List A Reregj

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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

JUN 3 1996

MEMORANDUM

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

SUBJECT: **2,4-D.** (030001) Magnitude of the Residue (field corn, rice, sorghum, grass, wheat, and sugarcane) and Processing Studies (field corn, rice, sorghum, sugarcane, and wheat). GDLNs 171-4(k), and 171-4(l).
DP Barcodes: D213641, D214733, D216364, D216606, D216608, D216939, D217132, D217400, D217790, D217980, D218820, D219399, D219400, D219402; CBRS No. 15334, 15519, 15707, 15733, 15754, 15812, 15884, 15886, 15975, 16021; 16152, 16224, 16226, 16238, MRID Nos.: 435921-01, 436108-01, 436108-02, 436860-01, 436937-02, 436978-01, 437180-01, 437180-02, 437361-01, 437361-02, 437479-01, 437795-01 through 437795-04, 437859-01, 436652-01 through 436652-06, 436768-01, 436768-02, 436937-01, 437097-01, 437097-02, 437554-01 and 437554-02; Case No. 0073.

FROM: David J. Miller, HSO, US Public Health Service
Chemistry Pilot Review Team
Chemistry Branch II--Reregistration Support
Health Effects Division (7509C)

THRU: Edward Zager, Branch Chief
Chemistry Branch II--Reregistration Support
Health Effects Division (7509C)

TO: Paula Deschamps, Section Head
Reregistration Section
Risk Characterization and Analysis Branch
Health Effects Division (7509C)

Attached is a review of the registrants submission regarding the magnitude of the residue in field corn, rice, sorghum, grass, wheat, and sugarcane as well as processing studies in field corn, rice, sorghum, sugarcane, and wheat. This information was reviewed by Dynamac Corporation under the supervision of CBRS/HED. The data assessment has undergone secondary review in the Branch and has been revised to reflect Agency policies.

CBRS makes the following conclusions with respect to the submitted studies:

- The GC/ECD method, EN-CAS Method No. ENC-2/93, is adequate for determining 2,4-D residues in/on RACs of field corn, rice, sorghum, grass, wheat, and sugarcane, and in processed commodities from wheat, corn, sorghum, sugarcane, and rice.

- CBRS has reviewed 2,4-D storage stability data provided in an earlier separate submission. Since in no instance did storage intervals associated with the present field trials and processing studies exceed 2-3 years, there are no storage stability concerns associated with the present studies.

- The available field corn data are adequate with sufficient geographic representation. The available data indicate that the current tolerances for grain (0.5 ppm) and forage (20 ppm) are too high and that the current 20 ppm tolerance for corn fodder is too low. The registrants should propose lower tolerances for corn grain and forage. The available data indicate that appropriate tolerances for corn grain and forage would be 0.05 and 6 ppm, respectively, for either a 7 or 14 day PTI. Additional information is required for corn fodder before a recommendation for a corn fodder tolerance can be made. Data on residues of 2,4-D in/on sweet corn (K+CWHR) remain outstanding.

- The submitted rice residue data are adequate with sufficient geographic representation. The field trial results indicate that residues of 2,4-D *are* likely to exceed the established 0.1 ppm tolerance in/on rice grain harvested ~60 days following a postemergence application of 2,4-D at 1.5 lb ae/A. An appropriate tolerance on rice grain would be 0.5 ppm. The data also indicate that the current 20 ppm tolerance on rice straw is too high. The registrants should propose a lower tolerance on rice straw. The available data indicate that a tolerance of 10 ppm would be appropriate.

- The submitted sorghum residue data are adequate with sufficient geographic representation. Based upon the supported use patterns for 2,4-D on grain sorghum, the registrants should propose lower tolerances for sorghum grain, forage, and fodder. The available data indicate that 0.2 ppm would be an appropriate tolerance for sorghum forage with a 30-day PHI, and that 0.05 ppm each would be appropriate tolerances for grain and fodder.

- The available field trial data for wheat are adequate. The available data indicate that the current tolerances for wheat forage (20 ppm) and wheat grain (0.5 ppm) for residues of 2,4-D are be too low. If the registrant prefers a 7-day PHI, the following tolerances must be proposed: 7 ppm for wheat grain, 115 ppm for wheat forage, and 110 ppm for wheat straw and wheat hay. If the registrant prefers a 14-day PHI, the current 20 ppm for wheat forage is

appropriate; however, the tolerances of 4 ppm for wheat grain, and 110 ppm for wheat straw and wheat hay must be proposed.

- The available data for grasses are adequate. The 0-day PTI forage data indicate that the established tolerance of 1000 ppm for grass forage is too high. The registrants should propose a lower tolerance. The available data indicate that a tolerance of 360 ppm would be appropriate. Provided that labels are amended to specify a 7-day PHI for the cutting of grass hay, the available grass hay data indicate that the established tolerance of 300 ppm for grass hay is adequate. Otherwise, the registrants must propose increasing the tolerance on hay to 720 ppm

- Adequate data are available on aspirated grain fractions. Grain dust samples were not available for sorghum and soybeans; however, these data are not required as 2,4-D is applied as an early season or preplant application to both these crops. In addition, residues of 2,4-D were nondetectable in/on sorghum grain (<0.01 ppm) and soybean seeds (<0.05 ppm) treated at 1.5x and 5.5x, respectively. Based upon the corn and wheat data, the registrants should propose a tolerance for aspirated grain fractions. Assuming a 7-day PHI for corn and wheat, the available data indicate that an appropriate tolerance for 2,4-D residues in/on aspirated grain fractions would be 200 ppm. With a 14 day PHI, the appropriate tolerance would be 40 ppm.

- The submitted sugarcane residue data are adequate and indicate that the current 2 ppm tolerance on sugarcane is too high. The registrants should propose a lower tolerance on sugarcane. The available data indicate that a tolerance of 0.05 ppm would be appropriate. The tolerance for sugarcane forage should be revoked as sugarcane forage is no longer considered to be a significant feed item.

- The submitted corn processing data are adequate. The data indicate that residues of 2,4-D do not concentrate in any corn processed commodity and that no Section 409 food/feed additive tolerances or 701 Maximum Residue Limits (MRLs) are required.

- The submitted rice processing data are adequate. Residues of 2,4-D did not concentrate in rice bran or milled white rice, but concentrated by 3.3x in rice hulls, which are not a RTE feed item. The dilution factor for rice hulls is 5x; therfore, no 409 food/feed additive tolerances are required. Based upon the 3.3x concentration factor and HAFT residues of 0.42 ppm for rice grain, the maximum expected residues in/on rice hulls would be 1.4 ppm, which exceeds the recommended 0.5 ppm tolerance. A Section 701 MRL should be established at 1.5 ppm for residues of 2,4-D in/on rice hulls.

- The submitted sorghum processing data are adequate. No 409 tolerances or Section 701 MRLs are required.

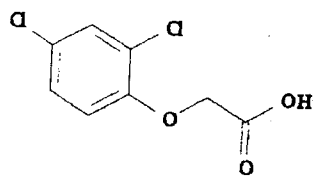
- The submitted sugarcane processing data are not adequate as residues of 2,4-D were below the LOQ (<0.01 ppm) in the cane samples used for processing. Although the present sugarcane processing study is not adequate, sugarcane processing data are available in the 2,4-D Registration Standard (2/16/88). These data indicate that residues can concentrate in molasses up to 7x. An appropriate food/feed additive tolerance for sugarcane molasses (a RTE feed item) would be 0.2 ppm based on the available processing data. The feed additive tolerance for sugarcane bagasse should be revoked as sugarcane bagasse is no longer considered to be a significant feed item.

- The submitted wheat processing data are adequate and indicate that residues of 2,4-D do not concentrate in any wheat processed commodity except wheat bran, in which residues concentrated by 3.6x. As wheat bran is a RTE commodity, Section 409 food/feed additive tolerances should be established. Depending upon whether the registrants prefer a 7- or 14-day PHI, maximum expected 2,4-D residues in wheat bran would be either 22.4 or 11.5 ppm, respectively. Appropriate tolerances for residues of 2,4-D in wheat bran would be either 25 ppm (7-day PHI) or 12 ppm (14-day PHI). Once a tolerance for wheat bran is established, the current 2 ppm food/feed additive tolerances for 2,4-D residues in wheat milled fractions (except flour) should be revoked.

If you need additional information, please advise.

cc: RF, SF, List A Rereg. File, Circ., J. Coombs (SRRD), DJM.
RDI: Pilot Team: 5/14/96;RPerfetti:5/30/96;EZager:5/31/96.

2,4-D



(Shaugh nessy No. 030001, Case No. 0073)

CB Nos. 15707, 15519, 157: 4, 15773, 15884, 15886, 15975, 16021, 16152, 16224, 16226 and 16238; DP Barco es D213641, D214733, D216364, D216606, D216608, D216939, D217132, D2174(0, D217790, D217980, D218820, D219399, D219400, and D219402

REGISTRANT'S RI SPONSE TO RESIDUE CHEMISTRY DATA REQUIREMENTS

BACKGROUND

The 2,4-D Guidance Docume it (9/88) required data depicting residues in/on field corn, rice, sorghum, grass, w heat, and sugarcane commodities following application of representative formulations of all end-use products (EPs) with registered uses on these crops. In response, the Industry Task Force II on 2,4-D Research Data (TF-II), comprised of AGRO-GOI Corporation, DowElanco, Nufarm, and Rhone-Poulenc, submitted field trial protocols that were reviewed by the Agency (CB No. 10020, DP Barcode D179177 11/3/92, W. Smith). In their response, TF II also explained that they would onl be supporting the low volatile ester (2-EHE), amine salt, and acid formulations of 2,4-D. The Agency stated that if no other party agrees to support the use of a l other formulations then these uses must be removed from all product labels.

The TF II has submitted field corn, rice, sorghum, grass, wheat, and sugarcane field trial data (1995; MRIDs 4359 2101, 43610801, 43610802, 43686001, 43693702, 43697801, 43718001, 43718( )2, 43736101, 43736102, 43747901, 43779501 through 43779504, 43785901 43665201 through 43665206, 43676801, and 43676802) and field corn, ric , sorghum, sugarcane, and wheat processing studies (1995; MRID 43693701, 437 9701, 43709702, 43755401 and 43755402). These data are reviewed here to dete rmine their adequacy in fulfilling residue chemistry data requirements. The Conc usions and Recommendations stated in this review

pertain only to residue analytical methods, magnitude of the residue in plants, and magnitude of the residue in processed food/feeds.

The nature of the residue in plants is adequately understood based upon acceptable wheat, lemon, and potato metabolism studies. The nature of the residue in animals is understood based upon acceptable ruminant and poultry metabolism studies. The HED Metabolism Committee (6/16/93) has concluded that the residues of concern in plants and animals is 2,4-D and that there is no need to require data for 2-ethylhexanol in crops treated with the 2-ethylhexyl ester of 2,4-D.

Tolerances for residues of 2,4-D (2,4-dichlorophenoxyacetic acid) in/on plant and processed food/feed commodities are expressed in terms of 2,4-D *per se* [40 CFR §180.142 (a-f, and j), §185.1450 (a), and §186.1450]. Tolerances in animal commodities are currently established in terms of residues of 2,4-D and its metabolite 2,4-dichlorophenol (2,4-DCP) [40 CFR §180.142 (h)]. Adequate methods are available for data collection. Three GC methods with microcoulometric detection (MCD) and one GC method with electron capture detection (ECD) are listed in Pesticide Analytical Method (PAM) Vol. II as Methods A, B, C, and D. The registrant has indicated that these methods are inadequate since no hydrolysis step is incorporated and has proposed a new analytical enforcement method.

The Codex and U.S. tolerance expression for 2,4-D are compatible for plant commodities. Codex MRLs (CXL) for 2,4-D are expressed in terms of parent only and range from 2.0 mg/kg on citrus to 0.05 mg/kg on sorghum and rice. Issues regarding the compatibility of the U.S. tolerances and Codex MRLs will be addressed when the reregistration eligibility decision for 2,4-D is made.

CONCLUSIONS AND RECOMMENDATIONS

Residue Analytical Methods

1. The GC/ECD method, EN-CAS Method No. ENC-2/93, is adequate for determining 2,4-D residues in/on RACs of field corn, rice, sorghum, grass, wheat, and sugarcane, and in processed commodities from wheat, corn, sorghum, sugarcane, and rice. The method has a validated limit of quantitation (LOQ) of 0.01 ppm for each matrix except grass forage and hay (LOQ = 1.0 ppm) and wheat aspirated grain fractions (LOQ = 0.10 ppm).

Storage Stability Data

2. CBRS has reviewed 2,4-D storage stability data provided in an earlier separate submission and concluded that no storage stability concerns or data requirements remain for 2,4-D for each of the three following RAC crop

groupings: (1) oilsee ls or nuts; (2) leafy vegetables; and (3) grains provided that field trial sampl s are not stored for appreciably longer than ca. 2-3 years. CBRS also c ncluded that sufficient storage stability data has been provided to support j rocessed commodities of corn (starch, flour, and oil), wheat flour, sugarca e (sugar, molasses, and bagasse); and rice (bran and hulls) provided that s orage intervals for these 171-4(k) studies do not exceed approximately 2-3 ye rs. Since in no instance did storage intervals associated with the p esent field trials and processing studies exceed 2-3 years, there are no st rage stability concerns associated with the present studies.

Magnitude of the Residues i Plants

3a. Corn. The available ield corn data are adequate, with the registrant conducting a total of 6 tests in the following states: IA, IL, MN, NC, NE, OH, and PA. Seven ests each were conducted with amine salt and low volatile ester formula ons, and two tests were conducted with an acid formulation. As resid e data for the acid, amine salts, and 2-EHE formulations are simil r, CBRS will consider the three formulations to be equivalent.

3b. The available data ind cate that the current tolerances for grain (0.5 ppm) and forage (20 ppm) are t o high and that the current 20 ppm tolerance for corn fodder is too low. Th registrants should propose lower tolerances for corn grain and forage; the available data indicate that appropriate tolerances for corn grain and forage would be 0.05 and 6 ppm, respectively, for either a 7 or 14 day PTI. Addit onal information is required for corn fodder before a recommendation for a corn fodder tolerance can be made. Before a recommendation for a corn fodder tolerance can be made, the registrants must specify the minir um PHI (7 or 14 days) desired on the labels. A 7-day PHI will require a 70 ppm tolerance while a 14 day PHI would require a 35 ppm tolerance.

3c. The registrants must a mend use directions for corn to indicate a maximum seasonal use rate and I HIs. The available data support a maximum seasonal rate of 3 lb ae/A. All labels must indicate a minimum application volume of 2 gal/A of water for a rial applications or submit residue data reflecting ultra low volume aerial appl cations.

3d. Data on residues of 2,4-D in/on sweet corn (K+CWHR) remain outstanding.

4a. Rice. The submitted r ce residue data are adequate with sufficient geographic representation. A total of 10 tests were conducted in AR, CA, LA and TX with the DMA and/or a cid formulations.

4b. The field trial results indicate that residues of 2,4-D *are* likely to exceed the established 0.1 ppm tolerance in/on rice grain harvested ~60 days following a postemergence application of 2,4-D at 1.5 lb ae/A. An appropriate tolerance on rice grain would be 0.5 ppm. The data also indicate that the current 20 ppm tolerance on rice straw is too high. The registrants should propose a lower tolerance on rice straw. The available data indicate that a tolerance of 10 ppm would be appropriate.

4c. Labeled uses for 2,4-D on rice should be amended to specify a single postemergence application at late tillering up to 60 days prior to harvest at a rate up to 1.5 lb ae/A. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

5a. Sorghum. The submitted sorghum residue data are adequate with sufficient geographic representation. A total of 10 tests were conducted in KS, MO, NE, and TX with the 2-EHE, DMA salt, and acid formulations of 2,4-D. As residue data for the amine salt, 2-EHE, and acid were similar, CBRS will consider the formulations to be equivalent

5b. Based upon the supported use patterns for 2,4-D on grain sorghum, the registrants should propose lower tolerances for sorghum grain, forage, and fodder. The available data indicate that 0.2 ppm would be an appropriate tolerance for sorghum forage with a 30-day PHI, and that 0.05 ppm each would be appropriate tolerances for grain and fodder.

5c. The registrants must amend current labels to specify a maximum seasonal use rate and a PHI for forage. The available data support maximum seasonal use rates of 0.5 lb ae/A for low volatile ester formulations and 1.0 lb ae/A for acid and amine salt formulations. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

6a. Wheat. The available field trial data for wheat are adequate, with the registrant conducting a total of 36 tests in CA, GA, KS, MN, ND, OK, and WA depicting residues of 2,4-D in/on wheat forage, grain, and straw. Tests were conducted with the 2-EHE, DMA salt, or acid formulations.

6b. The available data indicate that the current tolerances for wheat forage (20 ppm) and wheat grain (0.5 ppm) for residues of 2,4-D are too low. Following a *single* application at ca. 1.25 lb ae/A of the 2,4-D 2-EHE, DMA, or acid formulations, maximum 2,4-D residues were 112 ppm (7-day PTI) and 19.4 ppm (14-day PTI) in/on wheat forage. For grain, maximum residues of 2,4-D were 6.16 ppm (7-day PTI) and 3.24 ppm (14-day PTI)

following *two* applica ions (61-90 day retreatment interval) at ~1.25 lb ae/A per application (~2.: lb ae/A seasonal total) of the 2,4-D, 2-EHE, DMA, or acid formulations.

6c. From the above infor nation, CBRS makes the following conclusions:

- If the registrar t prefers a 7-day PHI, the following tolerances must be proposed: 7 p)m for wheat grain, 115 ppm for wheat forage, and 110 ppm for v heat straw and wheat hay. The recommended tolerance for wheat hay s based on the residues in wheat straw.

- If the registrar : prefers a 14-day PHI, the current 20 ppm for wheat forage is appr(priate; however, the following tolerances must be proposed: 4 p)m for wheat grain, and 110 ppm for wheat straw and wheat hay. Tl e recommended tolerance for wheat hay is based on the residues in wh at straw.

7a. Grasses. A total of 3 : tests using either the acid, DMA, or 2-EHE formulations were cor ducted in the following states: AR, KS, KY, MI, MO, MT, ND, NE, NY, C K, PA, SD, TN, TX, VA, and WY. Tests were conducted on a repres ntative number of grass species, including: Bermuda grass, Blue gamma, B uegrass, little Bluestem, Bromegrass, Buffalograss, Prairie tall grass, Per(nnial rye, Quack grass, Tall fescue, Timothy, and Western wheat grass. As residue data for the acid, ester, and amine formulations are simil r, no additional field trials are required.

7b. The 0-day PTI forage data indicate that the established tolerance of 1000 ppm for grass forage is too high. The registrants should propose a lower tolerance. The availal le data indicate that a tolerance of 360 ppm would be appropriate. Provide(that labels are amended to specify a 7-day PHI for the cutting of grass hay, t e available grass hay data indicate that the established tolerance of 300 ppm or grass hay is adequate. Otherwise, the registrants must propose increasi g the tolerance on hay to 720 ppm.

7c. The registrants must a nend all product labels registered for use on rangeland and pasture grasses to identify the single and seasonal maximum use rates. The available data sup)ort a maximum use rate of 2 lb ae/A, applied twice with a 30-day retreatm ent interval. All product labels must be amended appropriately. In add ion, labels should be amended to specify a 7-day PHI for the cutting of hay. All labels must also indicate a minimum application volume of 2 gal/A for aerial applications or submit residue data reflecting ultra low volume aeria applications. Several labels (EPA Reg. No. 62719-8, -9, -50, and -182) ind :ate that oil or water/oil mixtures can be used as

diluents. These labels must be amended to indicate that water is the only diluent permitted or the registrants must submit residue data reflecting the use of oil and water/oil mixtures as a diluents.

8. Aspirated grain fractions. Adequate data are available on aspirated grain fractions. Grain dust samples were not available for sorghum and soybeans; however, these data are not required as 2,4-D is applied as an early season or preplant application to both these crops. In addition, residues of 2,4-D were nondetectable in/on sorghum grain (<0.01 ppm) and soybean seeds (<0.05 ppm) treated at 1.5x and 5.5x, respectively.

Based upon the corn and wheat data, the registrants should propose a tolerance for aspirated grain fractions. Assuming a 7-day PHI for corn and wheat, the available data indicate that an appropriate tolerance for 2,4-D residues in/on aspirated grain fractions would be 200 ppm. With a 14 day PHI, the appropriate tolerance would be 40 ppm.

9a. Sugarcane. The registrant conducted a total of eight field trials in the states of FL, HI, and LA on sugarcane. Tests were conducted only with the 2,4-D DMA salt and acid formulations since the registrant has indicated that the 2-EHE will not be supported for this crop.

9b. The submitted sugarcane residue data are adequate and indicate that the current 2 ppm tolerance on sugarcane is too high. The registrants should propose a lower tolerance on sugarcane. The available data indicate that a tolerance of 0.05 ppm would be appropriate. The tolerance for sugarcane forage should be revoked as Table II (9/95) no longer lists sugarcane forage as a RAC.

9c. Labels for low volatile ester forms for 2,4-D should be amended to delete uses on sugarcane, and the remaining 2,4-D labels should indicate a maximum seasonal use rate for sugarcane of 4.0 lb ae/A. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

Magnitude of the Residues in Processed Foods/Feeds

10. Corn. The submitted corn processing data are adequate. The data indicate that residues of 2,4-D do not concentrate in any corn processed commodity and that no Section 409 food/feed additive tolerances or 701 Maximum Residue Limits (MRLs) are required.

11. Rice. The submitted rice processing data are adequate. Residues of 2,4-D did not concentrate in rice bran or milled white rice, but concentrated by 3.3x in rice hulls, which are not a RTE feed item. Based upon the 3.3x concentration factor and HAFT residues of 0.42 ppm for rice grain, the maximum expected residues in/on rice hulls would be 1.5 ppm, which exceeds the recommended 0.5 ppm tolerance. The maximum expected residues of 2,4-D in RTE feeds for cattle and poultry would be 0.28, using a dilution factor of 5.0 for rice hulls in RTE feeds for cattle and poultry. As these levels are below the recommended tolerance for rice, a Section 409 feed additive tolerance is not required for rice hulls. Rather, a Section 701 MRL should be established at 1.4 ppm for residues of 2,4-D in/on rice hulls.

12. Sorghum. The submitted sorghum processing data are adequate. Residues of 2,4-D were below the LOQ (<0.01 ppm) in sorghum flour and starch processed from grain harvested from plants treated at 1.5x the maximum label rate and having residues of <0.01 ppm. No 409 tolerances or Section 701 Maximum Residue Limits are necessary for any processed sorghum commodity. CB notes that requirements for data on residues in sorghum starch and flour have been removed from Table II (9/95).

13a. Sugarcane. The submitted sugarcane processing data are not adequate as residues of 2,4-D were below the LOQ (<0.01 ppm) in the cane samples used for processing. Residues of 2,4-D were also <0.01 ppm in bagasse, molasses (first strike), and sugar processed from treated cane, but residues of 2,4-D were detected at 0.012 ppm in molasses (final strike). Sugarcane for the processing study was treated at only 2x the maximum label rate, and the registrants provided no explanation of why a higher exaggerated rate was not used. In addition, data from the sugarcane field trials indicate that cane samples can be generated that bear detectable residues of 2,4-D.

13b. Although the present sugarcane processing study is not adequate, sugarcane processing data are available in the 2,4-D Registration Standard (2/16/88). These data indicate that residues can concentrate in molasses up to 7x. Based upon HAFT residues of 0.015 ppm in/on cane and the 7x concentration factor, maximum expected residues in first molasses would be 0.105 ppm. Therefore, in conjugation with lowering the tolerance on sugarcane, the food/feed additive tolerance on sugarcane molasses should also be reassessed. An appropriate food/feed additive tolerance for sugarcane molasses (a RTE feed item) would be 0.2 ppm based on the available processing data. The feed additive tolerance for sugarcane bagasse should be revoked as Table II (9/95) no longer lists sugarcane bagasse as a feed item for livestock.

14a. Wheat. The submitted wheat processing data are adequate and indicate that residues of 2,4-D do not concentrate in any wheat processed commodity except wheat bran, in which residues concentrated by 3.6x. As wheat bran is a RTE commodity, Section 409 food/feed additive tolerances should be established. Data from the wheat field studies indicate that HAFT residues in/on wheat grain are 6.16 ppm at a 7-day PHI and 3.19 ppm at a 14-day PHI. Depending upon whether the registrants prefer a 7- or 14-day PHI, maximum expected 2,4-D residues in wheat bran would be either 22.4 or 11.5 ppm, respectively. Appropriate tolerances for residues of 2,4-D in wheat bran would be either 25 ppm (7-day PHI) or 12 ppm (14-day PHI). Once a tolerance for wheat bran is established, the current 2 ppm food/feed additive tolerances for 2,4-D residues in wheat milled fractions (except flour) should be revoked.

14b. The registrants must amend the current labels to indicate a maximum seasonal use rate of 2.5 lb ae/A for wheat as is supported by the residue data. The registrants must also indicate a PHI for grain on the labels of either 7 or 14 days. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

DETAILED CONSIDERATIONS

Residue Analytical Methods

In conjunction with the magnitude of the residue field studies on field corn, grass, rice, sorghum, sugarcane, and wheat (1995; MRIDs 43592101, 43610801, 43610802, 43665201 through 43665206, 43676801, 43676802, 43686001, 43693702, 43697801, 43718001, 43718002, 43736101, 43736102, 43747901, 43779501 through 43779504, and 43785901) and the processing studies on field corn, rice, sorghum, sugarcane and wheat (1995; MRIDs 43693701, 43709701, 43709702, 43755401 and 43755402), the TF-II submitted a description of a GC/ECD method, EN-CAS Method No. ENC-2/93, for determining residues of 2,4-D in various plant commodities and processed fractions. This method has been previously reviewed and deemed adequate for determining 2,4-D residues in/on RACs of various crops (CB No. 14004, DP Barcode D205346, D. Miller, 1/24/96). Sample analyses from the current submission were performed by EN-CAS Analytical Laboratories, Winston-Salem, NC (EN-CAS) or Hazleton Wisconsin, Inc., Madison, WI (HWI).

Briefly, residues are extracted from all plant matrices except corn oils with 0.5 M KOH in ethanol:H_2O (1:1, v/v), filtered and then refluxed for 1 hour in 0.22 M HCl. For corn oils, residues are extracted with 0.5 M KOH in hexane:ethyl acetate (3:1, v/v), and aqueous soluble residues are acidified with 12 N HCl and refluxed

for 1 hour. Hydrolyzed resi ues are then cleaned-up by eluting though a C_{18} solid phase extraction column witl hexane:ethyl acetate (1:1, v/v). Residues are then partitioned into 0.1 M Na_2H O_4, acidified, partitioned into diethyl ether (Et_2O), concentrated to dryness, and hen derivatized to the methyl ester with 14% boron trifluoride in methanol. The erivatized residues are partitioned into 25% toluene in hexane and cleaned-up using an Alumina column prior to analysis by GC/ECD.

Method validation data were ubmitted for processed commodities of corn, rice, sorghum, sugarcane, and wh at. Two to six control samples of each matrix were fortified at levels ranging fro n 0.01-5.0 ppm. Two controls of each matrix were analyzed along with the forti ed samples. Apparent residues of 2,4-D were nondetectable (<0.01 ppm f r all matrices except wheat aspirated grain fractions which were <0.10 ppm) in a l controls. Method validation recoveries were 65-125% and are presented in T ble 1.

In conjunction with sample a alyses, concurrent method recovery data were submitted for RACs of field c orn, grass, rice, sorghum, and sugarcane and for processed fractions of field c rn, rice, sorghum, sugarcane, and wheat. Control samples of each matrix were ortified at 0.01-1000 ppm of 2,4-D. One to two controls of each matrix were nalyzed along with the fortified samples. Apparent residues of 2,4-D were less t an the LOQ in/on control samples of all matrices analyzed with the fortified sa ples. Apparent residues of 2,4-D in control samples analyzed with treated samples are discussed in the Magnitude of the Residue Section under each crop. The LOQ v as 0.01 ppm for each matrix except grass forage and hay (LOQ = 1.0 ppm) and w eat aspirated grain fractions (LOQ = 0.10 ppm). Concurrent method recoveries for all matrices were 63-133% and are detailed in Table 2.

Concurrent and method valida ion recoveries from fortified samples were corrected by the registrants for percent : oisture (hay only) and the molecular weight conversion factor (0.94).

The GC/ECD method, EN-C/ S Method No. ENC-2/93, is adequate for determining 2,4-D residues in/on field cor , grass, rice, sorghum, and sugarcane RACs and in corn, rice, sorghum, sugarcan , and wheat processed commodities. The method has a validated LOQ of 0.01 ppm for each matrix except grass forage and hay (LOQ = 1.0 ppm) and wheat aspirated grain fractions (LOQ = 0.10 ppm).

Table 1. Method validation data for the GC/ECD method, EN-CAS Method No. ENC-2/93, for determining residues of 2,4-D in various RACs and their processed fractions.

Crop	Matrix	Fortification level (ppm)	Number of samples [a]	% Recovery
Wheat	patent flour	0.01	5	74-101
		0.50	2	73, 80
	bran	0.01	2	86, 110
		0.50	2	77, 79
	middlings	0.01	2	74, 76
		0.50	2	84, 90
	shorts	0.01	2	77, 85
		0.50	2	85, 97
	aspirated grain fractions	0.10	2	113, 116
		1.00	2 (1)	111, 125
Corn	starch	0.01	6 (1)	65-87
		0.50	2	75, 85
	grits	0.01	2	92, 105
		0.50	2	89, 92
	meal	0.01	2	96, 100
		0.50	2	86, 91
	flour	0.01	6	81-100
		0.50	2	72, 80
	crude oil	0.01	6	71-104
		0.50	2	84, 88
	refined oil	0.01	2	92, 98
		0.50	2	81, 90
	aspirated grain fractions	0.01	2	93, 99
		0.50	2	95, 97
Sorghum	starch	0.01	2	77, 86
		0.50	2	82, 84
	flour	0.01	2	88, 94
		0.50	2	73, 77
Sugarcane	molasses	0.01	6	82-98
		5.0	2	87, 89
	bagasse	0.01	6	72-110
		5.0	2	83, 83
	sugar	0.01	6	100-107
		2.0	2	73, 80
Rice	hulls	0.01	2 (1)	68, 78
		0.10	2	74, 82
	bran	0.01	2	87, 88
		0.50	2	90, 97
	polished rice	0.01	6	70-90
		0.10	2	78, 80

[a] Values in parentheses represent the number of samples with recovery values outside of the 70-120% range.

Table 2. Concurrent recove ies of 2,4-D from fortified control samples of RACs from field corn, grass, i ce, sorghum, and sugarcane and processed fractions from field corn, rice, so ghum, sugarcane, and wheat.

Crop MRID	Matrix	Fortification level (ppm)	Number of samples [a]	% Recovery
Field corn 43686001, 43693702, 43676801	forage	0.01-10.0	15	73-95
	silage	0.01-10.0	14	78-110
	grain	0.01-20.5	23	73-112
	fodder	0.01-100	22	80-109
Field corn 43709701	starch	0.01, 1.0	2	93, 95
	grits	0.01, 1.0	2	86, 86
	meal	0.01, 0.05	2	106, 109
	flour	0.01, 0.05	2	111, 121
	crude oil	0.05, 0.10	4	85-107
	refined oil	0.01, 0.05	2	100, 128
	grain	0.01-0.10	4	86-110
	aspirated grain fractions	0.01-5.0	4	79-102
Grass 43592101, 43610801 43610802, 43779501 through -04, 43665203 through -05	forage	0.01-1000	65 (7)	64-112
	hay	1.0-1500	58 (4)	65-100
Rice 43747901, 43785901	grain	0.01-0.50	10	81-118
	straw	0.01-0.50	8	72-97
Rice 43755402	grain	0.01, 0.05	2	70, 82
	hulls	0.01, 0.50	2	99, 119
	bran	0.01, 0.50	2	84, 114
	n lled white rice	0.01, 0.05	2	93, 103
Sorghum 43697801, 43718001, 43718002	forage	0.01-0.10	14 (1)	67-114
	grain	0.01-0.10	14	74-93
	fodder	0.02-1.00	12 (3)	100-133
Sorghum 43709702	starch	0.01, 0.05	2	91, 94
	flour	0.01, 0.05	2	96, 88
	grain	0.02-0.20	4	70-93
Sugarcane 43736101, 43736102	forage	0.01-0.50	8	90-117
	cane	0.01-0.20	8	76-108

(continued; footnote follows)

Table 2. Continued.

Crop MRID	Matrix	Fortification level (ppm)	Number of samples [a]	% Recovery
Sugarcane 43755401	cane	0.05, 0.50	2	79, 93
	molasses	0.01, 0.05	4	85-116
	bagasse	0.01, 0.05	2	90, 96
	sugar	0.01, 0.05	2	87, 100
Wheat 43665201, 4366502, and 43676802	forage	0.01-120	19(1)	60-110
	grain	0.01-20	15	71-113
	straw	0.01-20	17 (2)	69-127
Wheat 43693701	bran	0.01-10	4	83-100
	low grade flour	0.01, 0.05	2	97, 93
	patent flour	0.01, 0.05	2	97, 100
	middlings	0.01-5.0	4	76-107
	shorts	0.01-5.0	4	72-93
	grain	0.01, 0.05	2	63, 86
	aspirated grain fractions	0.10-100	3	86-107

[a] Values in parentheses represent the number of samples with recoveries outside of the 70-120% range.

Storage Stability Data

No storage stability data were submitted with the current field trials and processing studies. However, CBRS has reviewed 2,4-D storage stability data provided in an earlier separate submission (D. Miller, 3/19/96, CBRS No. 16425, DP Barcode D220451) and concluded that no storage stability concerns or data requirements remain for 2,4-D for each of the three following RAC crop groupings: (1) oilseeds or nuts; (2) leafy vegetables; and (3) grains provided that field trial samples are not stored for appreciably longer than ca. 2-3 years. CBRS also concluded that sufficient storage stability data has been provided to support processed commodities of corn (starch, flour, and oil), wheat flour, sugarcane (sugar, molasses, and bagasse); and rice (bran and hulls) provided that storage intervals for these 171-4(k) studies did not exceed approximately 2-3 years.

(continued; footnote follows)

All samples from the submitted field trials and processing studies were frozen on the same day of collection with the exception of one set of grass samples collected in MI, which were frozen 48 hours after collection.

Samples from the submitted processing studies were held frozen at unspecified temperatures at the field site and processing facility and at ≤-12 C at the analytical laboratory prior to analysis. All shipments were made on dry ice by overnight carrier. The maximum storage intervals for the submitted field trials and processing studies are presented in Table 3. Since storage intervals in no case exceeded 2-3 years, CBRS concludes that there are no storage stability concerns associated with the field trials or processing studies reviewed in the document.

Table 3. Maximum frozen storage intervals for RACs and processed commodities.

Crop/ MRID	Commodity	Maximum storage interval (days)
Field corn 43686001, 43693702	forage	177
	silage	118
	grain	102
	fodder	174
Field corn 43676801	forage	168
	silage	92
	grain	90
	fodder	117
Field corn - processing study 43709701	grain	102
	processed fractions and aspirated grain fractions	197
Grass 43592101, 43610801 43610802, 43779501-04	forage	273
	hay	315
Grass 43665203 through 4366505	forage	103
	hay	108
Rice 43747901, 43785901	grain	234
	straw	232
Rice - processing study 43755402	grain	245
	hulls, bran, and milled rice	196
Sorghum 43697801, 43718001, 43718002	forage	216
	grain	172
	fodder	279
Sorghum - processing study 43709702	grain	155
	processed fractions	24
Sugarcane	forage	253

Crop/ MRID	Commodity	Maximum storage interval (days)
Sugarcane (cont'd) 43736101, 43736102	cane	383
Sugarcane - processing study 43755401	cane	167
	bagasse	20
	molasses	30
	sugar	22
Wheat 43665201, 43665202, and 43676802	forage	140
	grain	109
	straw	108
Wheat - processing study 43693701	grain	181
	processed fractions and aspirated grain fractions	244

Magnitude of the Residue in Plants

Cereal Grains and Forage, Fodder, and Straw of Cereal Grains Groups

Corn. Tolerances of 0.5 ppm have been established for residues of 2,4-D in/on fresh corn (K+CWHR) and corn grain. Tolerances of 20 ppm have been established for residues of 2,4-D in/on corn fodder and forage [40 CFR §180.142 (b)].

A REFS search dated 7/31/95 identified 17 EPs containing 2,4-D that are registered to members of the TF-II for use on corn. All of these EPs are registered for use on field corn, some are also registered for use on sweet corn and popcorn. These EPs include acid, amine salts, and low volatile ester forms of 2,4-D and consist of one SC/S, five SC/Ls, 10 ECs, and one WP (Table 4). One of these labels (EPA Reg. No. 62719-264) is a formulation containing herbicides other than 2,4-D. These products are registered for preplant, preemergence, emergence, postemergence and preharvest broadcast applications using ground or aerial equipment. Maximum single application rates specified are 1.05-1.9 lb ae/A for preemergence applications, 0.3-1.2 lb ae/A for postemergence applications, and ~1.0 lb ae/A for preharvest applications. With the exception of EPA Reg. No. 62719-264, which specifies a maximum seasonal application of 0.125 lb ae/A and an 85-day PHI, these labels do not specify maximum seasonal use rates or PHIs for corn grain or fresh corn (K+CWHR). Nine of these labels specify a 7-day PHI for feeding or harvesting forage or fodder. Application volumes are unspecified on most of the labels. Six labels specify minimum application volume of 2-3 gal/A by air and 5-10 gal/A by ground; one label (EPA Reg. No. 62719-8) specifies a minimum of 1 gal/A of water for aerial applications.

In response to the 9/88 Gu lance Document and on behalf of the TF-II, DowElanco submitted data (1995; MRI)s 43686001, 43676801, and 43693702) from tests depicting residues of 2,4-D in/on field corn forage, silage, grain, and fodder following applications of 2, l-D. A total of seven side-by-side tests were conducted in IA, IL, MN, NC, NE, (H, and PA with the DMA salt and 2-EHE forms of 2,4-D. In each state, two or th ee applications of 2,4-D DMA salt (3.8 lb ae/gal SC/L) or 2-EHE (3.08 lbs ae/gal] C) were made to corn totaling up to ~3.0 lb ae/A/season; these applicati ns included a preemergence application at ~1 lb ae/A, a directed postemergence ap)lication at ~0.5 lb ae/A (except in MN, 1 lb ae/A) when the corn was 10-16 in hes tall, and a preharvest application at ~1.5 lb ae/A ~14 days prior to normal c op maturity. Two additional concurrent tests using the same use pattern were condi cted concurrently in NC and IA with the 2,4-D acid (85% SC/S). Applications ' ere made using ground equipment in ~5 gal/A of water with retreatment inter als of 30-48 days between the first and second applications and 83-113 day: between the second and third applications.

Forage samples were collect d 7 days following the second application, and silage samples were collected at th dough-dent stage approximately 54-89 days after the second application (1.50-2.0 lb ae/A total applied). Grain and fodder samples were harvested at 7-day (9-day in 'A) and 14-day PTIs following the third application (3.01-3.55 lb ae/A total appl ed).

At the specified PTIs, two tr ated and one control sample of each matrix were collected from each test site,)ut only one treated sample of each matrix/PTI was analyzed per test site. Samp :s were frozen within 2 hours of collection and stored frozen (temperature unspecifi :d) on site for 1-29 days prior to shipment overnight by air carrier on dry ice to EN-(AS. Samples were held at the analytical laboratory at ≤-12 C. Total frozen storag : intervals prior to analysis were as follows: 127-177 days (forage), 31-118 days (s lage), 35-102 days (grain), and 68-174 days (fodder). As indicated earlier under Sto age Stability, CBRS has no storage stability concerns associated with these field tri ls.

Residues were determined usi ig the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in ie Residue Analytical Method section of this report. The LOQ for corn matrices w as 0.01 ppm. Apparent residues of 2,4-D were nondetectable (<0.01 ppm) i /on 16 forage, 16 silage, 32 grain, and 19 fodder control samples. Thirteen foc ler controls bore apparent residues at 0.010-0.063 ppm. Residues in treated con forage, silage, grain, and fodder samples are presented in Table 5.

Following *two* applications to ield corn of 2,4-D as either a DMA salt, 2-EHE, or acid at rates totaling 1.5-2.0 l ae/A, residues of 2,4-D were 0.01-5.2 ppm in/on 16 forage samples collected at a -day PTI and <0.01 ppm-0.33 ppm in/on 16 silage samples collected at 54-89 day PTIs. Following *three* applications of either the

DMA or acid totaling 3.01-3.55 lb ae/A, residues of 2,4-D in/on grain were <0.01-0.038 ppm (~7-9 day PTI, 16 samples) and <0.01-0.015 ppm (14-day PTI, 16 samples), and residues in/on fodder were 3.19-49.8 ppm (~7-day PTI, 16 samples) and 1.44-30.4 ppm (14-day PTI, 16 samples).

Geographic representation is adequate. The 2,4-D Guidance Document required field corn trials in IA, IL, MN, NE, and OH. The registrant has conducted a total of 16 tests in the following states: IA, IL, MN, NC, NE, OH, and PA. Seven tests each were conducted with amine salt and low volatile ester formulations, and two tests were conducted with an acid formulation. As residue data for the acid, ester, and amine formulations are similar, no additional field trials are required.

The available field corn data are adequate. The current submission indicates that following two applications (totaling ~1.5 lb to 2.0 lb ae/A) to field corn of either the 2,4-D DMA salt, the 2-EHE, or the acid, maximum residues of 2,4-D were 5.2 ppm in/on forage collected at a 7-day PTI. Following three applications (totaling ~3.0 lb to 3.6 lb ae/A) of either the DMA salt, 2-EHE, or acid formulation, maximum residues in/on grain were 0.038 ppm at a 7-day PTI and 0.015 ppm at a 14-day PTI, and maximum residues in/on fodder were 49.8 ppm at a 7-day PTI and 25.8 ppm at a 14-day PTI. In addition, TF-II has submitted 6(a)(2) information for corn fodder following application of the acid, DMA, and 2-EHE 2,4-D formulations (5/18/94, J. Coombs). These preliminary data indicated that maximum residues for fodder were 63.9 ppm at a 7-day PTI and 30.4 ppm at a 14-day PTI.

The available data indicate that the current tolerances for grain (0.5 ppm) and forage (20 ppm) are too high and that the current 20 ppm tolerance for corn fodder is too low. The registrants should propose lower tolerances for corn grain and forage; the available data indicate that appropriate tolerances for corn grain and forage would be 0.05 and 6 ppm, respectively, for either a 7 or 14 day PTI. Before a recommendation for a corn fodder tolerance can be made, the registrants must specify the minimum PHI (7 or 14 days) desired on the labels. A 7-day PHI will require a 70 ppm tolerance and a 14 day PHI will require a 35 ppm tolerance.

As the Agency no longer establishes separate tolerances on silage (Updated Livestock Feeds Table II, 9/95), the submitted silage data are used only for informational purposes. Data for sweet corn (K + CWHR) remain outstanding.

The registrants must amend the current labels to indicate the maximum seasonal use rate and PHI supported by the submitted residue data. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

Rice. Tolerances for residues of 2,4-D have been established at 0.1 ppm for rice and 20 ppm for rice straw [40 CFR §180.142 (b)].

Table 4. Active 2,4-D end-use products regis red for use on corn, grasses, rice, sorghum, sugarcane, and wheat to members of Industry Task Force II [DowElanco 52719), Agro-Gor Corp. (61469), Nufarm (61272), and Rhone-Poulenc (264)].

AI (code)/ EPA Reg No.	Formulation [a]	Label Date	Trade Name	Crop Uses [b]					
				corn	rice	sorghum	sugarcane	wheat	grasses
2,4-Dichlorophenoxyacetic acid (030001)									
264-37 [c]	2.8 lb/gal EC	2/94	Weedone® 638 Broadleaf Herbicide	✓		✓		✓	✓
62719-218	85% SC/S	1/94	Statesman®	✓	✓	✓	✓	✓	✓
62719-264 [d]	50% WP	2/95	Broadstrike® Post - Corn	✓					
Dimethylamine 2,4-dichlorophenoxyacetate			**30019)**						
264-2	3.8 lb/gal SC/L	2/94	Weedar® 64 Broadleaf Herbicide	✓	✓	✓	✓	✓	✓
61272-4	5.77 lb/gal SC/L	2/82	CO-OP Weed Out 2,4-D Amine 6 Pound®	✓	✓	✓	✓	✓	✓
62719-1 [e]	3.8 lb/gal SC/L	1/94	Formula 40® Herbicide	✓	✓	✓	✓	✓	✓
62719-2	5.7 lb/gal SC/L	5/94	DMA® 6 Weed Killer	✓	✓		✓		✓
62719-3	3.8 lb/gal SC/L	1/94	DMA® 4 Herbicide	✓	✓	✓	✓	✓	✓
Triisopropanolamine 2,4-dichlorophenoxyac			**tate (30035)**						
62719-48 [f]	2.0 lb/gal EC	1/94	Curtail®					✓	✓
62719-182 [g]	2.0 lb/gal SC/L	1/95	Grazon® P+D						✓
Butoxyethyl 2,4-dichlorophenoxyacetate (30			**53)**						
264-20	3.8 lb/gal EC	2/94	Weedone® LV4 Broadleaf Postemergence Herbicide	✓		✓	✓	✓	✓
264-271	5.7 lb/gal EC	4/94	Weedone® LV6 Broadleaf Postemergence Herbicide	✓		✓	✓	✓	✓
62719-50	3.8 lb/gal EC	4/94	BEE-4	✓		✓	✓	✓	✓
62719-260 [h]	2.0 lb/gal EC	9/94	Crossbow®						✓
2-ethylhexyl 2,4-Dichlorophenoxyacetate (30			**63)**						
264-535	5.4 lb/gal EC	11/94	2,4-D 2-EHE GEL Broadleaf Herbicide®	✓		✓	✓	✓	✓
62719-9	3.8 lb/gal EC	1/94	Weed Killer 4D®	✓		✓		✓	✓
Isooctyl (2-ethyl-4-methylpentyl) 2,4-dichloro			**henoxyacetate (30064)**						
264-517	3.7 lb/gal EC	3/94	Weedone® LV4 IOE Broadleaf Herbicide	✓		✓	✓	✓	✓
264-518	5.4 lb/gal EC	3/94	Weedone® LV6 IOE Broadleaf Herbicide	✓		✓	✓	✓	✓
264-529	3.8 lb/gal EC	3/94	Weedone® NO-SOL 400 Broadleaf Herbicide	✓		✓	✓	✓	✓
62719-8	5.6 lb/gal EC	1/94	steron® 6E Herbicide	✓		✓		✓	✓

[a] The active ingredient for the formulated pro ucts is expressed as the acid equivalent.
[b] Use of each EP on the listed crops is indicat d by a "✓".
[c] EPA Reg. No. 264-37 is a MAI formulation containing both 2,4-D and its butoxyethyl ester for a total acid equivalent of 2.8 lb/gal.
[d] EPA Reg. No. 62719-264 is a MAI formula on that also contains 9.3% flumetsulam and 25% clopyralid.
[e] EPA Reg. No. 62719-1 is a MAI formulatio containing both DMA and triisopropanolamine salts of 2,4-D for a total acid equivalent of 3.8 lb/gal.
[f] EPA Reg. No. 62719-48 is a MAI formulati a that also contains 0.38 lb/gal of clopyralid.
[g] EPA Reg. No. 62719-182 is a MAI formulat on that also contains 0.54 lb/gal picloram.
[h] EPA Reg. No. 62719-260 is a MAI formulat on that also contains 1.0 lb/gal of triclopyr.

Table 5. Residues of 2,4-D in/on field corn forage and silage following two applications and in/on grain and fodder following three applications of 2,4-D acid or DMA salt formulations at ~0.5-1.5 lb ae/A (~3.0 lb ae/A/season, 1x).

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Total Application Rate (lb ae/A)			
43676801	Corn forage	3.08 lb ae/gal EC (2,4-D 2-EHE)	1.50	7	IA	5.2
			1.56		IL	1.05
			2.03		MN	0.684
			1.55		NC	0.877
			1.48		NE	0.025
			1.53		OH	0.478, 0.436
			1.53		PA	2.95
43686001	Corn forage	3.8 lb/gal SC/L (2.4-D DMA)	1.52	7	IA	1.03
			1.53		IL	0.086
			2.02		MN	0.249
			1.55		NC	1.00
			1.51		NE	0.010
			1.56		OH	0.244
			1.53		PA	2.68
43693702	Corn forage	85% SC/S (2,4-D acid)	1.52	7	IA	0.726, 0.475 [b]
			1.50		NC	0.331
43676801	Corn Silage	3.08 lb ae/gal EC (2,4-D 2-EHE)	1.52	70	IA	<0.01, <0.01
			1.56	69	IL	<0.01
			2.03	76	MN	<0.01
			1.55	60	NC	<0.01
			1.49	65	NE	<0.01
			1.53	76	OH	<0.01
			1.53	89	PA	<0.01
43686001	Corn silage	3.8 lb/gal SC/L (2.4-D DMA)	1.5I2	70	IA	<0.01
			1.53	69	IL	<0.01
			2.02	76	MN	<0.01
			1.55	60	NC	<0.01
			1.51	65	NE	<0.01
			1.56	76	OH	<0.01
			1.53	89	PA	<0.01
43693702	Corn silage	85% SC/S (2,4-D acid)	1.52	54	IA	0.33, 0.028, 0.024 [b]
			1.50	59	NC	<0.01
43676801	Corn grain	3.8 lb ae/gal EC (2,4-D 2-EHE)	3.05	7	IA	<0.01
			3.10		IL	0.011
			3.56		MN	<0.01

Table 5. Continued.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Total Application Rate[a] (lb ae/A)			
			3.11		NC	0.029
			2.99		NE	<0.01
			3.08		OH	<0.01
			3.01		PA	<0.01
			3.05	14	IA	<0.01
			3.10		IL	0.012
			3.56		MN	<0.01
			3.11		NC	<0.01
			2.99		NE	0.015
			3.08		OH	<0.01
			3.01		PA	<0.01, <0.01
43686001	Corn grain	3.8 lb/gal S C/L (2.4-D DM A)	3.05	7	IA	<0.01
			3.08		IL	<0.01
			3.55		MN	<0.01
			3.13		NC	0.038
			3.01		NE	0.019
			3.09		OH	0.011
			3.06		PA[c]	<0.01
			3.05	14	IA	<0.01
			3.08		IL	<0.01
			3.55		MN	<0.01
			3.13		NC	<0.01
			3.01		NE	0.013
			3.09		OH	<0.01
			3.06		PA	<0.01
43693702	Corn grain	85% SC/ (2,4-D aci)	3.04	7	IA	<0.01
			3.01		NC	0.016
			3.04	14	IA	<0.01
			3.01		NC	0.01
43676801	Corn fodder	3.8 lb ae/gal EC (2,4-D 2-EH E)	3.05	7	IA	13.7
			3.10		IL	3.62
			3.56		MN	7.34
			3.11		NC	19.7
			2.99		NE	4.95
			3.08		OH	6.43
			3.01		PA	14.73

Table 5. Continued.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Total Application Rate [a] (lb ae/A)			
			3.05	14	IA	30.4
			3.08		IL	1.80, 2.36
			3.55		MN	4.27
			3.13		NC	8.17
			3.01		NE	5.85, 5.36
			3.09		OH	6.01
			3.06		PA	6.37
43686001	Corn fodder	3.8 lb/gal SC/L (2,4-D DMA)	3.05	7	IA	4.09
			3.08		IL	9.06
			3.55		MN	49.8
			3.13		NC	3.19
			3.01		NE	4.36
			3.09		OH	10.6
			3.06		PA [c]	4.20
			3.05	14	IA	1.44
			3.08		IL	3.83
			3.55		MN	25.8
			3.13		NC	10.4
			3.01		NE	4.19
			3.09		OH	3.57
			3.06		PA	3.40
43693702	Corn fodder	85% SC/S (2,4-D acid)	3.04	7	IA	24.97
			3.01		NC	3.31
			3.04	14	IA	13.27, 14.26 [b]
			3.01		NC	1.56

[a] Target application rates for the three applications were 1 lb ae/A (preemergence), 0.5 lb ae/A (directed postemergence), and 1.5 lb ae/A (preharvest).

[b] Duplicate analysis of a single sample.

[c] Corn grain and fodder samples were collected at a 9-day PTI in PA.

A REFS search dated 7/31/95 ident fied six EPs containing 2,4-D that are registered to members of the TF-II for use on rice. These EPs include acid and amine salt forms of 2,4-D and consist of one SC/S and five SC/Ls (Table 4) These products are registered for a postemergence application to rice at the late tillering stage pric : to boot or panicle development using ground or aerial equipment. The maximum applicat on rates specified are 1.2-1.4 lb ae/A. Although no PHIs are directly specified, each label states nat the application should be made prior to panicle initiation or emergence of seed stalks. One l bel (EPA Reg. No. 264-2) also allowsfor an application at 1.0 lb ae/A at up to 4 weeks before pla ting; this is also the only label that specifies a maximum seasonal use rate (1.2 lb ae/A/seaso). With the exception of EPA Reg. No. 264-2, these labels prohibit applications through any ty e of irrigation system. Three labels do not specify minimum application volumes, and three labe ; specify minimum application volumes of 2-6 gal/A by air and 5-15 gal/A by ground. Three of th se labels (EPA Reg Nos. 61272-4, 62719-1, and 62719-218) also prohibit applications to rice pa dies where shellfish are of economic importance or where flood water is used for irrigation of other crops.

In response to the 9/88 Guidance D cument data requirements and on behalf of TF-II, DowElanco submitted data (1995; MRIDs 4374 901 and 43785901) from tests depicting residues of 2,4-D in/on rice grain and straw following a postemergence application of 2,4-D formulated as either the acid or as a DMA salt (no 2-EHE f rmulations are registered for use on rice). A total of ten tests were conducted in AR (3), CA (2), LA (3), and TX (2). In each state, two trials were conducted using 2,4-D formulated as a DMA : alt (3.8 lb ae/gal SC/L); two additional tests were conducted in AR and LA using 2,4-D formulated as the acid (85% SC/S). There are no TF-II registered uses of the 2-EHE on rice. In each test, a ostemergence broadcast application of 2,4-D was made at 1.44-1.61 lb ae/A at tillering prior t first joint. Applications were made using ground equipment in water at 9.6-10.7 gal/A.

Two treated samples and one contro of grain and straw were collected from each test at normal crop maturity, 61-104 days posttrea nent. Samples were frozen within 3 hours of collection and stored frozen (temperature unspecifi d) on site for 4-13 days prior to shipment overnight by air carrier on dry ice to EN-CAS. Sam ples were held at the analytical laboratory at <-12 C. The total frozen storage intervals prior t analysis were 149-234 days for grain samples and 152-232 days for straw samples.

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for rice matrices is 0.01 ppm. With the exception of g rain samples from the LA(2) test site, only one treated sample each of grain and straw was analyze l per test site. Apparent residues of 2,4-D were nondetectable (<0.01 ppm) in/on seven control sa nples each of grain and straw. One control grain sample from TX(1) had apparent residues of 0.01 4 ppm, but reanalysis of this control found residues of <0.01 ppm. One control straw sample fro a LA had apparent residues of 0.011 ppm. Control samples of grain and straw from the CA test had apparent residues of 0.105-0.127 ppm in grain and 0.029-0.036 ppm in straw from app rent contamination when an adjacent field was sprayed with 2,4-D.

Residues in treated grain and straw samples were not corrected for apparent residues in the controls and are presented in Table 6. Following a postemergence application at late tillering of 2,4-D formulated as an acid or DMA salt at a rate of 1.5 lb ae/A (1x), 2,4-D residues were <0.01-0.485 ppm in/on 11 grain samples and 0.056-8.83 ppm in/on 10 straw samples harvested at maturity, 61-104 days posttreatment. However, the registrants reported that residue data from the LA(2) test may be erroneous and should not be used for assessing tolerances: repeated analysis of both treated grain samples from LA(2) detected 2,4-D residues of 0.343-0.485 ppm (average of 0.425 ppm). The report stated that the high residues at the LA(2) test site may have been the result of drift from spraying of 2,4-D on roadsides surrounding the test site, although control grain and straw samples from the adjacent plot had nondetectable residues (<0.01 ppm), indicating that the field was not contaminated. CBRS believes that since repeated analyses of duplicate samples showed high 2,4-D concentrations and control grain and straw from an adjacent plot showed no detectable residues, we can not exclude the LA(2) site for purposes of assessing a tolerance for rice.

Geographic representation is adequate. Field trials were conducted in the states specified in the 9/88 Guidance Document and in the accepted protocol (W. Smith, 11/3/92).

The submitted rice residue data are adequate and indicate that residues of 2,4-D are likely to exceed the established 0.1 ppm tolerance in/on rice grain harvested ~60 days following a postemergence application of 2,4-D at 1.5 lb ae/A. An appropriate tolerance would be 0.5 ppm. The data also indicate that the current 20 ppm tolerance on rice straw is too high. The registrants should propose a lower tolerance on rice straw. The available data indicate that a tolerance of 10 ppm would be appropriate.

Labeled uses for 2,4-D on rice should be amended to specify a single postemergence application at late tillering up to 60 days prior to harvest at a rate up to 1.5 lb ae/A. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

Table 6. Residues of 2,4-D in/on rice rain and straw following a single postemergence application at tillering of 2,4-D acid or DMA salt form ulations at ~1.5 lb ae/A (1x).

MRID	Commodity	Application Data: Formulatic ı	Application Rates (lb ae/A)	PTI (days)	Test Location	2,4-D Residues (ppm)
43785901	Grain	3.8 lb/gal S(/L (2,4-D DM .)	1.59	66	AR(1)	0.032
			1.56	66	AR(2)	0.013
			1.57	104	CA(1)	0.068
			1.57	104	CA(2)	0.082
			1.52	61	LA(1)	0.014
			1.56	62	LA(2) [a]	0.485, 0.988 [b], 0.343, 0.363 0.466, 0.441
			1.45	73	TX(1)	<0.01
			1.57	64	TX(2)	<0.01
43747901	Grain	85% SC/S (2,4-D acic	1.61	66	AR	0.047
			1.44	61	LA	0.011
43785901	Straw	3.8 lb/gal S(/L (2,4-D DM.)	1.59	66	AR(1)	3.06
			1.56	66	AR(2)	1.45
			1.57	104	CA(1)	0.365, 0.320 [c]
			1.57	104	CA(2)	0.056
			1.52	61	LA(1)	5.42
			1.56	62	LA(2)	8.83
			1.45	73	TX(1)	0.736
			1.57	64	TX(2)	1.11
43747901	Straw	85% SC/S (2,4-D acid	1.61	66	AR	2.09
			1.44	61	LA	6.35

[a] Both field samples from LA(2) were a: alyzed; one in quadruplicate and the other in duplicate. The registrant contends that this analysis should be e: cluded as an outlier, but CBRS believes that this would not be appropriate and will consider these data to be valic for the purposes of establishing a tolerance.

[b] The registrants stated that this value is :rror and probably the result of a dilution error during analysis.

[c] Duplicate analysis of a single sample.

Sorghum. Tolerances for residues of 2,4-D have been established at 0.5 ppm for sorghum grain and 20 ppm for sorghum forage and sorghum fodder [40 CFR §180.142 (b)].

A REFS search dated 7/31/95 identified 15 EPs containing 2,4-D that are registered to members of TF-II for use on grain sorghum (milo). These EPs include acid, amine salt, and low volatile ester forms of 2,4-D and consist of one SC/S, four SC/Ls, and ten ECs (Table 4). These products are registered for postemergence broadcast and directed applications when plants are 5 to 15 inches in height. Once plants are ≥8 inches in height, applications should be directed so as to avoid contact with the foliage. All labels prohibit treatments during the boot, flowering, or early dough stages. Applications can be made using ground or aerial equipment. Maximum single application rates are ~0.5 lb ae/A, with the exception of three labels (EPA Reg Nos. 62719-1, -3, and -218) which specify rates of 0.9-1.0 lb ae/A under sections titled "higher rates for special situations." None of the labels specify a maximum seasonal use rate for sorghum. Eight of the labels specify a 7-day PHI/PGI for feeding or harvesting forage or fodder, and none of the labels specify a PHI for grain. Minimum application volumes on 12 labels are 2-6 gal/A for aerial applications and 5-10 gal/A for ground applications. Two labels do not specify minimum application volumes and one label (EPA Reg. No. 62719-8) specifies a minimum of 1 gal/A for aerial applications.

On behalf of TF-II, DowElanco submitted data (1995; MRIDs 43697801, 43718001, and 43718002) from tests depicting residues of 2,4-D in/on sorghum forage, grain, and fodder following a postemergence directed application of 2,4-D formulated as either the acid (85% SC/S; EPA Reg. No. 62719-278), a DMA salt (3.8 lb./gal SC/L; EPA Reg. No. 264-2), or the 2-EHE low volatile ester (3.8 lb/gal EC; EPA Reg. No. 62719-9). A total of 10 tests were conducted in KS (3), MO (2), NE (2), and TX (3). In each state in separate tests, a single postemergence directed application of 2,4-D formulated as the 2-EHE was made at 0.5 lb ae/A, and a single postemergence directed application of 2,4-D formulated as a DMA salt was made at 1.0 lb ae/A. In two additional tests conducted in KS (1) and TX(1), 2,4-D acid was applied as a single postemergence directed application at 1.0 lb ae/A. All applications were made using ground equipment in 5.00-6.47 gal/A when plants were 8-10 inches tall. Forage samples were harvested 26-31 days posttreatment, and grain and fodder samples were harvested at maturity, 82-112 days posttreatment.

One control and two treated samples were collected from each test site. However, only one treated sample was analyzed per test site with the exception of forage from one test in KS. Samples were frozen on the day of collection. All samples were stored frozen (temperature unspecified) at the test site for 4-11 days prior to shipment on dry ice overnight by air carrier to EN-CAS for analysis. The forage samples from TX arrived cold, but not frozen. Samples were held at the analytical laboratory at ≤-12 C. The total frozen storage intervals prior to analysis were 167-216 days for forage, 94-172 days for grain, and 100-279 days for fodder. As indicated earlier under Storage Stability, CBRS has no storage stability concerns with these field trials.

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for sorghum matrices was 0.01 ppm. Apparent residues of 2,4-D were <LOQ (<0.01 ppm) in/on all forage control

samples, eight grain control samp es, and one fodder control sample. Two grain control samples had apparent residues of 0.012 pp n and nine fodder control samples had apparent residues of 0.015-0.048 ppm. Residues in tre ted sorghum forage, grain, and fodder samples were not corrected for apparent residues in he controls (Table 7).

Geographic representation is adeq te to support the use on grain sorghum of 2,4-D formulated as an acid, low volatile ester, or ami e salt. Field trials were conducted in the states specified in the accepted protocol (W. Smith, 11/3 92) and the 2,4-D Guidance Document (9/88).

Following a total seasonal applicat n to sorghum at either 0.5 lb ae/A of the low volatile ester or 1.0 lb ae/A of either the acid or D MA salt formulations, residues of 2,4-D were <0.01-0.162 ppm in/on 11 forage samples harve ted ~30 days after treatment, and <0.01-0.012 ppm in/on 10 grain samples and <0.01-0.042 pp n in/on 10 fodder samples harvested at maturity.

The submitted sorghum residue dat are adequate. Based upon the supported use patterns for 2,4-D on grain sorghum, the registrants should propose lower tolerances for sorghum grain, forage, and fodder. The available data ind cate that 0.2 ppm would be an appropriate tolerance for sorghum forage with a 30-day PHI, and that 0.05 ppm each would be appropriate tolerances for grain and fodder.

The registrants must amend current abels to specify a maximum seasonal use rate and a PHI for forage. The available data support maximum seasonal use rates of 0.5 lb ae/A for low volatile ester formulations and 1.0 lb ae/A f r acid and amine salt formulations. All labels must indicate a minimum application volume of 2 g l/A of water for aerial applications or submit residue data reflecting ultra low volume aerial ap lications.

Wheat. Tolerances of 20 and 0.5 pp m have been established for residues of 2,4-D in/on wheat forage and grain, respectively [40 C R § 180.142 (b)]. No tolerances have been established for straw.

A REFS search dated 7/31/95 identi ed 16 EPs containing 2,4-D registered to members of the TF-II for use on wheat. These end-use p roducts include acid, amine salt, and low volatile ester forms of 2,4-D and consist of four SCs, 11 ECs, and one WP (Table 4). One of these labels (EPA Reg. No. 62719-48) is a MAI formulation containing herbicides other than a form of 2,4-D. These products are registered for broadcast postemergence or preharvest applications using ground or aerial equipment. Single postemerge ce application rates are 0.2-1.4 lb ae/A and single preharvest applications are 0.3-1.4 lb ae/A. Wi h the exception of the MAI label, these labels do not specify maximum seasonal use rates. The M AI label specifies a maximum rate of 0.7 lb ae/A. For all labels except EPA Reg. Nos. 62719-, 62719-3, and 62719-8 applications are to be made in >2 GPA of water. The application volu e is not specified for EPA Reg. Nos. 62719-1 and 62719-3. The EPA Reg. Nos. 62719-8 label sp cifies a minimum of 1 GPA for aerial applications. None of the labels specify a PHI for grain. T e labels specify a pregrazing interval (PGI) for forage

Table 7. Residues of 2,4-D in/on sorghum forage, grain, and fodder following a single postemergence directed application at 0.5-1.00 lb ae/A of 2,4-D formulated as an acid, DMA salt, or low volatile ester.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm) [a]
		Formulation	Application Rate (lb ae/A)			
43697801	Forage	3.8 lb ae/gal EC (2,4-D 2-EHE)	0.5	30	KS	0.037
				26	MO	0.017, 0.021[b]
				30	NE	<0.01
				30	TX	0.030
43718002		85% SC/S (2,4-D acid)	1.0	30	KS	0.058, 0.086 [b]
				30	TX	0.130
43718001		3.8 lb/gal SC/L (2,4-D DMA)	1.0	30	KS	0.128, 0.162[b], 0.162, 0.120[b]
				31	MO	0.028
				30	NE	0.016
				30	TX	0.082
43697801	Grain	3.8 lb ae/gal EC (2,4-D 2-EHE)	0.5	110	KS	<0.01
				84	MO	<0.01
				99	NE	0.011
				82	TX	<0.01
43718002		85% SC/S (2,4-D acid)	1.0	112	KS	<0.01
				82	TX	<0.01
43718001		3.8 lb/gal SC/L (2,4-D DMA)	1.0	110	KS	<0.01
				89	MO	<0.01
				99	NE	0.012
				82	TX	<0.01
43697801	Fodder	3.8 lb ae/gal EC (2,4-D 2-EHE)	0.5	110	KS	0.019
				84	MO	0.011
				99	NE	0.028
				82	TX	<0.01
43718002		85% SC/S (2,4-D acid)	1.0	112	KS	0.033
				82	TX	0.020

(continued; footnotes follow)

Table 7. Continued.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm) [a]
		Formula ion	Application Rate (lb ae/A)			
43718001	Fodder	3.8 lb/gal SC/L (2,4-D D MA)	1.0	110	KS	0.042
				89	MO	0.015
				99	NE	0.013
				82	TX	0.033

[a] Residues were not corrected for contrc recoveries.
[b] Duplicate analysis of a single field san ple.

of 2-weeks for dairy cattle and meat animals being finished for slaughter, except for label EPA Reg. No. 62719-48 that specifies a 1-week PGI for forage. The feeding of treated straw and/or hay is prohibited. This feeding restriction, however, is no longer permitted by the Agency.

In response to the 9/88 Guidance Document data requirements DowElanco, on behalf of TF-II, submitted data (1995; MRIDs 43665201, 43665202, and 43676802) from a total of 36 tests conducted in CA (2 sites, 4 at each site), GA (4), KS (6), MN (4), ND (6), OK (4), and WA (4) depicting residues of 2,4-D in/on wheat forage, grain, and straw. At each test site, up to two applications of either the 2-EHE, formulated as the 3.8 lb ae/gal EC, or the DMA salt formulated as the 3.8 lb ae/gal SC/L, were made at a target rate of 1.25 lb ae/A/application. In tests conducted in ND (2) and KS (2), two applications of the 2,4-D acid, formulated as the 85 WP, were made at target rates of 1.25 lb ae/A/application. Applications were made using ground equipment in ~5 GPA of water with retreatment intervals from 61-90 days. For all tests, samples of forage and hay were harvested at 7 and 14 days after the first application of 1.15-1.41 lb ae/A (1x the stated maximum rate for forage). Samples of grain and straw were harvested 7 and 14 days after the second application (2.42-2.78 lb ae/A total application rate, 1x the stated maximum rate for grain).

Two treated and one control sample were collected from each test site and PTI with the exception of KS. In the field trials using the acid and the DMA formulations (MRIDs 43676802 and 43665202) grain and straw samples were not collected at the KS test site 14 days following the second application due to inadvertent crop destruction. Only one treated sample was analyzed per test. Forage, straw, and grain samples were frozen on the day of collection. Hay samples were air dried for 2-7 days and then frozen. Samples were stored frozen (temperature unspecified) on site for 0-30 days prior to shipment over-night by air carrier on dry ice or by freezer truck to EN-CAS Analytical Laboratories, Winston-Salem, NC where they were stored at <-12 C. Wheat samples were held frozen for a maximum of 140 days (forage) or 109 days (grain and straw) prior to analysis. As indicated earlier under Storage Stability, all storage intervals were less than 1 year and CBRS therefore has no storage stability concerns associated with these field trials.

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for wheat matrices was 0.01 ppm. Hay samples were not analyzed.

Residues of 2,4-D were nondetectable (<0.01 ppm) in/on 24 forage, 27 grain, and 5 straw controls. Apparent residues of 2,4-D were 0.010-0.025 ppm in/on 12 forage controls, 0.010-0.124 ppm in/on 9 grain controls, and 0.010-0.171 ppm in/on 29 straw controls. Residues in treated wheat forage, grain, and straw samples are presented in Table 8.

As shown in the table, residues of 2,4-D were 3.19-112 ppm in/on 18 wheat forage samples collected at a 7-day PTI following a *single* postemergence application of the 2-EHE, acid, or DMA 2,4-D formulations at 1.15-1.41 lb ae/A. At a 14-day PHI, corresponding residues were 0.298-19.4 ppm in/on 18 wheat forage samples. Following *two* postemergence applications of the 2-EHE, acid, or DMA 2,4-D formulations at total rates of 2.42-2.78 lb ae/A, residues of 2,4-D were

0.094-6.16 ppm in/on 18 wheat grai ı samples (7-day PTI) and were 0.289-3.24 ppm in/on 16 wheat grain samples (14-day PTI). 'or straw treated at the same rate as grain, 2,4-D residues were 6.39-94.3 ppm (7-day PTI) in/ ın 18 samples and 5.04-102 ppm (14-day PTI) in/on 16 samples.

Geographic representation is adequat :. The Guidance Document required that tests be conducted in KS or CO, MN, TX or OK, WA. CA, and GA. A total of 32 tests using a representative 2,4-D ester (2-EHE) or amine (DMA) fc rmulation were conducted in KS, MN, OK, WA, CA, GA, and ND. Additional trials were con ucted in several of these states with the 2,4-D acid formulation. Geographic representat on is adequate to support the 2,4-D ester and amine formulations. As residue data for the acid, ester, and amine formulations are similar, no additional field trials are required.

The submitted wheat field trial data re adequate. The available data indicate that the current tolerances for wheat forage (20 ppm and wheat grain (0.5 ppm) for residues of 2,4-D may be too low. Following a *single* application it ca. 1.25 lb ae/A of the 2,4-D 2-EHE, DMA, or acid formulations, maximum 2,4-D residı es were 112 ppm (7-day PTI) and 19.4 ppm (14-day PTI) in/on wheat forage. For grain, max num residues of 2,4-D were 6.16 ppm (7-day PTI) and 3.24 ppm (14-day PTI) following *two* app ications (61-90 day retreatment interval) at ~1.25 lb ae/A per application of the 2,4-D 2-EHE, DMA, or acid formulations.

Some but not all of the labels prohib t the feeding of treated hay and straw to livestock. The Updated Livestock Feeds Table for ubdivision O (Table II, September, 1995) considers wheat hay and straw as RACs. The Agency cu rently disallows feeding prohibitions for wheat straw and hay. Tolerances for wheat straw and hay ıust be proposed. Following two applications at ~1.25 lb ae/A per application of the 2,4-D 2- HE, DMA, or acid formulations, maximum 2,4-D residues were 94.3 ppm (7-day PTI) and 102 ppm (14-day PTI) in/on straw. The registrant provided no information regarding residues in ha . Since dry matter content in hay and straw is similar, CBRS will translate data from straw to hay

From the above information, CBRS nakes the following conclusions:

- If the registrant prefers a 7-d y PHI, the following tolerances must be proposed: 115 ppm for wheat forage, 7 ppm for wheat grain, and 110 ppm for wheat straw and wheat hay. The recommended tolerances for wheat hay are based on the residues in wheat straw.
- If the registrant prefers a 14- ay PHI, the current 20 ppm for wheat forage is appropriate; however, the following tolera ıces must be proposed: 4 ppm for wheat grain, and 110 ppm for wheat straw and wheat ha . The recommended tolerances for wheat hay are based on the residues in wheat straw.

The registrant must amend the current labels to indicate a maximum seasonal use rate of 1.25 lb ae/A for forage/hay and 2.5 lb ae/A for grain as is supported by the residue data. The registrant must also indicate on the labels a PHI for grain of either 7 or 14 days. The current labels specify a PGI of 2-weeks for forage for dairy cattle and meat animals being finished for slaughter, except for label EPA Reg. No. 62719-48 that specifies a 1-week PGI for forage. The registrant must specify clearly on the labels either a 1- or 2-week PGI for forage and propose the appropriate tolerances as described above. The feeding prohibitions for treated hay and straw to livestock must be removed from the labels. A PHI of 7 or 14 days for wheat hay and straw must be indicated on all the labels and the registrant must propose the appropriate tolerances as described above. All labels must indicate a minimum application volume of 2 GPA of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

Table 8. Residues of 2,4-D in/on whea forage following one application and in/on wheat grain and straw following two applications of 2,4-D 2-E 4E, 2,4-D acid, or 2,4-D DMA at ~1.25 lb ae/A/application and harvested at 7 or 14 days after the last t eatment.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulati n	Total Application Rate (lb ae/A)			
43665201	Wheat forage	3.8 lb ae/gal EC (2,4-D 2-Et E)	1.24	7	CA1	32.7
			1.20		CA2	15.4, 20.2 [a]
			1.25		GA	49.6
			1.24		KS	58.1
			1.27		MN	23.5
			1.15		ND	17.6
			1.27		OK	41.8
			1.29		WA	41.1
			1.24	14	CA1	18.1
			1.20		CA2	16.1
			1.25		GA	19.2
			1.24		KS	19.4
			1.27		MN	10.1
			1.15		ND	6.20
			1.27		OK	12.7
			1.29		WA	18.7
43665202	Wheat forage	85 WP (2,4-D acid	1.34	7	KS	35.0
			1.22		ND	4.05, 3.19 [a]
			1.34	14	KS	5.94
			1.22		ND	0.298
43676802	Wheat forage	3.8 lb/gal SC /L (2,4-D DMA)	1.28	7	CA1	8.40, 9.22 [a]
			1.24		CA2	112
			1.25		GA	16.5
			1.28		KS	26.2
			1.28		MN	17.0
			1.41		ND	7.08
			1.28		OK	6.36
			1.27		WA	8.29

Table 8 (*continued*).

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Total Application Rate (lb ae/A)			
43676802 (cont.)	Wheat forage (cont.)	3.8 lb/gal SC/L (2,4-D DMA) (cont.)	1.28	14	CA1	4.89
			1.24		CA2	6.33
			1.25		GA	4.23
			1.28		KS	8.49, 9.99 [a]
			1.28		MN	6.07
			1.41		ND	0.862
			1.28		OK	4.38
			1.27		WA	3.58
43665201	Wheat grain	3.8 lb ae/gal EC (2,4-D 2-EHE)	2.44	7	CA1	0.853
			2.49		CA2	0.873
			2.50		GA	1.47, 1.57 [a]
			2.50		KS	0.504, 0.387
			2.56		MN	0.414
			2.42		ND	0.679
			2.56		OK	3.41
			2.50		WA	2.51
			2.44	14	CA1	0.490
			2.49		CA2	1.34
			2.50		GA	0.693
			2.50		KS	3.24, 3.12
			2.56		MN	0.289
			2.42		ND	0.852
			2.56		OK	1.34, 1.18
			2.50		WA	0.864
43665202	Wheat grain	85 WP (2,4-D)	2.65	7	KS	0.094
			2.49		ND	0.310
			2.65	14	KS	NA
			2.49		ND	0.391
43676802	Wheat grain	3.8 lb/gal SC/L (2,4-D DMA)	2.49	7	CA1	2.86
			2.51		CA2	1.92
			2.50		GA	1.22, 1.65 [a]
			2.78		KS	0.863
			2.57		MN	0.792
			2.69		ND	1.04
			2.56		OK	6.16
			2.54		WA	2.46

Table 8 (*continued*).

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formula on	Total Application Rate (lb ae/A)			
43676802 (cont.)	Wheat grain (cont.)	3.8 lb/gal C/L (2,4-D DI IA) (cont.)	2.49	14	CA1	2.37
			2.51		CA2	1.84
			2.50		GA	0.839
			2.78		KS	— [b]
			2.57		MN	0.466
			2.69		ND	1.15
			2.56		OK	2.76, 1.81 [a]
			2.54		WA	1.02
43665201	Wheat straw	3.8 lb ae/ga EC (2,4-D 2-E IE)	2.44	7	CA1	73.0
			2.49		CA2	76.1
			2.50		GA	21.7, 20.3 [a]
			2.50		KS	26.0
			2.56		MN	65.7
			2.42		ND	16.8
			2.56		OK	22.6
			2.50		WA	19.0
			2.44	14	CA1	51.8
			2.49		CA2	65.4
			2.50		GA	17.3
			2.50		KS	17.1
			2.56		MN	16.2
			2.42		ND	17.4
			2.56		OK	11.6, 15.7 [a]
			2.50		WA	8.49
43665202	Wheat straw	85 WP (2,4-D acid	2.65	7	KS	6.77
			2.49		ND	6.39
			2.65	14	KS	NA
			2.49		ND	5.04
43676802	Wheat straw	3.8 lb/gal SC. (2,4-D DMA	2.49	7	CA1	79.8
			2.51		CA2	94.3
			2.50		GA	52.6
			2.78		KS	8.48
			2.57		MN	75.8
			2.69		ND	30.1
			2.56		OK	11.0
			2.54		WA	60.4, 62.8 [a]

Table 8 (*continued*).

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Total Application Rate (lb ae/A)			
43676802 (cont.)	Wheat straw (cont.)	3.8 lb/gal SC/L (2,4-D DMA) (cont.)	2.49	14	CA1	65.5
			2.51		CA2	102
			2.50		GA	5.42, 5.27 [a]
			2.78		KS	--- [b]
			2.57		MN	34.1
			2.69		ND	21.4
			2.56		OK	11.1, 12.7 [a]
			2.54		WA	32.9

[a] Duplicate analysis of a single sample.
[b] Grain and straw samples were not collected at the KS test site 14 days following the second application due to inadvertent crop destruction.

Grass Forage, Fodder, and Hay Gr(ıp

Grasses. Tolerances of 300 and 10( ) ppm have been established for residues of 2,4-D in/on grass hay and pasture/rangeland grasses, ı :spectively [40 CFR §180.142 (b)]. Tolerances for residues of 2,4-D in/on forage grasses resulting from 2,4-D DMA salt application to irrigation ditch banks have been established at 0.1 ppm [4 ı CFR §180.142 (c)]. Tolerances for residues of 2,4-D in/on forage grasses resulting from 2,4-D)MA salt application for water hyacinth control in ponds, lakes, reservoirs, marshes, bayous, ı rainage ditches, canals, rivers and streams have been established at 1.0 ppm [40 CFR §18).142 (f)].

A REFS search dated 7/31/95 identi ied 19 EPs containing 2,4-D that are registered to members of TF-II for use on pasture and rangela ıd grasses. REFS also listed one EP (EPA Reg. No. 62719-67) as having pasture and rangeland ıses; however, the actual label only lists uses on turf grass. These EPs include acid, amine salt, ınd low volatile ester forms of 2,4-D and consist of one SC/S, six SC/Ls, and 12 ECs (Table 4). ' hree of these labels (EPA Reg Nos. 62719-48, -182, and -260) are MAIs containing herbicides other than some form of 2,4-D, and one product (EPA Reg. No. 61719-182) is restricted to use i ı regions west of the Mississippi River and to AL, GA, LA, and MS. Fifteen of these products ; re registered for ground or aerial broadcast applications at maximum single application rates of 1.4-2.0 lb ae/A. The other four labels (EPA Reg Nos. 62719-9, 264-20, -517, and -529) li t maximum single application rates of 2.8-3.8 lb ae/A. None of these labels indicate a maximum : easonal application rate. For all labels except EPA Reg. Nos. 62719-1, -8, and -182, aerial and gr)und applications are to be made in a minimum of 2 and 5 gal/A of water, respectively. The n inimum application volume is not specified on EPA Reg. No. 62719-1, and a minimum of 1 gal/A for aerial applications is specified on EPA Reg Nos. 62719-8 and -182. Four of these labels (EP/ Reg. Nos. 62719-8, -9, -50, and -182) also allow applications in oil or oil/water mixtu es. Sixteen of the labels list the following restrictions: a PGI of 7 days following treatment; ; PHI of 30 days for grass cut for hay; and a pre-slaughter interval of 3 days for animals feedin ; upon treated areas.

In response to the 9/88 Guidance D(ument data requirements and on behalf of TF-II, DowElanco submitted data (1995; MRIDs 43592 101, 43610801, 43610802, 43665203, 43665205 and 43779501 through 43779504) from t sts depicting residues of 2,4-D in/on grass forage and hay following application of 2,4-D as a) MA salt (3.8 lb/gal SC/L), 2-EHE (3.8 lb/gal EC) or 85% WP acid formulation. A total of 32 tests were conducted in the following states: AR (1), KS (6), KY (1), MI (2), MO (3), MT (1), N E (1), ND (1), NY (1), OK (7), PA (3), SD (1), TN (1), TX (1), VA (1), and WY (1). Two postemergence broadcast applications of 2,4-D formulated as either a DMA salt or 2-EHE were n ıde to grass at ~2.0 lb ae/A/application, totaling 3.87-4.40 lb ae/A (1x the maximum stated applic tion rate). In 26 of the tests, samples of forage and hay were harvested at 0 and 7 days after the s cond application. In the remaining 6 tests, forage and hay samples were harvested at 14, 21, a d 30 days after the second application. Applications were made using ground equipment in ~: gal/A of water at retreatment intervals of 29-33 days. After cutting, hay samples were dried for 0 hours to 7 days prior to sample collection.

Two treated and one control sample were collected from each test site at each PTI. Only one treated sample was analyzed per test. All samples were frozen on the day of collection with the exception of one set of grass samples collected in MI at the 21-day PTI, which were frozen 48 hours after collection. Total frozen storage intervals prior to analysis were 52-273 days for forage and 69-315 days for hay. As indicated earlier under Storage Stability, CBRS has no storage stability concerns associated with these field trials.

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for grass matrices was 1.0 ppm. Apparent residues of 2,4-D were nondetectable (<1.0 ppm) in/on 69 forage and 70 hay controls. On forage control bore residues of 1.10 ppm. Residues in treated samples are presented in Table 9.

Immediately (0-day) following two applications to grass of 2,4-D as either the DMA salt or 2-EHE formulation totaling 3.87-4.40 lb ae/A, residues of 2,4-D were 90.4-358 ppm in/on 26 grass forage samples and were 114-719 ppm in/on 27 grass hay samples. At these same application rates with a ~7-day PTI, residues were 19-179 ppm in/on 26 forage samples and 15.1-279 ppm in/on 26 hay samples. Following two applications of 2,4-D (DMA salt or 2-EHE) totaling 3.9-4.1 lb ae/A, residues in/on forage declined from 36.1-155 ppm at a 14-day PTI (6 samples) to 34.1-74.2 ppm at a 30-day PTI (6 samples). Residues in/on hay declined from 42.7-206 ppm at a 14-day PTI (6 samples) to 46.6-150 ppm at a 30-day PTI (6 samples).

Geographic representation is adequate. The Guidance Document required that pasture and rangeland grass field trials be conducted in AR, KS, KY, MO, MT, ND, NE, NY, OK, PA, SD, TN, TX, VA, and WY. A total of 32 tests using either the acid, DMA, or 2-EHE formulations were conducted in the following states: AR, KS, KY, MI, MO, MT, ND, NE, NY, OK, PA, SD, TN, TX, VA, and WY. Tests were conducted on a representative number of grass species, including: Bermuda grass, Blue gamma, Bluegrass, little Bluestem, Bromegrass, Buffalograss, Prairie tall grass, Perennial rye, Quack grass, Tall fescue, Timothy, and Western wheat grass. As residue data for the acid, ester, and amine formulations are similar, no additional field trials are required.

The majority of grass data (26 out of 32 tests) submitted by the TF-II depicts residues of 2,4-D in/on grass forage and hay from 0- and 7-day PTIs. These data are summarized in Table 10. Following two applications to grass totaling ~4.0 lb ae/A/season of 2,4-D (acid, amine salt, and low volatile ester), maximum residues in/on grass forage were 271-358 ppm at the 0-day PTI and 94-179 ppm at the 7-day PTI; maximum residues in/on grass hay were 572-719 ppm at the 0-day PTI and 210-279 ppm at the 7-day PTI. For postemergence applications to grasses, the Agency currently considers feeding restrictions and PHIs greater than zero days impractical for forage of pasture and rangeland grasses (Updated Livestock Feeds Table, 9/95). Grass forage tolerances are set using 0-day PTI residue data. However, reasonable PHIs are allowed for the cutting of grass hay.

Table 9. Residues of 2,4-D in/on range and and pasture grass forage and hay following two applications of 2,4-D acid or DMA salt formulation at ~2.0 lb ae/A (~4.0 lb ae/A/season, 1x) and harvested at 0-30 days after the last treatment.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Single Application Rates (lb ae/A) [a]			
43592101	Grass forage	3.8 lb/gal EC (2,4-D 2-EHE)	2.1, 2.3	0	KS	177
			2.0, 2.0		MT	285
			2.0, 2.0		NE	154
			2.0, 2.0		OK	258
			2.0, 2.0		SD	182
			2.1, 2.3	7	KS	44.9
			2.0, 2.0		MT	160, 179 [b]
			2.0, 2.0		NE	20.3
			2.0, 2.0		OK	73.6
			2.0, 2.0		SD	31.9
43665203	Grass forage	3.8 lb ae/gal EC/L (2,4-D DMA)	2.0, 1.92	0	AR	173
			2.08, 2.05		KS	169
			2.02, 2.00		MO	172
			2.02, 2.07		NY	92
			2.04, 2.03		OK	236
			1.99, 2.04		PA	233
			2.02, 2.06		TN	198
			2.0, 1.92	7	AR	86.3
			2.08, 2.05		KS	117
			2.02, 2.00		MO	122
			2.02, 2.07		NY	60.6
			2.04, 2.03		OK	46.3
			1.99, 2.04		PA	41.2
			2.02, 2.06		TN	107
43665205	Grass forage	85 WP (2,4-D acid)	2.0, 2.05	0	KS	170, 154 [b]
			2.1, 2.05		OK	271
			2.0, 2.05	7	KS	19.0
			2.1, 2.05		OK	41.3
43665204	Grass forage	85 WP (2,4-D acid)	2.08, 2.09	0	KS	135
			1.97, 2.08		PA	153
			2.08, 2.09	7	KS	93.5
			1.97, 2.08		PA	38.6
43610801	Grass forage	3.8 lb/gal SL/L (2,4-D DMA)	2.0, 2.21	0	KS	241
			2.01, 2.02		ND	314
			2.03, 2.07		OK	280
			1.88, 1.99		WY	194
			2.0, 2.21	7	KS	22.5

Table 9. Continued.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Single Application Rates (lb ae/A) [a]			
43610801 (cont'd)	Grass forage (cont'd)	3.8 lb/gal SC/L (2,4-D DMA) (cont'd)	2.01, 2.02		ND	34.5
			2.03, 2.07		OK	49.0
			1.88, 1.99		WY	21.2, 19.2 [b]
43610802	Grass forage	3.8 lb/gal EC (2,4-D EHE)	2.07, 1.98	0	KS	223
			2.05, 2.04		KY	90.4
			2.06, 2.05		OK	311
			1.98, 2.02		PA	358
			2.32, 2.02		TX	192
			1.91, 2.07		VA	183
			2.07, 1.98	7 [c]	KS	103
			2.05, 2.04		KY	107, 99.2 [b]
			2.06, 2.05		OK	40.9
			1.98, 2.02		PA	117, 132 [b]
			2.32, 2.02		TX	82.3
			1.91, 2.07		VA	106, 134 [b]
43779501	Grass forage	3.8 lb/gal EC (2,4-D 2-EHE)	2.02, 2.01	14	MI	155
			1.96, 1.96		MO	87.2
			2.02, 2.01	21	MI	116
			1.96, 1.96		MO	85.1
			2.02, 2.01	30	MI	74.2
			1.96, 1.96		MO	44.5
43779502	Grass forage	3.8 lb/gal SC/L (2,4-D 2-DMA)	2.01, 2.03	14	MI	53.1
			1.98, 2.00		MO	121
			2.01, 2.03	21	MI	24.7
			1.98, 2.00		MO	139
			2.01, 2.03	30	MI	34.1
			1.98, 2.00		MO	67.9
43779503	Grass forage	3.8 lb/gal EC (2,4-D 2-EHE)	2.07, 2.00	14	OK	61.9
			2.07, 2.00	21	OK	70.9
			2.07, 2.00	30	OK	43.6
43779504	Grass forage	3.8 lb/gal SC/L (2,4-D 2-DMA)	2.07, 2.00	14	OK	36.1
			2.07, 2.00	21	OK	46.2
			2.07, 2.00	30	OK	42.5
43592101	Grass hay	3.8 lb/gal EC (2,4-D 2-EHE)	2.1, 2.3	0	KS	114
			2.0, 2.0		MT	254, 234 [b]
			2.0, 2.0		NE	275
			2.0, 2.0		OK	162
			2.0, 2.0		SD	239

Table 9. Continued.

MRID	Commodity	Application Data					
		Formula on	Single Application Rates (lb ae/A) [a]	PTI (days)	Test Location	2,4-D Residues (ppm)
43592101 (cont'd)	Grass hay (cont'd)		2.1, 2.3	7	KS	68
			2.0, 2.0		MT	180
			2.0, 2.0		NE	65
			2.0, 2.0		OK	143
			2.0, 2.0		SD	96.1
43610801	Grass hay	3.8 lb/gal C/L (2,4-D DI A)	2.0, 2.21	0	KS	183
			2.01, 2.02		ND	402
			2.03, 2.07		OK	229
			1.88, 1.99		WY	161
			2.0, 2.21	7	KS	60.5
			2.01, 2.02		ND	38.8
			2.03, 2.07		OK	101
			1.88, 1.99		WY	21.8, 15.1 [b]
43610802	Grass hay	3.8 lb/gal C (2,4-D EH E)	2.07, 1.98	0	KS	329.7
			2.05, 2.04		KY	575
			2.06, 2.05		OK	526
			1.98, 2.02		PA	457.3
			2.32, 2.02		TX	477
			1.91, 2.07		VA	365
			2.07, 1.98	7 [c]	KS	141.6
			2.05, 2.04		KY	197
			2.06, 2.05		OK	126
			1.98, 2.02		PA	181.6
			2.32, 2.02		TX	147
			1.91, 2.07		VA	210
43665203	Grass hay	3.8 lb ae/gal C/L (2,4-D DM)	2.0, 1.92	0	AR	428
			2.08, 2.05		KS	426
			2.02, 2.00		MO	378
			2.02, 2.07		NY	118
			2.04, 2.03		OK	388
			1.99, 2.04		PA	451
			2.02, 2.06		TN	719
43779501	Grass hay	3.8 lb/gal E (2,4-D 2-EH)	2.02, 2.01	14	MI	103
			1.96, 1.96		MO	142
			2.02, 2.01	21	MI	64.9
			1.96, 1.96		MO	96.3
			2.02, 2.01	30	MI	46.6
			1.96, 1.96		MO	60.5

Table 9. Continued.

MRID	Commodity	Application Data		PTI (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Single Application Rates (lb ae/A) [a]			
43779502	Grass hay	3.8 lb/gal SC/L (2,4-D 2-DMA)	2.01, 2.03	14	MI	50.1
			1.98, 2.00		MO	206
			2.01, 2.03	21	MI	44.7
			1.98, 2.00		MO	156
			2.01, 2.03	30	MI	50.2
			1.98, 2.00		MO	107
43779503	Grass hay	3.8 lb/gal EC (2,4-D 2-EHE)	2.07, 2.00	14	OK	115
			2.07, 2.00	21	OK	124
			2.07, 2.00	30	OK	150
43779504	Grass hay	3.8 lb/gal SC/L (2,4-D 2-DMA)	2.07, 2.00	14	OK	42.7
			2.07, 2.00	21	OK	82.0
			2.07, 2.00	30	OK	68.4

[a] Retreatment intervals ranged from 29-33 days.
[b] Duplicate analysis of a single sample.
[c] Samples for OK were collected at an 8-day PTI.

Table 10. Summary of 2,4-D residues in/on grass forage and hay harvested 0-7 days following two applications of 2,4-D formulated as an acid, DMA salt, or 2-EHE at ~2.0 lb ae/A (~4.0 lb ae/A/season, 1x).

Commodity	PTI (days)	2,4-D Formulation	2,4-D Residues (ppm)	Residue Tests	
				Number [a]	Locations (States)
Forage	0	DMA	92-314	11	AR, KS(2), MO, ND, NY, OK(2), PA, TN, WY
		2-EHE	90-358	11	KS(2), KY, MT, NE, OK(2), PA, SD, TX, VA
		Acid	135-271	4	KS(2), OK, PA
	7	DMA	19-122	11	AR, KS(2), MO, ND, NY, OK(2), PA, TN, WY
		2-EHE	20-179	11	KS(2), KY, MT, NE, OK(2), PA, SD, TX, VA
		Acid	39-93.5	4	KS(2), OK, PA
Hay	0	DMA	118-719	11	AR, KS(2), MO, ND, NY, OK(2), PA, TN, WY2
		2-EHE	114-575	11	KS(2), KY, MT, NE, OK(2), PA, SD, TX, VA
		Acid	170-572	4	KS(2), OK, PA
	7	DMA	15-279	11	AR, KS(2), MO, ND, NY, OK(2), PA, TN, WY
		2-EHE	65-210	11	KS(2), KY, MT, NE, OK(2), PA, SD, TX, VA
		Acid	41-218	4	KS(2), OK, PA

[a] One sample from each test site was analyzed.

The 0-day PTI forage data indicate that at the established tolerance of 1000 ppm for grass forage is too high. The registrants should propose a lower tolerance. The available data indicate that a tolerance of 360 ppm would be appropriate. Provided that labels are amended to specify a 7-day PHI for the cutting of grass hay, the available grass hay data indicate that the established tolerance of 300 ppm for grass hay is adequate. Otherwise, the registrants must propose increasing the tolerance on hay to 720 ppm.

The registrants must amend all product labels registered for use on rangeland and pasture grasses to identify the single and seasonal maximum use rates. The available data support a maximum use rate of 2 lb ae/A, applied twice with a 30-day retreatment interval. All product labels must be amended appropriately. In addition, labels should be amended to specify a 7-day PHI for the cutting of hay. All labels must also indicate a minimum application volume of 2 gal/A for aerial applications or submit residue data reflecting ultra low volume aerial applications. Several labels (EPA Reg. No. 62719-8, -9, -50, and -182) indicate that oil or water/oil mixtures can be used as diluents. These labels must be amended to indicate that water is the only diluent permitted or the registrants must submit residue data reflecting the use of oil and water/oil mixtures as a diluents.

Miscellaneous Commodities

Aspirated grain fractions. The Updated Livestock Feeds Table II for Subdivision O (6/2/94) reclassified aspirated grain fractions (previously called "grain dust") as a RAC and required data for aspirated grain fractions from corn, wheat, sorghum, and soybeans for postharvest uses and for preharvest uses after the reproductive stage begins. Agency guidance on aspirated grain fractions (E. Saito and E Zager, 6/94) indicates that when a pesticide is used on several of these crops, the crop with the highest residues in the dust will be used to establish the tolerance. The Chemistry Branch Guidance Document also indicates that ca. 50% of the aspirated grain fraction should consist of particles of less than 425 μm in diameter, but the fractionation performed by the registrant showed that these fines comprised in many cases less than 5-10% of the grain dust. Since this is not a post-harvest application, the Agency believes that this will not significantly affect the calculated concentration factor and will consider the aspirated grain fraction study acceptable.

The registrants have provided adequate data on residues in aspirated grain fractions from corn and wheat (1995; MRID 43709701 and 43693701) in conjunction with the corn and wheat processing studies discussed below under Magnitude of the Residue in Processed Feed/Food.

Corn: Following the last of three applications of 2,4-D totalling a seasonal rate of 4.5 lb ae/A (1.5x the stated maximum use rate), 2,4-D residues in/on corn aspirated grain fractions were 2.2 ppm at a 7-day PHI, concentrating 39 times (see Table 12). Using the 7-day and 14 day HAFT values of 0.038 ppm and 0.015 ppm, respectively, and the 7-day PHI concentration factor, tolerances for aspirated grain fractions of 1.5 ppm (7-day PHI) or 0.6 ppm (14-day PHI) would be necessary.

Wheat: Following two applications of 2,4-D 2-EHE at a seasonal rate of 2.5 lb ae/A (1x the stated maximum use rate), 2,4-D residues in/on wheat aspirated grain fractions were 46.9 ppm and 79.9 ppm at a 7-day PHI and 3.79 ppm and 9.99 ppm at a 14-day PHI, concentrating an average of 32.4 and 11.2 times, respectively (see Table 15). Using the 7-day and 14 day HAFT values of 6.16 ppm and 3.24 ppm, respectively, and the average 7- or 14- day PHI concentration factors, tolerances for wheat aspirated grain fractions of 200 ppm (7-day PHI) or 40 ppm (14-day PHI) would be necessary.

Sorghum: Grain dust samples were not generated in conjunction with the sorghum processing study; however, based upon the early season use pattern on sorghum and the fact that residues were nondetectable in/on sorghum grain from a 1.5x treatment, CB concludes that 2,4-D residue data on sorghum aspirated grain fractions are not required.

Soybeans: The use pattern on soybeans is also an early season use. Previously reviewed soybean data (CB No. 14458, DP Barcode D207980, D. Miller, 11/27/95) indicate that residues in/on soybean seed are nondetectable (<0.05 ppm) following application at the theoretical maximum concentration factor (5.5x). Therefore, residue data on aspirated soybean grain factions are not required.

Based upon the corn and wheat dat , the registrants should propose a tolerance for aspirated grain fractions. Assuming a 7-day PHI f r corn and wheat, the available data indicate that an appropriate tolerance for 2,4-D resi lues in/on aspirated grain fractions would be 200 ppm; with a 14-day PHI assumption, the corres onding required tolerance would be 40 ppm.

Sugarcane. Tolerances for residues of 2,4-D have been established at 2 ppm for sugarcane and 20 ppm for sugarcane forage [40 CFR §180.142 (b)]. Food/feed additive tolerances have also been established for residues of 2,4-D in sugarcane molasses and bagasse at 5 ppm [40 CFR §185.1450(a)(1) and §186.1450].

A REFS search dated 7/31/95 iden fied 13 EPs containing 2,4-D that are registered to members of the TF-II for use on sugarcane. Th se EPs include acid, amine salt, and low volatile ester forms of 2,4-D and consist of one SC/S, i ve SC/Ls, and seven ECs (Table 4). These products are registered for preemergence and po temergence applications using ground or aerial equipment. Maximum single application rates s ecified are 0.9-1.9 lb ae/A for preemergence and postemergence applications up to la by. One label (EPA Reg. No. 62719-1) also specifies an additional summer application at up to 1.2 lb ae/A. These labels do not specify maximum seasonal use rates or PHIs, with the exceptic n of EPA Reg. No. 62719-1, which allows up to 4 applications/year (6.9 lb ae/A) and pecifies a 6-week PHI. Application volumes are unspecified on most of the labels. Four labels pecify minimum application volumes of 2-6 gal/A by air and 5-15 gal/A by ground.

In response to the 9/88 Guidance D cument data requirements, the TF-II indicated that pre- and postemergence applications totaling up to 4 lb ae/A/season would be supported for 2,4-D acid and DMA salt formulations, but that the were not supporting uses on sugarcane of 2,4-D formulated as a low volatile ester or as a MAI ontaining 2,4-D as an acid and a N-oleyl-1,3-propylenediamine salt (W. Smith, 1 /3/92).

On behalf of the TF-II, DowElanco has submitted data (1995; MRIDs 43736101 and 43736102) from tests depicting residues of 2,4- D in/on sugarcane forage and cane following pre- and postemergence applications of 2,4-I formulated as either the acid or as a DMA salt. A total of eight tests were conducted in FL (3 , HI (2), and LA (3). In each state, two trials were conducted using 2,4-D formulated as a DMA alt (3.8 lb ae/gal SC/L), and two additional tests were conducted in FL and LA using 2,4-) formulated as the acid (85% SC/S). In each test, broadcast applications of 2,4-D were made at 1.97-2.30 lb ae/A, as a preemergence application and again as a postemergence application at layb , 106-175 days later, for a total seasonal rate of 3.96-4.30 lb ae/A. Applications were made usin ground equipment in water at 9.7-11.6 gal/A.

Forage samples were collected 88-9 days following the second application and cane samples were collected at maturity (137-214 days PTI). Two treated and one control sample of each matrix were collected from each test site, but on y one treated sample was analyzed per test site. Samples were frozen within 3.5 hours of collectio and stored frozen (temperature unspecified) on site for 2-19 days prior to shipment overnight by air carrier on dry ice to EN-CAS. Samples were held at the

analytical laboratory at ≤-12 C. The frozen storage intervals prior to analysis were 112-253 days for forage and 148-383 days for cane. As indicated earlier under Storage Stability, CBRS has no storage stability concerns with these field trials.

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for sugarcane matrices is 0.01 ppm. Apparent residues of 2,4-D were nondetectable (<0.01 ppm) in/on seven forage controls and eight cane controls; one forage control bore apparent residues of 0.112-0.134 ppm. Residues in treated forage and cane samples were not corrected for apparent residues in the controls and are presented in Table 11.

Table 11. Residues of 2,4-D in/on cane and forage of sugarcane following two applications of 2,4-D acid or DMA salt formulations at ~2.0 lb ae/A (~4.0 lb ae/A/season, 1x).

MRID	Commodity	Application Data		PTI [a] (days)	Test Location	2,4-D Residues (ppm)
		Formulation	Application Rates (lb ae/A)			
43736101	Forage	3.8 lb/gal SC/L (2,4-D DMA)	2.01, 2.16	90	FL(1)	0.025
			1.99, 2.09	90	FL(2)	0.095, 0.073 [b]
			2.00, 2.30	88	HI(1)	0.039
			2.00, 2.07	88	HI(2)	0.138
			2.02, 1.98	92	LA(1)	<0.01
			1.99, 1.97	92	LA(2)	0.01
43736102	Forage	85% SC/S (2,4-D acid)	2.02, 1.99	90	FL	<0.01
			2.00, 1.97	92	LA	<0.01
43736101	Cane	3.8 lb/gal SC/L (2,4-D DMA)	2.01, 2.16	188	FL(1)	<0.01
			1.99, 2.09	140	FL(2)	<0.01, <0.01
			2.00, 2.30	214	HI(1)	<0.01
			2.00, 2.07	214	HI(2)	<0.01
			2.02, 1.98	151	LA(1)	<0.01
			1.99, 1.97	151	LA(2)	<0.01
43736102	Cane	85% SC/S (2,4-D acid)	2.02, 1.99	140	FL	0.015, 0.014 [b]
			2.00, 1.97	137	LA	<0.01

[a] Days after postemergence layby application.
[b] Duplicate analysis of a single sample.

Following preemergence and postemergence (at layby) applications to sugarcane of either the 2,4-D DMA salt (3.8 lb ae/gal SC/L) or the acid (85% SC/S) at ~2 lb ae/A (~4 lb ae/A/season), residues of 2,4-D were <0.01-0.138 ppm in/on 8 forage samples collected 88-92 days after the

second application and were <0.01 0.015 ppm in/on 8 cane samples collected at maturity, 137-214 days after the second applicatio i.

Geographic representation is adequa e. Field trials were conducted in the states specified in the 9/88 Guidance Document and in the accepted protocol (W. Smith, 11/3/92).

The submitted sugarcane residue da i are adequate and indicate that the current 2 ppm tolerance on sugarcane is too high. The registra ts should propose a lower tolerance on sugarcane. The available data indicate that a toleran e of 0.05 ppm would be appropriate. The tolerance for sugarcane forage should be revoked as Table II (9/95) no longer lists sugarcane forage as a RAC.

Labels for low volatile ester forms f or 2,4-D should be amended to delete uses on sugarcane, and the remaining 2,4-D labels should i dicate a maximum seasonal use rate for sugarcane of 4.0 lb ae/A. All labels must indicate a mi imum application volume of 2 gal/A of water for aerial applications or submit residue data r eflecting ultra low volume aerial applications.

Magnitude of the Residue in Proces ed Food/Feed

Corn. Tolerances of 0.5 ppm have been established for residues of 2,4-D in/on fresh corn (K + CWHR) and corn grain. Tolerance: of 20 ppm have been established for residues of 2,4-D in/on corn fodder and forage [40 CFR §1: 0.142 (b)]. No food/feed additive tolerances have been established for 2,4-D residues in co r processed commodities.

A description of the 17 EPs contain ng 2,4-D that are registered to members of the TF-II for use on corn can be found in the Magnit de of the Residue in Plants under Corn in this report.

In response to the Guidance Docum nt and on behalf of the TF-II, DowElanco submitted data (1995; MRID 43709701) depicting t ie potential for concentration of 2,4-D residues in corn processed commodities. In two test conducted in IA and NE, three applications of 2,4-D 2-EHE (3.8 lb/gal EC) were made to corn a s a preemergence application at 1.5 lb ae/A, a postemergence directed application at 0.75 lb ae/A, and a broadcast preharvest application 2.25 lb ae/A, for a total of ~4.5 lb ae/A/season (1.5x) Applications were made using ground equipment in ~5 gal/A with 32-49 days between the first and second applications and 88-111 days between the second and third applications. Corn grain samples were collected 7 and 14 days following the final (preharvest) application.

Two treated and control samples of grain were collected from each test at each PTI. Only the samples collected at the 7-day PTI i NE were processed. One treated and one control sample were sent to EN-CAS for analysis a the grain RAC, and one treated and one control sample was sent to Texas A&M University, Bry n, TX for processing. Samples were processed using simulated commercial procedures in starch, grits, meal, flour, crude oil (wet and dry milling), and refined oil (wet and dry milling .

Samples were frozen within 2 hours of collection. Corn grain RAC samples were held for 77-102 days prior to analysis. RAC samples for processing were held for 133 days prior to processing and for an additional 115-197 days as processed commodities (including aspirated grain fractions) prior to analysis. Samples were held frozen at unspecified temperatures at the field site and processing facility and at ≤-12 C at the analytical laboratory. All shipments were made on dry ice by overnight carrier. Since all storage intervals were less than six to seven months, CBRS has no storage stability concerns associated with these processing studies (see Storage Stability section).

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for corn matrices was 0.01 ppm. Residues in treated corn and corn processed fractions are presented in Table 12. Residues of 2,4-D were nondetectable in/on one RAC control and one control of each processed commodity.

Table 12. Residues of 2,4-D in commodities processed from corn grain harvested 7 days following the last of three applications of 2,4-D 2-EHE totaling ~4.5 lb ae/A (1.5x).

Commodity	Test Location (PTI, days)	Application Rate (lb ae/A)	2,4-D Residues (ppm)	Concentration Factor
Corn grain	IA (7)	4.57 (1.5x)	0.032, 0.035 (0.034) [a]	NA = not applicable
	IA (14)	-	Not analyzed	
	NE (7)	4.50 (1.5x)	0.048, 0.066 (0.057) [a]	
	NE (14)	-	0.028	
Starch	NE (7)	-	<0.01	<1x
Grits	NE (7)	-	0.040	<1x
Meal	NE (7)	-	0.049	<1x
Flour	NE (7)	-	0.054	<1x
Crude oil - wet milling	NE (7)	-	<0.01	<1x
Crude oil - dry milling	NE (7)	-	<0.01	<1x
Refined oil - wet milling	NE (7)	-	<0.01	<1x
Refined oil - dry milling	NE (7)	-	<0.01	<1x
Aspirated grain fractions	NE (7)	-	2.20	39x

[a] Average of duplicate analyses.

The submitted corn processing data are adequate. The data indicate that residues of 2,4-D do not concentrate in any corn processed commodity and that no Section 409 food/feed additive tolerances or 701 Maximum Residue Limits (MRLs) are required.

The submitted corn processing study is adequate to determine 2,4-D residues in/on aspirated corn grain fractions. For additional information on this rac, see Aspirated Grain Fractions under Magnitude of the Residue in Plants.

Rice. Tolerances for residues of 2, 4-D have been established at 0.1 ppm for rice and 20 ppm for rice straw [40 CFR §180.142 (b)]. No food/feed additive tolerances have been established for residues of 2,4-D in processed rice commodities.

A description of the six EPs containing 2,4-D that are registered to members of the TF-II for use on rice can be found in the Magnitude of the Residue in Plants under Rice in this report.

In response to the Guidance Document, DowElanco, on behalf of the TF-II, submitted data (1995; MRID 43755402) depicting the potential for concentration of 2,4-D residues in rice processed commodities. In two tests conducted in AR and LA, 2,4-D formulated as a DMA salt (3.8 lb/gal SC/L) was applied to rice at ~2.25 lb ae/A (1.5x) at late tillering in ~10 gal/A of water using ground equipment.

Two rice samples were harvested 61-66 days posttreatment from treated and control plots at each test site. Samples were frozen within 1 hour of collection and stored frozen at the field test sites for 4-6 days prior to shipment. One treated and control sample from each test was sent directly to the analytical laboratory (EN-CAS) and to the processing facility (South Texas Ag Research, Rice Processing Center, Sealy, TX). At the processing facility, rice grain samples were stored for 75-98 days prior to processing. Rice samples were processed into hulls, bran, and milled white rice using simulated commercial procedures. Rice grain samples from AR and LA were stored frozen for 217-245 days prior to analysis, and processed fractions from AR were stored frozen for 192-196 days prior to analysis. Processed fractions from the LA test were not analyzed. All shipments were made on dry ice by overnight carrier. Since all storage intervals were less than 7 to 8 months, CBRS has no storage stability concerns associated with this processing study (see Storage Stability section).

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for rice matrices was 0.01 ppm. Residues in treated rice and processed rice fractions are presented in Table 12. Apparent residues of 2,4-D were below the LOQ (<0.01 ppm) in/on one control sample of each rice commodity.

The submitted rice processing data are adequate. Residues of 2,4-D did not concentrate in rice bran or milled white rice, but concentrated by 3.3x in rice hulls, which are not a RTE feed item. Based upon the 3.3x concentration factor and HAFT residues of 0.42 ppm for rice grain, the maximum expected residues in/on rice hulls would be 1.4 ppm, which exceeds the recommended 0.5 ppm tolerance. The maximum expected residues of 2,4-D in RTE feeds for cattle and poultry would be 0.28, using a dilution factor of 5.0 for rice hulls in RTE feeds for cattle and poultry. As these levels are below the recommended tolerance for rice, a Section 409 feed additive tolerance is not required for rice hulls. Rather, a Section 701 MRL should be established at 1.5 ppm for residues of 2,4-D in/on rice hulls.

Table 13. Residues of 2,4-D in rice commodities processed from rice harvested at normal maturity following a postemergence application of 2,4-D DMA at 2.2 lb ae/A (~1.5x).

Commodity	Test site	Application Rate (lb ae/A)	2,4-D Residues (ppm)	Concentration Factor
Rice	AR LA [a]	2.17 2.23	0.028 0.018	NA=not applicable
Hulls	AR	-	0.093	3.3x
Bran	AR	-	0.011	<1x
Milled white rice	AR	-	<0.01	<1x

[a] Processed rice fractions from the LA test site were not analyzed.

Sorghum. Tolerances for residues of 2,4-D have been established at 0.5 ppm for sorghum grain and 20 ppm for sorghum forage and sorghum fodder [40 CFR §180.142 (b)]. No feed/feed additive tolerances have been established for 2,4-D residues in sorghum processed commodities.

A description of the 15 EPs containing 2,4-D that are registered to members of the TF-II for use on sorghum can be found in the Magnitude of the Residue in Plants under Sorghum in this report.

In response to the Guidance Document and on behalf of the TF-II, DowElanco submitted data (1995; MRID 43709702) depicting the potential for concentration of 2,4-D residues in sorghum processed commodities. In tests conducted in KS and TX, sorghum grain samples were collected 81-112 days following a single application of 2,4-D DMA (3.8 lb/gal SC/L) at 1.5 lb ae/A (1.5x the maximum label rate). Applications were made using ground equipment in water at ~5 gal/A.

Two treated and control samples were collected. One treated and one control sample were sent to EN-CAS for analysis as the grain RAC. One treated and one control sample was sent to Texas A&M University, Bryan, TX for processing. Samples from the KS test were not used for processing. Samples from TX were processed using simulated commercial procedures into starch and flour.

Grain samples were frozen within 2 hours of collection. Sorghum grain RAC samples were held for 92-155 days prior to analysis. Processed samples were held for 259 days prior to processing and for an additional 22-24 days as processed commodities prior to analysis. Samples were held frozen at unspecified temperatures at the field site and processing facility and at ≤-12 C at the analytical laboratory. All shipments were made on dry ice by overnight carrier. Since all processed commodity storage intervals were less than ca. 1 month, CBRS has no storage stability concerns associated with this processing study (see Storage Stability section).

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for sorghum matrices was 0.01 ppm. Apparent residues of 2,4-D were nondetectable (<0.01 ppm) in/on all control

samples. Residues of 2,4-D were also nondetectable in/on grain from both test sites and in processed commodities derived from the TX test.

The submitted sorghum processing data are adequate. Residues of 2,4-D were nondetectable (<0.01 ppm) in sorghum flour and starch processed from grain harvested from plants treated at 1.5x the maximum label rate and bearing nondetectable (<0.01 ppm) residues of 2,4-D. CBRS notes that requirements for data on residues in sorghum starch and flour have been removed from Table II (9/95).

Based upon (i) the early season use pattern on sorghum, (ii) nondetectable 2,4-D residues in/on sorghum grain from a 1.5x treatment, and (iii) the fact that late season applications to corn and wheat resulted in much higher residues in/on these grains, CBRS concludes that 2,4-D residue data on sorghum aspirated grain fraction are not required.

Sugarcane. Tolerances for residues of 2,4-D have been established at 2 ppm for sugarcane and 20 ppm for sugarcane forage [40 CFR §180.142 (b)]. Food/feed additive tolerances have also been established for residues of 2,4-D in sugarcane molasses and bagasse at 5 ppm [40 CFR §185.1450(a)(1) and §186.1450].

A description of the 13 EPs containing 2,4-D that are registered to members of the TF-II for use on sugarcane can be found in the Magnitude of the Residue in Plants under Sugarcane in this report.

On behalf of the TF-II, DowElanco submitted data (1995; MRID 43755401) depicting the potential for concentration of 2,4-D residues in sugarcane processed commodities. In two tests conducted in FL and LA, 2,4-D formulated as a DMA salt (3.8 lb/gal SC/L) was applied twice to sugarcane at ~4.0 lb ae/A, once preemergence and again 110-176 days later at layby, for a total of 8 lb ae/A/season (2x). Applications were made using ground equipment in ~10 gal/A.

A single sample of mature cane was harvested from each test 166 or 188 days following the second application. Samples were frozen within 4 hours of collection. Sugarcane RAC samples from FL and LA were stored frozen for 152 and 167 days, respectively, prior to analysis. Cane samples from FL and LA were stored frozen at an unspecified temperature for 155 and 65 days, respectively, prior to processing. Cane samples were processed into bagasse, molasses (first and final strike), and sugar using simulated commercial procedures by the Hawaiian Sugar Planters' Association, Environmental Service Dept., Aiea, HI. Processed fractions from the LA test were not further analyzed as the sugar and molasses fractions were not stored frozen immediately after processing. Processed fractions for FL were stored frozen for 20-34 days prior to analysis. Samples were stored frozen at unspecified temperatures at the field site and processing facility and at ≤-12 C at the analytical laboratory. All shipments were made on dry ice by overnight carrier. Since all storage intervals were less than 2-3 years, CBRS has no storage stability concerns associated with this processing study (see Storage Stability section).

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for sugarcane matrices was 0.01 ppm. Residues in treated sugarcane and sugarcane processed fractions are presented in Table 14. Apparent residues of 2,4-D were below the LOQ (<0.01 ppm) in/on two control cane samples and in one control sample of each processed commodity. Residues of 2,4-D were also <0.01 ppm in/on cane samples from both FL and LA and in bagasse, molasses (first strike) and sugar processed from cane (FL). Residues of 2,4-D were 0.012 ppm in one sample of molasses (final strike); however, upon reanalysis of this fraction in duplicate, residues of 2,4-D were <0.01 ppm (0.009 ppm).

The submitted sugarcane processing data are not adequate as residues of 2,4-D were nondetectable in the cane samples used for processing. Cane samples used for the processing study were treated at only 2x the maximum label rate, and the registrants provided no explanation of why a higher exaggerated rate was not used. In addition, data from sugarcane field trials discussed above under Magnitude of the Residue in Plants indicate that cane samples can be generated that bear detectable residues of 2,4-D.

Although the present processing study is not adequate, sugarcane processing data are available in the 2,4-D Registration Standard (2/16/88). In one study (MRID 00068889), residues of 2,4-D were reduced on average by 0.7x in juice processed from cane bearing detectable residues of 2,4-D. In a companion study, residues concentrated by 8-10x in first molasses processed from fortified juice samples and did not concentrate in raw sugar. Together these data indicate that 2,4-D residues can concentrate by ~7x in molasses. Based upon HAFT residues of 0.015 ppm and the 7x concentration factor, maximum expected residues in first molasses would be 0.105 ppm. Therefore, in conjunction with lowering the tolerance on sugarcane, the food/feed additive tolerance on sugarcane molasses should be lowered. An appropriate food/feed additive tolerance for sugarcane molasses (a RTE feed item) would be 0.2 ppm based on the available processing data. The feed additive tolerance for sugarcane bagasse should be revoked as Table II (9/95) no longer lists sugarcane bagasse as a significant feed item for livestock.

Table 14. Residues of 2,4-D in sugarcane commodities processed from sugarcane harvested at normal maturity following a preemergence and layby application of 2,4-D DMA, totaling ~8.0 lb ae/A/season (2x).

Commodity	Test site	Total Application Rate (lb ae/A)	2,4-D Residues (ppm)	Concentration Factor
Sugarcane	FL LA	8.12 8.00	<0.01 <0.01	NA=not applicable
Bagasse	FL	-	<0.01	NA
Molasses (first strike)	FL	-	<0.01	NA
Molasses (final strike)	FL	-	0.012, <0.01, <0.01 *	NA
Sugar	FL	-	<0.01	NA

* Sample was reanalyzed in duplicate.

Wheat. Tolerances of 20 and 0.5 ppm have been established for residues of 2,4-D in/on wheat forage and grain, respectively [40 CFR §180.142 (b)]. No tolerances have been established for straw. Food/feed additive tolerances of 2 ppm have been established for 2,4-D residues in wheat milled fractions (except flour) [40 CFR §185.1450 (a) and §186.1450].

A description of the 16 EPs containing 2,4-D that are registered to members of the TF-II for use on wheat can be found in the Magnitude of the Residue in Plant under Wheat in this report.

In response to the Guidance Document and on behalf of the TF-II, DowElanco submitted data (1995; MRID 43693701) depicting the potential for concentration of 2,4-D residues in wheat processed commodities. In two tests conducted in ND, wheat grain samples were collected 7 and 14 days following the last of two broadcast applications of 2,4-D 2-EHE (3.8 lb/gal EC) at either ~1.25 or ~1.88 lb ae/A, totaling 2.5 (1x) or 3.8 lb ae/A (1.5x), respectively. Applications were made using ground equipment in ~ 5 gal/A with an 82 day retreatment interval. Two additional field trials were conducted in KS at the same application rates, but only 7-day PTI samples were collected as the 14-day sample plots were inadvertently destroyed. The KS grain samples were not processed.

Two treated and control grain samples were collected from each test site/PTI. For each test/PTI, one treated and one control sample were sent to EN-CAS for analysis as the grain RAC. A treated and control sample were sent to Texas A&M University for processing. Samples collected at the 7-day PTI in ND were processed using simulated commercial procedures into bran, low grade wheat flour, patent flour, middlings shorts, and aspirated grain fractions. Although wheat germ is a Table II commodity, no wheat germ was produced. Aspirated grain fractions were also produced from the ND samples collected at the 14-day PTI.

Wheat grain RAC samples were held for 122-181 days prior to analysis. Processed samples were held for up to 50 days prior to processing and for an additional 205-244 days as processed commodities (including aspirated grain fractions) prior to analysis. Samples were frozen within 6 hours of collection. Samples were held frozen at unspecified temperatures at the field site and processing facility and at ≤-12 C at the analytical laboratory. All shipments were made on dry ice by overnight carrier. CBRS has no storage stability concerns with this processing study (see Storage Stability section).

Residues were determined using the adequate GC/ECD method, EN-CAS Method No. ENC-2/93, described in the Residue Analytical Method section of this report. The LOQ for all wheat matrices was 0.01 ppm, with the exception of aspirated grain fractions which had an LOQ of 0.10 ppm. Residues in treated wheat and wheat processed fractions are presented in Table 15. Apparent residues of 2,4-D were nondetectable in/on two grain controls and in controls of each processed commodity; one grain control bore apparent residues of 2,4-D at 0.011 ppm.

The submitted wheat processing data are adequate and indicate that residues of 2,4-D do not concentrate in any of the tested wheat processed commodities except wheat bran, in which residues concentrated by 3.6x. As wheat bran is a RTE commodity, Section 409 food/feed additive tolerances should be established. Data from the wheat field studies indicate that HAFT residues in/on wheat grain are 6.16 ppm at a 7-day PHI and 3.19 ppm at a 14-day PHI. Depending upon whether the registrants prefer a 7- or 14-day PHI, maximum expected 2,4-D residues in wheat bran would be either 22.4 or 11.5 ppm, respectively. Appropriate tolerances for residues of 2,4-D in wheat bran would be either 25 ppm (7-day PHI) or 12 ppm (14-day PHI). Once a tolerance for wheat bran is established, the current 2 ppm food/feed additive tolerances for 2,4-D residues in "wheat milled fractions (except flour)" should be revoked.

No concentration data was submitted for wheat germ. However, concentration factors for wheat germ would be expected to be similar to those for wheat middlings. Since the registrant demonstrated that no concentration occurs in this commodity, CBRS will not require that additional studies with wheat germ be conducted and will conclude that no 409 tolerances or Section 701 MRLs are necessary.

The submitted wheat processing study is adequate to determine 2,4-D residues on aspirated wheat grain fractions. For additional information on this RAC, see the Aspirated Grain Fraction section under Magnitude of the Residue in Plants.

The registrants must amend the current labels to indicate a maximum seasonal use rate of 2.5 lb ae/A for wheat as is supported by the residue data. The registrants must also indicate a PHI for grain on the labels of either 7 or 14 days. All labels must indicate a minimum application volume of 2 gal/A of water for aerial applications or submit residue data reflecting ultra low volume aerial applications.

Table 15. Residues of 2,4-D in commo lities processed from wheat harvested 7 or 14 days following the last of two applications of 2,4-D 2-EHE totaling either 2.5 or 3.8 lb ae/A (1x and 1.5x).

Commodity	Test Loc ion (PTI, da s)	2,4-D Residues (ppm)		Concentration Factor [a]
		2.5 lb ae/A	3.8 lb ae/A	
Wheat grain	KS (7	0.258	0.558	NA=not applicable
	ND (7	1.52	2.35	NA
	ND (1)	0.410	0.762	NA
Bran	ND (7	5.65	8.29	3.63x (3.72x, 3.53x)
Low grade flour	ND (7	0.209	0.232	<1x
Patent flour	ND (7	0.186	0.161	<1x
Middlings	ND (7	0.634	1.10	<1x
Shorts	ND (7	0.812	3.71	1.05x (0.53x, 1.58x)
Aspirated grain fractions	ND (7	46.9	79.9	32.4 (30.8, 34.0)
	ND (1)	3.79	9.99	11.2 (9.24, 13.1)

[a] The concentration factors for the indiv dual tests are listed parenthetically.

MASTER RECORD IDENTIFICATION NUMBER

43592101 Rosemond, J. (1995) Magnitude of the Residue of 2,4-D Acid (2,4-Dichlorophenoxy Acetic Acid) in Rangelands Following Ground Applications with 2,4-D 2-Ethylhexyl Ester: (Final Report): Lab Project Number: AA930220: 93-0025-0220. Unpublished study prepared by American Agricultural Services,Inc. and EN-CAS Analytical labs. 409 p.

43610801 Rosemond, J. (1995) Magnitude of the Residue of 2,4-D Acid (2,4-Dichlorophenoxyacetic Acid) in Rangelands Following Ground Applications with 2,4-D Dimethylamine Salt: Lab Project Number: 93-0025-0219: AA930219. Unpublished study prepared by American Agricultural Services and EN-CAS Analytical Laboratories. 417 p.

43610802 Rosemond, J. (1995) Magnitude of the Residue of 2,4-D Acid (2,4-Dichlorophenoxyacetic Acid) in Grass Pastures Following Ground Applications with 2,4-D 2-Ethylhexyl Ester: Lab Project Number: AA930217: 93-0026-0217. Unpublished study prepared by American Agricultural Services and EN-CAS Analytical Labs. 484p.

43665201 Carringer, S. (1995) Magnitude of the Residue of 2,4-D (2,4-Dichlorophenoxy Acetic Acid) in/on Wheat (Winter and Spring) Following Ground Applications with 2,4-D 2-Ethylhexyl Ester: Lab Project Number: AA930204: 93-0019-1054: 47509. Unpublished study prepared by American Agricultural Services,Inc. and En-Cas Analytical Labs. 705 p.

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Final Report: Lab Project Number: AA930226: 60635: 60636. Unpublished study prepared by American Agricultural Services,Inc 55 p.

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43779501 Carringer, S. (1995) Magnitude of the Residue of 2,4-D Acid in Grass Pastures Following Ground Applications with 2,4-D 2-Ethylhexyl Ester: (Final Report): Lab Project Numbers: AA940503: 6397-154. Unpublished study prepared by American Agricultural Services, Inc. and Hazleton Wisconsin, Inc. 383 p.

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AGENCY MEMORANDA CITED IN THIS DOCUMENT

CB No.: 10020
DP Barcode: D179177
Subject: 2,4-D Task Force II response to Data Requirements in 1988 Reregistration Guidance Document.
From: W. Smith, CB
To: W. Waldrop/J. Coombs, SRRD
Date: 11/3/92
MRID(s): None

CB No.: None
DP Barcode: None
Subject: 6(a)(2) as F.Y.I.
From: J. Coombs, SRRD
To: T. Edwards, CB
Date: 5/18/94
MRID(s): 43207201

CB No.: 14004
DP Barcode: D205346
Subject: Enforcement Analytical Method for Plants.
From: D. Miller, CB
To: J. Coombs, SRRD
Date: 1/24/96

MRID(s): 43289301

CB No.: 14458
DP Barcode: D207980
Subject: Magnitude of the Residue (soybeans) and Confined Rotational Field Trials (lettuce, wheat, radish).
From: D. Miller, CB
To: J. Coombs, SRRD
Date: 11/27/95
MRID(s): 43356301, 43356302, and 43356002

CBRS No.: None
DP Barcode: None
Subject: 6(a)(2) as F.Y.I.
From: J. Coombs, SRRD
To: T. Edwards, CBRS
Date: 5/18/94
MRID(s): 43207201

13544

R102503

Chemical:	**2-4,D**
PC Code:	**030001**
HED File Code	**11200 Subject Files Chemistry**
Memo Date:	**06/03/96**
File ID:	**DPD213641; DPD214733; DPD216364; DPD216606; DPD216608; DPD216939; DPD217132; DPD217400; DPD217790; DPD217980; DPD218820; DPD219399; DPD219400; DPD219402**
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