature cotton were harvested 7 days after the last application, placed in coolers slightly above freezing, and shipped frozen within 1.5 hours of collection to the processor, Food Protein Research and Development Center, Texas A&M University System, Bryan, TX, where the samples were stored at -12 C. Cotton seed samples were ginned to produce undelinted seed, and then processed into hulls, meal, and refined oil

using simulated commercial procedures. A summary of the processing procedures and material balance sheets were provided. After processing, single control and treated samples of each matrix were collected and frozen. Frozen cotton and cotton processed commodities were shipped by freezer truck to Syngenta WRC, Richmond, CA where the samples were stored at -18 ± 5 C until analysis. The maximum frozen storage interval was 24 days, and is supported by available storage stability data.

Residues of PMG and TMS in cotton and cotton processed fractions were determined using the adequate GC/MS methods described above. The method LOQ is 0.05 ppm for each analyte on each commodity. Apparent residues of each analyte were <0.05 in/on a single sample of untreated cotton seed and each processed fraction. Adequate representative sample calculations and chromatograms were submitted.

Residues of PMG were 9.1, 9.5, 5.43 ppm, and <0.05 ppm in treated samples each of cotton seed, hulls, meal, and refined oil, respectively (Table 13), and residues of TMS were 3.95, 0.58, 3.8, and <0.05 ppm in treated samples of cotton seed, hulls, meal, and refined oil, respectively. The combined residues of PMG and TMS were 13.3 ppm in seeds, 10.1 in hulls, 9.2 ppm in meal, and <0.1 ppm in refined oil. Residues did not concentrate in any processed cotton fractions. Table 14 lists residues of PMG and TMS in cotton seed processed commodities (hulls, meal, and refined oil).

Table 14. Residues of PMG and TMS in hulls, meal, and refined oil processed from cotton seed harvested 7 days following 7 applications of sulfosate (6 lb/gal SC/L) at 1-4 lb ai/A/application (8 lb ai/A/season; 1x).

Matrix	Residues (ppm)[a]			
	PMG	TMS	Combined	Concentration/ Reduction Factor
Undelinted seed	9.06, 9.13 (9.1)	3.92, 3.98 (3.95)	13.3	NA
Hulls	10.16, 8.85 (9.5)	0.54, 0.61 (0.58)	10.1	0.8x
Meal	5.43	3.73, 3.91 (3.8)	9.2	0.7x
Refined Oil	<0.05	<0.05	<0.1	<0.01x

[a] Average of duplicate analyses of a single sample are reported in parentheses and were used to calculate combined residues.

Conclusions: Tho cotton processing study is adequate and indicates that the combined residues of PMG and TMS do not concentrate in cotton hulls, meal, or refined oil. Separate tolerances for cotton processed fractions are not required.

Potatoes. Syngenta submitted a processing study (cited below) on potatoes treated with sulfosate at 5x the maximum proposed rate.

44872111 Iwata, Y. (1998) Glyphosate-Trimesium: Processing Study on Potatoes from a Trial Conducted in Washington: Lab Project Number: GLYP-97-PR-02. Unpublished study prepared by Zeneca Ag Products and Englar Food Laboratories, Inc. 64 p.

In a field trial conducted in WA during 1997, sulfosate (6 lb/gal SC/L) was applied as a single preemergence application to potatoes at 40 lb ai/A (5x the maximum proposed rate) with ground equipment using 29 gallons of water per acre.

Single bulk control and treated samples of mature potato tubers were harvested 130 days post-treatment, and shipped at ambient temperatures the same day to the processing facility, Englar Food Laboratories, Inc, Moses Lake, WA, where the samples were stored at 7 C until processing. Within 35 days of harvest, the potatoes were processed into wet peel, flakes, and chips using simulated commercial procedures. A summary of the processing procedures and material balance sheets were provided. After processing, single control and treated sample of each matrix were collected and frozen. Frozen potatoes and processed commodities were shipped by overnight carrier on dry ice to Syngenta WRC, where samples were stored at -18 C until analysis. The maximum frozen storage interval was 205 days, and is supported by the available storage stability data on potatoes.

Residues of PMG and TMS in potatoes and potatoes processed fractions were determined using the adequate GC/MS methods described above. The method LOQ is 0.05 ppm for each analyte on each commodity. Apparent residues of each analyte were <0.05 ppm in/on a single control sample of tubers and each processed fraction. Adequate representative sample calculations and chromatograms were submitted.

Residues of PMG were <0.05 ppm in/on 5x-treated potato tubers and in flakes, chips, and wet peel processed from these tubers (Table 14). Residues of TMS were 0.055 ppm in/on whole tubers and 0.14, 0.067, and <0.05 ppm in flakes, chips and wet peel, respectively. The combined residues of PMG and TMS were <0.11 ppm in tubers, <0.19 ppm in flakes, <0.12 ppm in chips, and <0.10 ppm in wet peel. Residues did not concentrate in wet peel and concentrated only slightly in flakes (1.7x) and chips (1.1x). Table 15 lists the residues of PMG and TMS in potato processed commodities (flakes, chips, and wet peel).

Table 15. Residues of PMG and TMS in flakes, chips, and wet peel processed from potatoes harvested 130 days following a preemergence application of sulfosate (6 lb/gal SC/L) at 40 lb ai/A (5x).

Matrix	Residues (ppm)			
	PMG	TMS	Combined	Concentration Factor
Potato tubers	<0.05, <0.05, <0.05 (<0.05)	0.054, 0.056 (0.055)	<0.11	--
Flakes	<0.05, <0.05 (<0.05)	0.13, 0.14 (0.14)	<0.19	1.7x
Chips	<0.05, <0.05 (<0.05)	0.065, 0.069 (0.067)	<0.12	1.1x
Wet Peel	<0.05	<0.05, <0.05 (<0.05)	<0.10	0.9x

[a] Averages are reported in parentheses.

Conclusions: The potato processing study is adequate and indicates that the combined residues of PMG and TMS do not concentrate in wet peel and concentrate only slightly in flakes (1.7x) and chips (1.1x). Based on the combined HAFT residues of <0.37 ppm from the potato field trials and the observed concentration factors for flakes and chips, the maximum expected combined residues of PMG and TMS in potato flakes and chips would be 0.63 and 0.41 ppm, respectively. As these residue levels are below the 1 ppm tolerance proposed for the potato

RAC, separate tolerances for residues in potato flakes and chips are not required. **A revised Section F should be submitted with the tolerance for potato, flakes deleted.**

Sugar beets. The petitioner submitted a processing study (cited below) on sugar beets treated with sulfosate (6 lb/gal SC/L) at 5x the maximum proposed rate.

> 44872108 Iwata, Y. (1998) Glyphosate-Trimesium: Processing Study on Sugar Beets from a Trial Conducted in Minnesota: Lab Project Number: GLYP-97-PR-03. Unpublished study prepared by Zeneca Ag Products and Englar Food Laboratories, Inc. 45 p.

In a field trial conducted in MN during 1997, sulfosate (6 lb/gal SC/L) was applied as a single preemergence application to sugar beets at 40 lb ai/A (5x the maximum proposed rate) with ground equipment using 27 gallons of water per acre.

Single bulk control and treated samples of mature sugar beets were harvested 132 days post-treatment and separated into roots and tops. The roots were frozen and shipped within 18 hours by freezer truck to the processor, Englar Food Laboratories, Inc, Moses Lake, WA, where the samples were stored at -22 C until processing. Within 48-54 days of harvest, the sugar beets were processed into dried pulp, refined sugar and molasses using simulated commercial procedures. A summary of the processing procedures and material balance sheets were provided. After processing, single control and treated sample of each matrix were collected and frozen. Frozen sugar beet roots and processed commodities were shipped overnight on dry ice to Syngenta WRC, where samples were stored at -18 C until analysis. The maximum frozen storage interval was 171 days, and is supported by the available storage stability data on potatoes.

Residues of PMG and TMS in sugar beets roots were determined using the adequate GC/MS methods described above. The method LOQ is 0.05 ppm for each analyte. Apparent residues were <0.05 ppm in/on the untreated sugar beets. Residues of PMG and TMS were also each <0.05 ppm in/on treated sugar beet roots harvested at maturity following a single preemergence application at 40 lb ai/A (5x the maximum proposed rate). The samples of dried pulp, refined sugar, and molasses processed from the 5x-treated roots were not analyzed because residues of PMG and TMS were <LOQ (<0.05 ppm) in/on all samples of sugar beet roots harvested from the 9 field studies conducted at 1x and the one test conducted at 5x. Adequate representative sample calculations and chromatograms were submitted.

Conclusions: The sugar beet processing study is adequate and indicates that detectable levels of sulfosate residues are not likely to occur in commodities processed from sugar beets treated in accordance with the proposed use directions. Therefore, no tolerances are required for sulfosate residues in sugar beet processed commodities.

OPPTS GLN 860.1480: Meat, Milk, Poultry, Eggs

Ruminants

Tolerances have been established for the residues of sulfosate at 1.5 ppm in milk, and at 0.5 ppm in fat, 6.0 ppm in kidney, 1.5 ppm in meat byproducts (except kidney), and 1.0 ppm in meat of cattle, goats, hogs, horses, and sheep [40 CFR §180.489(a)]. The petitioner is proposing increasing the tolerance for milk to 2.0 ppm.

No additional feeding studies were submitted with the current petition. However, an adequate ruminant feeding study was submitted previously and reviewed by HED (CBTS Nos. 6814, 6815, and 6816, 4/29/91, S. Koepke). The feeding study reflected dosing levels of 50, 300, and 1000 ppm in dairy cattle.

The petitioner based the proposed tolerance for milk on the MTDB in beef and dairy cattle for sulfosate resulting from a diet comprised of aspirated grain fractions, grain sorghum and sweet corn stover, wheat forage, and cotton gin byproducts (Table 16). The MTDB for beef and dairy cattle was calculated to be 438 and 427 ppm, respectively. The calculated MTDBs for beef and dairy cattle are adequate.

Table 16. The petitioner's calculation of the MTDB of sulfosate for beef and dairy cattle.

Feed Commodity	Existing/ Proposed Tolerance (ppm)	% Dry Matter	Beef Cattle		Dairy Cattle	
			% of Diet	Burden (ppm)	% of Diet	Burden (ppm)
Aspirated grain fractions	1300	85	20	306	20	306
Grain sorghum stover	140	88	25	40	--	--
Sweet corn stover	170	83	25	51	15	31
Wheat forage	35	25	25	35	60	84
Cotton gin byproducts	120	89	5	7	5	7
		TOTAL	100	439	100	428

Using the 438 ppm MTDB, the petitioner recalculated the predicted maximum residue levels of sulfosate by comparing the 439 ppm MTDB to the maximum combined residues found at the 1000-ppm feeding level (2.3x) using the following formula:

$$\frac{439 \text{ ppm}}{1000 \text{ ppm}} = \frac{x}{\textbf{Maximum} \text{ combined residues of TMS and PMG found in milk at 1000-ppm dosing level}}$$

The results of these calculations are presented in Table 17. The predicted values are presented along the maximum predicted residues calculated by HED using the residue data from the 300-ppm feeding level (0.7x). Comparison of the predicted values for residues in liver, fat, and muscle with the established tolerances indicates that no change in tolerances for these commodities is required for this petition. However, the predicted maximum residue values for milk and kidney are equivocal. Using data from the 300-ppm dose group, the maximum expected residues in kidney (6.6 ppm) and milk (1.4 ppm) suggest that the tolerance for kidneys

should be increased but that the current tolerance for milk is adequate. Alternatively, using data from the 1000-ppm dose group, the maximum expected residues in kidney (5.3 ppm) and milk (1.8 ppm) suggest that the current tolerance for kidneys is adequate, but the tolerance for milk should be increased.

As such a large portion (70%) of the MTDB for cattle is contributed by aspirated grain fractions, which are unlikely to be present in the diet at the established 1300 ppm tolerance, and given the equivocal data on the predicted maximum residues in milk and kidney, HED concludes that the existing tolerances for sulfosate residues in milk and kidney are adequate. **A revised Section F should be submitted with the proposed tolerance increase for milk deleted.**

Table 17. Calculated residues of PMG and TMS predicted in the tissues, fat, and milk of cattle with a 438 ppm MTDB of sulfosate residues.

Commodity	Maximum combined PMG and TMS residues from feeding study [a]		Calculated maximum combined residue based on 438 ppm dietary burden using		Established Tolerance
	300-ppm group	1000-ppm group	300-ppm group [b]	1000-ppm group [c]	
Milk	0.95	4.02	1.4	1.8	1.5
Kidney	4.5	12.1	6.6	5.3	6.0
Liver	0.89 [d]	2.51	1.3	1.1	1.5
Fat	0.16	0.18	0.23	0.08	0.5
Muscle	0.68 [e]	1.68	0.99	0.74	1.0

[a] In a previous review (CBTS Nos. 6814, 6815, and 6816, 4/29/91, S. Koepke) the anion is referred to as carboxymethylamino phosphonate (CMP) and in subsequent reviews the anion is referred to as N-(phosphonomethyl)glycine anion (PMG).

[b] Maximum expected residues calculated by reviewer using residue data from the 300-ppm dose group.

[c] Maximum expected residues calculated by petitioner using residue data from the 1000-ppm dose group.

[e] Includes PMG residues below the method LOQ (<0.2 ppm).

[d] Includes PMG residues below the method LOQ (<0.05 ppm).

Poultry

Tolerances have been established for the residues of sulfosate in eggs at 0.05 ppm, poultry fat at 0.05 ppm, poultry meat byproducts at 0.1 ppm, and poultry meat at 0.05 ppm [40 CFR §180.489(a)]. The petitioner has proposed increasing the tolerance for poultry, meat byproducts to 0.5 ppm.

No additional feeding studies were submitted with this petition. An adequate poultry feeding study was previously submitted and reviewed by HED (CBTS Nos. 6814, 6815, and 6816, 4/29/91, S. Koepke). The poultry feeding study reflected dosing levels of 0.5, 5 and 50 ppm. Based on a diet consisting of 80% grain sorghum grain (proposed tolerance of 35 ppm) and 20% soybean hulls (tolerance of 45 ppm), the petitioner calculated that the poultry MTDB for sulfosate residues to be 43 ppm. However, the petitioner factored in the dry weight of these commodities in their dietary burden calculation. HED notes that the percent dry weight for commodities is not used in calculating dietary burdens for poultry and swine (see OPPTS GLN 860.1480). Therefore, the appropriate MTDB for poultry is 37 ppm (Table 18).

Table 18. Calculation of the MTDB of sulfosate for poultry.

Feed Commodity	Existing/Proposed Tolerance Level (ppm)	% of Diet	Burden (ppm)
Grain sorghum grain	35	80	28
Soybean hulls	45	20	9
	TOTAL	100	37

The predicted maximum residue levels of sulfosate in poultry tissues and eggs from hens exposed to a dietary burden of 37 ppm MTDB are presented in Table 19. Comparison of the predicted values for residues in eggs, fat, and muscle with the established tolerances indicates that no change in tolerances for these commodities are required for this petition. However, the predicted maximum residue values for kidney (0.36 ppm) support the proposed increase to 0.50 ppm for residues in poultry meat byproducts.

Table 19. Calculated residues of PMG and TMS predicted in the tissues, fat, and eggs of poultry receiving a 37 ppm MTDB of sulfosate residues.

Commodity	Maximum residues from 50-ppm dose group			Predicted maximum residues for 37 ppm MTDB [b]	Established Tolerance
	PMG	TMS	Combined		
Eggs	0.015	<0.02	<0.035	<0.026	0.05
Kidney	0.31	0.18	0.49	0.36	0.1
Liver	<0.05	0.13	<0.18	<0.13	
Fat	<0.05	<0.05	<0.1	<0.074	0.05
Muscle	<0.05	<0.05	<0.1	<0.074	0.05

[a] In a previous review (CBTS Nos. 6814, 6815, and 6816, 4/29/91, S. Koepke) the anion is referred to as carboxymethylamino phosphonate (CMP) and in subsequent reviews the anion is referred to as N-(phosphonomethyl)glycine anion (PMG).

[b] Maximum expected residues calculated by reviewer using residue data from the 50-ppm dose group.

OPPTS GLN 860.1850/1900: Confined/Field Accumulation in Rotational Crops

HED has previously reviewed two confined rotational crop studies for sulfosate and concluded that rotational crop restrictions were not required for uses on crops in which the total seasonal application rate does not exceed 8 lb ai/A (DP Barcode D209543, 4/21/95, G. Kramer). No additional rotational crop data are required to support this petition.

INTERNATIONAL CONSIDERATIONS

No Codex limits or Canadian and Mexican Maximum Residue Limits (MRLs) have been established for the proposed uses. Therefore, harmonization is not an issue with these petition. The International Residue Limit Status (IRLS) sheet is attached (Attachment I).

AGENCY MEMORANDA CITED IN THIS REVIEW

DP Barcode:	None
Subject:	Multiresidue Test Information for Updating PAM I.
From:	S. Koepke
To:	L. Sawyer, FDA
Dated:	10/25/90
MRID(s):	None

CBTS No.:	6814, 6815, 6816
DP Barcode:	None
Subject:	PP#0F3860 Sulfosate (Touchdown) in or on soybean seed, forage, and hay. Evaluation of analytical methods and residue data.
From:	S. Koepke
To:	R. Taylor/C. Giles and Toxicology Branch II
Dated:	4/29/91
MRID(s):	41462102-41462106 and 41209919

CBTS No.:	13515 and 3514.
DP Barcode:	D201499 and D201513.
Subject:	PP# 4F04343. Glyphosate-trimesium (formerly known as Sulfosate) in or on the nut crop group (except almonds). Evaluation of residue data and analytical methods.
From:	G. Kramer
To:	R. Taylor and E. Allen
Dated:	9/22/94
MRID(s):	43165801 and 43165802.

CBTS No.:	15072
DP Barcode:	D211742
Subject:	February 7, 1995 Meeting with Tox concerning residues of regulatory concern for glyphosate-trimesium (formerly known as sulfosate).
From:	G. Kramer, R. Loranger, P. Errico, P. Hurley, W. Dykstra, and R. Gardner
To:	Chemistry Branch Files
Dated:	2/8/95
MRID(s):	None

CBTS No.:	15282
DP Barcode:	D213279
Subject:	PP#s 9F03796, 0F03860, 3F04238, and 4F04343. Glyphosate-trimesium (formerly known as Sulfosate) in or on corn, soybeans, citrus fruit, stone fruit, and the nut crop group (except almonds). Results of Petition Method Validation (PMV)
From:	G. Kramer
To:	R. Taylor
Dated:	3/21/95
MRID(s):	42848702 and 43165802

CBTS No.:	13993, 14726, 14727, and 15174
DP Barcode:	D205472, D209331, D209332, and D209333
Subject:	PP# 9F03796. Glyphosate-trimesium (formerly known as Sulfosate) in or on Corn and Livestock RACs. Amendments of 6/16/94 and 11/7/94.
From:	G. Kramer
To:	R. Taylor and J. Smith
Dated:	4/4/95
MRID(s):	43298101, 43298102, 43273601-43273611

CBTS No.:	14617, 14618, 15346, and 15347
DP Barcode:	D208740, D208742, D213615, and D213612
Subject:	PP# 0F03860. Glyphosate-trimesium (formerly known as Sulfosate) in or on Soybean RACs. Amendments of 10/3/94 and 3/20/95.
From:	G. Kramer
To:	R. Taylor and J. Smith
Dated:	4/4/95
MRID(s):	43397001-43397003, 43589500, and 43419801

CBTS No.:	14729
DP Barcode:	D209543
Subject:	ID# 010182-00324. Label Amendment for Glyphosate-trimesium (Touchdown Herbicide).
From:	G. Kramer
To:	R. Taylor and J. Smith
Dated:	4/21/95
MRID(s):	43450901 and 43450902

CBTS No.:	15649
DP Barcode:	D215869
Subject:	PP#s 9F03796, 0F03860, 3F04238, and 4F04343. Glyphosate-trimesium (formerly known as Sulfosate) in or on corn, soybeans, stone fruit, and the nut crop group (except almonds). Amendment of 5/1/95.
From:	G. Kramer
To:	R. Taylor
Dated:	7/6/95
MRID(s):	43631301

CBTS No.:	16276
DP Barcode:	D219866
Subject:	PP#s 9F03796, 0F03860, 3F04238, 0F3890, 1H03950, and 4F04343. Glyphosate-trimesium (formerly known as Sulfosate) in or on corn, soybeans, citrus fruit, grapes, stone fruit, and the nut crop group (except almonds). Results of Petition Method Validation (PMV).
From:	G. Kramer
To:	R. Taylor
Dated:	10/17/95
MRID(s):	43273604

CBTS No.:	15931, 15932, and 15933
DP Barcode:	D217458, D217440, and D217452
Subject:	PP#s 5F04554 and 5H05727. Glyphosate-trimesium in/on Pome Fruit and Wheat. Evaluation of Residue Data and Analytical Methods.
From:	G. Kramer
To:	R. Taylor and K. Whitby
Dated:	11/28/95
MRID(s):	43712801-43712805

CBTS No.:	16576
DP Barcode:	D221382
Subject:	PP#s 9F03796, 0F03860, 0F03890, and 4F04343. Glyphosate-trimesium (formerly known as Sulfonate) in or on corn, soybeans, citrus fruit, and the nut crop group. Results of Petition Method Validation (PMV) - TMS in/on Livestock RACs.
From:	G. Kramer
To:	R. Taylor
Dated:	1/22/96
MRID(s):	43273608

CBTS No.:	16253, 16252, and 16707
DP Barcode:	D219447, D219460, and D221687
Subject:	PP#s 0F03860. Glyphosate-Trimesium in or on Soybeans and Livestock RACs. Amendments of 7/24/95 & 11/29/95.
From:	G. Kramer
To:	R. Taylor and K. Whitby
Dated:	1/23/96
MRID(s):	43743801 and 43864801

DP Barcode:	D242217
Subject:	PP#0F03860. Sulfosate (Glyphosate-Trimesium) in or on Soybean and Livestock RACs. Amendment of ?. Revised Analytical Methods for Livestock Tissues.
From:	G. Kramer
To:	J. Tompkins/T. Colvin-Snyder
Dated:	4/4/98
MRID(s):	44246701 and 44246702

DP Barcode:	D248046
Subject:	Analytical method (determination of the PMG ion in/on crops) for inclusion in PAM Vol II.
From:	G. Kramer
To:	M. Clower
Dated:	8/17/98
MRID(s):	43631301

DP Barcode:	D248047
Subject:	Analytical method (determination of the TMS ion in/on crops) for inclusion in PAM Vol II.
From:	G. Kramer
To:	M. Clower
Dated:	8/17/98
MRID(s):	43864801

DP Barcode:	D248043
Subject:	Analytical method (determination of the PMG ion in meat, milk, poultry and eggs) for inclusion in PAM Vol II.
From:	G. Kramer
To:	M. Clower
Dated:	8/17/98
MRID(s):	44246701

DP Barcode:	D248045
Subject:	Analytical method (determination of the TMS ion in meat, milk, poultry and eggs) for inclusion in PAM Vol II.
From:	G. Kramer
To:	M. Clower
Dated:	8/17/98
MRID(s):	44246702

DP Barcode:	D243450
Subject:	PP# 7F04876. Sulfosate (i.e. Touchdown) in/on Fruiting Vegetables (Except Cucurbits). Evaluation of Residue Data and Analytical Methods.
From:	J. Rowell and G. Kramer
To:	J. Tompkins/T. Colvin-Snyder
Dated:	9/21/98
MRID(s):	44326501-44326503

DP Barcode:	D243318
Subject:	PP# 7F04854. Sulfosate (Glyphosate-Trimesium) in or on Soybean and Livestock RACs. Evaluation of Residue Data and Analytical Methods.
From:	G. Kramer
To:	J.Tompkins/T. Colvin-Snyder
Dated:	4/23/99
MRID(s):	44313901-44313903

ATTACHMENT 1

INTERNATIONAL RESIDUE LIMIT STATUS			
Chemical Name: Sulfosate	Common Name:	X Proposed tolerance Reevaluated tolerance Other	Date: 12/7/00

Codex Status (Maximum Residue Limits)	U. S. Tolerances
X No Codex proposal step 6 or above No Codex proposal step 6 or above for the crops requested	Petition Number: PP# 9F6032. DP Barcode: D263247 Other Identifier:
Residue definition (step 8/CXL):N/A	Reviewer/Branch: Jennifer R. Tyler
	Residue definition: Tolerances for sulfosate should be expressed as "residues of sulfosate (sulfonium, trimethyl-salt with N-(phosphonomethyl)glycine (1:1)) in or on..." In situations where the levels of both ions are expected to be below the LOQ (0.05 ppm), tolerances should be established as: RAC = 0.05 ppm In cases where quantifiable residues are expected, tolerances should be established as: RAC (of which no more than x ppm is trimethylsulfonium) = y ppm, where x is the maximum expected residue of TMS and y is the maximum expected total of TMS and PMG.

Crop (s)	MRL (mg/kg)	Crop(s)	Tolerance (ppm)
		Cotton, gin byproducts	120 ppm (of which no more than 35 ppm is TMS)
		Cotton, undelinted seed	40 ppm (of which no more than 10 ppm is TMS)
		Leaves of Root and tuber Vegetables Group, except Radish	0.25 ppm (of which no more than 0.2 ppm is TMS)
		Milk	2.0 ppm
		Pistachio	0.05 ppm
		Potato, flakes	2.0 ppm (of which no more than 1.5 ppm is TMS)
		Poultry, mbyp	0.5 ppm
		Radish, roots	16 ppm (of which no more than 15 ppm is TMS)
		Radish, tops	10 ppm (of which no more than 8 ppm is TMS)
		Root Vegetables, except Radish	0.15 ppm (of which no more than 0.1 ppm is TMS)
		Sorghum, grain	35 ppm (of which no more than 15 ppm is TMS)
		Sorghum, forage	0.2 ppm (of which no more than 0.1 ppm is TMS)
		Sorghum, stover	140 ppm (of which no more than 60 ppm is TMS)
		Sweet corn, forage	20 ppm (of which no more than 5 ppm is TMS)
		Sweet corn, kernels + cob with husks removed (K+CWHR)	0.15 ppm (of which no more than 0.1 ppm is TMS)
		Sweet corn, stover	165 ppm (of which no more than 65 ppm is TMS)
		Tuberous and Corm Vegetables Subgroup	1 ppm (of which no more than 0.5 ppm is TMS)

Limits for Canada	Limits for Mexico
X No Limits No Limits for the crops requested	X No Limits No Limits for the crops requested
Residue definition: N/A	Residue definition:N/A

Crop(s)	MRL (mg/kg)	Crop(s)	MRL (mg/kg)

Notes/Special Instructions:
S.Funk, 12/12/00

Rev. 1998

Large File: May Be Slow During Launch

Title of Document:	PP# 9F6032 Sulfosate (Glyphosate-trimesium) in/on cotton, Root and tuber Vegetables, Pistachio, Grain Sorghum, and Sweet Corn. Evaluation of Residue Data and analytical Methods. MRID#s 44872101,44872102,44872103,44872104,44872105,44872106,44872107,44872108,44872109,44872110,44872111,44872112,44872113,45315801 PC Code 128501 D263247 9F06032
PC Code & Name	128501 Sulfosate
Memo Date:	02/13/2001
TXR Number:	
MRID Number:	44872101; 44872102; 44872103; 44872104; 44872105; 44872106; 44872107; 44872108; 44872109; 44872110; 44872111; 44872112; 44872113; 45315801
DP Bar Code:	D263247
Administrative #:	9F06032
File Code & Schedule	11000 Chemistry Reviews PEST 361 Science Review Documents

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