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Efficacy Review: BIRD SHIELD REPELLENT CONCENTRATE, 66550-R

Applicant:

Dolphin Trust
Pullman, WA 99163

Producer:

Bird Shield Corporation
Pullman, WA 99163

200.0 INTRODUCTION

200.1 Uses

A 26.4% Methyl Anthranilate concentrate proposed for Federal registration. According to the proposed routed for my review, this product is to be mixed with water for non-aerial applications to

"limit feeding by robins (Turdus migratorius), starlings (Sturnus vulgaris), Cedar waxwings (Bombycilla cedrorum), jays, magpies and crows (Corvidae), ravens (Corvus spp.), finches and sparrows (Fringillidae) on as well as other fruit-eating birds on ripening cherries, blueberries, and grapes."

200.2 Background Information

See efficacy reviews of 6/9/93 and 5/5/95. In the first of these reviews, I accepted claims for repelling robins, starlings, cedar waxwings, and "native sparrows (Family Fringillidae)" from blueberries, cherries, and grapes. As the data examined were very limited in scope, my acceptance of these claims was most generous and a bit foolhardy.

I did not, however, accept proposed claims

"to repel starlings and swallows (Hirundinidae) from structures, roost and nest sites as well as ducks (Anatinae and Aythyinae), geese (Anserinae), gulls and terns (Laridae) from water impoundments and chemigation systems."

In the efficacy review of 5/5/95, I examined data pertaining to the water impoundment use but did not accept the claim at that time, noting various insufficiencies in the reporting of the data. I also noted that no data had been submitted to support the claim that the product repels starlings and swallows "from structures, roost and nest

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sites." These are public health claims which must be supported by efficacy data, even if we do change our efficacy policy (as rumored) in the near future.

This review considers another efficacy report (MRID# 437202-01, submitted 7/10/95) pertaining to the water impoundment use and a letter of 7/17/95 which discusses EPA's E-mail letters of 3/31/95 and 6/6/95. A proposed amended label was included with the letter of 7/17/95. This review also considers the applicant's submission of 9/22/94, which consist largely of raw and processed data from the "wading pool" research which is the subject of efficacy reports discussed in this review and the efficacy review of 5/5/95.

Methyl Anthranilate (MA, hereafter) is a GRAS listed material for which, nevertheless, the proposed label warns of potential eye irritation and oral and inhalation hazards. The proposed "Master Label" bears safety claims but also includes statements such as

"May cause severe irritation to skin, mouth, or eyes";

"Avoid direct contact or prolonged breathing of fumes"; and

"Slightly toxic to fish."

OPP has determined that MA is a "biochemical" worthy of reduced registration data requirements. However, the signal word on the proposed label for 66550-R is "WARNING".

201.0 DATA SUMMARY

In addition to MA, this product also would contain [REDACTED]

[REDACTED] Ingredients which perform only these functions are considered to be inert.

The items in the efficacy volume (MRID# 437202-01) included in the submission of 7/10/95 are discussed individually below. The citation for the each item in that volume is given, followed by a separate discussion of the item.

Inert ingredient information may be entitled to confidential treatment

1. Askham, L.R. (1995a) Effective repellency concentration (EC₅₀ of Bird Shield Repellent* with Methyl Anthranilate to exclude ducks and geese from water impoundments. Ms., Dept. Horticulture and Landscape Architecture, Washington State University, Pullman, WA.

The text of this document corresponds very closely to the document discussed in the efficacy review of 5/5/95. The version reviewed earlier (MRID# 435528-01), was a 5-page document presented in a form intended for publication in: Masters, R. (ed.) Proceedings: 12th Great Plains Wildlife Damage Control Workshop. The version submitted on 7/10/95 appears to be an earlier draft of the same report which lacks a few footnotes and thus is reduced to 4 pages in length. However, the version submitted on 7/10/95 also includes 16 pages of raw data sheets, assorted "GLP" items, and an "APPENDIX" which consists of a separate published report on another company's MA products. In this review, I have elected to discuss that report as a separate document.

As noted in the efficacy review of 5/5/95, the first page and some of the second page of Askham's report are devoted to the abstract and introduction sections. The "meat" of the report ("**Materials and methods**", "**Results**", and "**Discussion**" sections) comprises less than 2 pages of text, with no data tables or figures being presented. I noted in the earlier review that the addition of raw data and other information regarding this study might make it sufficient to support some sort of claim, but allowed that any such claim might be quite limited.

The trials were conducted in two outdoor aviaries ("12.5 ft. X 7.0 ft. X 42 ft." in size). Three circular "children's wading pools" 4'8" in diameter were placed in the aviaries. Five barnyard geese (Anser? domesticus) were placed in one aviary and 9 mallards (Anas platyrhynchos) were placed in the other. Initially, untreated water (50 gal, or 190 L) was placed in each pool. During treatment phases, measured amounts of Bird Shield were added to two of the pools, while the third remained untreated. Periods of time in which some or all of the pools were treated with one or another amount of product occasionally were interrupted by "buffer" periods in which all three pools in each aviary were filled with untreated water. The locations of treatments and the amounts of product added to the various pools were changed from time to time.

The various test phases run gave Askham the opportunity to load the 25% MA product into pools in both aviaries once, according to the report, in each of the following amounts: 31 ml, 63 ml, 125 ml, 250 ml, 500 ml, and 1000 ml.

According to notes appended to the report and to materials included with the submission of 9/22/95, the two lowest amounts added were 40 ml and 75 ml. Effects on pool use reportedly were assessed by direct(?) and videotaped observations, and

"by the amount of soil deposited from the feet of the birds in the bottoms and the number of feathers floating on the water of each pool."

Askham writes that essentially no effects on pool use were observed for the three lowest doses, which he calculated to have provided 90 ppm, 180 ppm, and 360 ppm, respectively, of MA(?). At the three highest doses (claimed to yield MA[?] concentrations of 727 ppm, 1445 ppm, and 2890 ppm), Askham writes that the total amount of pool use was reduced and

"Significant differences ($p=0.01$) were recorded between the number of times both test species used the untreated pools and the treated pools. After an initial head dunking or drink all of the birds avoided the pools treated with the latter concentrations for the remainder of each trial period."

In the version of this report discussed in the efficacy review of 5/5/95, Askham did not present the numbers that were used to calculate the reported "Significant differences". If the second sentence quoted above describes what actually happened, the differences in data collected from treated and untreated pools should have been dramatic (all the more reason to wonder why the data were not shown). From his results, Askham reports that the EC, for Bird Shield (or MA?) "appears to be 727 ppm or greater" when the product is used "in standing pools of water".

I have examined the extra pages appended to the version of this report (MRID# 437202-01) in an effort to gain more information about how the research was conducted and what the results were.

The first document appended to Askham's report in MRID# 437202-01) is a 3-page item entitled

"EFFECTIVE REPELLENCY CONCENTRATION ECR OF BIRD SHIELD REPELLENT^(tm) WITH METHYL ANTHRANILATE TO EXCLUDE DUCKS AND GEESE FROM WATER IMPOUNDMENT'S.

Research Treatment and Observation Summary".

This item presents a printed narrative of the schedule of events in the study, along with occasional qualitative descriptions of its results. This document is followed by three pages of "DAILY INSPECTION/FEEDING RECORD" forms on which longhand entries (check marks, brief statements, and initials) appear for 78 study days. Askham's initials appear on the forms for 67 days; initials of 4 other people appear for 10 other study days, including one stretch of 5 days in a row; and a check mark appears in the initials column for one day. Not all information appearing in the forms appears in the printed narrative (and vice versa). The sources of information in the narrative reportedly include "field notes and videotape on June 28" in addition to information on the "daily" forms. The forms indicate that the aforementioned videotaping occurred on 6/29/94 and dealt with "feeding & bathing activity." There reportedly was no Bird Shield in any pool in either aviary on 6/28 or 6/29/94.

From these documents, I have learned that 11 ducks and 5 geese originally were obtained from the Army Corps of Engineers, but that 3 ducks "died from Alpha-chlorolose trt by Corps." One goose was reported to be "slow to recover", but the next day's report said "all birds O.K." (Alpha-chlorolose, a tranquilizer used in bird collection and control work, has been classified as an animal drug rather than as a vertebrate pesticide.) This left 8 ducks and 5 geese for the study. A duck and its two newly hatched ducklings were removed from the pen prior to the end of the study. Askham fooled around a bit with diets during the acclimation periods and subsequently, ultimately feeding the birds wheat, rabbit chow, fresh lettuce, and cabbage (which the birds "Don't like).

The water in the little pools was changed every 1-8 days, apparently depending upon the whether there was to be a change in treatment condition or whether there was considerable fouling of the water by "soil, feathers, food, and feces". Due apparently to differential rates of contamination, untreated pools were changed more often than treated ones.

The Bird Shield product was added to the three pools in various amounts according to the schedule indicated below.

DATE	VOLUME OF BIRD SHIELD ADDED		
	<u>Pool #1</u>	<u>Pool #2</u>	<u>Pool #3</u>
5/24/94	75 ml	125 ml	0
6/3/94	1000 ml	1000 ml	0
6/15/94	0	500 ml	500 ml
6/25/94	500 ml	500 ml	0
6/30/94	250 ml	0	250 ml
7/1/94	40 ml	75 ml	125 ml
7/12/94	250 ml	500 ml	0
7/17/94	0	0	250 ml

I searched the daily narrative report document and the "DAILY INSPECTION/FEEDING RECORD" forms in vain for any quantitative information which might have been used in the statistical analysis mentioned in Askham's report. The log documents are consistent with the qualitative descriptions in Askham's report of birds' responses to Bird Shield treatments at the higher rates, 500 and 1000 ml of product. These descriptions include cessation of drinking after 2-3 tries, head-shaking, "honking and quacking", "bowing and rubbing" (bills?) on ground and sides of pool, and transfer of all water-related activity to untreated pools. In contrast to Askham's report, the printed narrative indicates that the 250-ml treatments did not affect the behavior of the geese and ducks used in this study.

Askham writes that, in pools given Bird Shield treatments of 63 ml or greater, a "uniform brown precipitate or residue" formed within a day of application, but adds that

"None precipitated to the bottom of the pools nor coalesced on top of the water as noted in the Re-JeX-iT trials."

"Re-JeX-iT" is a trade name for another company's MA products, some of which already registered. Askham's discussions claim that Bird Shield's "patented" formulation disperses in water better than do the Re-JeX-iT products that have been tested in pools, puddles, and impoundments.

The printed log and the "DAILY INSPECTION/FEEDING RECORD" forms both report that the 500- and 1000-ml treatments imparted a strong odor to the pools.

Accepted at face value, Askham's report only states that captive mallards and barnyard geese do not seem to like water in a child-size wading pool if it has been treated with Bird Shield at a level of 250 ml/190 L (1.32 ml/L). Even this statement is called into question by Askham's notes which indicate that the 500-ml treatments were effective, but the 250-ml treatments were not.

The next 5 documents appended to Askham's report consist of protocols, and animal welfare and other administrative documents. None of these items includes data which could have been used in the statistical analysis to which Askham's report refers.

On 9/7/95, I called Askham and asked him whether he had collected any numerical efficacy data and run any statistical analyses. He said that he was not sure that he had, [REDACTED]

[REDACTED] I also asked him about the discrepancy between the report and the notes regarding the effectiveness of the 250-ml treatments.

A few days later, Askham called me, said that [REDACTED] he thought that he understood what I was looking for, and reported that data on pool entries had been collected and had been analyzed statistically. He said that he had an ongoing field trial to attend to immediately but that he would send in the raw data as soon as possible. Because of their relevance to the study discussed above, I have chosen to discuss the data submitted by Askham on 9/22/95 next, ahead of the published Re-JeX-iT report which appears in the end of the volume assigned MRID# 437202-01.

2. Askham, L. (1995b) September 22 letter, with attachments to "Bill Jacobs, Ph.D.", U.S. Environmental Protection Agency. Bird Shield Repellent Corporation, Pullman, WA, 1 p plus 43 pp. of attachments. (This letter is introduced by a 1-p. letter of 9/22/95 from Askham to Dan Peacock, also of EPA, PM Team 14.)

Askham's letter itself is very brief, consisting largely of a retelling of [REDACTED] new field trial, and data validation circumstances which delayed his response a bit. Forty-one pages of the attachments consist of a collection of "true copies of the field notes", these notes being different from those that were included in the volume assigned MRID# 437202-01. The other two attached pages

were a note dated 9/11/95 which introduces the "true copies" and a page entitled "PROBABILITY OF RANDOM SELECTION BY TWO SPECIES OF BIRDS DURING A WATER REPELLENCY TRIAL" on which two sets of Chi-Square contingency tables are presented along with results reported for analyses of the data on the tables.

The raw data sheets indicate that data on pool entry were collected only during two 30-minute observation periods (one in the 8:00-9:30 AM time frame and the other between during the 3:00-4:30 PM time frame) on certain days. One of these days invariably was the day of treatment (or of replacing all treatments with cleaned pools containing fresh water). If there was a second day of pool entry observations, the day chosen usually (3 of 4 cases) was the day following the day of treatment or return to the "buffer" condition. Results for the remaining days under a treatment condition are described in notes, but systematic counts of pool entries are absent. Distinct half-hour intervals were set aside for making pool entry counts for the duck and goose pens.

Treatment Rate (ml/50 gal)	<u>DUCKS</u> <u>Pools</u>			<u>Total</u>
	<u>Con- trol</u>	<u>Treat- ment 1</u>	<u>Treat- ment 2</u>	
500	318	0	0	318
1000	159	16	11	186
Total Observed	477	16	11	504
Expected	168	168	168	

Chi Square = 284.14 with 2 df.
P>0.005 [sic]

Treatment Rate (ml/50 gal)	<u>GEESE</u> <u>Pools</u>			<u>Total</u>
	<u>Con- trol</u>	<u>Treat- ment 1</u>	<u>Treat- ment 2</u>	
500	271	10	12	293
1000	116	0	7	123
Total Observed	387	10	19	416
Expected	138.67	138.67	138.67	

Chi Square = 219.172 with 2 df.
P>0.005 [sic]

The two contingency tables, one for geese and one for ducks, are 3-by-2 tables which present data on pool entries collected during half-hour observation periods conducted on days in which one pool in each pen was untreated and the other two were treated with either 500 ml or 1000 ml of the Bird Shield product. Above, I present the tables much as Askham presents them.

The results for the higher treatment levels can be portrayed as being "highly significant". However, the analyses reported do not consider all data that were collected. There also are inaccuracies on the raw data pages which have led to incorrect numbers being used in Askham's tables and calculations. (The inaccuracies are rather minor and would not have affected the Chi Square values reported very much. I mention them primarily because readers may noted discrepancies in some areas between the numbers I present below and those that were entered in Askham's table.) Askham's contingency tables and data analyses do not account for the strong preference that the geese had for the third pool. While the 500 ml concentration appeared to override this preference in the one trial in which that amount of Bird Shield was added to Pool #3, Pool #3 was the untreated pool in the other trial which included two 500-ml treatments and in the only trial which included 1000-ml treatments (see below).

For the portions of the three buffer periods (no treatments in any pool) during which pool entry data were collected, the results shown below were reported in the duck and goose pens. The total numbers of entries into these pools (pooled across the three "buffer" periods show that geese had a marked and enduring preference for Pool #3 and generally were reluctant to use Pool #1. There was no evidence that ducks clearly preferred or rejected any of the pools if they all were untreated.

DATES OBSERVED (1994)	ENTRIES IN EACH POOL			TOTAL POOL ENTRIES
	Pool #1	Pool #2	Pool #3	
	<u>Duck Results</u>			
5/19,22	68	58	48	174
6/11	47	32	68	147
6/28	54	71	66	191
TOTALS	169	161	182	512
% FOR POOL	33.0%	31.4%	35.5%	

Goose Results

5/19,22	0	31	70	101
6/11	0	24	67	91
6/28	3	22	127	152
TOTALS	3	77	264	344
% FOR POOL	0.9%	22.4%	76.7%	

If the Chi Square model is to be used to analyze Askham's data on pool entries, it seems to me that one might want to set up a 3-factor table for the results because of the clear bias by geese in favor of Pool #3. A less complicated, and perhaps "legal", alternative would be to use the results on buffer use as the basis for assigning "God-given" probabilities to calculate the expected results for each pool, absent treatment effects. However, geese seldom used Pool #1, especially when there was another pool available that was untreated or that had been treated with less than 500 ml of Bird Shield. Consequently, the "God-given" probability that there would be any geese going into that pool is exceedingly small, leading to distortions in the Chi Square values caused by low expected values in the cell associated with Pool #1.

For ducks, the results in the buffer tests were so close to the expected outcomes of 33.3% of all entries being into each of the pools, that the problem of small expected values does not arise, and that a strong case could be made for ignoring the results of the buffer tests and assigning 33.3% as a "God-given" probability of occurrence to each pool.

Below, I present data, discussions, and Chi Square values for the various periods when repellents were tested, beginning with the highest treatment rate and working downward.

1000 ml

If the results obtained on the two days of observations taken when Pools #1 and #2 were treated are considered, the results for ducks differ markedly from what was seen in the "buffer" trials, while the results with geese appear to be a potentiation of the existing bias in favor of Pool #3, largely at the "expense" of Pool #2. Using the results from the "buffer" trials to generate "God-given" probabilities, I computed a Chi Square value of 263.5 (2 df, $p < 0.001$) for the duck data obtained when 1000 ml of Bird Shield was added to Pools #1 and #2. The table below

shows the numbers that were used.

DATES OBSERVED (1994)	ENTRIES IN EACH POOL TREATMENT APPLIED			TOTAL POOL ENTRIES
	Pool #1 1000 ml	Pool #2 1000 ml	Pool #3 None	
<u>Duck Results</u>				
6/3,4	16	11	194	221
% FOR POOL	7.2%	5.0%	87.8%	
Expected	72.9	69.4	78.5	221
% FOR POOL	33.0%	31.4%	35.5%	
<u>Goose Results</u>				
6/3,4	0	7	114	121
% FOR POOL	0.0%	5.8%	94.2%	
Expected	1.1	27.1	92.8	121
% FOR POOL	0.9%	22.4%	76.7%	

I also performed the same test for the goose data on pool entries that were obtained under the same treatment conditions. Because the actual value for Pool #1 was very close to the expected value, I did not collapse across similarly treated pools (which should be done if the expected value is low and the resulting contribution to the Chi Square value is high). A much smaller Chi Square value (19.7, 2 df, $p < 0.001$) was obtained, although a significant association between entries and treatments still was obtained.

500 ml

When Pools #1 and #2 were treated with 500 ml of Bird Shield, the results obtained were much like those shown above. However, when the treatments were switched so that Pools #2 and #3 were the treated ones, the geese finally entered Pool #1 with some frequency. In fact, 139 of 147 total entries into Pool #1 (in 7 hr of observation while it was in the untreated condition) that were recorded for geese, were observed on two days (6/15-16/94) when the other two pools had been treated with 500 ml of Bird Shield. (Only 22 additional entries into Pool #1 were

observed during 8 hr of observation of it while it was in various treated conditions.)

DATES OBSERVED (1994)	ENTRIES IN EACH POOL			TOTAL POOL ENTRIES
	Pool #1	Pool #2	Pool #3	

Duck Results

Treatment	None	500 ml	500 ml	
6/15,16	168	8	0	176
% FOR POOL	95.5%	4.5%	0	
Expected	58.1	55.3	64.5	176
% FOR POOL	33.0%	31.4%	35.5%	

Treatment	500 ml	500 ml	None	
6/25	0	0	155	155
% FOR POOL	0.0%	0.0%	100%	
Expected	51.2	48.7	55.0	155
% FOR POOL	33.0%	31.4%	35.5%	

Goose Results

Treatment	None	500 ml	500 ml	
6/15,16	139	10	12	161
% FOR POOL	86.3%	6.2%	7.5%	
Expected	1.4	36.1	123.0	161
% FOR POOL	0.9%	22.4%	76.7%	

Treatment	500 ml	500 ml	None	
6/25	0	0	143	143
% FOR POOL	0.0%	0.0%	100%	
Expected	1.3	32.0	109.7	143
% FOR POOL	0.9%	22.4%	76.7%	

These results are summarized in the table shown above. Clearly, the Bird Shield was extremely deterrent to both species when applied at or above 500 ml/190 gal of water. The Chi Square values for the results obtained with ducks were 312.9 (2 df) for the 6/15-16 arrangement of treatments and 287.7 (2 df) for the arrangement presented on 6/25. Obviously, these values are significant.

Which pool was left untreated affected the sizes of the Chi Square values calculated for pool entries by geese when the 500-ml treatment was applied to two pools and the third was left untreated. When Pool #3 was treated (6/15,16), the resulting Chi Square value was enormous (13,643.2, 2 df), due mainly to the extremely low expected value and the high number of entries observed for the pool that was not treated. When the favored Pool #3 was the untreated one (6/25), the result obtained again appeared to be mere potentiation of the bias for that pool. The Chi Square value was much smaller (43.4, 2 df) but still significant.

In the only other instance in which an amount of Bird Shield as great as 500 ml was applied to at least one Pool, that treatment level appeared to be more deterrent to both species than was a 250-ml treatment. Again, note that the 500-ml treatment was able to override the preference that geese had for Pool #3. The Chi Square values (2 df) obtained were 189.0 for ducks and 390.5.

DATES OBSERVED (1994)	ENTRIES IN EACH POOL TREATMENT APPLIED			TOTAL POOL ENTRIES
	Pool #1 250 ml	Pool #2 None	Pool #3 500 ml	
<u>Duck Results</u>				
7/12,13	71	166	3	240
% FOR POOL	29.6%	69.2%	1.8%	
Expected	79.2	75.4	85.2	240
% FOR POOL	33.0%	31.4%	35.5%	
<u>Goose Results</u>				
7/12,13	17	86	4	107
% FOR POOL	15.9%	80.4%	3.7%	
Expected	1.0	24.0	82.1	107
% FOR POOL	0.9%	22.4%	76.7%	

For both ducks and geese, the number of entries into the pool (#1) treated with 250 ml of Bird Shield was intermediate to the numbers of entries into the untreated (#2) and 500-ml-treated (#3) pools. However, the number of entries to Pool #1 was fairly large for ducks and unusually large for geese, considering their avoidance of that pool when Pool #3 was untreated. In fact, 17 of the total of 22 observed entries by geese into Pool #1 when it had any Bird Shield in it occurred on 7/12-13 when the 250-ml treatment was one of two alternatives to the 500-ml treatment in Pool #3.

During the succeeding (and final) observation period on 7/17/94, geese returned to their habitual preference for Pool #3 despite the fact that it was the only treated pool. Geese were seen entering Pool #3 67 times (76.1% of total entries), but entered the untreated Pool #1 just 5 times (5.7%) and the untreated Pool #2 16 times (18.2%).

250 ml

When this amount of Bird Shield was applied to Pools #1 and #3, the results shown in the table below were obtained. These data produced non-significant (2 df) Chi Square values of 2.53 for ducks and 3.29 for geese (despite the extremely low expected value for Pool #1).

DATES OBSERVED (1994)	ENTRIES IN EACH POOL TREATMENT APPLIED			TOTAL POOL ENTRIES
	Pool #1 250 ml	Pool #2 None	Pool #3 250 ml	
<u>Duck Results</u>				
6/30	60	45	68	173
% FOR POOL	34.6%	26.0%	39.3%	
Expected	57.1	54.3	61.4	173
% FOR POOL	33.0%	31.4%	35.5%	
<u>Goose Results</u>				
6/30	2	16	54	72
% FOR POOL	2.7%	22.2%	75.0%	
Expected	0.6	16.1	55.2	72
% FOR POOL	0.9%	22.4%	76.7%	

The results obtained during the final period when geese were observed were mentioned above. The data for both species are presented below. From the duck results, I calculated a significant Chi Square value (24.8, 2 df) which seems to have had nothing to do with an aversion for the Bird Shield treatment. For geese, the data seem to fit the prediction from the "buffer" trials very well, except for problems associated with the low expected value for Pool #1. As Pool #2 also was untreated, I lumped the results for the two untreated pools together and came up with a non-significant Chi Square (0.016, 2 df) and an extremely good fit.

DATES OBSERVED (1994)	ENTRIES IN EACH POOL TREATMENT APPLIED			TOTAL POOL ENTRIES
	Pool #1 None	Pool #2 None	Pool #3 250 ml	
<u>Duck Results</u>				
7/17	29	73	82	184
% FOR POOL	15.8%	39.7%	44.6%	
Expected	60.7	57.8	65.3	184
% FOR POOL	33.0%	31.4%	35.5%	
<u>Goose Results</u>				
7/17	5	16	67	88
% FOR POOL	5.7%	18.2%	76.1%	
Expected	0.8	19.7	67.5	88
% FOR POOL	0.9%	22.4%	76.7%	

125 ml, 75 ml, and 40 ml

These concentrations were presented only in combination with at least one other Bird Shield treatment. On 5/24/95, Pool #1 was treated with 75 ml of product, Pool #2 with 125 ml, and Pool #3 was untreated. The results obtained are shown in the table below. Results obtained for ducks fit reasonably well with the results obtained from "buffer" periods (Chi Square = 3.06, 2 df, NS). The same was true for the results with geese (Chi Square = 1.87, 2 df, NS).

DATES OBSERVED (1994)	ENTRIES IN EACH POOL			TOTAL POOL ENTRIES
	TREATMENT APPLIED			
	Pool #1 75 ml	Pool #2 125 ml	Pool #3 None	

Duck Results

5/24	47	58	48	153
% FOR POOL	30.7%	37.9%	31.4%	
Expected	50.5	48.0	54.3	153
% FOR POOL	33.0%	31.4%	35.5%	

Goose Results

5/24	0	16	39	55
% FOR POOL	5.7%	18.2%	76.1%	
Expected	0.5	12.3	42.2	55
% FOR POOL	0.9%	22.4%	76.7%	

All three of these treatment levels were used at once in early July of 1994. Askham collected pool entry data on 7/2/94. The results obtained are shown in the table on the next page. For the ducks, the pattern of pool entry was significantly different from that expected from the results of the "buffer" tests (Chi Square = 12.43, 2 df, $p < 0.01$), but the pool (#1) ostensibly given the lowest amount of Bird Shield was the one most out of line with the expected value. The results with geese fit reasonably well with the results from the "buffer" trials (Chi Square = 4.50, 2 df, NS).

Collectively, these results support that Askham's conclusions that pools treated with Bird Shield at rates equal or higher to 500 ml product/190 gal of water were extremely aversive to mallard and barnyard geese, while lower concentrations were ineffective. These data suggest that the product could be expected to work wonders in some cases and to fail completely in others. The 500 ml/190 gal concentration works out to 0.0695% (v/v).

DATES OBSERVED (1994)	ENTRIES IN EACH POOL TREATMENT APPLIED			TOTAL POOL ENTRIES
	Pool #1	Pool #2	Pool #3	
	40 ml	75 ml	125 ml	
<u>Duck Results</u>				
7/2	33	65	64	162
% FOR POOL	20.4%	40.1%	39.5%	
Expected	53.4	50.9	57.5	162
% FOR POOL	33.0%	31.4%	35.5%	
<u>Goose Results</u>				
5/24	3	20	72	95
% FOR POOL	3.2%	21.1%	75.8%	
Expected	0.9	21.3	72.9	95
% FOR POOL	0.9%	22.4%	76.7%	

The published article appended to the version of Askham's report submitted on 7/10/95 is cited and discussed below.

3. Belant, J.L., Gabrey, S.W., Dolbeer, R.A., and Seamans, T.W. (1995) Methyl anthranilate formulations repel gulls and mallards from water. Crop Protection, 14:2, 171-175.

This report discusses studies run in Erie County, OH. As I have already discussed at length an unpublished version of this report (combined efficacy review of 5/24/93 for 58035-A, 58035-T, and 58035-I), will mention only the highlights of this research here.

Four 8-m-X-4-m pens each containing two 1-m diameter plastic pools were used in the mallard study. A pair of mallards (duck and drake) were placed in each holding pens associated with the corrals.

Initially, one pool was treated with Re-JeX-iT TP-40 ("40% MA, 0.02% v/v" product/water?) in 40 l of water. Mallards then were released into and confined to the corrals for 8 daylight hours per day. Mallard activity was observed at intervals over the first 80 minutes after their release. Instances of occurrence of certain activities during 120 20-second observation periods were recorded. This schedule

was maintained for four consecutive days, followed by two days in which the mallards were confined to the holding pens.

The untreated pools were removed, and birds were again released and monitored in the corrals for 8 hr/day for four consecutive days.

Results of this test are summarized in the table immediately below.

MEASUREMENT	TEST PHASE	
	<u>Choice</u>	<u>No-Choice</u>
Mean # Entries in Untreated Pool	52.9	----
Mean # Entries in Treated Pool	0.3	1.1
% of Mallard Use in Untreated Pool	99.4%	----
Mean # Bill Contacts w/Untreated Water	103.8	----
Mean # Bill Contacts w/Treated Pool	6.0	15.6
% of Bill Contacts w/Untreated Water	94.5%	----

During the 4-day choice tests, entries and bill contacts to the water in the treated pools were dramatically (and significantly) lower in treated pools than in untreated pools. The mean numbers of entries and bill contacts in treated water were higher when no untreated pool was available than during the initial choice test, but these numbers remained far below those observed for the untreated pools during the initial test phase.

Under these conditions of testing, the TP-40 had a dramatic negative effect upon pool entry and bill contacts with treated water by these 8 mallards.

In the second phase of this study involved separate trials using two MA formulations. In the first trial of this phase, involving TP-40, eight of 1-m diameter plastic pools were lined up 4 m apart at an Erie County landfill frequented by ring-billed gulls (Larus delawarensis) and herring gulls (L. argentatus). Each pool was filled with 50 l of water. Twenty ml of TP-40 ("0.016% v/v) were added to each of "four randomly chosen pools". Observers noted and recorded gull activity in the pools for 20-sec time periods with two 40-min observation periods/day, beginning at 10:30 AM and 2:30 PM, on 5 of 6 consecutive days in mid-

November of 1991. Each pair of pools (paired apparently only on the basis propinquity) was observed for about 40 min/day.

MEASUREMENT	TP-40 CHOICE TEST
Mean # Entries in Untreated Pool	10.8
Mean # Entries in Treated Pool	0.5
% of Gull Entries in Untreated Pool	95.6%
Mean # Bill Contacts w/Untreated Water	107.1
Mean # Bill Contacts w/Treated Pool	6.9
% of Bill Contacts w/Untreated Water	93.9%
Mean # Gulls Using Untreated Pool	7.0
Mean # Gulls Using Treated Pool	2.3
% of Gull Use in Untreated Pool	75.3%

Results (above) of the first landfill trial suggest repellent effects. Total activity at the landfill varied greatly over the period with counts ranging from 0 to 2480 birds. Relatively few birds used pools, whether treated or untreated. This test had a premature ending because the birds left the landfill in favor of another feeding area, the Huron River where there was an abundance of gizzard shad. The pools had frozen by the time the gulls returned to the landfill.

In the second AP-50 gull trial at the landfill, eight 1.2-m diameter plastic pools were lined up 12 m apart in two parallel lines 10 m apart at the same landfill. Each pool was filled with 100 l of water. Observers noted and recorded gull activity in the pools for 20-sec time periods during four 20-min observation periods/day. These periods ran from about 1:30 PM to 3:00 PM, during two 5-day and two 7-day periods of study in August and September of 1992. The observation periods were called "weeks".

During the first "week", AP-50 ("0.016% v/v) was added in 75-g aliquots to one member of each (side-by-side) pair of pools. During the second "week", 75 g of AP-50 was added to the previously untreated pool while the previously treated pool was neither cleaned nor retreated. For the third "week", the used pools were removed and replaced with

new pools into which 100 l of clean water were placed. During the fourth and last "week" all pools were treated with 75 g of AP-50.

During the first "week", when one member of a pair of pools was treated, the following results were observed:

MEASUREMENT	TREATED POOLS	UNTREATED POOLS	% IN UNTREATED POOLS
Pool Entries	0.4/day	2.4/day	85.7%
Bill Contacts	14.3/day	87.1/day	85.9%
Individual Gulls Using Pools	5.1/day	15.8/day	75.6%

While there was relatively less use of treated pools, pool use was low all around during the first "week". In the second "week", when there was a freshly treated and a previously treated pool in each pair, mean use of both members of pairs was at levels similar to those reported for the treated pools during the first "week". There were no differences between newly and previously treated pools in terms of bird activity, which increased over time in both sets, roughly correlated with increases in numbers of birds observed at the site.

The table below compares the results obtained during the third "week" (no treated pools) and the fourth "week" (no untreated pools)

MEASUREMENT	TREATED PERIOD Fourth "Week"	UNTREATED PERIOD Third "Week"	TREATED PERIOD ACTIVITY AS % OF UNTREATED PERIOD ACTIVITY
Pool Entries	0.1/day	0.7/day	14.3%
Bill Contacts	27.1/day	60.1/day	45.1%
Individual Gulls Using Pools	7.0/day	12.8/day	54.7%

These results suggest that treatment of all pools suppressed pool activity somewhat, but these results (which are not time-controlled) are not nearly as impressive as those obtained when treated and untreated pools were paired side-by-side.

Because the data reported by Belant, et al (1995) were generated with different products produced by different companies, questions of applicability to the Bird Shield product (66550-R) and data compensation arise. Considering only the former, I note that these data support the notion that MA can be used to keep captive mallards and free-ranging gulls that are not very interested in the items, out of small circular plastic pools. The producer of the Re-JeX-iT products has submitted data regarding use of MA to repel birds from larger, temporary pools of standing water, such as arise on airport grounds following heavy rains. Askham mentions one such study in his letter of 7/10/95, but does not formally cite the item.

The "DIRECTIONS FOR USE" portion of the revised proposed label does not mention the use of the product to treat bodies of water. There are some problems with wording in the "Use Restrictions", "Preparation and Mixing Directions", and "Application Directions" subsections. As these problems call mainly for editorial changes, they are discussed in this review.

This revised proposed label lacks the objectionable claims of safety which were on the labeling discussed in the efficacy review of 5/5/95. However, the following statement does appear:

"This concentrate has been formulated from food grade ingredients that meet or exceed U.S. standards."

Although it is not an efficacy reviewer's "call", if it is true, this statement would appear to be

"A true statement used in such a manner as to give a false or misleading impression to the purchaser." [See 40 CFR, §156.10(a)(5)(vii)]

Specific comments on the label appear under "CONCLUSIONS."

202.0 CONCLUSIONS

1. We concur with your assessments of the efficacy submitted (MRID#437202-01) and the data included in your submission of September 22, 1995. Under the conditions of testing, pools treated with the product were highly aversive to ducks and geese of the types tested if the treatment rate met or exceeded 500 ml of product per 190 gallons of water. At lower treatment rates, birds' use of the various pools apparently was determined largely by factors other than Bird Shield treatments. To us, these results indicate that the

product could be successfully used to keep birds from standing water, but that the product also could fail if its concentration were too low.

Absent additional relevant efficacy data, any future proposed application directions pertaining to the use of Bird Shield in standing water must be written in such a way that the lowest treatment rate found to be effective in these trials is the minimum concentration of product prescribed by the labeling.

2. Delete from the revise proposed label submitted on July 10, 1995, the statement

"This concentrate has been formulated from food grade ingredients that meet or exceed U.S. standards."

Even if it is absolutely true, this statement would appear to be an example of

"A true statement used in such a manner as to give a false or misleading impression to the purchaser."

A products with such a statement in its labeling would be considered to be "misbranded" under FIFRA [See 40 CFR, §156.10(a)(5)(vii)].

3. Make the editorial changes listed below to the "DIRECTIONS FOR USE" section of the proposed revised label submitted July 10, 1995.
 - a. Change the first sentence of the "Use Restrictions" to read

"This product may be used to limit feeding by robins (Turdus migratorius), starlings (Sturnus vulgaris), Cedar waxwings (Bombycilla cedrorum), jays, magpies and crows (Corvidae), ravens (Corvus spp.), finches and sparrows (Fringillidae) and other types of fruit-eating birds on ripening cherries, blueberries, and grapes."
 - b. Delete the third and fourth sentences from the "Preparation and Mixing Directions" subsection of the "DIRECTIONS FOR USE" ("Best if . . . active" and "Do not . . . surfaces"). The information in the sentences to be dropped from this subsection is more appropriate for the "Application Directions".

- c. Change the "**Application Directions**" subsection of the "**DIRECTIONS FOR USE**" to read as indicated below.

"Application Directions"

Blueberries, cherries, and grapes. Mix 1 part Bird Shield Repellent with 99 parts of water. Agitate mixture well before application.

Apply mixture with a commercial or back-pack sprayer, hand-held hose, or pressurized applicators. Begin making applications when fruit begins to ripen or when birds begin feeding on crop. Thoroughly wet all fruit and foliage until solution runs off treated surfaces. Re-apply every 6 to 8 days or when odor cannot be detected. Repeat treatments as necessary to retain repellency. Harvest 6 to 8 days after the last treatment, or after all odor of the product has dissipated (whichever occurs last).

This product works best if applied when birds are most active (early in the morning or late in the afternoon). Do not apply this product to wet surfaces. Repeat treatment is heavy rains occur within 24 hours of application."

William W. Jacobs
Biologist
Insecticide-Rodenticide Branch
September 28, 1995



13544

R140289

Chemical: Benzoic acid, 2-amino-, methyl ester

PC Code:
128725

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