United States Environmental Protection Agency

Office of Prevention, Pesticide and Toxic Substance (7501C)

Pesticide Fact Sheet

Name of Chemical: **Metrafenone**
Reason for Issuance: **New Chemical**
Date Issued: **September 2006**

Description of Chemical

Generic Name:	(3-bromo-6-methoxy-2-methylphenyl)(2,3,4-trimethoxy-6-methylphenyl)methanone
Common Name:	Metrafenone
Trade Names:	BAS 560 02F
EPA Chemical Code:	000325
Chemical Abstracts Service (CAS) Number:	220899-03-6
Registration Status:	
Pesticide Type:	benzophenone fungicide
U.S. Producer:	BASF Corporation

Use Pattern and Formulations

Metrafenone is a benzophenone fungicide with protectant and curative properties intended for the control of powdery mildew produced by *Uncinula necator* in all commercial varieties of grape vines. Although the mode of action of metrafenone has not been determined, it appears that the fungicide inhibits the growth of mycelium on the leaf surface, leaf penetration, formation of haustoria, and sporulation. There are currently no registered uses of metrafenone in the U.S., and no metrafenone tolerances have been established. No Codex, Canadian, or Mexican MRLs have been established for metrafenone.

The petitioner has submitted a draft label for a 500 g/L (equivalent to 4 lb/gal) suspension concentrate (SC) formulation (Product name = BAS 560 02F Fungicide) prepared for the European Union. The label indicates that the product may be used on all commercial varieties of vines. The petitioner stated that the average maximum single application rate for this product is 100 g ai/ha (0.089 lb ai/A). The proposed use directions are summarized in Table1.

Table 1. Summary of Proposed Directions for Use of Metrafenone on Grape Vines.

Trade Name	Application Timing	Application Rate (lb ai/A) [g ai/ha]	Max. No. Applic. per Season	RTI[1] (days)	Max. Seasonal Applic. Rate [2] (lb ai/A) [g ai/ha]	PHI (days)	Use Directions and other Limitations
Grape [all varieties of vines]							
BAS 560 02F	May be applied up to and including the berry-ripening stage (GS 81)	Germany and Italy: 0.07-0.14 [80-160]	8	14	1.14 [1280]	28	The product is best applied in treatments starting before disease begins to develop in the crop. Applications may be made in a spray volume of 400-1600 L/ha.
		"French-growing grapes": 0.089 [100]			0.72 [800]		

[1] RTI = Retreatment interval

[2] The maximum seasonal application rate was calculated by the study reviewer based on the maximum number of applications (8) and the maximum single application rate (100 or 160 g ai/ha).

Science Findings

Available product chemistry data supporting the use of metrafenone are summarized below.

Physical/Chemical Structure:

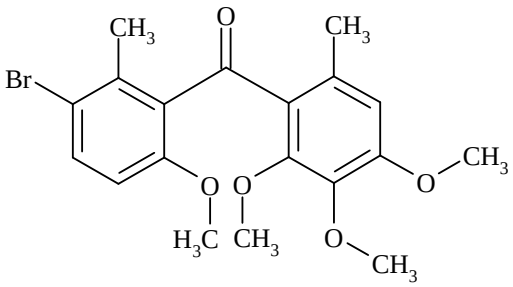

TABLE 2. Physicochemical Properties of Metrafenone.		
Parameter	Value	Reference
Melting point/range	99.2-100.8 ºC	Petition Administrative materials
pH	3.45 (1% suspension)	
Density	1.45 g/cm^3 at 20 °C (specific gravity)	
Water solubility	mg/L deionized 0.474 pH >5 0.552 pH 7 0.492 pH 9 0.457	
Solvent solubility	g/L acetone 403 acetonitrile 165 dichloromethane 1950 ethyl acetate 261 n-hexane 4.8 methanol 26.1 toluene 363	
Vapor pressure	1.15 x 10^{-6} mmHg at 20ºC	
Dissociation constant, pK_a	"No dissociation constant"	
Octanol/water partition coefficient, Log(K_{OW})	4.3 at 25 ºC, pH 4	
UV/visible absorption spectrum	Not available	

[1] Values as reported by the petitioner.

The Registrant has submitted the studies listed in Tables 3a and 3b which include a number of recent toxicity studies and summaries published in the open literature. These include the usual acute studies for metrafenone. The Registrant has also submitted subchronic oral, dermal and inhalation studies as well as chronic, carcinogenicity, developmental and mutagenicity studies as shown in Table 3b.

Table 3.a. Acute Toxicity Profile for Metrafenone (95.86%)				
Guideline Number	**Study Type Classification**	**MRID Number**	**Results**	**Toxicity Category**
870.1100	Acute-oral-rat		LD_{50} (M/F) >5,000 mg/kg LD_{50} Combined >5,000 mg/kg	IV
870.1200	Acute-dermal-rat		LD_{50} (M/F) > 5000 mg/kg	IV
870.1300	Acute-inhalation-rat		LC_{50} (M/F) > 5mg/L	IV
870.2400	Acute-eye irritation-rabbit		Slight reversible conjunctival irritation	IV
870.2500	Acute-dermal irritation-rabbit		500 mg (M): no irritation up to 3 days	IV
870.2600	Skin sensitization - guinea pig		Not a sensitizer	-

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.3100	2001 28-DAY FEEDING-RAT Acceptable/Guideline	ppm = 0, 1000, 5000, 10000, 20000 mg/kg/day = M: 0, 106, 528, 1127, 2245 F: 0, 118, 586, 1151, 2294	46415719	NOAEL (mg/kg/day) M/F: 106/118 LOAEL (mg/kg/day): M/F: 528/586, based on increased liver weights, periportal cytoplasmic vacuolation and increased cholesterol in females
870.3100	2001 13 WEEK FEEDING-RAT Acceptable/Guideline	ppm = 0, 1000, 5000, 10000, 20000 mg/kg/day = M: 0, 79, 404, 800, 1663 F: 0, 94, 486, 967, 1938	46415720	NOAEL (mg/kg/day): M/F:79/94 LOAEL (mg/kg/day): M/F: 404/486, based on decreased body weight and body weight gains in females, increased serum cholesterol in both sexes, increased absolute and relative liver weight in both sexes and increased incidences of periportal cytoplasmic vacuolation in female livers
870.3100	2001 13 WEEK FEEDING-RAT Unacceptable/Guideline [LOAEL not attained; not limit dose]	ppm = 0, 250, 500 mg/kg/day = M: 0, 21.3, 43.1 F: 0, 23.7, 48.1	46415721 46415719	NOAEL (mg/kg/day) M/F: 43.1/48.1 LOAEL (mg/kg/day) M/F: Not attained
870.3100	2001 13 WEEK FEEDING-MOUSE Acceptable/Guideline	ppm = 0, 1000, 3500, 7000 mg/kg/day = M: 0, 163, 622, 1206 F: 0, 216, 788, 1663	46415722	NOAEL (mg/kg/day): M/F: 622/788 LOAEL (mg/kg/day): M/F: 1206/1663, based on decreased body weight gain in males
870.3100	2001 13 WEEK FEEDING-MOUSE Unacceptable/Guideline [LOAEL was not attained; not limit dose]	ppm = 0, 250, 500 mg/kg/day = M: 0, 42, 84 F: 0, 55, 113	46415723	NOAEL (mg/kg/day): M/F: 84/113 LOAEL (mg/kg/day): M/F: Not attained

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.3150	2002 13 WEEK CAPSULE-DOG Unacceptable/Guideline [no effects at highest dose tested; not limit dose]	mg/kg/day= M/F: 0, 50, 100, 500	46415725 46415724	NOAEL (mg/kg/day): M/F: 500 (HDT) LOAEL (mg/kg/day): M/F: Not attained
870.3700	2001 DEVELOPMENTAL TOXICITY-RAT (gavage) Acceptable/guideline	mg/kg/day = 0, 50, 500, 1000	46415726	Maternal: NOAEL (mg/kg/day): 1000 (HDT; limit dose) LOAEL (mg/kg/day): not attained Developmental: NOAEL (mg/kg/day): 1000 (HDT; limit dose) LOAEL (mg/kg/day): not attained.
870.3700	2001 DEVELOPMENTAL TOXICITY-RABBIT (gavage) Acceptable/Guideline	mg/kg/day = 0, 50, 350, 700	46415727	Maternal: NOAEL (mg/kg/day): 50 LOAEL (mg/kg/day): 350, based on decreased body weight gains and food consumption; increased liver weights; increased incidences and/or severity of periportal hepatocellular hypertrophy and diffuse hepatocellular vacuolation Developmental: NOAEL (mg/kg/day): 700 (HDT) LOAEL (mg/kg/day): not attained
870.3800	2002, 2001 2-GENERATION REPRODUCTION-RAT (feeding) Acceptable/Guideline	ppm = 0, 500, 1000, 10000 mg/kg/day = M: 0, 35.9, 72.8, 759 F: 0, 42.9, 84.8, 864	46415729 46415728	Parental: NOAEL (mg/kg/day): M/F: 35.9/42.9 LOAEL (mg/kg/day): M/F: 72.8/84.8, based on decreased body weights and body weight gain F_1 males as well as body weights in F_1 and F_2 females Reproductive: NOAEL (mg/kg/day): M/F: 759/864 LOAEL (mg/kg/day): M/F: not attained Offspring: NOAEL (mg/kg/day): M/F: 72.8/84.8 LOAEL (mg/kg/day): M/F: 759/864, based on decreased body weights in F_1 and F_2 pups

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.4300	2002 104 WEEK COMBINED CHRONIC TOXICITY/ CARCINOGENICITY-RAT (feeding) Acceptable/Guideline	ppm = 0, 500, 5000, 20000 (F 10000 week 69) mg/kg/day = M: 0, 24.9, 260, 1068 F: 0, 30.4, 320, 1419 (593) NOTE: at week 69 for females only, the HDT was reduced from 20000 ppm (1419 mg/kg/day) to 10000 ppm (593 mg/kg/day)	46415732 (study) 46415738 (Hunting. historical control tumor data) 46415739 (Charles River hist. control tumor data, 1992) 46415740 (Charles River hist. control tumor data, 2001)	NOAEL (mg/kg/day) M/F: 24.9/30.4 LOAEL (mg/kg/day): M/F: 260/320, based on nephrotoxicity and hepatotoxicity in both sexes: increase in SGGT, liver weights, centrilobular hepatocellular hypertrophy, hepatocellular eosinophilic alteration, kidney weights, subacute/chronic interstitial inflammation/chronic progressive nephropathy/cysts and brown pigment in renal cells in both sexes; increased urinary volume in males; increased serum cholesterol, centrilobular hepatocellular necrosis, polyploid hepatocytes, bile duct epithelial hyperplasia, vesiculated/vacuolated hepatocellular cytoplasm, urinary protein and urinary amorphous material; and decreased body weights and body weight gains in females. **Evidence of carcinogenicity**: Increase in incidence of hepatocellular adenomas in females at 1419/593 mg/kg/day.
870.4100	2001 52 WEEK CAPSULE-DOG Unacceptable/Guideline (not upgradeable) [no effects at HDT in 52-week or range finding study; <LIMIT DOSE]	mg/kg/day = 0, 50, 150, 500	46415730	NOAEL (mg/kg/day): M/F = 500 (HDT) LOAEL (mg/kg/day): not attained

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.4200	2002 78 WEEK CARCINOGENICITY-MICE (feeding) Acceptable/Guideline	ppm = 0, 250, 1000, 7000 mg/kg/day = M: 0, 39, 156, 1109 F: 0, 53, 223, 1493	46415731	NOAEL (mg/kg/day) M/F: 156/223 LOAEL (mg/kg/day): M/F: 1109/1493, based on increased absolute and relative (to body) liver weights, gross liver masses (males only), centrilobular and diffuse hepatocyte hypertrophy, and chronic nephropathy in both sexes. **Evidence of carcinogenicity** Increased incidence of hepatocellular adenomas and adenomas plus carcinomas in males at 1109 mg/kg/day.
870.5100	1999 BACTERIAL REVERSE MUTATION ASSAY Acceptable/Guideline	*S. typhimurium* and *E. coli* +/- S9 at 1000 µg/plate	46415741	Negative
870.5300	2001 *IN VITRO* MAMMALIAN CELL GENE MUTATION TEST (CHO cells) Acceptable/Guideline	Limit dose of 5000 µg/mL +/- S9	46415742	Negative
870.5375	2001 *IN VITRO* MAMMALIAN CELL CHROMOSOME ABERRATION TEST (CHO cells) Acceptable/Guideline	25 µg/mL: cytotoxicity (>50% reduction in mitotic index) +/-S9	46415743	Negative
870.5395	2001 MICRONUCLEUS ASSAY IN MICE Acceptable/Guideline	LIMIT DOSE OF 2000 mg/kg	46415744	Negative

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.6200	2003 ACUTE GAVAGE NEUROTOXICITY-RAT Acceptable/Guideline	mg/kg = M/F: 0, 125, 500, 2000	46415745	SYSTEMIC NOAEL (mg/kg): M/F: 2000 (HDT, limit dose) LOAEL (mg/kg): M/F: not attained NEUROTOXIC NOAEL (mg/kg): M/F: 2000 (HDT, limit dose) LOAEL (mg/kg): M/F: not attained
870.6200	2003 SUBCHRONIC DIETARY NEUROTOXICITY – RAT (4-weeks) Acceptable/Guideline	ppm = 0, 1500, 5000, 15000 mg/kg/day = M: 0, 143.0, 458.7, 1370.9 F: 0, 151.9, 492.5, 1371.1	46415746	SYSTEMIC NOAEL (mg/kg/day): M/F = 458.7/492.5 LOAEL (mg/kg/day): M/F = 1370.9/1371.1, based on piloerection and decreased body weights and food efficiency in males plus decreased body weight gain and food consumption in both sexes. NEUROTOXICITY NOAEL (mg/kg/day): M/F = 1370.9/1371.1 (exceeds limit dose) LOAEL (mg/kg/day): not attained

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.7485	2002 METABOLISM AND PHARMOKINETICS-RAT Acceptable/Guideline	Trimethoxyphenyl Radiolabel U-^{14}C, single gavage dose 10 or 1000 mg/kg Non-radiolabel 10 mg/kg/day for 14 days followed by 10 mg/kg radiolabel on day 15 Bromophenyl-6-^{14}C 10 mg/kg	46415747	**Excretion** – After 168 hrs 90.9-99.6% recovery (no differences between doses, sexes or position of label). Most radioactivity in feces (84.1-98.8% with urine 0.5-4.8%. Most radioactivity recovered in first 48 hours. Cage and tissue/carcass<= 1.8%. Repeated doses of non-radiolabeled had no effect on absorption, distribution or excretion of radioactive dose. Rapid absorption into blood (Tmax of 8.5-15.0 hours, Cmax of 1.2-1.3 µg/g and 12.7-16.1µg/g for low and high doses, respectively). Most radioactivity associated with plasma at both doses. Highest concentration in liver. **Biliary excretion**- Bile was major excretion pathway. In bile duct-cannulated rats, total recovery was 97.0-100.4% at 72 hours. At low dose, bile recovery of 85.2-90.1%; at 1000 mg/kg, feces had 79.8-81.9% with bile, 14.8-17.4% (indicating absorption process was saturated). **Urinary and biliary metabolites –** Six urinary and biliary metabolites: CL1500700, CL1500702, CL1500697, CL1500698, CL1500701 and CL1500699. These ranged in urine 0.00-0.74% and in bile from 2.14-39.46% low dose and 0.33-7.94% of high dose. In urine, up to 21 other minor unknowns (0.32-1.98%). In bile, up to 24 minor unknowns (20.8-23.8% low dose 3.05-3.76% high dose). Parent compound not detected in urine or bile. Metabolite profile similar for sexes and label position.

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
870.7485	2002 METABOLISM AND PHARMOKINETICS-RAT **CONTINUED**	**SEE ABOVE**	**SEE ABOVE**	**Feces –** Twelve fecal metabolites along with parent: CL3000402, CL1023427, CL377096, CL377160, CL434223, CL376991, CL1500700, CL1500702, CL1500697, CL1500698, CL1500701 and CL1500699. Parent was most of fecal radioactivity (low dose), 25.0-41.3%; high dose, 84.5-84.8%. Fecal metabolites 0.03-15.3% of administered dose with CL1023427 (1.31-8.12%), CL377160 (0.85-6.09%), CL434223 (1.26-15.3%) and CL376991 (1.37-5.55%). Up to 45 other fecal minor unknowns. Metabolite profiles similar for sexes, label position and single versus multiple doses. In tissues, <0.03 ppm. In feces of bile duct-cannulated animals, metabolites plus parent were identified: CL3000402, CL1023427, CL377096, CL377160, CL434223 and CL376991. Parent accounted for most activity (1.08-12.6% low dose and 78.3-78.8% high dose). Up to 17 minor unknowns (<0.72%). **Route of metabolism** – Stated: absorbed material was metabolized by ortho-dealkylation, aliphatic oxidation, debromination, ring hydroxylation and conjugation. Main excretion as glucuronic acid conjugates in bile and urine; residues in feces primarily parent and aglycones of bile and urine conjugates.
None	2002, 2000 HEPATIC ENZYME INDUCTION STUDY-RAT Acceptable/Non guideline	Not applicable STUDY DESIGN: Determined liver: PALCoA, EROD and PROD activity. Purpose to determine effects of metrafenone on peroxisome proliferation and hepatic enzyme induction. Positive control was phenobarbital.	46415733 46415734 46415737	RESULTS: metrafenone increased EROD activity M/F; no effects on PALCoA, GSH concentration or PROD activity. Phenobarbital induced hepatic cytochrome P450 and PROD activity with slight induction of EROD; no effects on PALCoA or GSH. CONCLUSIONS: metrafenone induces liver enzymes similar to phenobarbital, but does not induce peroxisome prolifereation. Belongs to benzophenone class: inducer of phenobarbital-like P450 (increased PROD activity).

Table 3.b. Subchronic, Chronic and Other Toxicity Profile for Metrafenone				
GDLN	**Study Type/ Classification**	**Dose Levels**	**MRID**	**Results**
None	2002 INITIATION STUDY – RAT Acceptable/Non guideline	5000 mg/kg STUDY DESIGN: Examine potential for metrafenone to act as hepatic tumor initiator by using an established two-stage model of hepatocarcinogenesis	46415736	RESULTS: No effects on foci/cm^2, foci area % or foci cellular alteration. NNM-initiated positive control, increased foci and foci area as well as cellular alteration. Slight to severe hepatocyte hypertrophy in males and females receiving phenobarbital as promoting agent. CONCLUSIONS: Metrafenone did not show initiator effect compared to NNM.
None	2002 S-PHASE RESPONSE IN LIVER-RAT Acceptable/Non guideline	Not applicable STUDY DESIGN: Determine potential of metrafenone to influence DNA synthesis (S-phase response) in liver. Males and females treated for 1week, 4 weeks or 4 weeks + 2 weeks recovery	46415735	RESULTS: At 20000 ppm (approx. 1000 mg/kg), BrdU labeling index increased in entire liver lobule (all zones) in males treated for 1 week and females 1 or 4 weeks. Increases in: absolute and relative liver weights and centrilobular hepatocyte hypertrophy. Recovery reversed findings. CONCLUSIONS: At 20000 ppm, metrafenone increased cell proliferation in both sexes (more in females). Apoptosis increased in females and decreased in males.

Hazard Characterizations

The liver was the primary organ affected (with the kidney showing some effects). In a 28-day rat feeding study, increased liver weights and periportal cytoplasmic vacuolation were noted. There were two 13-week feeding studies in rats. In one, no effects were reported at the highest dose tested (HDT) of 43.1/48.1 mg/kg/day (M/F). In the other study, the LOAEL was based upon decreased body weight and body weight gains in females, increased serum cholesterol in both sexes, increased absolute and relative liver weight in both sexes, and increased incidences of periportal cytoplasmic vacuolation in female livers. In a developmental rabbit study, the maternal LOAEL was 350 mg/kg/day based on decreased body weight gains and food consumption, increased liver weights, and increased incidences and/or severity of periportal hepatocellular hypertrophy as well as diffuse hepatocellular vacuolation. In a combined chronic/carcinogenicity dietary rat study, the following were noted at a LOAEL of 260/320 mg/kg/day (M/F) for both sexes: increases in SGGT, liver weights, centrilobular hepatocellular hypertrophy, hepatocellular eosinophilic alteration, kidney weights, subacute/chronic interstitial inflammation/chronic progressive nephropathy/cysts and brown pigment in renal cells in both sexes; increased urinary volume in males; increased serum cholesterol, centrilobular hepatocellular necrosis, polyploid hepatocytes, bile duct epithelial hyperplasia, vesiculated/vacuolated hepatocellular cytoplasm, urinary protein and urinary amorphous material; and decreased body weights as well as body weight gains in females. The

NOAEL was 24.9/30.4 mg/kg/day (M/F). When doses of up to 500 mg/kg/day were used, no liver or kidney effects were seen in 13-week or 52-week dog studies. In a 78-week dietary mouse study, the limit dose of 1109/1493 mg/kg/day (M/F) was the LOAEL based upon increased absolute and relative (to body) liver weights, gross liver masses (males only), centrilobular and diffuse hepatocyte hypertrophy, and chronic nephropathy in both sexes.

In a developmental rat study, no maternal or developmental effects were reported at doses up to 1000 mg/kg/day (HDT, limit dose). No developmental effects were noted in the rabbit developmental study at doses up to 700 mg/kg/day. In a 2-generation dietary reproduction study in rats, effects seen in the parents were decreases in body weights and body weight gains only in F_1 males at 72.8/84.8 mg/kg/day (M/F). No effects were reported regarding reproduction (HDT = 759/864 mg/kg/day, M/F). Offspring effects were decreased body weights in F_1 and F_2 pups at 759/864 mg/kg/day (M/F) with the NOAEL being 72.8/84.8 mg/kg/day. The EPA risk assessment team considered that there was no increase in qualitative or quantitative susceptibility in the developmental or reproduction studies.

There was evidence of increased incidences of tumors in the 2-year rat and 78-week mouse studies. In the rat study, the incidence of hepatocellular adenomas in females increased over controls. As this increase in adenomas occurred only at 1419 mg/kg/day (until week 69) or 593 mg/kg/day (after week 69), it was considered that the increased incidence occurred above the maximum tolerated dose (MTD) and, therefore, was not relevant. In the mouse study, there was an increase in the incidence of hepatocellular adenomas and adenomas plus carcinomas in males (only) at 1109 mg/kg/day (HDT, limit dose). No increase in these tumors was noted at 156/223 mg/kg/day (M/F).

Acute and subchronic neurotoxicity studies are available for metrafenone. In the acute gavage study, no systemic or neurotoxicity signs were reported up to the limit dose of 2000 mg/kg. In a 4-week dietary study, piloerection and decreases in body weight/food consumption/food efficiency were observed at the highest dose tested of 1370.9/1371.1 mg/kg/day (M/F). The NOAEL was 458.7/492.5 mg/kg/day. There were no neurotoxicity signs noted at the HDT (above limit dose). No other studies indicated any signs of neurotoxicity.

In a rat metabolism and pharmacokinetics study, excretion was 91-100 % after 168 hours. Most radioactivity was excreted within the first 48 hours (feces = 84-99%; urine = 0.5-4.8%). The highest concentration was in the liver. Bile was the major excretion pathway. In bile duct-cannulated rats, total recovery was 97-100% at 72 hours. At the low dose, bile recovery was 85-90%; at the high dose, feces had 80-82% with bile having 15-17% (indicating absorption was saturated). Six urinary and biliary metabolites were found. In urine, up to 21 other minor unknowns were found. In bile, up to 24 minor unknowns were found (21-24% low dose and 3-4% high dose). The parent compound was not detected in urine or bile. Twelve fecal metabolites along with the parent were found. Most of the fecal radioactivity was contained in parent metrafenone. Fecal metabolites were 0.03-15% of administered dose. There were up to 45 other fecal minor unknowns. In feces of bile duct-cannulated animals, metabolites plus parent were

identified. The parent accounted for most of the activity; however, there were up to 17 minor unknowns. The absorbed material was metabolized by ortho-dealkylation, aliphatic oxidation, debromination, ring hydroxylation and conjugation. Primary excretion was as glucuronic acid conjugates in bile and urine. Residues in feces were primarily as parent and aglycones of bile and urine conjugates.

Food Quality Protection Act Considerations

Based on the hazard database, EPA concludes there are no concerns and no residual uncertainties with regard to pre- and/or post-natal toxicity. After evaluating the toxicological and exposure data, the Agency recommends that the FQPA safety factor be reduced to 1X because:
(1) There was no evidence of increased qualitative or quantitative susceptibility observed in the rat or rabbit developmental as well as the rat reproduction studies; there are no residual uncertainties with regard to pre-and postnatal toxicity.
(2) The dietary food exposure assessment is based on EPA-recommended tolerance-level residues and assumes 100% crop treated for all commodities, which results in very high-end estimates of dietary exposure.
(3) The proposed use is for import tolerances; therefore residential and occupational exposures are not anticipated.
(4) The Toxicology database is complete

Hazard Identification and Toxicity Endpoint Selection

In accordance with *EPA's Final Guidelines for Carcinogen Risk Assessment* (March, 2005), the EPA classified metrafenone as, "Suggestive Evidence of Carcinogenicity," and concluded that human risk to liver tumorigenesis would not be expected at exposure levels that do not cause tumors in mice. The NOAEL and LOAEL selected for the cRfD are based on hepatotoxicity and nephrotoxicity observed at doses lower than the liver tumor response. Thus, the cRfD is protective of the cancer effects.

Toxicological Endpoints

Table 4. Summary of Toxicological Doses and Endpoints for Metrafenone for Use in Human Risk Assessments

Exposure Scenario	Dose Used in Risk Assessment, UF	FQPA SF and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (General population including infants/ children)	N/A	N/A	No appropriate endpoint attributable to a single dose identified.
Acute Dietary (Females 13-49 years of age)	N/A	N/A	No appropriate endpoint attributable to a single dose identified.

Table 4.	Summary of Toxicological Doses and Endpoints for Metrafenone for Use in Human Risk Assessments		
Exposure Scenario	**Dose Used in Risk Assessment, UF**	**FQPA SF and Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Chronic Dietary (all populations)	NOAEL= 25 mg/kg/day UF=100 chronic RfD=0.25 mg/kg/day	cPAD= cRfD/FQPA SF cPAD= 0.25	**Combined Chronic/Carcinogenicity-Rat** LOAEL (mg/kg/day): 260, based on hepatotoxicity and nephrotoxicity in both sexes.
Dermal Short-Term (1 - 30 days)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Dermal Intermediate-Term (1 - 6 months)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Dermal Long-Term (> 6 months)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Inhalation Short-Term (1 - 30 days)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Inhalation Intermediate-Term (1 - 6 months)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Inhalation Long-Term (> 6 months)	N/A	N/A	**This risk assessment is not required.** Tolerance on imported commodities - no proposed uses would result in residential or occupational exposures in the US.
Cancer (oral, dermal, inhalation)	Classification: "Suggestive Evidence of Carcinogenicity." The chronic RfD is protective of cancer effects.		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, N/A = Not Applicable.

Exposure Assessment

Dietary exposure and risk estimates

The Agency performed an unrefined chronic dietary assessment, i.e., EPA-recommended tolerance level residues and 100% crop treated, using the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database (DEEM-FCID^{TM}). As the proposed use is on an imported commodity, residues in drinking water were not included

in the analysis. For the general U.S. population and all population subgroups, the chronic dietary exposure estimates are below the EPA's level of concern (i.e., 100% of the chronic population-adjusted dose (cPAD) for non-cancer assessments). The most highly exposed subpopulation is children 1-2 years old which utilizes 0.8% of the cPAD. The general U.S. population utilizes 0.1% cPAD. The dietary exposure and risk estimates for metrafenone is summarized in table 5.

Table 5. Summary of Dietary Exposure and Risk for Metrafenone

Population Subgroup*	Acute Dietary		Chronic Dietary		Cancer	
	Dietary Exposure (mg/kg/day)	% aPAD	Dietary Exposure (mg/kg/day)	% cPAD	Dietary Exposure (mg/kg/day)	Risk
General U.S. Population	N/A	N/A	0.000276	<1	N/A	N/A
All Infants (< 1 year old)	No acute dietary endpoint was identified		0.000608	<1		
Children 1-2 years old			0.001946	<1		
Children 3-5 years old			0.001174	<1		
Children 6-12 years old			0.000446	<1		
Youth 13-19 years old			0.000142	<1		
Adults 20-49 years old			0.000124	<1		
Adults 50+ years old			0.000135	<1		
Females 13-49 years old			0.000140	<1		

Residential and Occupational exposure and Risk/aggregate risk

As this assessment is for an import tolerance, the anticipated exposure route for the US population is via the diet (food only). Thus, residential and occupational exposure risk assessments for incidental oral, dermal, and inhalation routes of exposure are not required. As no acute dietary endpoint was identified, no aggregate acute risk assessment was conducted. The chronic aggregate assessment is equivalent to the chronic dietary risk assessment.

Data Gaps

Toxicology: None

Residue Chemistry:

The Agency has examined the residue chemistry database for the new active ingredient metrafenone and has identified several residue chemistry issues that need to be resolved.

(1) submission of a revised Section F; (2) successful petition method validation of the proposed enforcement method FAMS 105-01 by BEAD/ACB; and (3) submission of analytical reference standards to BEAD/ACL.

For any future tolerance petitions**,** radiovalidation data will be required to show that the use of n-heptane/acetone in the analytical method adequately extracts aged residues. In addition, for use on grapes in the U.S., data will be needed on table grapes and grape juice. Depending upon review of the recently submitted multiresidue data, additional information may also be required on this topic.

Occupational and Residential Exposure:

As there are no U.S. registrations or proposed registrations, occupational and residential data deficiencies are not applicable to this tolerance petition.

Contact Person at USEPA:

Janet Whitehurst
Environmental Protection Agency
Office of Pesticide Programs
Registration Division
Fungicide Branch
1200 Pennsylvania Ave., NW,
Washington, DC 20460-0001

Office Location and telephone number:

7873, Potomac Yard South
2777 South Crystal Dr.
Arlington V.A. 22202
703-305-6129

DISCLAIMER: The information presented in this Pesticide Fact Sheet is for informational purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.

APPENDIX I:

GLOSSARY OF TERMS AND ABBREVIATIONS

ADNT	**Acute delayed neurotoxicity**
a.i.	**Active Ingredient**
aPAD	**Acute Population Adjusted Dose**
ARI	**Aggregate Risk Index**
BCF	**Bioconcentration Factor**
CAS	**Chemical Abstracts Service**
ChE	**Cholinesterase**
ChEI	**Cholinesterase inhibition**
cPAD	**Chronic Population Adjusted Dose**
%CT	**Percent crop treated**
DAT	**Days after treatment**
DEEM-FCID	**Dietary Exposure Evaluation Model - Food Consumption Intake Database**
DNA	**Deoxyribonucleic acid**
DNT	**Developmental neurotoxicity**
DIT	**Developmental immunotoxicity**
DWLOC	**Drinking Water Level of Comparison.**
EC	**Emulsifiable Concentrate Formulation**
EEC	**Estimated Environmental Concentration. The estimated pesticide concentration in an environment, such as a terrestrial ecosystem.**
EPA	**U.S. Environmental Protection Agency**
FQPA	**Food Quality Protection Act**
GLC	**Gas Liquid Chromatography**
GLN	**Guideline Number**
LC_{50}	**Median Lethal Concentration. A statistically derived concentration of a substance that can be expected to cause death in 50% of test animals. It is usually expressed as the weight of substance per weight or volume of water, air or feed, e.g., mg/l, mg/kg or ppm.**
LD_{50}	**Median Lethal Dose. A statistically derived single dose that can be expected to cause death in 50% of the test animals when administered by the route indicated (oral, dermal, inhalation). It is expressed as a weight of substance per unit weight of animal, e.g., mg/kg.**
LOAEL	**Lowest Observed Adverse Effect Level**
LOAEC	**Lowest Observed Adverse Effect Concentration**
LOC	**Level of Concern**
LOD	**Limit of Detection**
LOQ	**Limit of quantitation**
mg/kg/day	**Milligram Per Kilogram Per Day**
mg/L	**Milligrams Per Liter**
MOE	**Margin of Exposure**
MRID	**Master Record Identification (number), EPA's system of**

	recording and tracking studies submitted
MTD	**Maximum tolerated dose**
NA	**Not Applicable**
NOEC	**No Observable Effect Concentration**
NOEL	**No Observed Effect Level**
NOAEL	**No Observed Adverse Effect Level**
NOAEC	**No Observed Adverse Effect Concentration**
NPDES	**National Pollutant Discharge Elimination System**
OP	**Organophosphate**
OPP	**EPA Office of Pesticide Programs**
OPPTS	**EPA Office of Prevention, Pesticides and Toxic Substances**
PAD	**Population Adjusted Dose**
PAG	**Pesticide Assessment Guideline**
PAM	**Pesticide Analytical Method**
PHED	**Pesticide Handler's Exposure Data**
PHI	**Preharvest Interval**
ppb	**Parts Per Billion**
PPE	**Personal Protective Equipment**
ppm	**Parts Per Million**
PRZM/ EXAMS	**Tier II Surface Water Computer Model**
RAC	**Raw Agriculture Commodity**
RBC	**Red Blood Cell**
RED	**Reregistration Eligibility Decision**
REI	**Restricted Entry Interval**
RfD	**Reference Dose**
SCI-GROW	**Tier I Ground Water Computer Model**
SF	**Safety Factor**
TGAI	**Technical Grade Active Ingredient**
UF	**Uncertainty Factor**
µg	**micrograms**
µg/L	**Micrograms Per Liter**
µL/g	**Microliter per gram**
USDA	**United States Department of Agriculture**
WPS	**Worker Protection Standard**

APPENDIX II:

Citations Considered to be Part of the Data Base Supporting the Registration of Metrafenone

46415700 BASF Corp. (2004) Submission of Product Chemistry, Toxicity, and Residue Data in Support of the Petition for Tolerance of BAS 560 F on Grapes. Transmittal of 66 Studies.

46415701 Heinz, W. (2001) BAS 560 F (Metrafenone): Description of the Manufacturing Process: Final Report. Project Number: 2001/1018295. Unpublished study prepared by BASF Ag Research Station. 7 p.

46415702 Foerster, R. (2003) BAS 560 F (Metrafenone): Composition of the Technical Grade Active Ingredient (TGAI): Final Report. Project Number: 2003/1006508. Unpublished study prepared by BASF Ag Research Station. 10 p.

46415703 Heinz, W. (2001) BAS 560 F (Proposed Common Name: Metrafenone): Absence of Polybrominated and Polychlorinated Dibenzodioxins and -furans and Nitrosamines from the Technical Active Ingredient (TC): Final Report. Project Number: 2001/1019509. Unpublished study prepared by BASF Ag Research Station. 7 p.

46415704 Heinz, W. (2002) Characterization of Five Batches of BAS 560 F Technical Grade Active Ingredient: Determination of Active Ingredient and Process-Related Impurities: Final Report. Project Number: PCP06495, 2002/1003384. Unpublished study prepared by BASF Ag Research Station. 40 p.

46415705 Werle, H. (1999) Determination of the Color of AC 375839 (CL 375839) Technical Grade Active Material: Final Report. Project Number: 98/50/40/411/A, BN/390/007. Unpublished study prepared by Biochem Gmbh. 17 p.

46415706 Werle, H. (1999) Determination of the Physical State of AC 375839 (CL 375839) Technical Grade Active Material: Final Report. Project Number: 98/50/40/411/B, BN/390/006. Unpublished study prepared by Biochem Gmbh. 17 p.

46415707 Werle, H. (1999) Determination of the Odor of AC 375839 (CL 375839) Technical Grade Active Material: Final Report. Project Number: 98/50/40/411/C, BN/390/008. Unpublished study prepared by Biochem Gmbh. 17 p.

46415708 Werle, H. (1998) Determination of the Melting Point of AC 375839 (CL 375839): Final Report. Project Number: 98/50/40/042/D, BN/303/001. Unpublished study prepared by Biochem Gmbh. 18 p.

46415709 Werle, H. (1998) Determination of the Boiling Point of AC 375839 (CL 375839) Secondary Standard: Final Report. Project Number: 98/50/40/042/E, BN/304/001. Unpublished study prepared by Biochem Gmbh. 18 p.

46415710 Werle, H. (1999) Determination of the Relative Density of AC 375839 (CL 375839) Technical Grade Active Material: Final Report. Project Number: 98/50/40/411/D, BN/308/001, CFS/1999/088. Unpublished study prepared by Biochem Gmbh. 21 p.

46415711 Yan, Z. (1998) AC 375839: Determination of Solubility in Water Using the Shake Flask Method: Final Report. Project Number: E/98/010, BN/311/001. Unpublished study prepared by American Cyanamid Co. 53 p.

46415712 Sicilia, D.; Ta, C. (1998) AC 375839: Determination of Solubility of TGAI in Various Organic Solvents Using the Shake Flask Method. Project Number: E/98/023, BN/312/001. Unpublished study prepared by American Cyanamid Co. 47 p.

46415713 Yacoub, R. (2001) BAS 560 F (AC 375839): Determination of Vapor Pressure: Final Report. Project Number: 81807, BN/306/002. Unpublished study prepared by BASF Corporation. 12 p.

46415714 Petry, A. (1998) Dissociation Constant of AC 375839: Final Report. Project Number: BN/390/004. Unpublished study prepared by American Cyanamid Co. 5 p.

46415715 Holman, J. (1999) AC 375839: Determination of 1-Octanol/Water Partition Coefficient by HPLC Method. Project Number: E/98/043, BN/315/001. Unpublished study prepared by American Cyanamid Co. 40 p.

46415716 Raad, Y. (2004) BAS 560 F: Determination of pH of the Technical Grade Active Ingredient (TGAI). Project Number: 2003/5000562, 172696. Unpublished study prepared by BASF Corporation. 9 p.

46415717 Jones, M. (2001) Stability of BAS 560 F (AC 375839) Technical Grade Material at 25 Degrees Celsius During Storage for Two Years: Final Report. Project Number: CA/16602, BN/326/008. Unpublished study prepared by BASF Corporation. 31 p.

46415718 Lowe, C. (1999) Oral LD50 Study in Albino Rats with AC 375839: Final Report. Project Number: T/1132, BN/411/001, A99/31. Unpublished study prepared by American Cyanamid Co. 19 p.

46415719 Fischer, J. (2001) 28-Day Dietary Toxicity Study in Albino Rats with BAS 560F: Final Report. Project Number: T/1009, BN/420/002, AX01/06. Unpublished study prepared by BASF Agro Research and Experimental Pathology Laboratories and American Cyanamid Co. 125 p.

46415720 Fischer, J. (2001) 13-Week Dietary Toxicity and 28-Day Recovery Study in Albino Rats with BAS 560F: Final Report. Project Number: T/1046, BN/425/001, AX01/01. Unpublished study prepared by BASF Agro Research and Experimental Pathology Laboratories and American Cyanamid Co. 275 p.

46415721 Fischer, J. (2001) 13-Week Dietary Toxicity Study in Albino Rats with BAS 560F: Final Report. Project Number: T/1079, BN/425/003, AX01/03. Unpublished study prepared by BASF Agro Research and Experimental Pathology Laboratories and American Cyanamid Co. 155 p.

46415722 Fischer, J. (2001) 13-Week Dietary Toxicity Study in Albino Mice with BAS 560F: Final Report. Project Number: T/1047, BN/425/002. Unpublished study prepared by BASF Corporation. 158 p.

46415723 Fischer, J. (2001) 13-Week Dietary Toxicity Study in Albino Mice with BAS 560F: Final Report. Project Number: T/1085, BN/425/004. Unpublished study prepared by BASF Corporation. 150 p.

46415724 Kelly, C. (2001) 28-Day Oral Toxicity Study with AC 375839 in Purebred Beagle Dogs via Capsule Administration: Final Report. Project Number: 98/3370, BN/420/001, 971/98/133. Unpublished study prepared by Huntingdon Life Sciences. 157 p.

46415725 Kelly, C. (2002) 90-Day Oral Toxicity Study with AC 375839 in Purebred Beagle Dogs via Capsule Administration: Final Report. Project Number: 98/3387, BN/425/005. Unpublished study prepared by Huntingdon Life Sciences. 304 p.

46415726 Barnett, J. (2001) A Definitive Oral Developmental Toxicity (Embryo-Fetal Toxicity/Teratogenicity) Study with BAS 560F in Rats: Final Report. Project Number: 101/035, BN/432/002. Unpublished study prepared by Argus Research Laboratories, Inc. 344 p.

46415727 Barnett, J. (2001) A Definitive Oral Developmental Toxicity (Embryo-Fetal Toxicity/Teratogenicity) Study with BAS 560F in Rabbits: Final Report. Project Number: 101/034, BN/432/001. Unpublished study prepared by Argus Research Laboratories, Inc. 376 p.

46415728 Schroeder, R. (2001) A Pilot Dietary Reproduction Study with AC 375839 in Rats:

Final Report. Project Number: 141/036, BN/430/001. Unpublished study prepared by American Cyanamid Co. 574 p.

46415729 Schroeder, R. (2002) A Two-Generation Reproduction Study with BAS 560F in Rats: Final Report. Project Number: 141/036, BN/430/002. Unpublished study prepared by MPI. 1878 p.

46415730 Kelly, C. (2001) One-Year Oral Toxicity Study with BAS 560F in Purebred Beagle Dogs via Capsule Administration: Final Report. Project Number: 98/3388, BN/427/001. Unpublished study prepared by Huntingdon Life Sciences. 582 p.

46415731 Fischer, J. (2002) 18-Month Dietary Oncogenicity Study in Albino Mice with BAS 560F: Final Report. Project Number: T/1130, BN/428/002. Unpublished study prepared by BASF Corporation. 1168 p.

46415732 Kelly, C. (2002) A 24-Month Dietary Toxicity and Oncogenicity Study with BAS 560F in Rats: Final Report. Project Number: 98/2606, BN/428/001, 971/99/101. Unpublished study prepared by Huntingdon Life Sciences. 5934 p.

46415733 Mellert, W.; Deckardt, K; Leibold, J.; et. al. (2002) BAS 560 F: Hepatic Enzyme Induction Study in Sprague Dawley Rats Administration in the Diet for 4 Weeks: Final Report. Project Number: 99C0437/01053, 2002/1005176. Unpublished study prepared by BASF Aktiengesellschaft. 81 p.

46415735 Mellert, W.; Kaufmann, W.; Ravenzwaay, B. (2002) BAS 560 F: S-Phase Response Study in the Liver of Sprague Dawley Rats Administration in the Diet for 1 and 4 Weeks and Recovery Period of 2 Weeks: Final Report. Project Number: 99C0437/01048, 3003/1006201. Unpublished study prepared by BASF Aktiengesellschaft. 237 p.

46415736 Mellert, W.; Kuttler, K.; Ravenzwaay, B. (2002) BAS 560 F - Initiation Study in Sprague Dawley Rats: Final Report. Project Number: 99C0437/01040, 2002/1006202. Unpublished study prepared by BASF Aktiengesellschaft. 198 p.

46415738 Anon. (2002) BAS 560 F: Historical Control Data - Sprague Dawley Rat: Neoplasms After 24 Months: Final Report. Project Number: BN/428/005. Unpublished study prepared by Huntingdon Life Sciences. 4 p.

46415739 Lang, P. (1992) Spontaneous Neoplastic Lesions and Selected Non-Neoplastic Lesions in the Crl:CD BR Rat: (BAS 560 F): Final Report. Project Number: BN/428/003. Unpublished study prepared by Charles River Laboratories. 41 p.

46415740 Giknis, M.; Clifford, C. (2001) Compilation of Spontaneous Neoplastic Lesions and Survival in Crl:CD (SD) BR Rats from Control Groups: Final Report. Project Number: BN/428/004. Unpublished study prepared by Charles River Laboratories. 29 p.

46415741 Wagner, V.; Sly, J. (1999) Bacterial Reverse Mutation Assay with AC 375839: Final Report. Project Number: BN/435/001, AA11JE/502/BTL, 971/99/103. Unpublished study prepared by Bioreliance. 49 p.

46415742 Pant, K. (2001) BAS 560 F: Test for Chemical Induction of Gene Mutation at the HGPRT Locus in Cultured Chinese Hamster Ovary (CHO) Cells with and wIthout Metabolic Activation with a Confirmatory Assay: Final Report. Project Number: 0645/2510, BN/435/003, 2510/3/090600. Unpublished study prepared by Sitek Research Laboratories. 64 p.

46415743 Xu, J. (2001) BAS 560 F: Test for Chemical Induction of Chromosome Aberration in Cultured Chinese Hamster Ovary (CHO) Cells With and Without Metabolic Activation: Final Report. Project Number: 0645/3110, BN/435/004, 3110/AB/2/092398. Unpublished study prepared by SITEK Research Laboratories. 74 p.

46415744 Xu, J. (2001) AC 375839: In Vivo Test for Chemical Induction of Micronucleated Polychromatic Erythricytes in Mouse Bone Marrow Cells: Final Report. Unpublished study prepared by Sitek Research Laboratories. Project Number: 0622/1521, BN/435/002, 1521/120199. 61 p.

46415745 Kaspers, U.; Kaufmann, W.; Hellwig, J. (2003) BAS 560 F: Acute Oral Neurotoxicity Study in Wistar Rats: Single Administration by Gavage: Final Report. Project Number: 20S0437/01101, 2003/1013528. Unpublished study prepared by BASF Aktiengesellschaft. 339 p.

46415746 Kaspers, U.; Kaufmann, W.; Ravenzwaay, B. (2003) BAS 560 F - Subacute Neurotoxicity Study in Wistar Rats; Administration in the Diet for 4 Weeks: Final Report. Project Number: 30S0437/01109, 2003/1016756, 08B0437/016038. Unpublished study prepared by BASF Aktiengesellschaft. 273 p.

46415747 Mallipudi, M. (2002) BAS 560 F (AC 375839) Absorption, Distribution, Metabolism and Excretion Study in the Rat: Final Report. Project Number: BN/440/001, 98025, MET/02/003. Unpublished study prepared by BASF Agro Research and Xenobiotic Laboratories, Inc. 1500 p.

46415748 Rice, P. (2004) Tier One Chronic and Acute Dietary Exposure Analysis of Bas 560 F (Metrafenone). Project Number: 2004/5000472. Unpublished study prepared by BASF Corp. 11 p.

46415749 Schluter, H.; Class, T. (2001) AC375839: Metabolism of Carbon-14 Labeled AC375839 in Grapevines: Final Report. Project Number: DEM14, P/393/G, BN/640/001. Unpublished study prepared by Cyanamid Forshung Gmbh (CFS) and PTRL Europe Gmbh. 188 p.

46415750 Hausmann, S. (1998) Independent Laboratory Validation of Analytical Methods for the Determination of CL 375839 Residues in Grapes (Method Fams 105-01) and in Wine (Method FAMS 106-01). Project Number: BN/244/001, CFS/1998/171, P307/G. Unpublished study prepared by PTRL Europe Gmbh. 86 p.

46415751 Smalley, R. (2000) Independent Validation of a Gas Chromatography Meothd for the Determination of CL 375839 Residues in Grapes: Final Report. Project Number: 99105V, BN/244/003. Unpublished study prepared by BASF Agro Research. 32 p.

46415752 Class, T.; Hausmann, S. (2000) AC 375839 (CL 375839): Validation of the Multi-Residue Method DFG S19 with Modified Extraction for the Determination of AC 375839 Residues in Barley Grain, Grapes, and Wine: Final Report. Project Number: BN/244/002, P/387/G, REA944. Unpublished study prepared by Cyanamid Forshung Gmbh (CFS) and PTRL Europe Gmbh. 88 p.

46415753 Pelz, S.; Steinhauer, S. (2001) BAS 560F (AC 375839): Independent Laboratory Validation of Multi-Residue Method DFG S 19 with Modified Extraction for the Determination of BAS 560F REsidues in Barley Grain, Grapes, and WIne: Final Report. Project Number: BAS/0106V, AZ/G01/0031. Unpublished study prepared by Chemische Laboratorien Gmbh. 49 p.

46415754 Class, T. (2000) AC 375839 (CL 375839): Storage Stability of AC 375839 Residues at (Greater or Equal to) -18 (Degrees C) in Grapes and Wine: Final Report. Project Number: P/384/G, DER/138, BN/328/004. Unpublished study prepared by Cyanamid Forshung Gmbh (CFS) and PTRL Europe Gmbh. 111 p.

46415755 Smalley, R. (2002) BAS 560 01 F (AC 375839) 500g as/L SC (SF 09955): At Harvest Residue and Processing Study on BAS 560 F in Vines - North France, 2000. Project Number: BN/713/011, BN/FR/00/843, 4770. Unpublished study prepared by BASF Agro Research. 73 p.

46415756 Smalley, R. (2002) BAS 560 01 F (AC 375839) 50g as/L SC (SF 09955): At Harvest Residue Study on BAS 560 F in Vines - North France, 2000. Project Number: BN/713/008, BN/FR/00/847, 4775. Unpublished study prepared by BASF Agro Research. 37 p.

46415757 Smalley, R. (2002) BAS 560 01 F (AC 375839) 500g as/L SC (SF 09955): At Harvest Residue and Processing Study on BAS 560 F in Vines - South France, 2000: Final Report. Project Number: BN/FR/00/844, BN/713/009, 4771. Unpublished study prepared by BASF Agro Research. 71 p.

46415758 Smalley, R. (2002) BAS 560 01 F (AC 375839) 500g as/L SC (SF 09955): At Harvest Residue and Processing Study on BAS 560 F in Vines - Italy, 2000: Final Report. Project Number: BN/IT/00/845, BN/713/007, 4774. Unpublished study prepared by BASF Agro Research. 90 p.

46415759 Trewhitt, J. (2001) AC 375839 500 g a.s./L SC (SF09955): Decline Curve Residue Study on AC375839 in Vines (Germany, 1999): Final Report. Project Number: BN/713/001, BN/GE/99/101, 4690. Unpublished study prepared by BASF Agro Research. 72 p.

46415760 Trewhitt, J. (2001) AC 375839 500 g a.s./L SC (SF09955): Decline Curve Residue Study on AC375839 in Vines (France-North, 1999): Final Report. Project Number: BN/713/002, BN/FR/99/102, 4686. Unpublished study prepared by BASF Agro Research. 52 p.

46415761 Trewhitt, J. (2001) AC 375839 500 g a.s./L SC (SF09955): Decline Curve Residue Study on AC375839 in Vines (France-South, 1999): Final Study. Project Number: BN/FR/99/103, BN/713/003, 4688. Unpublished study prepared by BASF Agro Research. 36 p.

46415762 Bamber, A. (2001) AC 375839 500 g a.s./L SC (SF09955): Decline Curve Residue Study on AC 375839 in Vine (Italy, 1999): Final Study. Project Number: BN/713/004, BN/IT/99/104, OAT5. Unpublished study prepared by OAT Ltd. 37 p.

46415763 Bamber, A. (2001) AC 375839 500 g a.s./L SC (SF09955): Decline Curve Residue Study on AC 375839 in Vine (Spain, 1999): Final Report. Project Number: BN/SP/99/105, BN/713/005, OAT7. Unpublished study prepared by OAT Ltd. 46 p.

46415764 Smalley, R. (2002) BAS 560 01 F (AC 375839) 500g as/L SC (SF 09955): At Harvest Residue and Processing Study on BAS 560 F in Vines - Spain, 2000: Final Report. Project Number: BN/SP/00/846, BN/713/010, 4773. Unpublished study prepared by BASF Agro Research. 31 p.

46415765 An, D. (2000) AC 375839: Effects of Processing on the Nature of the Residues Due to Hydrolysis: Final Report. Project Number: E/00/003, BN/790/0001, ENV/00/006. Unpublished study prepared by BASF Corp. 45 p.

46415766 Wisk, J. (2003) BAS 560 02 F: Product Identity and Composition. Project Number: 2003/5000412. Unpublished study prepared by BASF Corp. 14 p.

46857700 BASF Corporation (2006) Submission of Residue Data in Support of the Petition for Tolerance of Metrafenone for Use on Grape and Peanuts. Transmittal of 1 Study.

46857701 Khunachak, A.; Fomenko, J. (2001) CL 375839: Evaluation of CL 375839, CL 376991, CL 434223 and CL 3000402 Through the FDA Multi-residue Methods. Project Number: BP00PT01, A054/004, RES/01/006. Unpublished study prepared by Maxim Technologies, Inc. 204 p.