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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

Subject: PP#3F2884/3H5396 Chlorpyrifos on several crops.
A proposal to revise the established chlorpyrifos tolerances to separately specify the level of chlorpyrifos, per se.

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~~THRU:~~ J. Ellenberger/B.Comfort, Team No. 21
Registration Division
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Dow Chemical Company proposes to revise chlorpyrifos tolerances (40 CFR 180.342), which include the parent and the 3,5,6-trichloropyridinol metabolite, in such a way that the amount of chlorpyrifos would be specified but that the combined residue level would not be different from the existing tolerance. The tolerances proposed are listed below; in parentheses are existing tolerances and the number of the petition with which these tolerances were established.

alfalfa, green forage	4 ppm (of which no more than 3 ppm is chlorpyrifos)	(4 ppm; OF2281)
alfalfa, hay	15 ppm (of which no more than 8 ppm is chlorpyrifos)	(15 ppm; OF2281)
apples	1.5 ppm (of which no more than 1 ppm is chlorpyrifos)	(1.5 ppm; 1F2620)

bananas, pulp with peel removed	0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.05 ppm; 3F1370)
bean forage	1 ppm (of which no more than 0.7 ppm is chlorpyrifos)	(1.0 ppm; 0F2221)
broccoli	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2.0 ppm; 7E2010)
brussel sprouts	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2.0 ppm; 7E2010)
cabbage	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2.0 ppm; 7E2010)
cattle, meat and meat byproducts	2 ppm (of which no more than 0.4 ppm is chlorpyrifos)	(2 ppm; 0F2281)
cauliflower	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2 ppm; 7E2010)
cherries	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2 ppm; 1E2529)
chinese cabbage	2 ppm (of which no more than 1 ppm is chlorpyrifos)	(2 ppm; 0E2412)
citrus fruit	1 ppm (of which no more than 0.6 ppm is chlorpyrifos)	(1 ppm; 1F2575)
corn, field, grain	0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.1 ppm; 3F1306)
corn, fresh (inc. sweet, K+CWHR)	0.01 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(0.1 ppm; 4F1445)
corn, forage and fodder	10 ppm (of which no more than 8 ppm is chlorpyrifos)	(10 ppm; 1F2544)

cottonseed	0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos)	(0.5 ppm; 6F1786)
cucumbers	0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.1 ppm; 9F2221)
eggs	0.1 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.1 ppm; OF2281)
figs	0.1 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.1 ppm; 2E2668)
goats, fat	1 ppm (of which no more than 0.6 ppm is chlorpyrifos)	(1 ppm; OF2281)
goats, meat and meat byproducts	1 ppm (of which no more than 0.1 ppm is chlorpyrifos)	(1 ppm; OF2281)
hogs, fat	0.5 ppm (of which no more than 0.3 ppm is chlorpyrifos)	(0.5 ppm; OF2281)
hogs, meat and meat byproducts	0.5 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.5 ppm; OF2281)
horse, fat	1 ppm (of which no more than 0.6 ppm is chlorpyrifos)	(1 ppm; OF2281)
horses, meat and meat byproducts	1 ppm (of which no more than 0.1 ppm is chlorpyrifos)	(1 ppm; OF2281)
milk, fat	0.5 ppm (of which no more than 0.25 ppm is chlorpyrifos)	(0.5 ppm; OF2281)
milk, whole	0.02 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.02 ppm; OF2281)
mint, hay	1 ppm (of which no more than 0.8 ppm is chlorpyrifos)	(1.0 ppm; 9E2372)

nectarines	0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.05 ppm; 9E2215)
peaches	0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.05 ppm; 3F1306)
pea forage	1 ppm (of which no more than 0.7 ppm is chlorpyrifos)	(1.0 ppm; OF2221)
peanut, hulls	15 ppm (of which no more than 2 ppm is chlorpyrifos)	(15 ppm; OF2193)
peanuts	0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos)	(0.5 ppm; OF2193)
pears	0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.05 ppm; 6F1777)
peppers	1 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(1.0 ppm; 1E2523)
plums, incl. fresh prunes	0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos)	(0.05; ppm; 6F1777)
poultry, fat (including turkeys)	0.5 ppm (of which no more than 0.3 ppm is chlorpyrifos)	(0.5 ppm; OF2281)
poultry meat and meat byproducts (incl. turkeys)	0.5 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.5 ppm; OF2281)
pumpkins	0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.1 ppm; 9F2221)
radishes	3 ppm (of which no more than 2 ppm is chlorpyrifos)	(3.0 ppm; 8E2038)
rutabagas	3 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(3.0 ppm; 8E2038)

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seed and pod vegetables	0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.1 ppm; OF2221)
sheep, fat	1 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(1.0 ppm; OF2281)
sheep, meat and meat byproducts	1 ppm (of which no more than 0.1 ppm is chlorpyrifos)	(1.0 ppm; OF2281)
sorghum, fodder	6 ppm (of which no more than 3 ppm is chlorpyrifos)	(6.0 ppm; 6F1830)
sorghum, forage	1.5 ppm (of which no more than 0.8 ppm is chlorpyrifos)	(1.5 ppm; 6F1830)
sorghum, grain	0.75 ppm (of which no more than 0.3 ppm is chlorpyrifos)	(0.75 ppm; 6F1830)
soybeans, forage	8 ppm (of which no more than 6 ppm is chlorpyrifos)	(8.0 ppm; 9F2270)
soybeans	0.5 ppm (of which no more than 0.3 ppm is chlorpyrifos)	(0.5 ppm; 9F2270)
strawberries	0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos)	(0.5 ppm; OF2283)
sunflower seeds	0.25 ppm (of which no more than 0.2 ppm is chlorpyrifos)	(0.25 ppm; 1F2588)
sweet potatoes	0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos)	(0.1 ppm; 6F1786)
turnip greens	1 ppm (of which no more than 0.3 ppm is chlorpyrifos)	(1.0 ppm; OE2411)
turnips	3 ppm (of which no more than 1 ppm is chlorpyrifos)	(3.0 ppm; OE2411)

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The following food additives are proposed:

citrus oil	25 ppm (of which no more than 15 ppm is chlorpyrifos)	(25 ppm; 1H5322 (1F2575))
corn oil	3 ppm (of which no more than 1.5 ppm is chlorpyrifos)	(3.0 ppm; 1H5323)
mint oil	10 ppm (of which no more than 8 ppm is chlorpyrifos)	(10 ppm; OH5267 (OE2372))
peanut oil	1.5 ppm (of which no more than 0.4 ppm is chlorpyrifos)	(1.5 ppm; 9H5226 (9F2193))

The following feed additives are proposed:

apple pomace, dried	12 ppm (of which no more than 8 ppm is chlorpyrifos)	(12.0 ppm; 2H5331 (2F2620))
citrus pulp, dried	5 ppm (of which no more than 2.5 ppm is chlorpyrifos)	(5.0 ppm; 1H5322 (1F2575))
corn soapstock	1 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(1.0 ppm; 1H5323)
sorghum, grain, milling fractions	1.5 ppm (of which no more than 0.6 ppm is chlorpyrifos)	(1.5 ppm; 9H5203 (6F1830))
sugar beets molasses	15 ppm (of which is no more than 0.01 ppm is chlorpyrifos)	(15 ppm; 2H5352 (2F2684))
sugar beets dried pulp	5 ppm (of which no more than 0.5 ppm is chlorpyrifos)	(5.0 ppm; 2H5352 (2F2684))
sunflower seed hulls	0.5 ppm (of which no more than 0.4 ppm is chlorpyrifos)	(0.5 ppm; 2H5326 (1F2588))
tomato pomace, dried	35 ppm (of which no more than 15 ppm is chlorpyrifos)	(35 ppm pending (1H52935))

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No revisions to separately specify the level of chlorpyrifos are proposed to tolerances for the following crops; the tolerances marked with an asterik (*) are pending.

almonds.	0.20*
almond hulls	12*
asparagus	4*
bananas, whole	0.25*
cranberries	1*
cattle, fat	2*
grapes	0.5*
grape pomace, dried	2*
kiwifruit	2*
onions, dry bulb	0.5
soybean, straw	15
sugar beets, roots	1
sugar beet, tops	8
tomatoes	0.5
walnuts	0.2

Conclusions

1. The nature of the residue is adequately understood.
2. Adequate analytical methods are available for enforcement purposes.
3. The tolerances proposed for the following crops are supported by available residue data. See introduction, above, for tolerance levels.
 - a. banana, pulp with peel removed
 - b. bean forage
 - c. broccoli
 - d. brussel sprouts
 - e. cabbage
 - f. cauliflower
 - g. cherries
 - h. chinese cabbage
 - i. corn, field, grain
 - j. corn, fresh (inc. sweet, K+CWHR)
 - k. corn, forage
 - l. corn, fodder
 - m. corn, oil
 - n. corn, soapstock
 - o. cottonseed
 - p. cucumbers
 - q. eggs
 - r. figs
 - s. milk
 - t. milkfat
 - u. mint hay

- v. mint oil
- w. nectarines
- x. peaches
- y. pea forage
- z. peanuts
- aa. peanut hulls
- bb. peanut oil
- cc. pears
- dd. plums (incl. fresh prunes)
- ee. pumpkins
- ff. radishes
- gg. rutabagas
- hh. seed and pod vegetables
- ii. sorghum grain
- jj. soybeans
- kk. strawberries
- ll. sunflower seeds
- mm. sunflower hulls
- nn. sugar beets, dried pulp
- oo. sugar beets, molasses
- pp. sweet potatoes
- qq. turnips
- rr. turnip greens

4. The tolerances proposed for the following are not adequate and should be revised; the tolerances listed below would be adequate and should be proposed. (See introduction, above, for proposed tolerances).

- | | | |
|----|---|--|
| a. | alfalfa, hay | 15 ppm (of which no more than 13 ppm is chlorpyrifos) |
| b. | cattle, meat, fat
and meat byproducts | 2 ppm (of which no more than 1.5 ppm is chlorpyrifos) |
| c. | eggs | 0.1 ppm (of which no more than 0.01 ppm is chlorpyrifos) |
| d. | goats, meat, fat
and meat | 1 ppm (of which no more than 0.25 ppm is chlorpyrifos) |
| e. | hogs, meat, fat
and meat byproducts | 0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos) |
| f. | horses, meat, fat
and meat | 1 ppm (of which no more than 0.25 ppm is chlorpyrifos) |
| g. | poultry, meat, fat
and meat byproducts | 0.5 ppm (of which no more than 0.1 ppm is chlorpyrifos) |

- h. sheep, meat, fat and meat byproducts 1 ppm (of which no more than 0.25 ppm is chlorpyrifos)
- i. sorghum, fodder 6 ppm (of which no more than 4 ppm is chlorpyrifos)
- j. sorghum, forage 1.5 ppm (of which no more than 1 ppm is chlorpyrifos)
- k. sorghum, grain milling fractions 1.5 ppm (of which no more than 0.8 ppm is chlorpyrifos)

5. We recommend against the proposed tolerances for the following items because residue data suggest that chlorpyrifos may comprise all or nearly all of the terminal residue in these crops.
 - a. alfalfa, green forage
 - b. apples
 - c. apple pomace, dried
 - d. citrus fruit
 - e. citrus oil
 - f. citrus pulp, dried
 - g. soybean forage
6. We cannot recommend for the proposed tolerance on peppers because reliable residue data, in terms of the amount of chlorpyrifos present, are not available. (The pepper tolerance is based on residue data for tomatoes which we have also raised questions on.) The petitioner should either delete the proposal for peppers or submit residue data reflective of the established use on peppers.
7. We cannot support the tolerance proposed for tomato pomace. The tolerance for tomato pomace was proposed with FAP#1H5295. The deficiencies we noted for that petition need to be resolved before we can consider the tolerance now proposed. Specifically, additional residue data from tomato-producing states of the East and Midwest are needed.
8. The available chlorpyrifos data do not support any group tolerances under the new crop grouping scheme, either because representative commodities are missing or because the range of residues in the group is greater than 5X.
9. An International Residue Limit Status sheet is attached. Numerical compatibility between Codex and U.S. tolerances exists or could be achieved in some instances but since the U.S. expression of a tolerance includes the metabolite

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TCP and Codex does not, real compatibility cannot take place unless TCP is removed from the U.S. expression of a tolerance. We have considered this possibility and have decided against it because TCP may comprise, on some commodities, the entirety of the final residue.

Recommendation

We recommend against the proposed tolerances. For further consideration we require the following:

1. A revised Section F in which tolerance proposals are revised as suggested in conclusion 4 and deleted as suggested in conclusion 5.
2. The tolerance for peppers should be deleted or the petitioner should submit additional residue data.
3. The petitioner should resolve questions raised by us in conjunction with FAP#LH5295 before consideration can be given to the dried tomato pomace tolerance. Specifically, we require additional residue experiments for tomatoes from tomato-producing states of the East and Midwest.

If tolerances that separately specify the amount of chlorpyrifos, per se, are established their incorporation into 40 CFR should be the same in form as for acephate, 180.108, and carbofuran, 180.254.

Note: The existing tolerances for lima beans and snap beans and their forages should be deleted because these commodities are accommodated by more recently established tolerances for seed and pod vegetables and bean and pea forage.

Also, the existing tolerance for soybean straw should be expressed as soybean hay.

Detailed Considerations

Manufacture, Formulation, and Use

For information on the manufacture of chlorpyrifos, the formulations in use, and the use on crops under consideration refer to the petitions cited in the introduction, above, to the right of the tolerance proposals. Also, a brief summary of established uses is given in the Residue Data Section, below.

Nature of the Residue

The nature of the residue in plants and animals is adequately understood. The residue of concern consists of chlorpyrifos and its metabolite TCP (3,5,6-trichloropyridinol).

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Metabolism studies are discussed in several petitions; see, for example, PP#2F2588, memo of 3/5/82, K. Arne, and memos referenced therein.

Analytical Methodology

Adequate analytical methods are available for enforcement. For details see the petitions cited in the introduction, above, to the right of the tolerance proposals.

Residue Data

The following discussions of residue data are presented in alphabetical order in two sections, the first for crops, the second for meat, milk, poultry, and eggs. Processed foods or feeds that require food additive tolerances are discussed with the corresponding RAC. Also, commodities for which tolerances were proposed in the same petition are discussed together.

In a few instances the petitioner has disregarded specific residue data, claiming that they are inappropriate for regulatory purposes because they are out of line with the main body of data. In some cases we have accepted these arguments; for others (e.g., apples, citrus fruit) we have earlier used such data for tolerance setting purposes and have therefore drawn different conclusions than the petitioner. All of the residue data presented in this petition have been presented earlier; no data have been discounted that were not discounted in our original considerations.

Alfalfa hay and green forage.

Alfalfa tolerances were established with PP#0F2281. The use involves up to 4 applications of 1 lb a.i./A with a 14 day cutting and grazing restriction for applications of 0.5 lb a.i./A or less and a 21 day restriction for applications of over 1 lb a.i./A. Residues in alfalfa forage ranged to 4 ppm (of which 3.2 ppm is chlorpyrifos) as a result of 0.5 lb a.i./A treatments (13 days) and to 6.2 ppm (of which 5.0 ppm is chlorpyrifos) as a result of 1.0 lb a.i./A treatments, at 14 days. We accepted the petitioner's argument that residues as high as 6.2 ppm would degrade to less than 4 ppm at a 21-day PHI. In general, chlorpyrifos tended to be a majority of the residue (to ca. 90%) on alfalfa forage at PHI's of 14 days. Since residues occur at the tolerance level at 13 days and since chlorpyrifos in that instance made up 3.2 ppm, we cannot support the proposed 4 ppm (of which no more than 3 ppm is chlorpyrifos) tolerance. The data suggest that residues of chlorpyrifos, per se, may approach 4 ppm. We note that, while a revised tolerance is proposed in Section F, the cover letter (see Table 1) suggests that the tolerance for alfalfa green forage is not to be changed.

Residues in alfalfa hay (from 0.5 lb a.i./A) ranged to 13.6 ppm (of which 8.4 ppm was chlorpyrifos) as a result of the proposed use (except for one 35 ppm value which we considered to be aberrant). In other experiments at the 1.0 lb a.i./A rate and 22-day PHI, the combined residues were mostly chlorpyrifos (e.g., at a 22-day PHI combined residues were 15.7 ppm, of which 13 ppm were chlorpyrifos). The data do not support the proposed tolerance, 15 ppm (of which no more than 8 ppm is chlorpyrifos). A tolerance of 15 ppm (of which no more than 13 ppm is chlorpyrifos) would be adequate and should be proposed.

Apples and apple pomace

The 1.5 ppm apple tolerance was established with PP#2F2620 and is based on a New York study in which apples, treated with 9 applications of 2.0 lb a.i./A (the established use is up to 8 applications of 1.5 lb a.i./A), were found to carry residues of 2.3 ppm parent and 1.2 ppm TCP (including that from alkaline hydrolysis of chlorpyrifos). The petitioner suggests that this study is invalid because 1) a decline curve suggests contamination of the samples between days 14 and 21 of the experiment and 2) control samples were high. We have rejected these arguments (see PP#9F2221, memo of 7/29/80 E. Leovey and PP#2F2620, memo of 3/24/82, K. Arne); the decline curve, given the vagaries of residue data, is not unusual and the control values, though high, are not near the level of the treated values. Since the 1.5 ppm tolerance for apples is based on residues of parent (the TCP residues are all accounted for by hydrolysis of parent) we conclude that the residue may be present as parent only and that the proposed tolerance, 1.5 ppm (of which no more than 1 ppm is chlorpyrifos) cannot be supported.

In a processing study submitted with PP#1F2620, apples carrying residues of 0.52 ppm chlorpyrifos (and no detectable TCP, <0.05 ppm) were processed into juice, wet pomace, and dry pomace. Residues of chlorpyrifos were 0.11 ppm in juice, 0.92 ppm in wet pomace, and 4.1 ppm in dry pomace (no TCP was detected in any fraction). Therefore, concentration occurred only in pomace, about 7.5X. Since the residue in apples may be essentially all chlorpyrifos, the residue in pomace will also be primarily chlorpyrifos. The proposed tolerance for pomace, 12 ppm (of which no more than 8 ppm is chlorpyrifos) is not supported by available residue data.

Banana pulp

The tolerance for banana pulp was established with PP#3F1370. The use involves placing growing bananas in chlorpyrifos-impregnated polyethylene bags or a spray to the base of the tree. These uses produced no residue of chlorpyrifos (<0.01 ppm) or TCP in the pulp though combined residues were detectable in peels (to 0.21 ppm) and whole bananas (to 0.14

ppm). These data support the proposed tolerance for banana pulp, 0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos). No change is proposed for the existing tolerance for whole bananas.

Bean forage, pea forage, seed and pod vegetables, cucumbers, and pumpkins

Residue experiments reflecting the established seed treatment use of chlorpyrifos on beans, peas, cucumbers, and pumpkins were submitted with PP#9F2221 (see memo of 2/8/80, E. Leovey; tolerances for snap beans and lima beans and their forages were established earlier, with PP#3F1306). Seeds, when treated at the label rate, 1 oz. a.i./100 lbs, developed into plants that produced peas, beans, pumpkins, and cucumbers in which no residues were detected. The 3X rate produced combined residues of 0.16 ppm in peas, a value we consider anomalous. Residues in pea vines or bean vines were to 0.19 ppm (of which 0.06 ppm was chlorpyrifos) as a result of the label rate and to 1.4 ppm (of which 0.96 ppm was chlorpyrifos) as a result of a 4X rate. These data support the proposed tolerances, 0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos) for cucumbers, pumpkins, and seed and pod vegetables and 1 ppm (of which no more than 0.7 ppm is chlorpyrifos) in pea and bean forage.

Broccoli, brussel sprouts, cabbage, cauliflower

These uses were established with PP#7E2010 (see memo of 1/25/78, A. Smith). For control of root maggots the 4E formulation is applied at rates of 1.6-2.75 fl. oz./1000 ft of row for the above crops except cauliflower for which rates of 1.6-2.4 fl. oz./1000 ft of row are stipulated. Originally, rates of to 3.3 fl. oz./1000 ft. row for all these crops had been approved by us. This use resulted in combined residues <0.5 ppm in broccoli, cabbage, and cauliflower at a PHI of 27 days (the label PHI is 30 days). For brussel sprouts residues to 1.79 ppm (of which 0.66 ppm was chlorpyrifos) were realized from this use and a 27 day PHI. These data support the proposed tolerance of 2 ppm (of which no more than 1 ppm is chlorpyrifos) for broccoli, brussel sprouts, cabbage, and cauliflower.

Cherries

The use of chlorpyrifos on cherries was established with PP#1E2529 (see memo of 11/6/81, K. Arne). The use is a spray to the trunk and lower limbs (1.5 lb a.i./100 gals) to control the lesser peachtree borer. The highest combined residue as a result of the proposed use was 0.74 ppm (of which 0.55 ppm was chlorpyrifos). Residues as a result of the 0.5X rate were as high as 1.02 ppm (of which 0.36 ppm was chlorpyrifos). These data support the proposed tolerance for cherries, 2 ppm

Chinese cabbage

The residue data submitted for chinese cabbage (PP#0E2412, memo of 1/9/81, E. Leovey) show combined residues of to 0.38 ppm from a use similar to that for broccoli, brussel sprouts, cabbage, and cauliflower for which a 2 ppm tolerance is established and a tolerance of 2 ppm (of which no more than 1 ppm is chlorpyrifos) is proposed, above. By translating data from broccoli, brussel sprouts, cabbage, and cauliflower to chinese cabbage we conclude that the proposed tolerance, (2 ppm (of which no more than 1 ppm is chlorpyrifos) is adequate.

Citrus fruit, citrus oil, and dried citrus pulp.

Tolerances for citrus were established with PP#1F2575. The use of chlorpyrifos on citrus involves a PHI of 21 days for applications of 7 pts (3.5 lb a.i.)/A Lorsban 4E or less and a PHI of 35 days for applications greater than 7 pts/A. Results of residue experiments at exaggerated rates show that chlorpyrifos may make up to 90% of the total residue at a 21 day PHI. Since we do not expect the ratio of chlorpyrifos to TCP to be rate dependent and since we have previously concluded that a tolerance of 1 ppm was necessary for this use (see PP#1F2575 memo of 5/3/82, K. Arne) we cannot support a tolerance that limits the amount of chlorpyrifos on citrus fruit to 0.6 ppm. The petitioner now argues that residue data which showed high values for citrus fruit (and that are the basis of the established tolerance) are invalid because the treated trees were small and the method of application provided very thorough coverage. Because these are situations that may arise in normal use we do not find the petitioner's arguments compelling; these data should be considered for any tolerance revision.

We expect levels of chlorpyrifos that approach the tolerance level as a result of this use and therefore recommend against the proposed revision, 1 ppm (of which no more than 0.6 ppm is chlorpyrifos). Likewise, since studies show that the ratio of chlorpyrifos to TCP does not change appreciably upon processing we also recommend against the proposed revisions for citrus oil, 25 ppm (of which no more than 15 ppm is chlorpyrifos) and dried citrus pulp, 5 ppm (of which no more than 2.5 ppm is chlorpyrifos).

Corn, field, grain; corn, fresh (incl, sweet, K+CWHR); corn, forage and fodder, corn soapstock, and corn oil.

Tolerances for field corn grain were established with PP#3F1306 and tolerances for fresh corn were established with PP#4F1445. However, more pertinent residue data were submitted with PP#1F2544 in which tolerances for corn forage and fodder were raised from 0.1 ppm (established with PP#3F1306) to 10 ppm. The increased use that effected this did not cause tolerances for field and fresh corn grain to be raised. The maximum proposed use involves applications of Lorsban 4E (to 7.5 lbs a.i./A/season) and 15G (to 3 lb a.i./A/season; see PP#1F2544, memo of 1/29/82, K. Arne). The highest combined

residues found as a result of this use are as follows: grain, 0.09 ppm (0.05 ppm chlorpyrifos); forage and fodder, 7.9 ppm (no TCP detected, <0.05 ppm). These data support the proposed tolerances for field corn and fresh corn, 0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos) and forage and fodder, 10 ppm (of which no more than 8 ppm is chlorpyrifos).

A processing study using spiked corn showed a concentration factor of 30X for corn oil and 10X for soapstock. Therefore we do not expect the proposed tolerances for corn oil, 3 ppm (of which no more than 1.5 ppm is chlorpyrifos) and corn soapstock, 1 ppm (of which no more than 0.5 ppm is chlorpyrifos) to be exceeded as a result of established uses.

Cottonseed

Applications to cotton at the maximum label rate of 1 lb a.i./A resulted in maximum residues of 0.3 ppm (of which 0.16 ppm was chlorpyrifos) at the imposed 14 day PHI. These data are discussed in our review of PP#6F1673 (memo of 11/20/75, A. Smith) and adequately support the proposed tolerance of 0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos).

Processing studies show that residues of chlorpyrifos, per se, (as well as combined residues) do not concentrate in the processed byproducts of cottonseed; no food or feed additive tolerances are needed.

Cucumbers; see bean forage, above.

Figs

The use on figs, established with PP#2F2668 (see memo of 6/3/82, M. Nelson), involves dormant season applications of 2 lb a.i./A to the orchard floor for control of the larvae of dried fruit beetles. This use resulted in no detectable residues of chlorpyrifos (<0.01 ppm) and TCP (<0.05 ppm) and adequately supports the proposed tolerance, 0.1 ppm (of which no more than 0.01 ppm is chlorpyrifos).

Mint hay and mint oil

The use involves two applications (both 2 lb a.i./A max), one postharvest in the fall and one in the spring at least 90 days before harvest. These uses resulted in no detectable residues of chlorpyrifos (<0.01 ppm) and TCP (<0.05 ppm) at PHI's of 90 days or more though residues at 70 days were as high as 1.65 ppm (1.2 ppm chlorpyrifos) as a result of a 2X application. Processing studies indicated a concentration factor of 10X for oil (other processing studies showed concentration factors of up to 90X but these experiments weren't reflective of normal processing; see PP# 0F2372, memo of 5/18/80, K. Arne).

These data support the proposed tolerances, 1 ppm (of which no more than 0.8 ppm is chlorpyrifos) for mint hay and 10 ppm (of which no more than 8 ppm is chlorpyrifos) for mint oil.

Nectarines and Peaches

The tolerance for peaches was established with PP#3F1306. The peach residue data in that petition were used to support the tolerance for nectarines, established with PP#9E2215. The use is a trunk spray, for control of borers, so that fruit is exposed only by drift. This use resulted in no detectable residues of either chlorpyrifos (<0.01 ppm) or TCP (<0.02 ppm). These data support the proposed tolerances on peaches and nectarines, both at 0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos).

Pea forage: see bean forage, above.

Peanuts, peanut hulls, and peanut oil

The use of chlorpyrifos on peanuts involves applications of up to 2 lb a.i./A (maximum seasonal application is 4 lb a.i./A) to within 21 days of harvest. Residue data reflecting this use are discussed in our review of PP#9F2193 (memo of 8/7/79, J. Onley). The highest residues of chlorpyrifos, per se, in peanuts and peanut hulls were 0.11 and 1.1 ppm, respectively. The residues of TCP tended to be significantly higher, to 0.34 ppm in peanuts and to 13 ppm in peanut hulls. These data support the proposed tolerances for peanuts, 0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos) and peanut hulls, 15 ppm (of which no more than 2 ppm is chlorpyrifos).

A peanut processing study was submitted as an amendment to PP#9F2193 (see memo of 6/5/80, J. Onley). The chlorpyrifos tends to concentrate in the oil by a factor of up to 2X but the TCP remains in the press cake. Based on this study we expect chlorpyrifos residues in the oil to be twice that in the nutmeats, i.e., to 0.4 ppm; the proposed tolerance for peanut oil, 1.5 ppm (of which no more than 0.4 ppm is chlorpyrifos) is adequate.

Pears, plums, and prunes (fresh)

The use of chlorpyrifos on pears, plums, and prunes is a dormant or delayed dormant spray. Residue data submitted with PP#6F1777 (see memo of 10/21/76, A. Rathman) showed that no detectable residues of chlorpyrifos (<0.01 ppm) would be expected from this use. Since fruit isn't present during application no data were required for dried prunes. These data support the proposed tolerances for pears, plums, and prunes, all at 0.05 ppm (of which no more than 0.01 ppm is chlorpyrifos).

Peppers

There is no registered use for chlorpyrifos on peppers in the United States. The tolerance was established for peppers imported from Israel where chlorpyrifos is registered for use on peppers (see PP#1E2523, memo of 7/15/81, K. Arne). No residue experiments had been conducted for PP#1E2523. The petitioner submitted the equivalent of a "market basket survey" but since application rates and PHI's weren't known and TCP wasn't determined these data were considered marginally useful. We arrived at the tolerance level by translating residue data from tomatoes (PP#8E2092). The data for peppers (i.e., the tomato residue data) is tenuous. Because there are no useful residue data for peppers and because there is no limit to the number of applications to peppers (3-4 applications to tomatoes are allowed) we are not confident that the proposed tolerance change would be supported. The petitioner could pursue this by conducting residue experiments representative of the proposed use so that the level of chlorpyrifos could be established. Otherwise this proposal should be deleted from Section F.

Plums, including fresh prunes; see pears above.

Pumpkins; see bean forage, above.

Radishes and Rutabagas

Tolerances for radishes and rutabagas were established with PP#3E2038 (see memo of 7/17/78, A. Smith).

For radishes this use, a 0.031 oz. a.i./1000 ft row at planting application, resulted in residues of up to 2.37 ppm, of which 1.57 ppm was chlorpyrifos (one value for combined residues, 9.45 ppm, was considered aberrant). These data support the proposed tolerance for radishes, 3 ppm (of which no more than 2 ppm is chlorpyrifos).

The data for rutabagas were generated from experiments not strictly representative of the proposed use. The maximum residues found in two experiments were 1.03 and 1.14 ppm (of which 0.54 and 0.49 ppm, respectively, were chlorpyrifos) but at a 14-day PHI while the at-plant 0.1 lb a.i./1000 ft row use ensures a 70-90 day PHI (with PP#8E2038 two applications were proposed, one at plant and one 20 to 40 days later; the current label limits use to one at-plant application). These data support the proposed tolerance for rutabagas, 3 ppm (of which no more than 0.5 ppm is chlorpyrifos).

Seed and pod vegetables; see bean forage, above.

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Sorghum grain, forage, fodder, and milling fractions.

These tolerances were established with PP#6F1830 (see memo of 11/23/76, A. Smith). The use is a 0.25 lb a.i./A broadcast spray, up to three applications per season; there is a 14-day PHI. A 2X rate treatment resulted in residues of to 0.65 ppm (of which 0.23 ppm was chlorpyrifos) in grain. Consistently, the majority of the residue in the grain was TCP. The proposed tolerance for sorghum grain, 0.75 (of which no more than 0.3 ppm is chlorpyrifos) is adequate.

The proposed use resulted in residues in forage, at a 14-day PHI, of to 1.2 ppm (of which 0.74 ppm was chlorpyrifos). Forage sampled 8 days after the proposed application carried residues of to 1.34 ppm (of which 1.05 ppm was chlorpyrifos). The available data are not compelling in their support of the proposed tolerance, 1.5 ppm (of which no more than 0.8 ppm is chlorpyrifos). We could support a tolerance of 1.5 ppm (of which no more than 1 ppm is chlorpyrifos). The tolerance for fodder was arrived at by using a 4X dry down factor from forage. Therefore the proposed tolerance, 6 ppm (of which no more than 4 ppm is chlorpyrifos) cannot be supported; a tolerance of 6 ppm (of which no more than 4 ppm is chlorpyrifos) would be adequate.

A sorghum processing study was submitted as an amendment to PP#6F1830 (see memo of 9/25/78, A. Smith). Grain carrying 0.27 ppm combined residues (0.05 ppm chlorpyrifos) was processed with the following results (the amount of chlorpyrifos is given in parentheses): Flour 0.07 ppm (0.02 ppm chlorpyrifos); shorts 0.27 (0.04); middlings 0.06 ppm (0.01); bran 0.42 ppm (0.07); screenings 0.40 ppm (0.13); and germ 0.38 ppm (0.08). Thus the maximum concentration of chlorpyrifos, per se, is from grain (0.05 ppm) to screenings (0.13 ppm) a factor of ca. 2.5X. Based on this study and the proposed tolerance for grain an appropriate tolerance for milling fractions would be 1.5 ppm (of which no more than 0.8 ppm is chlorpyrifos); the proposed tolerance is 1.5 ppm (of which no more than 0.6 ppm is chlorpyrifos).

Soybeans and Soybean forage

Tolerances for soybeans and soybean forage were established with PP#9F2270 (see memo of 4/29/80, E. Leovey). The maximum amount of chlorpyrifos that can be applied per season is 3 lb a.i./A, in separate applications of 0.5 - 2 lb a.i./A. The highest residue found in soybeans was 0.82 ppm (of which 0.20 ppm was chlorpyrifos) which resulted from a total of 5 lb a.i./A (1.7X) and a 38-day PHI (the label PHI is 28 days). Other residue data showed significantly lower levels of which TCP was consistently the majority. These data support the proposed tolerance for soybeans, 0.5 ppm (of which no more

than 0.3 ppm is chlorpyrifos). Processing studies show that residues of chlorpyrifos, per se, (as well as combined residues) do not concentrate in the processed byproducts of soybeans; no food or feed additive tolerances are needed.

The 5 lb a.i./A (1.7X) seasonal rate resulted in maximum residues of 7.3 ppm (of which 0.1 ppm was chlorpyrifos) in soybean forage 14 days after the last application (a 14-day grazing restriction is imposed). However, since other residue data show that parent can comprise >90% of the residue at 14 days or later (seasonal applications of 3 lb a.i./A resulted in combined residues of 2.2 ppm, all of which was parent) we cannot support the proposed tolerance change for soybean forage. We also note that soybean straw samples, taken 51 days after an application of 5 lb a.i./A carried residues of 15.4 ppm of which 14 ppm was parent, further support for our contention that parent can comprise, for practical purposes, the entirety of the residue.

Strawberries

The tolerance for strawberries was established with PP#0E2283 (see memos of 3/19/80 and 2/8/81, E. Leovey). The use is limited to two prebloom applications of 1 lb a.i./A, a use which resulted in maximum residues of to 0.35 ppm (of which 0.13 ppm was chlorpyrifos). These data support the proposed tolerance, 0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos).

Sugar beets, dried pulp and molasses

These tolerances were established with PP#2F2684 (see memo of 1/4/83, J. Mayes). Chlorpyrifos is used to control army worms and cutworms via applications of 0.75 to 1.0 lb a.i./A up to 4 lb a.i./A/season. The petitioner proposes no change in the 1 ppm tolerance for sugarbeets. Processing studies, submitted with PP#6F1745, show concentration of TCP in dry pulp and molasses which is the basis of feed additive tolerances for these items. However, chlorpyrifos, per se, was not detected in molasses and was diminished by at least 50% in dry pulp. The proposed tolerances, 5 ppm (of which no more than 0.5 ppm is chlorpyrifos) for dry pulp and 15 ppm (of which no more than 0.01 ppm is chlorpyrifos) in molasses are supported by these studies.

Sunflower seeds and hulls

The tolerances for sunflower seeds and hulls were established with PP#2F2586/FAB#2H5326. (See memo of 3/5/82, K. Arne). The use involves an at-planting application of Lorsban 15E and foliar applications of Lorsban 4E, up to 9 pts. (4.5 lb. a.i.)/A/Season; the PHI is 42 days. This use resulted

in maximum residues of 0.2 ppm (of which 0.15 ppm was chlorpyrifos) in seeds. A processing study showed residues in hulls to be about twice those found in seeds. These data support the proposed tolerance for sunflower seeds, 0.75 ppm (of which no more than 0.2 ppm is chlorpyrifos), and sunflower hulls, 0.5 ppm (of which no more than 0.4 ppm is chlorpyrifos).

Sweet potatoes

The tolerance for sweet potatoes was established with PP#6F1786 (see memo of 10/21/76, A. Rathman, filed with PP#6F1777). The maximum combined residue found as a result of the label use, a preplant application of 2 lb a.i./A, was 0.09 ppm (of which 0.04 ppm was chlorpyrifos). These data support the proposed tolerance for sweet potatoes, 0.1 ppm (of which no more than 0.05 ppm is chlorpyrifos).

Dried tomato pomace

A tolerance for dried tomato pomace was proposed with FAP#1H5295. However, in our review of that petition we concluded that the proposed use on tomatoes would cause the existing tolerance for tomatoes (0.5 ppm; established for tomatoes imported from Israel and Mexico, PP#8E2092) to be exceeded. We therefore asked for more residue data; until the level in tomatoes is established we cannot make a conclusion as to an appropriate tolerance for tomato pomace (see FAP#1H5295, memo of 11/20/81, K. Arne).

Turnips and turnip greens

The use on turnips is an at-planting or thinning, or after the harvest of greens application of up to 2.25 lb a.i./A (one or two applications a season). Residue data submitted with PP#0F2411 (See PP#0E2412, memo of 1/9/81, E. Leovey), reflect this use and show residues of up to 1.6 ppm (of which 0.9 ppm was chlorpyrifos) for turnips and to 0.7 ppm (of which no more than 0.2 ppm was chlorpyrifos) for turnip greens. The tolerances now proposed, 3 ppm (of which no more than 1 ppm is chlorpyrifos) for turnips and 1 ppm (of which no more than 0.3 ppm is chlorpyrifos) for turnip greens, are supported by the available residue data.

Meat, Milk, Poultry, and Eggs

For cattle, tolerances of 2 ppm are established for meat, fat, and meat byproducts. The petitioner now proposes tolerances for meat and meat byproducts of 2 ppm (of which no more than 0.4 ppm is chlorpyrifos) reasoning as follows: no change is proposed for the fat tolerance. Since the highest residues, by an order of magnitude, are found in fat because chlorpyrifos tends to partition into fat, and since fat comprises about 20% of the carcass the maximum residue in meat and meat byproducts would be 20% of that in fat. These arguments are unacceptable because certain meat products

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(which must be accommodated by the meat tolerance) contain significantly greater than 20% fat. Sausage, for example, may contain 50% fat, bacon even more. Thus, for these meat products the tolerance must be based on residues expected in fat.

Following is a diet expected to provide the maximum potential for secondary residues of chlorpyrifos, per se, in beef cattle.

<u>Feed</u>	<u>ppm chlorpyrifos* per se</u>	<u>% in diet</u>	<u>ppm in diet</u>
alfalfa hay	13	25	3.25
soybean straw	15	10	1.5
corn forage	8	40	3.2
tomato pomace	15	25	3.75
			<u>11.7</u>

* The level listed here and in tables following is that proposed by the petitioner or suggested by us in the preceding section unless no revision is proposed in which case the established tolerance is presumed to consist of chlorpyrifos per se.

Cattle feeding studies (see PP#3F1306) were conducted at 3, 10, 30 and 100 ppm chlorpyrifos in the diet. Maximum residues in muscle, liver, kidney, and fat as a result of the 10 ppm feeding level were 0.07 ppm (0.02 ppm chlorpyrifos), 0.52 ppm (0.03 ppm), 0.55 (0.01) and 0.36 (0.16) ppm, respectively.

Another source of chlorpyrifos in cattle tissues is a dermal treatment (a 0.025% spray not to be applied within 14 days of slaughter) that produces residues of about 1 ppm chlorpyrifos (no detectable TCP) in fat, much less in other tissues.

Based on these data we expect existing uses to result in no more than 1.5 ppm chlorpyrifos in cattle tissue. The tolerance proposals for the meat, fat, and meat byproducts of cattle should be revised to read 2 ppm (of which no more than 1.5 ppm is chlorpyrifos).

For dairy cows the following diet would be expected to provide the greatest potential for secondary residues of chlorpyrifos.

<u>Feed</u>	<u>ppm chlorpyrifos</u>	<u>% in diet</u>	<u>ppm in diet</u>
alfalfa hay	13	75	9.75
tomato pomace	15	25	3.75
			<u>14.5</u>

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Dairy cow feeding studies were submitted with PP#3F1306. Cows fed 10 ppm chlorpyrifos produced milk with residues to 0.04 ppm chlorpyrifos (no detectable TCP) in cream and no detectable residues in whole milk (<0.01 ppm chlorpyrifos, <0.01 ppm TCP). The existing tolerance for milkfat is 0.5 ppm (reflecting 0.02 ppm in whole milk). The petitioner now proposes tolerances of 0.5 ppm (of which no more than 0.25 ppm is chlorpyrifos) for milkfat and 0.02 ppm (of which no more than 0.01 ppm is chlorpyrifos) for whole milk. The data support these tolerances.

Following is a diet expected to provide the greatest potential for secondary residues in hog tissue.

<u>Feed</u>	<u>ppm chlorpyrifos</u>	<u>% in diet</u>	<u>ppm in diet</u>
alfalfa hay	13	50	6.5
grape pomace	2	20	.4
corn grain	105	30	.015
			<u>6.9</u>

Hog feeding studies have been carried out at levels of 1, 3, and 10 ppm chlorpyrifos in the diet. At the 3 ppm level no residues of chlorpyrifos, per se, were found in any tissues except fat which carried residues of to 0.04 pm. At the 10 ppm feeding level combined residues were 0.08 (0.03 ppm chlorpyrifos), 0.09 (<0.01), 0.06 (<0.01), and 0.29 (0.22) ppm for muscle, liver, kidney, and fat, respectively.

As for cattle, the petitioner has proposed a higher tolerance (in terms of chlorpyrifos) for fat than for meat and meat byproducts as follows: 0.5 ppm (of which no more than 0.3 ppm is chlorpyrifos) for fat and 0.5 ppm (of which no more than 0.05 ppm is chlorpyrifos) for meat and meat byproducts. For reasons discussed above, under cattle, these tolerances are unacceptable. Based on a theoretical intake of 6.9 ppm and the above 10 ppm feeding study we conclude that a tolerance of 0.5 ppm (of which no more than 0.2 ppm is chlorpyrifos) would be adequate for the meat, fat, and meat byproducts of hogs. This conclusion is based on the amount of chlorpyrifos that may end up in fat (6.9 ppm/10 ppm X 0.22 ppm = 0.15 ppm).

For horses, goats, and sheep the maximum potential for secondary residues arises from a diet consisting entirely of alfalfa hay, which may carry chlorpyrifos residues of 13 ppm (see alfalfa, above). Based on the cattle feeding study we would expect levels of chlorpyrifos, per se, of 0.21 ppm in the fat of these animals, and considerably less in other tissues. The proposed tolerances, 1 ppm (of which no more than 0.6 ppm is chlorpyrifos) for fat and 1 ppm (of which no more than 0.1 ppm is chlorpyrifos) for meat and meat byproducts are inappropriate for reasons already discussed (see cattle

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discussion, above). We conclude that tolerances of 1 ppm (of which no more than 0.25 ppm is chlorpyrifos) are needed for the meat, fat, and meat byproducts of horses, goats, and sheep.

For poultry the following diet would provide the greatest potential for secondary residues.

<u>Feed</u>	<u>ppm chlorpyrifos</u>	<u>% in diet</u>	<u>ppm in diet</u>
alfalfa seeds	13	20	2.6
cull grapes	0.5	30	.15
soybeans	0.3	20	.06
corn grain	0.05	30	.0015
			<u>2.8</u>

A chicken feeding study was submitted with PP#3F1306. Chickens were fed chlorpyrifos at levels of 0.3, 1, 3, and 10 ppm in the diet. At the 3 ppm feeding level combined residues were <0.06 ppm (<0.01 ppm) for muscle, <0.07 (<0.01) ppm for liver, 0.25 (<0.01) for kidney and 0.07 (0.02) for fat. A registered dermal use for chlorpyrifos on turkeys results in residues of 0.057 ppm (0.054 ppm chlorpyrifos) in fat, 0.012 ppm (<0.002) in muscle, 0.08 ppm (<0.002) in liver, and 0.167 ppm (0.002) in kidney. The tolerances proposed by the petitioner, 0.5 ppm (of which no more than 0.3 ppm is chlorpyrifos) for poultry fat and 0.5 ppm (of which no more than 0.05 ppm is chlorpyrifos) for poultry meat and meat byproducts are inappropriate for reasons discussed earlier. Based on the above data we conclude that a tolerance of 0.5 ppm (of which no more than 0.1 ppm is chlorpyrifos) would be adequate for the meat, fat, and meat byproducts of poultry.

No residues were detected in eggs of chickens that had been fed 10 ppm chlorpyrifos for 45 days. We conclude that the proposed tolerance for eggs, 0.1 ppm (of which no more than 0.01 ppm is chlorpyrifos) is adequate.

Other considerations

We have determined that no crop group tolerances, as allowed by the new crop grouping scheme, are supported by available residue data for chlorpyrifos, either because representative commodities are missing or because the level of residues in a group varies by greater than 5X.

We have considered whether, for the purpose of compatibility with Codex, the U.S. expression of a tolerance should be changed to include parent only. Since residue data for several crops show the metabolite TCP to be the majority of the terminal residue and in some cases the only detectable residue, (e.g., sugar beet molasses) we believe that TCP should remain in the expression of a tolerances.

An International Residue Limit Status sheet is attached.

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INTERNATIONAL RESIDUE LIMIT STATUS

CHEMICAL Chlorpyrifos

PETITION No. 3F2884/3H5396

CCPR NO. 17

Codex Status

Proposed U. S. Tolerances

No Codex Proposal
 Step 6 or above

Residue (if Step 9): _____

Residue: Parent plus
TCP metabolite

chlorpyrifos only

(see attached)

Crop(s) Tol. (ppm)

Crop(s) Limit (mg/kg)

See attached sheets

CANADIAN LIMIT

MEXICAN TOLERANCIA

Residue: _____

Residue: _____

Parent only presumably

Presumably parent only

Crop Limit (ppm)

Crop Tolerancia (ppm)

(See attached)

(See attached)

NOTES: Since the proposed tolerances account for ca. 80% of existing U.S. chlorpyrifos tolerances, this would be an excellent opportunity to comprehensively address Codex compatibility questions. In particular, whether U.S. tolerances can be expressed the same needs to be addressed. Tox deferral? Where commodity descriptions differ, whether the U.S. can use the Codex expression also needs to be addressed. Where there is both an existing and proposed Codex limit, the feasibility of U.S. compatibility with both needs to be addressed.

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SECTION F. PROPOSED TOLERANCES FOR THE PESTICIDE CHEMICAL.

Codex	Canada	Mexico	Tolerances for combined residues of the insecticide chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate] and its metabolite 3,5,6-trichloro-2-pyridinol are proposed as revisions to 40 CFR 180.342 as follows:
none	none	none	4 parts per million (of which no more than 3 ppm is chlorpyrifos) in or on <u>alfalfa, green forage</u> ;
none	none	none	15 parts per million (of which no more than 8 ppm is chlorpyrifos) in or on <u>alfalfa, hay</u> ;
1	none	0.05	1.5 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>apples</u> ;
none	none	none	0.05 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>bananas, pulp with peel removed</u> ;
none	none	1	1 part per million (of which no more than 0.7 ppm is chlorpyrifos) in or on <u>bean forage</u> ;
none	0.18/	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>broccoli</u> ;
none	0.18/	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>Brussels sprouts</u> ;
0.012/ (red cabbage)	0.18/ (cabbage)	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>cabbage</u> ;
21/	none	none	2 parts per million (of which no more than 0.4 ppm is chlorpyrifos) in or on <u>cattle, meat and meat byproducts</u> ;
0.012/	0.18/	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>cauliflower</u> ;
none	none	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>cherries</u> ;
1	0.18/ (cabbages)	none	2 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>Chinese cabbage</u> ;

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Codex	Canada	Mexico	
0.3	none	none	1 part per million (of which no more than 0.6 ppm is chlorpyrifos) in or on <u>citrus fruit</u> ;
none	0.18/ (corn)	0.18/ corn grain)	0.1 parts per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>corn, field, grain</u> ;
none	0.18/ (corn)	none	0.1 parts per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>corn, fresh (inc. sweet, K+CWHR)</u> ;
none	none	0.18/ (forage)	10 parts per million (of which no more than 8 ppm is chlorpyrifos) in or on <u>corn, forage and fodder</u> ;
0.05 ³ /	none	0.5	0.5 part per million (of which no more than 0.2 ppm is chlorpyrifos) in or on <u>cottonseed</u> ;
none	none	none	0.1 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>cucumbers</u> ;
0.01 ³ / (shell free)	none	none	0.1 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>eggs</u> ;
none	none	none	0.1 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>figs</u> ;
none	none	none	1 part per million (of which no more than 0.6 ppm is chlorpyrifos) in or on <u>goats, fat</u> ;
none	none	none	1 part per million (of which no more than 0.1 ppm is chlorpyrifos) in or on <u>goats, meat, and meat byproducts</u> ;
none	none	none	0.5 part per million (of which no more than 0.3 ppm is chlorpyrifos) in or on <u>hogs, fat</u> ;
none	none	none	0.5 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>hogs, meat, and meat byproducts</u> ;

Codex	Canada	Mexico	
none	none	none	1 part per million (of which no more than 0.6 ppm is chlorpyrifos) in or on <u>horses, fat</u> ;
none	none	none	1 part per million (of which no more than 0.1 ppm is chlorpyrifos) in or on <u>horses, meat, and meat byproducts</u> ;
0.14/ (fat basis)	none	none	0.5 part per million (of which no more than 0.25 ppm is chlorpyrifos) in or on <u>milk, fat</u> ;
0.14/ (fat basis)	none	none	0.02 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>milk, whole</u> ;
none	none	none	1 part per million (of which no more than 0.8 ppm is chlorpyrifos) in or on <u>mint, hay</u> ;
none	none	none	0.05 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>nectarines</u> ;
none	none	0.058/	0.05 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>peaches</u> ;
none	none	none	1 part per million (of which no more than 0.7 ppm is chlorpyrifos) in or on <u>pea forage</u> ;
none	none	none	15 parts per million (of which no more than 2 ppm is chlorpyrifos) in or on <u>peanut, hulls</u> ;
none	none	none	0.5 part per million (of which no more than 0.2 ppm is chlorpyrifos) in or on <u>peanuts</u> ;
0.5	none	0.05	0.05 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on
0.5	none	none	1 part per million (of which no more than 0.5 ppm is chlorpyrifos) in or on <u>peppers</u> ;
none	none	none	0.05 part per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>plums, inc. fresh prunes</u> ;

Codex	Canada	Mexico	
0.15/	none	none	0.5 part per million (of which no more than 0.3 ppm is chlorpyrifos) in or on <u>poultry, fat (inc. turkeys);</u>
0.15/	none	none	0.5 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>poultry, meat, and meat byproducts (inc. turkeys);</u>
none	none	none	0.1 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>pumpkins;</u>
none	none	none	3 parts per million (of which no more than 2 ppm is chlorpyrifos) in or on <u>radishes;</u>
none	none	none	3 parts per million (of which no more than 0.5 ppm is chlorpyrifos) in or on <u>rutabagas;</u>
0.2 (beans)	0.18/ (beans & peas)	0.058/ (string beans)	0.1 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>seed and pod vegetables;</u>
none	none	none	1 part per million (of which no more than 0.6 ppm is chlorpyrifos) in or on <u>sheep, fat;</u>
none	none	none	1 part per million (of which no more than 0.1 ppm is chlorpyrifos) in or on <u>sheep, meat, and meat byproducts;</u>
none	none	none	6 parts per million (of which no more than 3 ppm is chlorpyrifos) in or on <u>sorghum, fodder;</u>
none	none	1.5	1.5 parts per million (of which no more than 0.8 ppm is chlorpyrifos) in or on <u>sorghum, forage;</u>
none	none	0.75	0.75 parts per million (of which no more than 0.3 ppm is chlorpyrifos) in or on <u>sorghum, grain;</u>
none	none	none	8 parts per million (of which no more than 6 ppm is chlorpyrifos) in or on <u>sorghum, forage;</u>

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Codex	Canada	Mexico	
none	0.181 (beans)	none	0.5 parts per million (of which no more than 0.3 ppm is chlorpyrifos) in or on <u>soybeans</u> ;
none ^{6/}	0.18/	none	0.5 part per million (of which no more than 0.2 ppm is chlorpyrifos) in or on <u>strawberries</u> ;
none	0.181	none	0.25 parts per million (of which no more than 0.2 ppm is chlorpyrifos) in or on <u>sunflower seeds</u> ;
none	none	0.1	0.1 part per million (of which no more than 0.05 ppm is chlorpyrifos) in or on <u>sweet potatoes</u> ;
none	none	none	1 part per million (of which no more than 0.3 ppm is chlorpyrifos) in or on <u>turnip greens</u> ; and
none	none	none	3 parts per million (of which no more than 1 ppm is chlorpyrifos) in or on <u>turnips</u> ;
			Under the provisions of Section 409 of the Federal Food, Drug, and Cosmetic Act feed additive tolerances for combined residues of the insecticide chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate] and its metabolite 3,5,6-trichloro-2-pyridinol are proposed as revisions to 21 CFR 193.85 as follows:
none	none	none	25 parts per million (of which no more than 15 ppm is chlorpyrifos) in or on <u>citrus oil</u> ;
none	none	none	3 parts per million (of which no more than 1.5 ppm is chlorpyrifos) in or on <u>corn oil</u> ;
none	none	none	10 parts per million (of which no more than 8 ppm is chlorpyrifos) in or on <u>mint oil</u> ; and
none	none	none	1.5 parts per million (of which no more than 0.4 ppm is chlorpyrifos) in or on <u>peanut oil</u> .

Codex	Canada	Mexico	
none	none	none	1.5 parts per million (of which no more than 0.4 ppm is chlorpyrifos) in or on <u>peanut oil.</u>
			Under the provisions of Section 409 of the Federal Food, Drug, and Cosmetic Act feed additive tolerances for combined residues of the insecticide chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate] and its metabolite 3,5,6-trichloro-2-pyridinol are proposed as revisions to 21 CFR 561.98 as follows:
none	none	none	12 parts per million (of which no more than 8 ppm is chlorpyrifos) in or on <u>apple pomace, dried;</u>
none	none	none	5 parts per million (of which no more than 2.5 ppm is chlorpyrifos) in or on <u>citrus pulp, dried;</u>
none	none	none	1 part per million (of which no more than 0.5 ppm is chlorpyrifos) in or on <u>corn soapstock;</u>
none	none	none	1.5 parts per million (of which no more than 0.6 ppm is chlorpyrifos) in or on <u>sorghum, grain, milling fractions;</u>
none ^{7/}	none ^{9/}	none	5 parts per million (of which no more than 0.5 ppm is chlorpyrifos) in or on <u>sugar beets, dried pulp;</u>
none	none	none	15 parts per million (of which no more than 0.01 ppm is chlorpyrifos) in or on <u>sugar beets, molasses;</u>
none	0.1 ^{8/}	none	0.5 parts per million (of which no more than 0.4 ppm is chlorpyrifos) in or on <u>sunflower seed, hulls; and</u>
none	none	none	35 parts per million (of which no more than 15 ppm is chlorpyrifos) in or on <u>tomato pomace^{10/}, dried intended for animal feed when present therein as the result of application of the insecticide to growing crops.</u>

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- 1/ Cattle carcass meat (fat basis).
- 2/ 0.05 ppm proposed (at or about limit of determination)
- 3/ At or about limit of determination.
- 4/ 0.01 ppm proposed on whole milk (1982 JMPR). Limit on milk products would be derived on a fat basis assuming 4% milk fat, except products <2% fat would be 0.005 ppm whole product basis
- 5/ Carcass meat (in carcass fat)
- 6/ There is a Codex 0.2 ppm limit on raspberries
- 7/ There is a Codex 0.05 ppm limit (at or about limit of determination) on sugar beets.
- 8/ Negligible residue type limit.
- 9/ There is a Canadian 0.1 ppm negligible residue tolerance on sugarbeets.
- 10/ Pending tolerance.

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