Methyl Anthranilate
Preliminary Work Plan and Summary Document

Registration Review: Initial Docket
September 2011

Case 6056

PC Code
128725

Approved by:

Keith Matthews
Director, Biopesticides and
Pollution Prevention Division

20 September 2011
Date

TABLE OF CONTENTS

LIST OF TABLES

METHYL ANTHRANILATE REGISTRATION REVIEW TEAM

Product Chemistry

Jacob Moore

Human Health

Sadaf Shaukat

Environmental Effects

Russell Jones, Ph.D

Risk Management

Chris Pfeifer

Office of General Counsel

Philip Ross, Esq.

I. PRELIMINARY WORK PLAN

A. Introduction

The Food Quality Protection Act (FQPA) of 1996 mandated the continuous review of existing pesticides. All pesticides distributed or sold in the United States must generally be registered by the U.S. Environmental Protection Agency (EPA or the Agency), based on scientific data showing that they will not cause unreasonable risks to human health or the environment when used as directed on the product labeling. The Registration Review program is intended to make sure that, as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects. Changes in science, public policy, and pesticide use practices will occur over time. Through the Registration Review program, the Agency periodically reevaluates pesticides to make sure that as change occurs, products in the marketplace can continue to be used safely. Information on this program is provided at: http://www.epa.gov/oppsrrd1/registration_review/.

The Agency is implementing the Registration Review program pursuant to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) section 3(g) and will review each registered pesticide every 15 years to determine whether it continues to meet the FIFRA standard for registration. The Agency will consider benefits information and data as required by FIFRA. The public phase of Registration Review begins when the initial docket is opened for each case. The docket is the Agency's opportunity to state what it knows about the pesticide and what additional risk analyses and data or information it believes are needed to make a Registration Review decision. After reviewing and responding to comments and data received in the docket during this comment period, the Agency will develop and commit to a final work plan and schedule for the Registration Review.

This is the Registration Review Summary Document for the biochemical pesticide active ingredient (a.i.) Methyl Anthranilate, PC Code 128725.

B. Background and Regulatory Information

Methyl Anthranilate (MA) is a naturally occurring ester found in plants such as grapes, corn, cherries, cocoa and black tea. MA is a pale yellow liquid that is redolent of grapes. It has no known acute toxic endpoints for mammals, and biodegrades rapidly. MA is used as a flavoring in candy and sodas and is considered 'Generally Regarded as Safe' (GRAS) by FDA for consumption as a flavoring agent. It is also used in perfumes.

MA was first registered by the Agency in 1985 for use as a bird repellent. It is used on agricultural sites and on other sites where nuisance birds create hazard, such as at airports and on turf. MA works through a non-toxic mode of action by causing a pain response in the trigeminal nerve of birds. Birds are then conditioned not to return to the place of their discomfort. It is formulated as a liquid and is applied by foliar spray or

fogger. Human exposure is considered minimal because of low application rates and rapid biodegradability. MA has negligible acute toxicity to humans, nontarget insects, plants, birds and fish. In 1995, MA was exempted from the requirement of a tolerance for use on grapes, blueberries and cherries under 40 CFR 180.1143. The exemption was amended in 2001 to include corn and sunflowers and amended again in 2002 to include all agricultural use sites. There are currently seven registered products containing the active ingredient. One of these products is a manufacturing-use product (MPs); the remaining six are end-use products (EPs).

C. Anticipated Risk Assessment and Data Needs

Below is a discussion of how the current data requirements for MA are satisfied by available data. The pertinent data areas include: Product Analysis, Toxicology (human health), and Nontarget Organisms and Environmental Fate (ecotoxicology).

1. Product Analysis
(40 CFR 158.2030)

The Agency has conducted a review of the available product chemistry data and information for MA and has concluded that all biochemical pesticide data requirements for the technical grade active ingredient have been satisfied. Table 1 provides information on chemical identity; and Table 2 reflects the fulfillment of the product chemistry data requirements.

Table 1. Methyl Anthranilate Chemical Identity

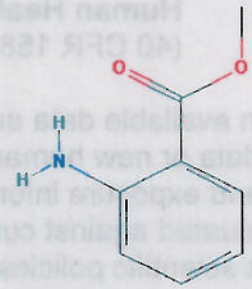
Common Name	Methyl Anthranilate
Chemical Name, IUPAC	2-aminobenzoic acid methyl ester
Molecular Weight	151.2 g/mol
PC Code	128725
CAS Registry Number	134-20-3
Empirical Formula	$C_8H_9NO_2$
Chemical Structure	

Table 2. Methyl Anthranilate Product Chemistry Data Requirements Summary

Guideline No.	Physical and Chemical Properties	Status [1]	Value
830.1100	Product Identity and Composition	A	Refer to Table 1.
830.1200	Description of starting materials, production and formulation process	A	CBI
830.1400	Discussion of formation of impurities	A	CBI
830.1700	Preliminary analysis	A	CBI
830.6302	Color	A	Pale Yellow
830.6303	Physical state	A	Liquid or crystals
830.6304	Odor	A	Orange blossoms; Grapes
830.6313	Stability to normal and elevated temperatures, metals and metal ions	A	No degradation observed.
830.7000	pH	N/A	N/A; pH testing done on end-use products.
830.7050	UV/Visible light absorption λ^{al} = 248, 341 nm	A	5012 M^{-1} cm^{-1}
830.7200	Melting point/melting range	A	24-25°C
830.7220	Boiling point/boiling range	A	256°C
830.7300	Density	A	1.168 g/mL
830.7520	Particle size, fiber length, and diameter distribution	N/A	N/A; water soluble
830.7550 830.7560 830.7570	Partition coefficient (n-Octanol/Water)	A	Log K_{ow} = 1.88
830.7840	Water solubility	A	0.29 g/100mL
830.7950	Vapor pressure	A	0.012 mm (20°C)

1. A=Acceptable, N/A=Not Applicable

Data from MRIDs 42608800, 42608801,42699800, 4269801 and 43036900.

2. Human Health Risk Assessment Status
(40 CFR 158.2050)

Based on available data and information, the Agency does not foresee the need for new data or new human health risk assessments for this active ingredient. Hazard and exposure information as well as Agency risk assessments on MA were evaluated against current safety standards established by statute, the Agency's scientific policies and regulations, and it was determined that there is no need to conduct additional risk assessments. The active ingredient is a naturally occurring ester found in plants such as corn, grapes, cherries, cocoa and black tea. It is present in those commonly consumed foods at higher concentrations than in any pesticidal exposure scenarios. Data indicate that

when MA is consumed, it is metabolized easily in the intestines and liver, obviating any systemic dietary exposure (MRID 44786300). It is used as a flavoring in candy and sodas and is considered GRAS by FDA for consumption as a flavoring agent (21 CFR 182.60). It is also used in perfumes. No acute toxic endpoints have been established for MA; and it degrades rapidly into non-toxic components such as anthranilic acid.

All acute toxicity data requirements were fulfilled for MA per 40 CFR 158.2050. All data show that MA is virtually non-toxic to mammals through all routes of exposure.

Due to the low toxicity, metabolism, rapid degradation and long history of dietary exposure to this naturally occurring biochemical, chronic and subchronic data were waived. No other toxic endpoints were identified and, therefore, no reference dose and no observable effect level were established. Labels for all products containing MA require the following personal protective equipment (PPE) for applicators/handlers: long sleeve shirt, long pants, shoes, socks, and protective eyewear. Because of a lack of significant acute toxicity and minimal exposure due to low application rates and rapid degradation, EPA does not foresee the need for new data or for a new human health risk assessment for MA.

Table 3. Human Health Assessment Data Requirements for Methyl Anthranilate

Data Requirement	LD_{50}	Toxicity Category	MRID
Acute Oral Toxicity/OPPTS 870.1100	3,633 mg/kg (males) 3,000mg/kg (females) 3,288 mg/kg (sexes combined)	III	42608802
Acute Dermal Toxicity/OPPTS 870.1200	> 2,000 mg/kg*	III*	42608803
Acute Inhalation Toxicity/OPPTS 870.1300	> 2.8 mg/L	III	44740303
Acute Eye Irritation/OPPTS 870.2400	Slight to moderate conjunctival irritation; all cleared by 72 hours after treatment	III	42608804
Acute Dermal Irritation/OPPTS 870.2500	No irritation	IV	42608805
Skin Sensitization/OPPTS 870.2600	Not a sensitizer	Not a sensitizer	42608806

* Highest tested dose.

3. Environmental Fates and Ecological Risk Assessment Status (40 CFR 158.2060)

MA is a naturally occurring substance in plants such as corn, sunflowers, grapes and cherries,as well as cocoa and black tea (EPA, 1994). Honey made from

citrus floral sources has been reported to contain from 3.60 to 5.04 mg/kg of MA (Ferreres et. a., 1994; White & Bryant, 1996, unpublished study). MA is extremely volatile and degrades rapidly into non-toxic components such as anthranilic acid. Numerous studies are available evaluating residues on crops and aquatic environments following application of MA at maximum label use rates for the respective use sites. In both terrestrial and aquatic exposure scenarios, the potential residues were well below the naturally occurring levels found in cherries (35 ppm) and grapes (33 ppm), and far below any level of concern for non-targets. Even in the event of exposure, toxicity data on nontarget organisms confirm that MA is virtually non-toxic to non-target plants, insects, mammals, and birds and slightly to moderately toxic to fish. It is slightly toxic to aquatic invertebrates, but at levels far in excess of any expected exposure scenario. In sum, use of MA as a bird repellent will not result in significant residues; and any residues are considered to be virtually non-toxic. (Table 4).

Terrestrial Residues: Data from magnitude of the residue studies on apples, corn (sweet), and sunflower confirm the rapid dissipation of the active ingredient. Residues on whole apples treated with a single foliar application at 2.29 lbs a.i./A declined from 1.79 ppm at 1-hour posttreatment to <0.055 ppm (non-detectable) by 14 days posttreatment (MRID 45065105). Sweet corn was treated twice at 0.573 lbs a.i./A with a 5-day interval; residues were 0.374 ppm 10-days after the second application (MRID 45065103). Avery et al. (1995) reported residues on rice as 11.7 ppm immediately following an application of ReJex-It AG-36 (14.5% a.i.) at 6.2 lb a.i./A, which rapidly declined over the next 14 days with a half-life of 7 days (interpolated by reviewer based on study author data). The residue value reported by Avery et al. (1995) was used to calculate Risk Quotients (RQs) for mammals and birds following terrestrial applications of MA at the maximum label used rate. Based on the highest respective application rates for terrestrial use sites, calculated RQs are all <0.05 for all taxa, indicating negligible risk for all non-target organisms exposed to MA residues (2011 EPA Methyl Anthranilate Eco Scoping Document and ESA).

Aquatic Residues: Magnitude of the residue studies have been conducted for both direct application and fogging applications of MA products to aquatic sites. In a catfish toxicity study (Dorr et al. 1998), a 40% liquid methyl anthranilate end-use product was applied directly to the surface of an aquaculture pond at an exaggerated rate of 80 lb a.i./A water surface (10X the maximum label rate for currently registered products). The maximum concentration of was 4.44 ppm at a depth of 24 inches following seven applications over a two-week period. If mathematically adjusted to a 1X rate, the calculated residues are estimated to be approximately 0.444 ppm. Fog application rates are an order of magnitude below that of direct spray applications (0.21 lb a.i/A vs. 8.0 lb a.i./A). The Tier I Rice Model equation (EPA, 2007) was used to estimate environmental concentrations in water following a fog application at maximum label use rates (0.21 lbs a.i./A or 0.24 kg a.i./ HA) and assuming a K_{oc} of 250 for MA (HSDB, 2004). The calculated residues for fogger applications were 0.175 ppm. Given the low EEC

levels, the virtual non-toxicity of MA to aquatic organisms and the prohibition of use on fish-bearing waters, no risks are anticipated to result from applications of MA as a bird repellent.

Table 4. Summary of Non-Target Organism Data

Study Type/OCSPP Guideline	$LD_{50}/LC_{50}/EC_{50}$ Results	Toxicity Category	MRID
Acute Oral Toxicity /OCSPP 870.1100	>5000 mg/kg (rat)	Tox Category IV	42608702
90-day Feeding (rat) /OCSPP 870.	>500 mg/kg/day	No effects on growth or survival	42151904
Avian Acute Oral Toxicity /OCSPP 850.2100	>2036 ppm (Bobwhite quail)	Practically non-toxic	42966902
	>2250 ppm (Bobwhite quail)	Practically non-toxic	43610701
Avian Dietary Toxicity /OCSPP 850.	>5620 ppm (Mallard duck)	Practically non-toxic	42608808
	>2200 (White crowned sparrow)	Practically non-toxic	42966903
	>5259 ppm (Mallard duck)	Practically non-toxic	44741501
Freshwater Fish Acute Toxicity, 96 hr /OCSPP 850.1075	9.12 ppm [1, 2] (Bluegill sunfish)	Moderately toxic	42718202
	42.56 ppm NOEC = 33.6 ppm (bluegill)	Slightly toxic	43610702
	22.91 ppm [1] (Rainbow trout)	Slightly toxic	42966901
	25.40 ppm [2] (Rainbow trout)	Slightly toxic	43610703
	16.23 ppm [1] (Channel catfish)	Slightly toxic	42699803
	32.25 ppm [1] (Atlantic salmon)	Slightly toxic	42995101
Freshwater Fish Dietary Toxicity, 12-hr /Non-Guideline	>1000 mg/kg (striped bass & African cichlid)	No effects on growth or survival	Harpaz & Clark, 2006
Aquatic Freshwater Invertebrate Toxicity, 48-hr /OCSPP 850.1010	17.0 mg/L	Slightly toxic	41895207
	29.1 mg/L	Slightly toxic	42718203
Non-target Plants	>40000 ppm on blueberries, cherries, grapes, and raspberries[3]	Practically non-toxic	42740204

Study Type/OCSPP Guideline	$LD_{50}/LC_{50}/EC_{50}$ Results	Toxicity Category	MRID
Non-target Insects (Honey Bee Contact Toxicity, 48-hr)/OCSPP 850.3020	>25 ug/bee	Practically non-toxic	41623704

[1] Static conditions
[2] Flow-through conditions
[3] Based on visual observations of foliar necrosis/desiccation

4. Risk to Threatened and Endangered Species

A risk assessment was conducted with acute and dietary mammal and avian toxicity data; aquatic organism LC_{50} and EC_{50} data; and terrestrial plant and insect (honey bee) data obtained from guideline studies, non-guideline studies, and the open technical literature in conjunction with the label use information for Methyl Anthranilate from the product labels (2011 EPA Methyl Anthranilate Eco Scoping Document and ESA). Based on the results of this assessment, a "No Effect" finding is concluded for threatened and endangered Species. MA undergoes rapid biodegradation in the environment and the Agency's Levels of Concern (LOCs) are not exceeded for listed species.

Mammals: Mammalian acute oral toxicity is >5000 mg/kg. The subchronic (90-day) dietary No Observable Effects Level (NOEL) was >500 ppm. The non-definitive endpoints are respectively approximately 430X and 43X greater than the observed maximum environmental concentrations of 11.7 ppm for MA residues (Avery et. al., 1995) on terrestrial foliage. Based on the data and the *Guidance for Using Non-Definitive Endpoints in Evaluating Risks to Listed and Non-listed Animal Species* (EPA, 2010), there are no concerns for non-target mammals, including listed species.

Birds: Applications of MA are not expected to affect birds. Based on available avian toxicity data, the acute oral LD50 is >2250 mg/kg, and the sub-acute dietary LC50 is>5620 ppm. The non-definitive endpoints are, respectively, approximately 192X and 480X greater than the observed maximum environmental concentrations of 11.7 ppm for MA residues (Avery et. al., 1995) on terrestrial foliage. Based on the data and the *Guidance for Using Non-Definitive Endpoints in Evaluating Risks to Listed and Non-listed Animal Species* (EPA, 2010), there are no concerns for non-target birds, including listed species.

Fish: Applications of MA are not expected to affect fish. Using the most conservative endpoint for fish in laboratory testing (Bluegill sunfish; 9.12 ppm) and the measured calculated maximum EEC of MA in water (0.44 ppm), the RQ was calculated as 0.019. The RQ is well below the Level of Concern (LOC) for listed species of 0.05.

Aquatic Invertebrates: Applications of MA are not expected to affect aquatic invertebrates. Using the most conservative endpoint for aquatic invertebrates (17.0 ppm) in laboratory testing and the maximum estimated environmental concentration (EEC) of MA in water following a direct spray application to water (0.44 ppm), the RQ was calculated as 0.048. The slightly less than the the listed species LOC of 0.05. When applied at a 10X rate to the surface of an aquaculture pond, the maximum concentration of MA was 4.44 ppm at a depth of 24 inches following seven applications over a two-week period (Dorr et. al., 1998), approximately 4X less than that the most conservative endpoint for aquatic invertebrates (17.0 ppm).

If applied according to EPA-approved label use dirtections, environmental concentrations of MA in water are not expected to reach concentrations that would be harmful to aquatic invertebrates due to rapid biodegradation, high volatility, and low solubility in water (HSDB, 2004). Based on the low toxicity of MA to aquatic invertebrates (Table 4) and its rapid dissipation in the environment (Avery et. al., 1995; Dorr et. al., 1998; HSDB, 2004), there are no concerns for non-target aquatic invertebrates, included listed species.

Plants: MA is a naturally occurring substance found in many plant species such as corn, sunflowers, grapes (33 ppm) and cherries (35 ppm). It is extremely volatile and degrades rapidly into non-toxic components such as anthranilic acid. It has no known toxic effects when applied exogenously to plants at the proposed rates of application. In a field study using leaves of blueberries, cherries, and grapes, it was demonstrated that non-target terrestrial plants can tolerate >40,000 ppm of MA before exhibiting any observable, but minor foliar desiccation or necrosis (MRID 42740204). Using the most conservative non-definitive endpoint for plants (40000 ppm) and the maximum observable residues on plants following a foliar spray application at the maximum label use rate, the RQ was calculated as 0.002. The RQ is well below any LOC for non-target plants, including listed species.

Insects: The non-target insect contact toxicity LD_{50} (honey bee) was >25 ug/bee, which is categorized as practically non-toxic. No toxic effects were observed at the highest rate used in laboratory testing. Endogneous levels of MA reported for grapes and cherries are higher than residues measured on foliage (11.7 ppm) following an application at maximum label use rates (Avery et. al., 1995). Honey made from citrus floral sources has been reported to contain from 3.60 to 5.04 mg/kg of MA (Ferreres et al., 1994; White & Bryant, 1996, unpublished study) indicating regular dietary and contact exposure to naturally occurring methyl anthranilate by pollinators. Based on these data, the Agency has no concerns to non-target insects, including listed species.

Based on the fact that MA degrades rapidly and all RQs are less than LOCs for listed species, EPA has determined that MA will have "No Effect" on listed threatened or endangered species or any designated critical habitat.

5. Endocrine Disruptor Screening Program

As required by the Administrator under FFDCA section 408(p), EPA has developed the Endocrine Disruptor Screening Program (EDSP) and has begun to implement the screening program that is to be used to test all pesticides in order to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a "naturally occurring estrogen, or other such endocrine effects as the Administrator may designate."

FFDCA section 408(p)(4), authorizes the Administrator, by order, to exempt from the requirements of the Estrogenic Substances Screening Program a biologic substance or other substance if a determination is made that the substance is anticipated not to produce any effect in humans similar to an effect produced by a naturally occurring estrogenic substance.

Between October 2009 and February 2010, EPA issued test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients. MA, a bird repellent and naturally occurring ester, found in corn, grapes, cherries and tea, is not among the group of 58 pesticide active ingredients on the initial list to be screened under the EDSP.

The Agency, as part of this preliminary work plan, believes that MA, the active ingredient involved in this registration review case, likely is a substance that would not produce any effect in humans similar to an effect produced by a naturally occurring estrogenic substance. As such, pursuant to Section 408(p)(4), EPA will determine in the future whether it can exempt MA from the requirements of the Section 408(p) EDSP. In the event the Agency does determine to exempt this substance from the EDSP, an order will be issued.

For further information on the status of the EDSP, the policies and procedures, the list of 67 chemicals, future lists, the test guidelines and the Tier 1 screening battery, please visit our website: http://www.epa.gov/endo/.

6. Incidents

According to the Agency's Office of Pesticide Programs Incident Data System (IDS), there have been three reported incidents from the use of EPA-registered products containing Methyl Anthranilate. On January 1, 2001 a human respiratory problem was caused by exposure to drift, attributable to misuse by the applicator; no additional information was available concerning this incident. On April 1, 2002, a human miscarriage was attributed to an applicator's misuse of the pesticide inside a store. On May 11, 2004, there was another respiratory problem resulting from exposure to fumes; no additional information was available concerning this incident. The Agency is not requiring more information or a revised risk assessment based on these incidents because none of the preceding reported incidents are attributable to information unknown to the

Agency regarding the nature of Methyl Anthranilate; and all incidents appear to be associated with applicator error. Label language, including the requirement of PPE, for methyl anthranilate products are appropriate and sufficient to protect the users/handlers of these products. The Agency will consider any incident data or comments submitted to this docket in response to this preliminary work plan.

D. Timeline

The projected timeline for the Registration Review of Methyl Anthranilate, Case 6056, is shown in Table 5, below.

Table 5. Projected Timeline for the Registration Review of Case 6056

Activities	Estimated Month/Year
Open Public Comment Period for Methyl Anthranilate	September 2011
Close Public Comment Period	November 2011
Issue Final Work Plan (FWP)	March 2012
Open Public Comment Period for Proposed Reg. Review Decision	September 2012
Close Public Comment Period	November 2012
Final Decision	December 2012
Total (years)	1.25

E. Guidance for Commenters

The public is invited to comment on EPA's preliminary work plan and rationale. The Agency will consider all comments as well as any additional information or data provided in a timely manner prior to issuing a final work plan for the case.

F. Environmental Justice

EPA seeks to achieve environmental justice, the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies. To help address potential environmental justice issues, the Agency seeks information on any groups or segments of the population who, as a result of their location, cultural practices, or other factors, may have atypical, unusually high exposure to MA compared to the general population. Please comment if you are aware of any subpopulations that may have atypical, unusually high exposure compared to the general population.

G. Water Quality

MA is not identified as a cause of impairment for any water bodies listed as impaired under section 303(d) of the Clean Water Act, based on information provided at: http://www.epa.gov/owow/tmdl/. In addition, no Total Maximum Daily Loads (TMDL) have been developed for MA based on information provided at: http://iaspub.epa.gov/tmdl_waters10/text_search.tmdl_search_form. More information on impaired water bodies and TMDL's can be found at: http://www.epa.gov/owow/tmdl/. The Agency invites submission of water quality data for this pesticide. To the extent possible, data should conform to the quality standards in Appendix A of the Office of Pesticide Program's (OPP) Standard Operating Procedure: Inclusion of Impaired Water Body and Other Water Quality Data in OPP's Registration Review Risk Assessment and Management Process (see: http://www.epa.gov/oppsrrd1/registration_review/water_quality_sop.htm) to ensure they can be used quantitatively or qualitatively in pesticide risk assessments.

H. Trade Irritants

Through the Registration Review process, the Agency intends to solicit information on trade irritants and, to the extent feasible, take steps toward facilitating irritant resolution. Growers and other stakeholders are asked to comment on any trade irritant issues resulting from lack of Maximum Residue Limits (MRL's) or disparities between United States tolerances and MRL's in key export markets, providing as much specificity as possible regarding the nature of the concern. In the case of Methyl Anthranilate (Case 6056), there are currently no established residue tolerances. Additionally, there is no MRL established for MA. Therefore, the Agency does not anticipate that current uses of MA will pose concerns as trade irritants.

I. Next Steps

After the 60-day comment period closes, the Agency will review and respond to any comments received in a timely manner and then issue a Final Work Plan for Case 6056: Methyl Anthranilate.

II. FACT SHEET for METHYL ANTHRANILATE

A. Background Information

Registration Review Case Number: 6056
PC Code: 128725
CAS #: 134-20-3
Common Name: Methyl Anthranilate
Synonyms and Abbreviations: Benzoic Acid, 2-Amino, Methyl Ester, Anthranilic Acid, methyl ester, Methyl-2-amonobenzoate, Methyl o-aminobenzoate, Neroli Oil, Nevoli Oil and o-Carbomethoxyaniline, MA
First Registered: 1985
Products: 1 MP, 7 EPs
Physical Description: Pale yellow liquid
Mode of Action: Triggers a pain response in the trigemimal nerve of birds (The trigemimal nerve is located in the head.)
Use Sites: For commercial food and non-food uses on agricultural areas, airports, turf, open spaces, landfills, commercial/industrial water impoundments, temporary pools and electrical substations.
Method(s) of Application: Spray and Fogger
Use Limitation: Not be applied to fish-bearing waters
Previous Regulatory Documents: Fact Sheet, Exemption from the Requirement of a Tolerance
Registration Review Lead: Chris Pfeifer; pfeifer.chris@epa.gov

Products Labels

Labels for the MA products may be found at:
http://oaspub.epa.gov/pestlab1/ppls.home, which is the Office of Pesticide Programs' Pesticide Product Label System (PPLS) website.

B. Description of Active Ingredient

MA is a bird repellent registered for use on agricultural sites and on sites where nuisance birds create hazard, sites such as at airports and on turf. It is a naturally-occurring substance found in plants such as corn, grapes, cherries, cocoa and black tea. It is used as a flavoring in candy and sodas and is considered 'Generally Regarded as Safe' (GRAS) by FDA for consumption as a flavoring agent. It is also used in perfumes. No toxic endpoints have been established for MA; and it degrades rapidly into non-toxic components such as anthranilic acid. It is applied as a foliar spray and through fogging. MA has a non-toxic mode of action, repelling birds by causing a pain response in a nerve located in their heads. The pain is temporary, but the birds associate the discomfort with the location and become conditioned to avoid that location. It was exempted from the requirement of a tolerance for use on grapes, blueberries and cherries in 1995 under 40 CFR 180.1143. The exemption was amended

in 2001 to include corn and sunflowers and amended again in 2002 to include all agricultural use sites.

C. Use Information

Agency screening estimates MA in 2011 indicate a minimal usage of 1000 pounds of active ingredient on cherries. No other usage data are available.

Table 6. Products Containing Methyl Anthranilate

EPA Reg. #	Registration Name	Company Name	Current Status	% of Active Ingredient
33162-1	AVIAN CONTROL	STONE SOAP CO. INC.	Registered 2010	20
58035-7	REJEX-IT TP-40	CEANNARD INC.	Registered 1994	40
58035-8	REJEX-IT MA	CEANNARD INC.	Registered 1994	98.5
58035-9	REJEX-IT AG-36	CEANNARD INC.	Registered 1994	14.5
58035-15	REJEX-IT FOG FORCE AR20	CEANNARD INC	Registered 2008	20
66550-1	BIRD SHIELD BIRD REPELLENT CONCENTRATE	BIRD SHIELD BIRD REPELLENT CORPORATION	Registered 1995	26.4
72041-2	GOOSE REPELLENT	LIQUID FENCE CO.	Registered 2005	20.72
83359-4	AVEX	IMPEC, INC.	Registered 2009	26.4

* The MP is highlighted.

D. Recent Actions

In July 2002, the Agency amended the 1995 exemption from the requirement of a tolerance to include all agricultural crops. A synopsis of the risk assessment supporting that decision can be found in Final Rule - 67 FR 51088, August 7, 2002.

E. Product Analysis

The Agency has conducted a review of the available product chemistry data and information for MA. Product chemistry data and information for MA, provided by the registrants, are sufficient to fulfill the respective product chemistry data requirements outlined in 40 CFR 158.2030.

F. Human Health Risk Assessment

Meeting the Current Data Requirements: Status

The Agency does not foresee the need to require new data or for a new human health risk assessment for methyl anthranilate. All data requirements as outlined in 40 CFR 158.2050 have been satisfied for methyl anthranilate.

Exposure Assessment

All occupational and non-occupational risk associated with MA end-use products (EPs) is expected to be insignificant because of the nontoxic mode of action and low exposure resulting from the low application rates of these products.

Dietary (Food and Water). Because of low use rates, pre-harvest intervals and rapid degradation, no significant MA residues are expected at harvest (MRIDs 45065102, 45065103, 45065104, 45065105, 43119401). Any residues would be below any naturally occurring levels found in commonly consumed foods such as grapes (MRID 44786301). Further, since MA has shown no mammalian toxicity and is rapidly metabolized in human intestines and liver, no dietary risks are anticipated. Likewise, residues of methyl anthranilateMA are very unlikely to be found in drinking water. In addition to the low use rates and the rapid photodegradation, MA is also prone to microbial degradation (MRID 43119401).

Residential exposure is expected to be minimal via the dermal and inhalation routes due to the largely commercial nature of the use patterns and the low application rates for Methyl Anthranilate EPs with residential uses. The residential labels prescribe a single use per season. Additionally, exposure is anticipated to be limited based on biodegradation and directions requiring household applicators to wear personal protective equipment - protective eyewear, long sleeved shirt and pants.

Occupational exposure is expected to individuals who handle this pesticide through mixing and loading and to those who apply the pesticide. The exposure is expected to be insignificant due to low application rates of these products, rapid biodegradation of the active ingredient and PPE requirements - protective eyewear and long-sleeved shirts and long pants.

Tolerance Exemption

<u>40 CFR 180.1143: Methyl Anthranilate; exemption from the requirement of a tolerance.</u> Residues of Methyl Anthranilate, a biochemical pesticide, are exempt from the requirement of a tolerance in or on all food commodities, when used in accordance with good agricultural practices. [67 FR 51088, August 7, 2002]

G. Environmental Fate and Ecological Risk Assessment

Meeting the Current Data Requirements: Status

The Agency considers the nontarget organisms and environmental fate biochemical data requirements, as outlined in 40 CFR 158.2060, to be satisfied for MA at this time.

Exposure Assessment

MA is a naturally occurring ester commonly found in fruits. It has a non-toxic mode of action, and is of low toxicity. It has no known toxicity to nontarget plants, mammals, insects and birds; and data confirm that the active ingredient is only slightly toxic to aquatic organisms. A screening level assessment was conducted to evaluate the risks posed by exposure to nontarget organisms. The risk quotients for all nontarget organisms were significantly below any LOC. Although MA is an effective repellent, EPA modeling demonstrates that indirect exposures to plants are not significant enough to elicit a response. The assessment determined that nontarget exposures to MA will have "No Effect" on any currently listed threatened or endangered species or any designated critical habitat.

BIBLIOGRAPHY

Studies

MRID	Citation
42151900	IR-4 Project (1992) Submission of product chemistry data and residue data to support the petition for tolerance of methyl anthranilate on various fruits. Transmittal of 5 studies.
42151901	Askam, L. (1991) Bird Shield/Methyl Anthranilate--Product Identity and Disclosure of Ingredients, Manufacturing Process and Discussion on the Formation of Unintentional Ingredients: Lab Project Number: 5026: 5028: 5029. Unpublished study prepared by Bird Shield Corp. 34 p.
42151902	Biehn, W. (1991) Methyl Anthranilate--Analysis of Samples, Certification of Limits, and Analytical Methods for Certified Limits: Lab Project Number: 5026: 5028: 5029. Unpublished study pre- pared by IR-4, Rutgers Univ. 26 p.
42151903	Askham, L. (1991) Methyl Anthranilate--Physical and Chemical Properties, Effect of Sunlight, Effect of Artificial Light: Lab Project Number: 5026: 5028: 5029. Unpublished study prepared by Bird Shield Corp. in coop with Washington State Univ., Perf. Lab for the Effect of Sunlight and Artificial Light. 30 p.
42151904	Biehn, L. (1991) Methyl Anthranilate Safety Data--in Support of Petition Proposing an Exemption from the Requirement of a Tolerance for Use in Cherry Blueberry and Grape Production: Lab Project Number: 5026: 5028: 5029. Unpublished study prepared by Rutgers Univ. 174 p.
42151905	Askham, L.; Fellman, J. (1989) Methyl Anthranilate: Magnitude of the Residue on Cherries in Proceedings of the 9th Great Plains Wildlife Damage Control Workshop; April 17-20, 1989. Fort Collins, CO|. Unpublished study prepared by Univ. of Idaho, Dept. of Plant Soil and Entomological Sciences. 7 p.
42580300	Dolphin Trust (1992) Submission of product chemistry and efficacy data in support of the registration of Methyl anthranilate. Transmittal of 3 studies.
42580301	Askham, L. (1992) Methyl anthranilate--Product Stability. Unpublished study prepared by Washington State Univ. 8 p.

42580302	Askham, L. (1991) Effect of Methyl Anthranilate on Reducing Bird Use of Perches and Nest Sites. Unpublished study prepared by Washington State Univ. 15 p.
42580303	Askham, L. (1991) Effect of Methyl Anthranilate on Reducing Bird Use of Water Impoundments and Chemical Application Systems (Chemigation) Use. Unpublished study prepared by Washington State Univ. 10 p.
42608700	PMC Specialties Group (1992) Submission of product chemistry and toxicity data in support of the registration of Rejex-it AP50. Transmittal of 6 studies.
42608701	Young, M. (1992) Physical and Chemical Characteristics of Methyl Anthranilate: Final Report: Lab Project Number: 92-GR-0004. Unpublished study prepared by Toxikon Corp. 305 p.
42608702	Glaza, S. (1992) Acute Oral Toxicity Study of Rejex-it AP-50 in Rats: Final Report: Lab Project Number: HWI 20305696. Unpublished study prepared by Hazleton Wisconsin, Inc. 24 p.
42608703	Glaza, S. (1992) Acute Dermal Toxicity Study of Rejex-it AP-50 in Rabbits: Final Report: Lab Project Number: HWI 20305700. Unpublished study prepared by Hazleton Wisconsin, Inc. 28 p.
42608704	Glaza, S. (1992) Primary Eye Irritation Study of Rejex-it AP-50 in Rabbits: Final Report: Lab Project Number: HWI 20305708. Unpublished study prepared by Hazleton Wisconsin, Inc. 33 p.
42608705	Glaza, S. (1992) Primary Dermal Irritation Study of Rejex-it AP-50 in Rabbits: Final Report: Lab Project Number: HWI 20305704. Unpublished study prepared by Hazleton Wisconsin, Inc. 21 p.
42608706	Glaza, S. (1992) Dermal Sensitization Study of Rejex-it AP-50 in Guinea Pigs (Closed Patch Technique): Final Report: Lab Project Number: HWI 20305712. Unpublished study prepared by Hazleton Wisconsin, Inc. 33 p.
42608800	PMC Specialties Group (1992) Submission of product chemistry and toxicity data to support Rejex-it registration. Transmittal of 8 studies.
42608801	Young, M. (1992) Physical and Chemical Characteristics of Methyl Anthranilate: Final Report: Lab Project Number: 92-GR-0004A. Unpublished study prepared by Toxikon Corp. 323 p.
42608802	Glaza, S. (1992) Acute Oral Toxicity Study of Rejex-it MA in Rats: Final Report: Lab Project Number: HWI 20305693. Unpublished study prepared by Hazleton Wisconsin, Inc. 38 p.
42608803	Glaza, S. (1992) Acute Dermal Toxicity Study of Rejex-it MA in Rabbits: Final Report: Lab Project Number: HWI 20305697. Unpublished study prepared by Hazleton Wisconsin, Inc. 28 p.
42608804	Glaza, S. (1992) Primary Eye Irritation Study of Rejex-it MA in Rabbits: Final Report: Lab Project Number: HWI 20305705. Unpublished study prepared by Hazleton Wisconsin, Inc. 28 p.
42608805	Glaza, S. (1992) Primary Dermal Irritation Study of Rejex-it MA in Rabbits: Final Report: Lab Project Number: HWI 20305701. Unpublished study prepared by Hazleton Wisconsin, Inc. 21 p.
42608806	Glaza, S. (1992) Dermal Sensitization Study of Rejex-it MA in Guinea Pigs (Closed Patch Technique): Final Report: Lab Project Number: HWI 20305709. Unpublished study prepared by Hazleton Wisconsin, Inc. 33 p.
42608807	Campbell, S.; Jaber, M. (1992) An Acute Oral Toxicity Study with the Mallard: Methyl Anthranilate: Final Report: Lab Project Number: 343-102. Unpublished study prepared by Wildlife Int'l, Ltd. 19 p.
42608808	Campbell, S.; Jaber, M. (1992) A Dietary LC50 Study with the Mallard: Methyl Anthranilate: Lab Project Number: 343-101A. Unpublished study prepared by Wildlife Int'l, Ltd. 19 p.
42608900	PMC Specialities Group (1992) Submission of product chemistry and toxicity data to support REJEX-IT registration. Transmittal of 6 studies.
42608901	Young, M. (1992) Physical and Chemical Characteristics of Methyl Anthranilate: Lab Project Number: 92-GR-0004. Unpublished study prepared by Toxikon Corp. 305 p.
42608902	Glaza, S. (1992) Acute Oral Toxicity Study of Rejex-it TP-40 in Rats: Final Report: Lab Project Number: HWI 20305694. Unpublished study prepared by Hazleton Wisconsin, Inc. 24 p.
42608903	Glaza, S. (1992) Acute Dermal Toxicity Study of Rejex-it TP-40 in Rabbits: Lab Project Number: HWI 20305698. Unpublished study prepared by Hazleton Wisconsin, Inc. 28 p.

42608904	Glaza, S. (1992) Primary Eye Irritation Study of Rejex-It TP-40 in Rabbits: Final Report: Lab Project Number: HWI 20305706. Unpublished study prepared by Hazleton Wisconsin, Inc. 28 p.
42608905	Glaza, S. (1992) Primary Dermal Irritation Study of Rejex-it TP-40 in Rabbits: Final Report: Lab Project No. HWI 20305702. Unpub- lished study prepared by Hazleton Wisconsin, Inc. 21 p.
42608906	Glaza, S. (1992) Dermal Sensitization Study of Rejex-it TP-40 in Guinea Pigs: Final Report: Lab Project No. HWI 20305710. Unpub- lished study prepared by Hazleton Wisconsin, Inc. 33 p.
42675200	PMC Specialites Group (1992) Submission of efficacy data of Methyl Anthranilate to support registration of ReJeX-iT TP 40 and AP 50. Transmittal of 5 studies.
42675201	Dolbeer, R.; Clark, L.; Woronecki, P.; et al. (1992) Pen Tests of Methyl Anthranilate as a Bird Repellent in Water. Proceedings of the Eastern Wildlife Damage Control Conference 5:112-116.
42675202	Dolbeer, R.; Clark, L.; Woronecki, P.; et al. (1992) Pen Tests of Methyl Anthranilate as a Bird Repellent in Water. Proceedings of the Eastern Wildlife Damage Control Conference 5:112-116.
42675203	Cummings, J.; Otis, D.; Mason, J.; et al. (1990) Evaluation of Dimethyl and Methyl Anthranilate as Waterfowl Feeding Deterrents. Denver Wildlife Research Center, Bird Section Research Report No. 458. 22 p.
42675204	Belant, J.; Gabrey, S.; Dolbeer, R.; et al. (1992) Pen and Field Evaluations of Two Formulations of Methyl Anthranilate (PMC 9491 and ReJeX-iT AP-50) to Repel Mallards and Gulls from Water. Prepared by U. S. Dept. of Agriculture, Denver Wildlife Research Center. 23 p.
42675205	Belant, J.; Dolbeer, R. (1992) Preliminary Evaluation of a Landill Cover Material with Methyl Anthranilate to Repel Birds from Food. Prepared by U.S. Dept. of Agriculture, Denver Wildlife Research Center. 25 p.
42675300	PMC Specialites Group (1992) Submission of efficacy data of Methyl Anthranilate to support Rejex-iT MA, TP40, and AP50 registration. Transmittal of 3 studies.
42675301	Mason, J.; Glahn, J.; Otis, D. (1989) Concentration-response evaluation of Methyl Anthranilate relative to starch-plated Dimethyl Anthranilate. Denver Wildlife Research Center Bird Section Research Report No. 442. 15 p.
42675302	Glahn, J. (1990) Preliminary field evaluation of Methyl Anthranilate as a bird repellent livestock feed additive. U.S. Department of Agriculture, Denver Wildlife Research Center, Bird Section Research Report No. 459. 12 p.
42675303	Mason, J.; Adams, M.; Clark, L. (1989) Anthranilate repellency to starlings: chemical correlates and sensory perception. Journal of Wildlife Management 53(1):55-64.
42699800	PMC Specialties Group (1992) Submission of product chemistry and toxicity data in support of the methyl anthranilate (Rejex-iT) registration. Transmittal of 3 studies.
42699801	PMC Specialties Group (1993) Product Chemistry: Methyl Anthranilate. Unpublished study. 88 p.
42699802	Clark, L. (1992) Acute Toxicity of Methyl Anthranilate to Fish: Rainbow Trout, Atlantic Salmon, Channel Catfish, and Bluegill Sunfish: Lab Project Number: QA-208. Unpublished study prepared by USDA/APHIS/ADC Denver Wildlife Research Center. 123 p.
42699803	Clark, L.; Cummings, J.; Hughes, S. (1992) Acute Toxicity of Methyl Anthranilate to Channel Catfish: Lab Project Number: QA-208. Unpublished study prepared by USDA/APHIS/ADC Denver Wildlife Research Center. 270 p.
42718200	PMC Specialties Group (1992) Submission of toxicity data in support of the registration of Rejex-iT MA. Transmittal of 3 studies.
42718201	Clark, L.; Aronov, E. (1993) Degradation Studies of the Nonlethal Bird Repellent, Methyl Anthranilate. Unpublished study prepared by Monnell, USDA/APHIS/ADC. 28 p.
42718202	Clark, L.; Cummings, J.; Hughes, S. (1992) Acute Toxicity of Methyl Anthranilate to Bluegill Sunfish, Lepomis macrochirus: Lab Project Number: QA-208. Unpublished study prepared by Monnell, USDA/APHIS/ADC. 250 p.
42718203	Clark, L. (1992) Daphnid Acute Toxicity Test: Methyl Anthranilate. Unpublished study prepared by Academy of Natural Sciences of Philadelphia. 37 p.
42740200	Dolphin Trust (1993) Submission of efficacy and residue data in support of the registration for methyl anthranilate.

	Transmittal of 5 studies.
42740201	Askham, L. (1992) Product Efficacy Studies: Effect of Bird Shield Repellent on Reducing Bird Depredation of Cherries: Methyl Anthranilate. Unpublished study prepared by Washington State University. 68 p.
42740202	Askham, L. (1992) Product Efficacy Studies: Effect of Bird Shield Repellent on Reducing Bird Depredation of Blue Berries: Methyl Anthranilate. Unpublished study prepared by Washington State University. 63 p.
42740203	Askham, L. (1990) Product Efficacy Studies; Effect of Bird Shield Repellent on Reducing Bird Depredation of Grapes: Methyl Anthranilate. Unpublished study prepared by Washington State University. 23 p.
42740204	Askham, L. (1993) Magnitude of Phytotoxicity of Bird Shield Repellent to Plants: Methyl Anthranilate. Unpublished study prepared by Washington State University. 151 p.
42740205	Askham, L. (1992) Magnitude of Methyl Anthranilate Residue on Cherries and Blueberries. Unpublished study prepared by Washington State University. 186 p.
42966900	Dolphin Trust (1993) Submission of Acute Toxicology Data in Support of Methyl Anthranilate Registration Amendment. Transmittal of 3 Studies.
42966901	Clark, L. (1992) Acute Toxicity of Methyl Anthranilate to Fish: Rainbow Trout, Atlantic Salmon, Channel Catfish and Bluegill Sunfish: Lab Project Number: QA208. Unpublished study prepared by Monell Chemical Senses Center. 128 p.
42966902	Ahmed, M. (1993) Acute Oral LD50 with Bobwhite Quail (Colinus virginianus) Using Methyl Anthranilate: Lab Project Number: 93007. Unpublished study prepared by Genesis Labs, Inc. 36 p.
42966903	Askham, L. (1991) Lethal Dietary Concentrations of Methyl Anthranilate to Sparrows, Juncos, Finches and Ring-Necked Pheasants. Unpublished study prepared by Washington State Univ., College of Agriculture. 24 p.
42995100	Dolphin Trust (1993) Submission of Toxicology Data in Support of Registration of a New Biochemical Methyl Anthranilate. Trans- mittal of 1 study.
42995101	Clark, L. (1992) Daphnid Acute Toxicity Test: (with Methyl Anthranilate to Fish). Unpublished study prepared by Academy of Natural Sciences of Philadelphia. 26 p.
42999500	PMC Specialties Group (1993) Submission of Toxicity and Environmental Fate Data in Support Registration of Rejex-iT AG-36 (Methyl Anthranilate). Transmittal of 6 studies.
42999501	Glaza, S. (1993) Acute Oral Toxicity Study of Rejex-it Ag-36 in Rats: Final Report: Lab Project Number: HWI 30203369. Unpublished study prepared by Hazleton Wisconsin, Inc. 25 p.
42999502	Glaza, S. (1993) Acute Dermal Toxicity Study of Rejex-it AG-36 in Rabbits: Final Report: Lab Project Number: HWI 30203370. Unpublished study prepared by Hazleton Wisconsin, Inc. 29 p.
42999503	Glaza, S. (1993) Primary Eye Irritation Study of Rejex-it AG-36 in Rabbits: Final Report: Lab Project Number: HWI 30203372. Unpublished study prepared by Hazleton Wisconsin Inc. 30 p.
42999504	Glaza, S. (1993) Primary Dermal Irritation Study of Rejex-it Ag-36 in Rabbits: Final Report: Lab Project Number: HWI 30203371. Unpublished study prepared by Hazleton Wisconsin, Inc. 22 p.
42999505	Glaza, S. (1993) Dermal Sensitization Study of Rejex-it AG-36 in Guinea Pigs--Closed Patch Technique: Final Report: Lab Project Number: HWI 30203373. Unpublished study prepared by Hazleton Wisconsin, Inc. 35 p.
42999506	Kabler, K. (1993) Methyl Anthranilate: Determination of Aerobic Biodegradation (Screening Study): Final Report: Lab Project Number: J9306006. Unpublished study prepared by Toxikon Environmental Sciences. 31 p.
43036900	PMC Specialties Group (1993) Submission of product chemistry data in support of registration for ReJeX-iT-MA (TGAI) and end-use products ReJeX-iT AP-50 and ReJeX-iT TP-40. Transmittal of 2 studies.
43036901	Desai, L. (1993) Physical and Chemical Characteristics: One Year Storage Stability: Rejex-it TGAI: Supplemental Report: Final Report: Lab Project Number: 92/GR/0004A. Unpublished study prepared by Toxikon Corp. 32 p.
43036902	Desai, L. (1993) Physical and Chemical Characteristics: One Year Storage Stability: Rejex-it TP-40 and AP-50: Supplemental Report: Final Report: Lab Project Number: 92/GR/0004. Unpublished study prepared by Toxikon

	Corp. 36 p.
43045000	PMC Specialties Group (1993) Submission of Product Chemistry and Efficacy Data in Support of Application for Registration for ReJeX-iT AG-36. Transmittal of 3 Studies.
43045001	PMC Specialties Group (1993) ReJeX-iT AG-36: Technical Bulletin #4811: (Product Chemistry-Physical and Chemical Characteristics): Lab Project Number: BA-4811: X20RJ7012. Unpublished study. 4 p.
43045002	Desai, L. (1993) Physical and Chemical Characteristics of Methyl Anthranilate: Final Report: Lab Project Number: 93-GR-0001. Unpublished study prepared by Toxikon Corp. 301 p.
43045003	Cummings, J.; Pochop, P.; Davis, J.; et al. (1993) Methyl Anthranilate: Evaluation of ReJeX-iT AG-36 as a Canada Goose Grazing Repellent: Lab Project Number: QA-186. Unpublished study prepared by Denver Wildlife Research Center, USDA-APHIS. 15 p.
43055600	PMC Specialties Group (1993) Submission of Environmental Fate Data in Support of Registration of ReJeX-iT AG-36. Transmittal of 1 Study.
43055601	Aronov, E.; Clark, L. (1993) Degradation Studies of the Nonlethal Bird Repellent, Methyl Anthranilate. Unpublished study prepared by USDA, APHIS, Monell Chemical Senses Center. 25 p.
43094400	PMC Specialties Group (1994) Submission of Efficacy Data for Methyl Anthranilate in Support of Registration. Transmittal of 1 Study.
43094401	Mason, J.; Avery, M.; Glahn, J. et al. (1991) Evaluation of methyl anthranilate and starch-plated dimethyl anthranilate as bird repellent feed assitives (sic). Journal of Wildlife Managm. 55(1):182-187.
43119400	Dolphin Trust (1994) Submittal of Environmental Fate Data in Support of Registration of Bird Shield Repellent (Methyl Anthranilate). Transmittal of 1 study.
43119401	Clark, C.; Aronov, E. (1994) Biodeterioration Studies of the Nonlethal Bird Repellent, Methyl Anthranilate: Lab Project Number: PR93-9. Unpublished study prepared by Denver Wildlife Research Center. 30 p.
43195400	PMC Specialties Group (1994) Submittal of Product Chemistry Data in Support of Registration of ReJeX-iT AG-36. Transmittal of 1 study.
43195401	PMC Specialties Group (1994) Manufacturing Process for ReJeX-iT AG-36. Unpublished study. 5 p.
43212800	ERM Specialties Group. (1994) Submission of product chemistry data in support of registration for ReJeX-iT AG-36. Transmittal of 1 study.
43212801	Desai, L. (1994) Physical and Chemical Characteristics One Year Storage Stability Supplemental Report: Final Report: Lab Project Number: 93/GR/0001: 93/GR/0001/12. Unpublished study prepared by Toxikon Corp. 45 p.
43256500	PMC Specialties Group (1994) Submittal of Toxicity Data in Support of Registration of Methyl Anthranilate. Transmittal of 20 Studies.
43256501	Glaza, S. (1992) Supplement to Acute Oral Toxicity Study of Rejex-it MA in Rats MRID 42608802: Lab Project Number: HWI 20305693. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256502	Glaza, S. (1992) Supplement to Acute Dermal Toxicity Study of Rejex-it MA in Rabbits MRID 42608803: Lab Project Number: HWI 20305697. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256503	Glaza, S. (1992) Supplement to Primary Eye Irritation Study of Rejex-it MA in Rabbits MRID 42608804: Lab Project Number: HWI 20305705. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256504	Glaza, S. (1992) Supplement to Primary Dermal Irritation Study of Rejex-it TP-40 in Rabbits MRID 42608905: Lab Project Number: HWI 20305702. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256505	Glaza, S. (1992) Supplement to Dermal Sensitization Study of Rejex-it TP-40 in Guinea Pigs Closed Patch Technique MRID 42608906: Lab Project Number: HWI 20305710. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256506	Glaza, S. (1992) Supplement to Acute Oral Toxicity Study of Rejex-it AP-50 in Rats MRID 42608702: Lab Project Number: HWI 20305696. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.

43256507	Glaza, S. (1992) Supplement to Acute Dermal Toxicity Study of Rejex-it AP-50 in Rabbits MRID 42608703: Lab Project Number: HWI 20305700. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256508	Glaza, S. (1992) Supplement to Primary Eye Irritation Study of Rejex-it AP-50 in Rabbits MRID 42608704: Lab Project Number: HWI 20305708. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256509	Glaza, S. (1992) Supplement to Primary Dermal Irritation Study of Rejex-it AP-50 in Rabbits MRID 42608705: Lab Project Number: HWI 20305704. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256510	Glaza, S. (1992) Supplement to Dermal Sensitization Study of Rejex-it AP-50 in Guinea Pigs Closed Patch Technique MRID 42608706: Lab Project Number: HWI 20305712. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256511	Glaza, S. (1992) Supplement to Acute Oral Toxicity Study of Rejex-it TP-40 in Rats MRID 42608902: Lab Project Number: HWI 20305694. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256512	Glaza, S. (1992) Supplement to Acute Dermal Toxicity Study of Rejex-it TP-40 in Rabbits MRID 42608903: Lab Project Number: HWI 20305698. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256513	Glaza, S. (1992) Supplement to Primary Eye Irritation Study of Rejex-it TP-40 in Rabbits MRID 42608904: Lab Project Number: HWI 20305706. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256514	Glaza, S. (1992) Supplement to Primary Dermal Irritation Study of Rejex-it MA in Rabbits MRID 42608805: Lab Project Number: HWI 20305701. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256515	Glaza, S. (1992) Supplement to Dermal Sensitization Study of Rejex-it MA in Guinea Pigs Closed Patch Technique MRID 42608806: Lab Project Number: HWI 20305709. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256516	Glaza, S. (1993) Supplement to Acute Oral Toxicity Study of Rejex-it AG-36 in Rats MRID 42999501: Lab Project Number: HWI 30203369. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256517	Glaza, S. (1993) Supplement to Acute Dermal Toxicity Study of Rejex-it AG-36 in Rabbits MRID 42999502: Lab Project Number: HWI 30203370. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256518	Glaza, S. (1993) Supplement to Primary Eye Irritation Study of Rejex-it AG-36 in Rabbits MRID 42999503: Lab Project Number: HWI 30203372. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256519	Glaza, S. (1993) Supplement to Primary Dermal Irritation Study of Rejex-it Ag-36 in Rabbits MRID 42999504: Lab Project Number: HWI 30203371. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43256520	Glaza, S. (1993) Supplement to Dermal Sensitization Study of Rejex-it AG-36 in Guinea Pigs Closed Patch Technique MRID 42999505: Lab Project Number: HWI 30203373. Unpublished study prepared by Hazleton Wisconsin, Inc. 5 p.
43304100	ERM Program Management Co. (1994) Submission of Toxicity Data for ReJeX-iT MA (Methyl Anthranilate) in Support of Registration. Transmittal of 2 studies.
43304101	Vrbanic, M. (1993) Methyl Anthranilate: Analysis in Avian Diet for the Study Entitled "Methyl Anthranilate (MA): A Dietary LC50 Study with the Mallard": Lab Project Number: 92N1116. Unpublished study prepared by Bushy Run Research Center (BRRC) Union Carbide Chemicals and Plastics Co. Inc. (UCC&P). 23 p.
43304102	Clark, L. (1992) Daphnid Acute Toxicity Test: Supplement to MRID 42718203: Methyl Anthranilate. Unpublished study prepared by Academy of Natural Sciences of Philadelphia. 4 p.
43331000	PMC Specialties Group (1994) Submission of Efficacy Data in Support of Application for Registration of ReJeX-iT AP-50 and ReJeX-iT TP-40. Transmittal of 1 Study.
43331001	Dolbeer, R.; Clark, L. (1991) Evaluations of Methyl Anthranilate Formulations as Bird Repellents in Water: Experiment 1: Preliminary Field Evaluations of Two Formulations of Methyl Anthranilate as Bird Repellents in Temporary Pools of Water at JFK International Airport, May-August 1991. Unpublished study prepared by U.S. Dept. of Agriculture. 13 p.
43416000	PMC Specialties Group, Inc. (1994) Submission of Toxicity Data in Support of Registration of ReJeX-iT MA,

	ReJeX-iT AP-50, ReJeX-iT TP-40, and ReJeX-iT AG-36. Transmittal of 4 Studies.
43416001	Moreno, O. (1973) Dermal Toxicity in Rabbits to Support GRAS Listing of Methyl Anthranilate: Lab Project Number: MB 73-313. Unpublished study prepared by MB Research Labs, Inc. 4 p.
43416002	Epstein, W. (1974) Contact Sensitization Potential of Methyl Anthranilate to Support GRAS Listing. Unpublished study. 6 p.
43416003	Epstein, W. (1973) Contact Sensitization Potential of Methyl Anthranilate to Support GRAS Listing. Unpublished study prepared by Research Institute for Fragrance Materials, Inc. 6 p.
43416004	Kligman, A. (1966) The identification of contact allergens by human assay: (III) The maximization test: A procedure for screening and rating contact sensitizers. Journal of Investigative Dermatology 47(5):393-409.
43443000	PMC Specialities Group, Inc. (1994) Submission of Efficacy Data in Support of the Registration of ReJeX-iT AG-36. Transmittal of 1 Study.
43443001	Curtis, P.; Merwin, I.; Pritts, M. et al. (1994) Evaluation of Methyl Anthranilate for Control of Bird Damage to Sweet Cherries. Unpublished study prepared by Cornell University. 16 p.
43446300	PMC Specialties Group, Inc. (1994) Submission of Efficacy Data in Support of Application for Registration of ReJeX-iT WPC. Transmittal of 1 Study.
43446301	Woronecki, P.; Dolbeer, R.; Hovis, J.; et al. (1994) Evaluation of Suet Treated with ReJeX-iT TP-40 to Repel Woodpeckers: Special Report. Unpublished study prepared by USDA, APHIS. 14 p.
43527300	PMC Specialties Group (1995) Submission of efficacy data in support of registration of ReJeX-iT AG-36. Transmittal of 1 study.
43527301	Mason, J.; Clark, L. (1995) Evaluation of Methyl Anthranilate and Activated Charcoal as Snow Goose Grazing Deterrents. Unpublished study prepared by Monell Chemical Senses Center. 16 p.
43552800	Dolphin Trust (1995) Submission of Efficacy Data in Support of Registration of Bird Shield Repellent. Transmittal of 1 Study.
43552801	Askham, L. (1994) Product Efficacy Studies: Effective Repellency Concentration (ECr) of Bird Shield Repellent with Methyl Anthranilate to Exclude Ducks and Geese from Water Impoundments. Unpublished study prepared by Washington State University. 8 p.
43610700	RJ Advantage, Inc. (PMC Specialties Group, Inc.) (1995) Submission of Toxicity Data in Support of Conditional Registration of ReJeX-iT MA. Transmittal of 4 Studies.
43610701	Campbell, S.; Beavers, J. (1995) Methyl Anthranilate (MA): An Acute Oral Toxicity Study with the Northern Bobwhite: Lab Project Number: 373-102. Unpublished study prepared by Wildlife International Ltd. 26 p.
43610702	Cunningham, F.; Ward, G. (1995) ReJeX-iT MA: Acute Toxicity to Bluegill (Lepomis macrochirus) Under Flow-Through Test Conditions: Lab Project Number: J9412002B. Unpublished study prepared by Toxikon Environmental Sciences. 29 p.
43610703	Cunningham, F.; Ward, G. (1995) ReJeX-iT MA: Acute Toxicity to Rainbow Trout (Oncorhynchus mykiss) Under Flow-Through Test Conditions: Lab Project Number: J9412002A. Unpublished study prepared by Toxikon Environmental Sciences. 29 p.
43610704	Kirkland, R. (1995) Acute Contact Toxicity of Methyl Anthranilate to Honey Bees: Lab Project Number: BIO 191-94. Unpublished study prepared by Bio Research. 45 p.
43627500	PMC Specialties Group, Inc. (1995) Submission of Toxicity Data in Support of Registration Amendment for ReJeX-iT TP-40 and AG-36. Transmittal of 1 Study.
43627501	Cerven, M. (1995) Inhalation Toxicity in Rats: ReJeX-iT TP-40: Lab Project Number: MB 94-4162 E: 318-10. Unpublished study prepared by MB Research Labs, Inc. 21 p.
43720200	Dolphin Trust (1995) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent. Transmittal of 1 Study.

43720201	Askham, L. (1994) Product Efficacy Studies: Effective Repellency Concentration (ECr) of Bird Shield Repellent with Methyl Anthranilate to Exclude Ducks and Geese From Water Impoundments: Lab Project Number: 94-01. Unpublished study prepared by Washington State University. 30 p.
43818300	PMC Specialties Group (1995) Submission of Pesticide Use Data in Support of the Registration of ReJeX-iT AG-36 with Spreader/ Sticker. Transmittal of 1 Study.
43818301	Preiser, M. (1995) Efficacy of Stickers in Conjunction with AG-36. Unpublished study prepared by MFP Associates. 6 p.
43885500	RJ Advantage, Inc. (1996) Submission of Efficacy Data in Support of the Amended Registration of ReJeX-iT AG-36. Transmittal of 1 Study.
43885501	Hushon, J.; Vogt, P.; Shea, C. (1995) Large Scale Field Evaluation of ReJeX-iT AG-36 as a Bird Repellent on Blueberries. Unpublished study prepared by RJ Advantage, Inc. 19 p.
44048100	RJ Advantage, Inc. (1996) Submission of Efficacy Data in Support of the Application for Registration of ReJeX-iT FG-40. Transmittal of 1 Study.
44048101	Lewis, K. (1996) Field Evaluation of ReJeX-iT FG-40 in the Downtown Area of Chambersburg, Pennsylvania. Unpublished study prepared by J.C. Ehrlich Co., Inc. 6 p.
44055400	Dolphin Trust (1996) Submission of Pesticide Use Data in Support of the Amended Registration of Bird Shield Repellent. Transmittal of 1 Study.
44055401	Askham, L. (1996) Product Efficacy Studies: Effect of Bird Shield Repellent on Reducing Canadian Geese (Branta canadensis) and Mallard Duck (Anas platyrhynchos) Use of Turf Grass. Unpublished study prepared by Bird Shield Repellent Corp. 42 p.
44070300	Bird Shield Repellent Corp. (1996) Submission of Toxicity Data in Support of the Conditional Registration of Bird Shield Repellent Concentrate. Transmittal of 2 Studies.
44070301	Wnorowski, G. (1996) Primary Skin Irritation (in Rabbits): Bird Shield Repellent Concentrate: Lab Project Number: 4373: P326. Unpublished study prepared by Product Safety Labs. 16 p.
44070302	Wnorowski, G. (1996) Primary Eye Irritation (in Rabbits): Bird Shield Repellent Concentrate: Lab Project Number: 4372: P324. Unpublished study prepared by Product Safety Labs. 25 p.
44311100	USDA, APHIS (1997) Submission of Efficacy Data in Support of the Application for Registration of Mesurol 75% Wettable Powder Aversive Conditioning Egg Treatment. Transmittal of 5 Studies.
44311101	Avery, M.; Decker, D. (1994) Responses of captive fish crows to eggs treated with chemical repellents. J. Wildlife Manage. 58(2):261-266.
44324300	R.J. Advantage, Inc. (1997) Submission of Hazard to Aquatic Organisms and Efficacy Data in Support of the Amended Registration of ReJeX-iT TP-40. Transmittal of 1 Study.
44324301	Clark, L. (1997) Evaluation of ReJeX-iT TP-40 on Aquaculture Stock and Efficacy as Bird Repellent: Final Report: (Executive Summary). Unpublished study prepared by National Wildlife Research Center. 9 p.
44419600	R J Advantage Inc. (1997) Submission of Efficacy Data in Support of the Registration of ReJeX-iT AG-36. Transmittal of 1 Study.
44419601	Clark, L. (1997) Efficacy of ReJeX-iT AG-36 in Limiting Use of Treated Turf Areas: Lab Project Number: 97-7407-0299-RA. Unpublished study prepared by U.S. Dept of Agriculture, National Wildlife Research Center. 23 p.
44490200	RJ Advantage, Inc. (1998) Submission of Product Chemistry Data in Support of the Registration of ReJeX-iT TP-40. Transmittal of 1 Study.
44490201	Sinning, D. (1998) Physical and Chemical Characteristics of ReJeX-iT TP-40: Dielectric Breakdown Voltage: Lab Project Number: 1700-01. Unpublished study prepared by Case Consulting Laboratories, Inc. 7 p. {OPPTS 830.6321}
44584300	RJ Advantage (1998) Submission of Efficacy Data in Support of the Registration of ReJeX-iT TP-40. Transmittal of 3 Studies.

44584301	RJ Advantage, Inc. (1998) Fogging of ReJex-iT TP-40 at an Electrical Transformer Station in Puerto Rico. Unpublished study prepared by RJ Advantage, Inc. 4 p.
44584302	RJ Advantage, Inc. (1998) Fogging of Rejex-iT TP-40 at the Shell Oil Refinery in Wood River, Illinois. Unpublished study prepared by RJ Advantage, Inc. 6 p.
44584303	Dolbeer, R. (1998) Methyl Anthranilate Aerosols as a Dispersal Technique for Swallows. Unpublished study prepared by RJ Advantage, Inc. 10 p.
44730900	Bird Shield Repellent Corporation (1998) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent. Transmittal of 3 Studies.
44730901	Askham, L. (1998) Sweet Corn Efficacy Field Trials: Bird Shield Repellent: Lab Project Number: BSRC980701: BSRC9807. Unpublished study prepared by Bird Shield Repellent Corporation. 18 p.
44730902	Askham, L. (1998) Taste Panel Evaluation of Sweet Corn After Efficacy Field Trials with Bird Shield Repellent to Reduce Bird Damage: Lab Project Number: BSRC980702: BSRC9808. Unpublished study prepared by Bird Shield Repellent Corporation. 10 p.
44730903	Askham, L. (1998) Sunflower Efficacy Field Trials: Bird Shield Repellent: Lab Project Number: BSRC980901: BSRC9808. Unpublished study prepared by Bird Shield Repellent Corporation. 27 p.
44740300	Dolphin Trust (1999) Submission of Toxicity Data in Support of the Registration of Bird Shield Repellent Concentrate. Transmittal of 3 Studies.
44740301	Douds, D. (1998) An Acute Oral Toxicity Study in Rats with Bird Shield Repellent Concentrate: Final Report: Lab Project Number: 3467.1. Unpublished study prepared by Springborn Laboratories, Inc. 22 p.
44740302	Douds, D. (1998) An Acute Dermal Toxicity Study in Rats with Bird Shield Repellent Concentrate: Final Report: Lab Project Number: 3467.2. Unpublished study prepared by Springborn Laboratories, Inc. 29 p.
44740303	Douds, D. (1998) An Acute Whole-Body Inhalation Toxicity Study in Rats with Bird Shield Repellent Concentrate: Final Report: Lab Project Number: 3467.3. Unpublished study prepared by Springborn Laboratories, Inc. 58 p.
44741500	Bird Shield Repent Corporation (1999) Submission of Toxicity Data in Support of the Registration of Bird Shield Repellent Concentrate. Transmittal of 1 Study.
44741501	Baroch, J.; Medlicott, B.; Fuhrman, V. (1998) Avian Dietary LC50 Test with Methyl Anthranilate Technical in Mallard Ducklings (Anas platyrhynchos): Lab Project Number: 98008. Unpublished study prepared by Genesis Laboratories, Inc. 67 p.
44786300	Bird Shield Repellent Corporation (1999) Submission of Toxicity, Residue Chemistry, Environmental Fate, Risk Assessment and Exposure Data in Support of the Petition for Tolerance of Methyl Anthranilate in/on Corn for Consumption by Humans and Livestock and Application for Registration of Bird Shield Repellent. Transmittal of 1 Study.
44786301	Askham, L. (1999) Literature Review in Support of the Request for the Exemption of Methyl Anthranilate from the Requirements of Tolerance on all Raw Agricultural Commodities: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 131 p.
45020900	Bird Shield Repellent Corporation (2000) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent. Transmittal of 4 Studies.
45020901	Askham, L. (1999) Control of Pest Birds on or in Structures: Swallows: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 10 p.
45020902	Askham, L. (1999) Control of Pest Birds on or in Structures: Starlings, Pigeons and Sparrows: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 10 p.
45020903	Askham, L. (1999) Control of Pest Birds on or in Structures: Woodpeckers: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 12 p.
45020904	Askham, L. (1999) Control of Pest Birds on or in Structures: Pigeons: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 10 p.

45032100	Bird Shield Repellent Corp. (2000) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent. Transmittal of 1 Study.
45032101	Askham, L. (1999) Aerial Application Efficacy Field Trials: Cherries: Bird Shield Repellent: Lab Project Number: BSRC9904: BSRC9905. Unpublished study prepared by Bird Shield Repellent Corp. 15 p.
45065100	Bird Shield Repellent Corporation (2000) Submission of Residue Chemistry Data in Support of the Registration of Bird Shield Repellent. Transmittal of 5 Studies.
45065101	Askham, L. (1999) Method for Determining the Recovery of Methyl Anthranilate, Formulated as Bird Shield Repellent Concentrate, from Corn, Sunflowers and Apples: Lab Project Number: 990501: BSRC990401. Unpublished study prepared by Bird Shield Repellent Corporation. 26 p. {OPPTS 860.1340}
45065102	Askham, L. (2000) Method for the Analysis of Bird Shield Repellent Concentrate on Corn and Sunflowers: Lab Project Number: 99048. Unpublished study prepared by Genesis Laboratories, Inc. 35 p. {OPPTS 860.1340}
45065103	Askham, L. (1999) Residue Chemistry: Crop Field Trials: Sweet Corn (Bird Shield Repellent): Lab Project Number: BSRC990612: 990501. Unpublished study prepared by Bird Shield Repellent Corporation. 33 p. {OPPTS 860.1500}
45065104	Askham, L. (1999) Residue Chemistry: Crop Field Trials: Sunflowers (Bird Shield Repellent): Lab Project Number: 990501: BSRC990612. Unpublished study prepared by Bird Shield Repellent Corporation. 32 p. {OPPTS 860.1500}
45065105	Askham, L. (1999) Residue Chemistry: Crop Field Trials: Apples (Bird Shield Repellent): Lab Project Number: 991017: BSRC991017. Unpublished study prepared by Bird Shield Repellent Corporation. 27 p. {OPPTS 860.1500}
45088600	Becker Underwood, Inc. (2000) Submission of Efficacy Data in Support of the Registration of Rejex-it TP-40. Transmittal of 2 Studies.
45088601	Vogt, P.; Lewis, K. (2000) Fogging of Rejex-it TP-40: Apartment Property in Wheaton, Md. Unpublished study prepared by Becker Underwood Inc. 4 p.
45088602	Vogt, P.; Ling, J. (2000) Fogging of Rejex-it TP-40: Corporate Office Park, Fort Wayne, IN. Unpublished study prepared by Becker Underwood Inc. 5 p.
45209200	Bird Shield Repellent Corporation (2000) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent Concentrate. Transmittal of 1 Study.
45209201	Askham, L. (1999) Control of Pest Birds on or in Structures: Pigeons: Bird Shield Repellent: Lab Project Number: BSRC990401. Unpublished study prepared by Bird Shield Repellent Corporation. 10 p.
45210200	Becker Underwood Inc. (2000) Submission of Residue Data in Support of the Registration of Rejex-It TP-40. Transmittal of 2 Studies.
45210201	Vogt, P. (2000) Residue of MA in Water after Fogging with Rejex-it TP-40: Lab Project Number: RJ 3.2. Unpublished study prepared by Becker Underwood Inc. 9 p.
45210202	Willis, C. (2000) Methyl Anthranilate-Magnitude of Residue in Water after Fogging (Rejex-it TP-40): Final Report: Lab Project Number: 2330-01. Unpublished study prepared by Case Consulting Laboratories, Inc. 10 p.
45229700	Becker Underwood, Inc. (2000) Submission of Residue Data in Support of the Registration of Rejex-It TP-40. Transmittal of 1 Study.
45229701	Dolbeer, R.; Cepek, J. (2000) Collection of Water Samples for Residue Analysis from Ponds Treated by Fogging with Birds-Repellent Formulation, Rejex-It TP-40. Unpublished study prepared by USDA, National Wildlife Research Center. 8 p.
45237500	Becker Underwood, Inc. (2000) Submission of Efficacy Data in Support of the Registration of Rejex-it TP-40. Transmittal of 1 Study.
45237501	Vogt, P.; Ling, J. (2000) Fogging of Rejex-it TP-40 Parking Garage in Fort Wayne, IN. Unpublished study prepared by Becker Underwood, Inc. 4 p.

45365100	Bird Shield Repellent Company (2001) Submission of Product Chemistry, Toxicity and Product Performance Data in Support of the Registration of Bird Shield Repellent and the Petition for Tolerance of Methyl Anthranilate in/on All Agricultural Crops Consumed by Humans and Livestock. Transmittal of 1 Study.
45365101	Askham, L. (1992) Data Review in Support of the Request for the Exemption of Methyl Anthranilate from the Requirements of a Tolerance on All Raw Agricultural Commodities: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corporation. 250 p.
45441400	Becker Underwood, Inc. (2001) Submission of Product Chemistry Data in Support of the Registration of Rejex-it TP-40. Transmittal of 1 Study.
45441401	Becker Underwood, Inc. (2001) Information on the Proposed Replacement Inert for Rejex-it TP-40. Unpublished study prepared by Becker Underwood, Inc. 13 p.
45547100	Bird Shield Repellent Corp. (2001) Submission of Efficacy Data in Support of the Amended Registration of Bird Shield Repellent. Transmittal of 2 Studies.
45547101	Askham, L. (2000) Efficacy of Bird Shield Repellent to Control Bird Feeding on Rice Seed Planted in Water Field Trials. Unpublished study prepared by Bird Shield Repellent Corp. 13 p.
45547102	Askham, L. (2000) Rice Efficacy Field Trials: Bird Shield Repellent. Unpublished study prepared by Bird Shield Repellent Corp. 15 p.
45629100	Bird Shield Repellent Corporation (2002) Submission of Efficacy Data in Support of the Amended Registration of Bird Shield Repellent. Transmittal of 2 Studies.
45629101	Askham, L. (2000) Bird Shield Repellent: Rice Efficacy Field Trials: Lab Project Number: BSRC200501. Unpublished study prepared by Bird Shield Repellent Corporation. 24 p.
45629102	Askham, L. (2000) Efficacy of Bird Shield Repellent to Control Bird Feeding on Rice Seed Planted in Water Field Trials: Lab Project Number: BSRC200501: BSRC200502. Unpublished study prepared by Bird Shield Repellent Corporation. 13 p.
45656100	Becker Underwood, Inc. (2002) Submission of Product Chemistry Data in Support of the Registration of Rejex-it TP-40. Transmittal of 1 Study.
45656101	Rice, C. (2001) Dielectric Breakdown Voltage Study Rejex-it TP-40: Lab Project Number: T 36764: 17758. Unpublished study prepared by Delsen Testing Laboratories, Inc. 6 p.
45851300	Bird Shield Repellent Corporation (2003) Submission of Efficacy Data in Support of the Registration of Bird Shield Repellent. Transmittal of 1 Study.
45851301	Askham, L. (2000) Rice Efficacy Field Trials: Bird Shield Repellent: Lab Project Number: BSRC200501. Unpublished study prepared by Bird Shield Repellent Corporation. 24 p.
46498700	Liquid Fence Co. (2005) Submission of Efficacy, Toxicity and Environmental Fate Data in Support of the Application for Registration of Goose Repellent Concentrate. Transmittal of 17 Studies.
46498701	Chadbourne, D. (2005) Product Properties Data on Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/01. Unpublished study prepared by Brazos Associates, Inc. 20 p.
46498702	Chadbourne, D. (2005) Exploratory Test Results of Varying Formulae of Goose Repellent Concentrate and Discussion of Inert Ingredients in Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/R02. Unpublished study prepared by Brazos Associates, Inc. 13 p.
46498703	Chadbourne, D. (2005) Waiver Request from the Requirement to Provide Descroption of Production Process OPPTS 880.1200/830.1600/830.1620, Preliminary Analysis OPPTS 830.1700, and Submittal of Samples OPPTS 830.1900 Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/R01. Unpublished study prepared by Brazos Associates, Inc. 28 p.
46498704	Wo, C. (2005) Storage Stability and Corrosion Characteristics Including Enforcement Analytical Method - Interim Report - Initial Analysis: Goose Repellent Concentrate. Project Number: 16398/INTERIM/REPORT, P800. Unpublished study prepared by Product Safety Laboratories. 22 p.

46498705	Wo, C. (2005) Physical and Chemical Characteristics: Color, Physical State, Odor, Oxidation/Reduction, pH, and Density/Relative Density: Goose Repellent Concentrate. Project Number: 16399, P801. Unpublished study prepared by Product Safety Laboratories. 15 p.
46498706	Cadbourne, D. (2005) Waiver Request from the Requirement to Provide Data Characterizing the Flammability (OPPTS 830.6315) and Explodability (OPPTS 830.6316) of Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/R03. Unpublished study prepared by Brazos Associates, Inc. 34 p.
46498708	Aronov, E.; Clark, L. (1996) Degradation Studies of the Non-lethal Bird Repellent, Methyl Antranilate. Pestic. Sci. 47: 355-362.
46498710	Clark, L.; Cummings, J.; Bird, S.; et al. (1993) Acute Toxicity of the Bird Repellent. Methyl Anthranilate, to Fry of Salmp salar, Oncorhynus mykiss, Ictalurus punctatus and Lepomis macrochirus. Pestic. Sci. 39: 313-317.
46498711	Curtis, P.; Merwin, I.; Pritts, M.; et. al. (1994) Chemical Repellents and Plastic Netting for Reducing Bird Damage to Sweet Cherries, Blueberries, and Grapes; and Bird Repellents - Points of View. HortScience 29(10): 1151-1155.
46498712	Chadbourne, D. (2005) Waiver Request from the Requirement to Providie Data Characterizing the Acute Oral Toxicity (OPPTS 870.1100), the Acute Dermal Toxicity (OPPTS 870.1200), the Acute Inhalation Toxicity (OPPTS 870.1300), and Skin Sensitization (OPPTS 870.2600) of the End Product Goose Repellent Concentrate. Project Number: LFC/GRC/R06. Unpublished study prepared by:Brazos Associates, Inc. 7 p.
46498713	U.S. EPA (2002) Methyl Anthranilate; Exemption from the Requirement of a Tolerance. Federal Register 67(152): 51083-51088.
46498714	NIOSH (2004) The Registry of Toxic Effects of Chemical Substances, Antranilic Acid, Methyl Ester. National Institute for Occupational Safety & Health. www.cdc.gov/niosh/rtecs/cb32bc48.html.
46498715	Rodabaugh, D. (2005) A Primary Eye Irritation Study in Rabbits with CAS # 134-20-3 (Goose Repellent Concentrate): Amended Final Report. Project Number: IQD00001, 16399. Unpublished study prepared by Charles River Laboratories, Inc. 30 p.
46498716	Rodabaugh, D. (2005) A Primary Skin Irritation Study in Rabbits with CAS # 134-20-3 (Goose Repellent Concentrate): Amended Final Report. Project Number: IQD00002, 16399. Unpublished study prepared by Charles River Laboratories, Inc. 29 p.
46498717	Chadbourne, D. (2005) Waiver Request from the Requirement to Provide Data Characterizing the Immunotixicity (OPPTS 880.3550) for Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/R07. Unpublished study prepared by Brazos Associates, Inc. 7 p.
46498718	Cummings, J.; Mason, J.; Otis, D.; et. al. (1991) Evaluation of Dimethyl and Methyl Anthranilate as a Canada Goose Repellent on Grass. Wildl. Soc. Bull. 19(2): 184-190.
46498719	Mason, J.; Clark, L. (1994) Evaluation of Methyl Anthranilate and Activated Charcoal as Snow Goose Grazing Deterrents. Crop Protection 14(6) 467-469.
46557500	Liquid Fence Company, Inc. (2005) Submission of Product Chemistry, Toxicity and Environmental Fate Data in Support of the Application for Registration of Goose Repellent Concentrate. Transmittal of 2 Studies.
46557501	Chadbourne, D. (2005) Waiver Request from the Requirement to Provide Data Characterizing the Viscosity (OPPTS 830.7100) of Liquid Fence Company's Goose Repellent Concentrate. Project Number: LFC/GRC/R04. Unpublished study prepared by Brazos Associates, Inc. 7 p.
46557502	Pest Management Regulatory Agency, Health Canada (2000) Proposed Regulatory Decision Document PRDD2000-01, Avigon 14.5 Canada Goose Repellent for Turf Methyl Anthranilate. Project Number: LFC/GRC/PL02, PRDD2000/01. Unpublished study prepared by Health Canada, Pest Management. 22 p.
46640300	Dolphin Trust/ Bird Shield Repellent Corporation (2005) Submission of Product Chemistry Data in Support of the Registration of Bird Shield Bird Repellent Concentrate. Transmittal of 1 Study.
46640301	Brooks, M. (2005) Five Batch Analyses to Add Alternate Unregistered Sources of Methyl Anthranilate. Project Number: BS/02. Unpublished study prepared by Ag-Chem Consulting. 19 p.
46726100	Dolphin Trust (2006) Submission of Product Chemistry Data in Support of the Registration of Bird Shield Repellent

	Concentrate. Transmittal of 1 Study.
46726101	Brooks, M. (2005) Technical Methyl Anthranilate, Product Chemistry, Group A: Product Identity, Composition and Analytical Test Guidelines and Group B: Physical and Chemical Properties Test Guidelines. Project Number: BS/03. Unpublished study prepared by Ag-Chem Consulting. 28 p.
46726700	Dolphin Trust (2006) Submission of Toxicity Data in Support of the Registration of Bird Shield Repellent Concentrate. Transmittal of 1 Study.
46726701	Brooks, M. (2005) Rationale to Bridge Acute Toxicity Studies from Bird Shield End Use Product to Technical Methyl Anthranilate. Project Number: BS/01. Unpublished study prepared by Ag-Chem Consulting. 25 p.
46753100	Liquid Fence Co. (2006) Submission of Product Chemistry Data in Support of the Registration of Goose Repellent. Transmittal of 1 Study.
46753101	Wo, C. (2006) Storage Stability and Corrosion Characteristics Including Enforcement Analytical Method: Goose Repellent. Project Number: 16398, P800. Unpublished study prepared by Product Safety Laboratories. 33 p.
46830300	Imec, Inc. (2006) Submission of Product Chemistry Data in Support of the Application for Registration of Avex. Transmittal of 1 Study.
46830301	Brooks, M. (2006) Avex, Product Chemistry, Group A: Product Identity, Composition and Analytical Test Guidelines and Group B: Physical and Chemical Properties Test Guidelines. Project Number: IM/01. Unpublished study prepared by Ag-Chem Consulting. 20 p.
46876100	Liquid Fence Co, Inc. (2006) Submission of Fate and Toxicity Data in Support of the Registration of Goose Repellent. Transmittal of 2 Studies.
46876101	Chadbourne, D. (2006) Waiver Request from the Requirement to Provide Data Characterizing the Target Area Phytotoxicity of the End Product Goose Repellent. Project Number: LFC/GRC/R08. Unpublished study prepared by Brazos Associates, Inc. 13 p.
46876102	Chadbourne, D. (2006) Waiver Request from the Requirement to Provide Data Characterizing the Dermal Sensitization of the End Product Goose Repellent. Project Number: LFC/GRC/R09. Unpublished study prepared by Brazos Associates, Inc. 21 p.
47084400	Ceannard Inc. (2007) Submission of Toxicity Data in Support of the Registration of Rejex-it AG-36. Transmittal of 1 Study.
47084401	Rice, C. (2007) Waiver Request for Nontarget Plant Testing of Rejex-it AG-36. Unpublished study prepared by Cennard Inc. 4 p.
47376400	Ceannard, Inc. (2008) Submission of Product Chemistry and Toxicity Data in Support of the Application for Registration of Rejex-It Fog Fource AR20. Transmittal of 3 Studies.
47376401	Tillman, A. (2008) Product Identity and Composition, Description of Materials Used to Produce the Product, Description of the Formulation Process, Discussion of Formation of Impurities, Preliminary Analysis, Certified Limits and Enforcement Analytical Methods. Project Number: CE/200701. Unpublished study prepared by Ceannard, Inc. 74 p.
47376402	Tillman, A. (2008) Rejex-It Fog Force AR20: Request to Bridge Physico-Chemical Characteristics Data and Waiver Request for Certain Data. Project Number: CE/200702. Unpublished study prepared by Ceannard, Inc. 15 p.
47376403	Tillman, A. (2008) Rejex-It Fog Force AR20: Request to Bridge Acute Toxicity Data. Project Number: CE/200703. Unpublished study prepared by Ceannard, Inc. 64 p.
47941800	Stone Soap Company, Inc. (2009) Submission of Product Chemistry Data in Support of the Application for Registration of Formula 1001. Transmittal of 3 Studies.
47941801	Tillman, A. (2009) Product Identity and Composition, Description of Starting Materials and Formulation Process, Discussion of the Formation of Impurities, Certified Limits, and Enforcement Analytical Method for FORMULA 1001. Project Number: SS/200901. Unpublished study prepared by Stone Soap Company, Inc. 27 p.
47941802	Sinning, D. (2009) Physical and Chemical Characteristics of Hi Performance CONTROL: Color, Physical State,

	Odor, Stability, Oxidation/Reduction: Chemical Incompatibility, Flammability, pH, Viscosity and Relative Density: Final Report. Project Number: 4470/01. Unpublished study prepared by Case Consulting Laboratories, Inc. 13 p.
47941803	Tillman, A. (2009) Physical and Chemical Characteristics Waiver Requests for FORMULA 1001. Unpublished study prepared by Stone Soap Company, Inc. 6 p.
47950000	Corvus Repellent, Inc. (2010) Submission of Product Chemistry and Toxicity Data in Support of the Application for Registration of Corvus MA Bird Repellent. Transmittal of 7 Studies.
47950001	Brooks, M. (2009) Corvus MA: Product Chemistry: Group A: Product Identity, Composition and Analytical Test Guidelines and Group B: Physical and Chemical Properties Test Guidelines. Project Number: CO/01. Unpublished study prepared by Ag-Chem Consulting. 22 p.
47950002	Durando, J. (2010) Corvus MA Bird Repellent: Acute Oral Toxicity Up and Down Procedure in Rats. Project Number: 28487, P320/UDP, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 14 p.
47950003	Durando, J. (2010) Corvus MA Bird Repellent: Acute Dermal Toxicity Study in Rats. Project Number: P322/RAT, 28488, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 14 p.
47950004	Durando, J. (2010) Corvus MA Bird Repellent: Acute Inhalation Toxicity Study in Rats: Limit Test. Project Number: P330, 28489, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 22 p.
47950005	Durando, J. (2010) Corvus MA Bird Repellent: Primary Eye Irritation Study in Rabbits. Project Number: P324, 28490, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 17 p.
47950006	Durando, J. (2010) Corvus MA Bird Repellent: Primary Skin Irritation Study in Rabbits. Project Number: P326, 28491, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 15 p.
47950007	Durando, J. (2010) Corvus MA Bird Repellent: Dermal Sensitization Study in Guinea Pigs (Buehler Method). Project Number: P328, 28492, 091015/4D. Unpublished study prepared by Eurofins/Product Safety Laboratories. 24 p.
47955500	Stone Soap Company, Inc. (2010). Submission of Toxicity Data in Support of the Application for Registration of Formula 1001. Transmittal of 1 Study.
47955501	Tillman, A. (2010) Formula 1001 Substantial Similarity Discussion. Project Number: SS/201001, CE/200703. Unpublished study prepared by Stone Soap Company, Inc. 45 p.
48053100	Stone Soap Company, Inc. (2010) Submission of Toxicity Data in Support of the Application for Registration of Formula 1001. Transmittal of 6 Studies.
48053101	Oley, S. (2010) Hi-Performance CONTROL: Acute Oral Toxicity Up and Down Procedure in Rats. Project Number: 28740, P320/UDP. Unpublished study prepared by Eurofins/Product Safety Laboratories. 14 p.
48053102	Oley, S. (2010) Hi-Performance CONTROL: Acute Dermal Toxicity Study in Rats - Limit Test. Project Number: 28741, P322/RAT. Unpublished study prepared by Eurofins/Product Safety Laboratories. 14 p.
48053103	Oley, S. (2010) Hi-Performance CONTROL: Acute Inhalation Toxicity Study in Rats - Limit Test. Project Number: 28742, P330. Unpublished study prepared by Eurofins/Product Safety Laboratories. 21 p.
48053104	Oley, S. (2010) Hi-Performance CONTROL: Primary Eye Irritation Study in Rabbits. Project Number: 28743, P324. Unpublished study prepared by Eurofins/Product Safety Laboratories. 17 p.
48053105	Oley, S. (2010) Hi-Performance CONTROL: Primary Skin Irritation Study in Rabbits. Project Number: 28744, P326. Unpublished study prepared by Eurofins/Product Safety Laboratories. 15 p.
48053106	Oley, S. (2010) Hi-Performance CONTROL: Dermal Sensitization Study in Guinea Pigs (Buehler Method). Project Number: P328, 28745. Unpublished study prepared by Eurofins/Product Safety Laboratories. 23 p.
48082800	Ceannard, Inc. (2010) Submission of Product Chemistry Data in Support of the Registration of RejeX-it Fog Force AR20. Transmittal of 1 Study.
48082801	Sinning, D. (2010) Physical and Chemical Characteristics of Rejex-It Fog Force AR-20: Storage Stability and Corrosion Characteristics: Final Report. Project Number: 4230/03. Unpublished study prepared by Case Consulting

	Laboratories, Inc. 13 p.
48318200	Stone Soap Co., Inc. (2010) Submission of Product Chemistry Data in Support of the Registration of Avian Control. Transmittal of 1 Study.
48318201	Sinning, D. (2010) Physical and Chemical Characteristics of Hi Performance Control: Storage Stability and Corrosion Characteristic: Final Report. Project Number: 4470/02. Unpublished study prepared by Case Consulting Laboratories, Inc. 13 p.

EPA Reviews

EPA 2011. Non-target Organism and Endangered Species Screening Risk Assessment for the Methyl Anthranilate (Benzoic Acid, 2-Amino, Methyl Ester) Registration Review Preliminary Work Plan From Russell Jones to Chris Pfeifer.

EPA 2011. Product Chemistry Scoping Document for the Registration Review of Methyl Anthranilate. From Jacob Moore to Chris Pfeifer

EPA 2011. Preliminary Human Health Assessment for Methyl Anthranilate. From Sadaf Shaukat to Chris Pfeifer

EPA. 2001. GENEEC 2.0 (Generic Estimated Environmental Concentration Model, Version 2). Environmental Fate and Exposure Division, Office of Pesticide Programs.

EPA. 2008. T-REX (Terrestrial Exposure Model) Version 1.4.1. Terrestrial Biology and Exposure Technical Teams, Environmental Fate and Exposure Division, Office of Pesticide Programs.

References for the Preliminary Work Plan

Aronov, E. V. and L. Clark. 1996. Degradation studies of the non-lethal bird repellent, methyl anthranilate. Pesticide Science 47: 355-362.

Askham, L. R. and J. K. Fellman. 1989. Use of DMA to reduce robin depredation on cherries. Proceedings of the Great Plains Wildlands Damage Control Workshop 9: 116-119.

Askham, L. R. 1992. Efficacy of methyl anthranilate as a bird repellent on cherries, blueberries and grapes. Proceedings of the Fifteenth Vertebrate Pest Conference. J. E. Borrecco & R. E. Marsh, Eds. Published at University of California, Davis. 1992, pp. 137-141.

Avery, M. L. 1989. Experimental evaluation of partial repellent treatment for reducing bird damage to crops. Journal of Applied Ecology 26: 433-439.

Avery, M. L., D. G. Decker, J. S. Humphrey, S. Aronov, S. D. Lindscombe, and M. O. Way. 1995. Methyl anthranilate as a rice seed treatment to deter birds. Journal of Wildlife management 59(1): 50-56.

Dorr, B., L. Clark, J. E. Glahn, I. Mezine. 1998. Evaluation of a methyl anthranilate-based bird repellent. Toxicity to channel catfish *Ictalurus punctatus* and effect on Great Blue Heron *Ardea herodias* feeding behavior. Journal of the World Aquaculture Society 29(4): 451-462.

EPA. 1992. Classification of Methyl Anthranilate (Chem. No. 128725) as a Conventional Chemical or as a Biochemical Pesticide. Memorandum from J. T. McClintock to D. B. Peacock.

EPA. 1994. SAB review of the product chemistry, toxicology, summary information, and toxicology and residue chemistry waivers submitted for the registration of technical methyl anthranilate and an end-use product, "Bird Shield Repellent." Product chemistry (Case# 008125; Chemical # 128725; Submission # S455617; DP barcode D197915). Memorandum from S. K. Reilly to R. Forrest, dated 11/17/1994.

EPA. 2000. Experimental use permit for Bird Shield Repellent (EPA Reg. No. 6550-EUP-001) containing 26.4% methyl anthranilate as its active ingredient in or on corn sunflowers, and apples (chemical no. 128725): Evaluation of residue chemistry and analytical method. MRIDs 450651-01, -02, -03, -04, and -05; Case no. 066100; Submission no. S580610; DP barcode D266613. Memorandum from F. Toghrol to J. Downing, dated 08/16/2000.

EPA. 2007. Guidance for Tier I Estimation of Aqueous Pesticide Concentrations in Rice Paddies. Memorandum from S. Bradbury to EFED/OPP, dated 05/08/2007.

EPA. 2010. Guidance for Using Non-Definitive Endpoints in Evaluating Risks to Listed and Non-listed Animal Species. Memorandum from D. J. Brady (Director, Environmental Fate and Effects Division) to Environmental Fate and Effects Division Scientists, dated 08/03/2010.

Ferreres, F., J. M. Giner, and F. A. Tomas-Barberan. 1994. A comparative study of hesperetin and methyl anthranilate as markers of floral origin of citrus honey. Journal of the Science of Food and Agricultural Science 65(3): 371-372.

Harpaz, S. and L. Clark. 2006. Effects of addition of a bird repellent to fish diets on their growth and bioaccumulation. Aquaculture Research 37: 132-138.

Hazardous Substances Data Base (HSDB). 2004. National Library of Medicine/TOXNET (05/25/2004 update).
http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+1008

Kirifides, M. L., M. P. Kurnellas, L. Clark, and B. P. Bryant. Calcium responses of chicken trigeminal nerve ganglion neurons to methyl anthranilate and capsaicin. Journal of Experimental Biology 207: 715-722.

White, J. W. and V. M. Bryant 1996. Assessing citrus honey quality: Pollen and methyl anthranilate content. (Unpublished study). http://www.honey.com/white/pdf/white199-assessing-citrus-honey-quality.pdf