US EPA ARCHIVE DOCUMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 1 1989

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Dietary Exposure and Oncogenic Risk Assessment for Atrazine

FROM: J. Robert Tomerlin, Ph.D. J. Tomerlin 7/31/89
Tolerance Assessment System Staff
HED/SACB (H7509C)

THROUGH: Reto Engler, Ph.D.
Chief, Science Analysis and Coordination Branch
Health Effects Division (H7509C)

TO: Jack Housenger
Section Head, SRRD/SRB (H7508C)

Action Requested

Provide an estimate of dietary exposure and associated oncogenic risk to atrazine resulting from established uses and assuming residues in water at the Office of Drinking Water's (ODW) Health Advisory Level (HAL). A previous analysis used anticipated residues for milk from dairy cattle in a local "milk shed" and meat from animals which consume sugarcane and sorghum, feed items bearing the highest atrazine residues. Per your request (J. Housenger memo, 7/21/89), the current analysis includes anticipated residues for milk from cattle and meat from animals consuming a typical diet.

Discussion

1. Toxicology Endpoint: The routine chronic TAS analysis used a reference dose (ADI) of 0.005 mg/kg body weight/day, based upon a NOEL of 0.48 mg/kg body weight/day and an uncertainty factor of 100 from a 1 year dog feeding study. This value has been approved by HED (6/3/88) and Agency (6/22/88) reference dose committees.

Atrazine has been classified as a Category C (possible human) oncogen for which quantitative risk assessment is appropriate. The upper bound oncogenic potency estimate (Q_1^*) for atrazine is 0.22 $(mg/kg/day)^{-1}$ (R. Engler memo, 5/23/89).

2. Residue Information: Food uses evaluated were published tolerances from 40 CFR 180.220 and ODW's Health Advisory Level for water of 3 ppb. Anticipated residues for some commodities were derived from field trial studies (M. S. Metzger memo, 9/14/88).

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Anticipated residues in meat an milk for this analysis were based upon typical diets (M. S. Metzger memo, 7/14/89). These anticipated residues were further adjusted for per cent crop treated (R. Torla, cited in M. S. Metzger memo, 9/14/88).

The anticipated residues in eggs and in the meat, fat, and meat byproducts of poultry are zero. It should be noted that the anticipated residues for millet grain and sugarcane molasses are higher than the published tolerances.

NOTE: M. S. Metzger's 9/14/88 memorandum did not include sugarcane molasses as a human food item. However, after an examination of Foods and Food Production Encyclopedia (D. M. Considine and G. D. Considine, 1982), Mr. Metzger agreed that sugarcane molasses should be considered a human food item. Therefore, a residue value of 0.65 ppm was used for the TAS food "SUGAR-MOLASSES" in the analysis. A summary of the residue information used in the analysis is attached as Table 1.

3. Exposure Analysis: The TAS chronic exposure analysis uses tolerance level residues and 100 per cent crop treated to estimate the Theoretical Maximum Residue Contribution (TMRC) for the overall U.S. population and 22 population subgroups. The estimated TMRC for the overall U.S. population is 0.001091 mg/kg body weight/day, which represents 22 per cent of the ADI. The two most highly exposed TAS population groups, non-nursing infants and children aged 1 to 6, had estimated TMRCs of 0.002750 mg/kg body weight/day (55% of the ADI) and 0.002639 mg/kg body weight/day (53% of the ADI), respectively.

Using anticipated residues and per cent crop treated data to calculate the Anticipated Residue Contribution (ARC) resulted in exposure estimates lower than those calculated using tolerance level residues. The complete TMRC and ARC summaries are shown in Table 2. The ARC information and associated oncogenic risk for selected population groups is shown below.

Dietary Exposure (ARC) to Atrazine

Commodity	Overall U.S. Population	Oncogenic Risk	Non-Nurs. Infants	Children Aged 1 - 6
Published Food Uses	0.000098[a]	2.2×10^{-5}	0.000188	0.000278
Sugar	0.000050	1.1×10^{-5}	0.000056	0.000112
Grains	0.000038	8.4×10^{-6}	0.000093	0.000095

Footnotes on next page

Dietary Exposure to Atrazine, continued

Commodity	Overall U.S. Population	Oncogenic Risk	Non-Nurs. Infants	Children Aged 1 - 6
Milk	0.000003[a]	7.0×10^{-7}	0.000020	0.000009
Other[b]	0.000003	6.6×10^{-7}	0.000012	0.000017
Meat	0.000002	4.8×10^{-7}	0.000002	0.000004
Total Water	0.000101	2.2×10^{-5}	0.000424	0.000210
Food-Based Water[c]	0.000062	1.4×10^{-5}	0.000340	0.000125
Drinking Water	0.000039	8.6×10^{-6}	0.000084	0.000085
TOTAL	0.000199	4.4×10^{-5}	0.000607	0.000448

[a]ARC for the commodity in mg/kg body weight/day.
[b]Other includes guava, macadamia nuts, and pineapple.
[c]Water used to prepare food as well as the water component of milk, coffee, and tea. Some of the water used to prepare food would also be tap water, but it is not possible to determine how much.

Oncogenic risk is estimated by multiplying the exposure by the Q_1^* as shown below:

$$\text{Risk} = \text{Exposure (ARC)} \times Q_1^*$$

$$= 0.000199 \text{ mg/kg/day} \times 0.22 \text{ (mg/kg/day)}^{-1}$$

$$= 4.4 \times 10^{-5}$$

Since cancer risks are estimated over an entire lifetime, oncogenic risk was estimated only for the overall U.S. population. The exposure estimate for the overall U.S. population is based upon food consumption estimates which include infants, children, and adults, and therefore estimates lifetime exposure.

4. Comments: One of the reasons for conducting this analysis was to estimate exposure to atrazine in drinking water. TAS separates water consumption into two categories, drinking water and food water, and includes tap water in both categories. The current

implementation of TAS only permits these two water categories, with shortcomings as described in the following paragraphs.

Food water includes tap water used to prepare food, as well as the water component of commodities such as milk and carbonated beverages. Exposure estimates from drinking water only would not account for tap water used to prepare food and would therefore be too low. However, exposure estimates from drinking water plus food water overestimates exposure from tap water because it includes water from various food sources, the largest source being the water component of milk. The "Total Water" value on the previous page is thus an overestimate of exposure to atrazine from local water.

Atrazine contamination of water supplies is a localized phenomenon. In areas where atrazine does not contaminate the water supply, the exposure and oncogenic risk would be estimated by the values shown in "Published Food Uses" on the page 2. Exposure to atrazine and the associated oncogenic risk in areas in which the local water supply may be contaminated would then be estimated by adding the exposure from water to the "Published Food Uses".

An additional factor involving localized exposure involves residues in meat and milk. The previous analysis for atrazine (J. R. Tomerlin memo, 6/7/89) used residues in meat and milk from animals assumed to have consumed two feed commodities, sugarcane and sorghum, that have relatively large residues, but comprise a small proportion of the typical livestock diet. Consequently, the present analysis reports exposure based upon anticipated residues in meat and milk derived from feed items more representative of the typical diet of dairy cattle and animals grown for slaughter as described in M. Metzger's memorandum (7/14/89).

The various combinations of potential exposure lead to estimates of oncogenic risk as follows:

Onco. Risk	Exposure Summary
2.2×10^{-5}	Exposure based upon typical animal diet, water supply not contaminated at Health Advisory Level (HAL)
4.4×10^{-5}	Exposure based upon typical animal diet, water supply contaminated at HAL
3.4×10^{-5}	Exposure based upon "milk shed" animal diet, water supply not contaminated at HAL (JRT, 6/7/89)
5.6×10^{-5}	Exposure based upon "milk shed" animal diet, water supply contaminated at HAL (JRT, 6/7/89)

The preceding summary table clearly shows that the data currently available result in oncogenic risk estimates that exceed 10^{-6}. Even the least stringent assumptions (typical animal diet and a water supply free from atrazine contamination) lead to an oncogenic risk estimate of 2.2×10^{-5}. Additional data may provide anticipated residue estimates that would yield lower exposure estimates, with lower estimates of oncogenic risk. However, such data are not currently available. The chemistry review (M. Metzger memo, 7/14/89) suggests two options for providing additional estimates of anticipated residues.

Attachments

cc: TAS (Tomerlin, SACB), DEB, Caswell #063, Quest (SACB), Van Gemert (TOX-HFAB), Kutney (SACB)

Table 1

ANTICIPATED RESIDUE INFORMATION FOR CASWELL NUMBER 063 DATE: 07/27/89 PAGE: 1

CHEMICAL	STUDY TYPE	EFFECTS	REFERENCE DOSES	DATA GAPS/COMMENTS	STATUS
Atrazine	1yr feeding dog	Significant decr P-II	ADI UF =>100	No data gaps.	HED complete 07/09/86.
Caswell #063	NOEL= 0.4800 mg/kg	waves in F at day 175 &	OPP RfD= 0.005000		EPA verified 05/20/87.
CAS No. 1912-24-9	15.00 ppm	cardiac toxicity seen in	EPA RfD= 0.005000	Rat Reproduction study as	HED reassess 06/03/88.
A.I. CODE 080803	LEL= 4.9700 mg/kg	two male dogs.		co-critical; NOEL=0.5 mg/	EPA verified 06/22/88.
CFR No 180.220	150.00 ppm	Evidence of oncogenicity		kg/kg/day.	
	ONCO: Class C (HED VOTE).	in rats (mammary).		Q* calculated.	On IRIS.

FOOD CODE	FOOD	FOOD FORM	PET.#	TOLERANCE (ppm)	ANTICIPATED RESIDUE (ppm)	AR STATISTIC TYPE	% CROP TREATED	RES. VALUE USED IN TAS RUN (ppm)
03007AA	MACADAMIA NUTS	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	50.00	0.050000
06006AA	GUAVA	10 RAW-FRESH OR NFS	0E2393	P 0.050000	0.010000	AVG FLD TRIALS	80.00	0.008000
06006AA	GUAVA	21 COOKED-NFS	0E2393	P 0.050000	0.010000	AVG FLD TRIALS	80.00	0.008000
06006AA	GUAVA	62 COOKED-FRESH OR FROZEN-BAKED	0E2393	P 0.050000	0.010000	AVG FLD TRIALS	80.00	0.008000
06013AA	PINEAPPLE PULP	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013AA	PINEAPPLE-PULP	21 COOKED-NFS	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013AA	PINEAPPLE-PULP	31 COOKED-FRESH OR CANNED	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013DA	PINEAPPLE-DRIED	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013JA	PINEAPPLE-JUICE	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013JA	PINEAPPLE-JUICE	15 RAW-FRESH OR CANNED	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013JA	PINEAPPLE-JUICE	21 COOKED-NFS	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
06013JA	PINEAPPLE-JUICE	31 COOKED-FRESH OR CANNED	7F0620	P 0.250000	0.030000	AVG FLD TRIALS	80.00	0.024000
15004AA	CORN,POP	21 COOKED-NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
15005AA	CORN,SWEET	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	60.00	0.060000
15005AA	CORN,SWEET	21 COOKED-NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	60.00	0.060000
15005AA	CORN,SWEET	31 COOKED-FRESH OR CANNED	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	60.00	0.060000
24002EA	CORN,GRAIN-ENDO	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002EA	CORN,GRAIN-ENDO	21 COOKED-NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002EA	CORN,GRAIN-ENDO	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002EA	CORN,GRAIN-ENDO	23 COOKED-FRESH-BOILED	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002HA	CORN,GRAIN-BRAN	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002SA	CORN SUGAR	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002SA	CORN SUGAR	21 COOKED-NFS	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24002SA	CORN SUGAR	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
24006AA	SORGHUM	00 NOT SPECIFIED (NO CONSUMPTION)	7F0525	P 0.250000	0.130000	AVG FLD TRIALS	70.00	0.091000
24007AA	WHEAT-ROUGH	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007AA	WHEAT-ROUGH	21 COOKED-NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007AA	WHEAT-ROUGH	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007AA	WHEAT-ROUGH	23 COOKED-FRESH-BOILED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007GA	WHEAT-GERM	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007GA	WHEAT-GERM	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007HA	WHEAT-BRAN	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007HA	WHEAT-BRAN	21 COOKED-NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007HA	WHEAT-BRAN	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007WA	WHEAT-FLOUR	10 RAW-FRESH OR NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007WA	WHEAT-FLOUR	21 COOKED-NFS	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007WA	WHEAT-FLOUR	22 COOKED-FRESH-BAKED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24007WA	WHEAT-FLOUR	25 COOKED-FRESH-FRIED	7F0620	P 0.250000	0.020000	AVG FLD TRIALS	1.00	0.000200
24012AA	MILLET	10 RAW-FRESH OR NFS	8E2076	P 0.250000	0.680000	AVG FLD TRIALS	1.00	0.006800
24012AA	MILLET	21 COOKED-NFS	8E2076	P 0.250000	0.680000	AVG FLD TRIALS	1.00	0.006800

Table 1, continued

ANTICIPATED RESIDUE INFORMATION FOR CASWELL NUMBER 063 DATE: 07/27/89 PAGE: 2

CHEMICAL	STUDY TYPE	EFFECTS	REFERENCE DOSES	DATA GAPS/COMMENTS	STATUS
Atrazine	1yr feeding- dog	Significant decr P-II	ADI UF -->100	No data gaps.	HED complete 07/09/86.
Caswell #063	NOEL= 0.4800 mg/kg	waves in F at day 175 &	OPP RfD= 0.005000		EPA verified 05/20/87.
CAS No. 1912-24-9	15.00 ppm	cardiac toxicity seen in	EPA RfD= 0.005000	Rat Reproduction study as	HED reassess 06/03/88.
A.I. CODE: 080803	LEL= 4.9700 mg/kg	two male dogs.		co-critical; NOEL=0.5 mg/	EPA verified 06/22/88.
CFR No: 180.220	150.00 ppm	Evidence of oncogenicity		kg/kg/day.	
	ONCO: Class C (HED NOTE)	in rats (mammary).		Q* calculated.	On IRIS.

FOOD CODE	FOOD	FOOD FORM	PET.#	TOLERANCE (ppm)	ANTICIPATED RESIDUE (ppm)	AR STATISTIC TYPE	% CROP TREATED	RES. VALUE USED IN TAS RUN (ppm)
25003SA	CANE SUGAR	10 RAW-FRESH OR NFS		P 0.250000	0.160000	AVG FLD TRIALS	40.00	0.064000
25003SA	CANE SUGAR	21 COOKED-NFS		P 0.250000	0.160000	AVG FLD TRIALS	40.00	0.064000
25003SA	CANE SUGAR	22 COOKED-FRESH-BAKED		P 0.250000	0.160000	AVG FLD TRIALS	40.00	0.064000
25003SA	CANE SUGAR	31 COOKED-FRESH OR CANNED		P 0.250000	0.160000	AVG FLD TRIALS	40.00	0.064000
25003SB	SUGAR-MOLASSES	10 RAW-FRESH OR NFS		P 0.250000	0.650000	AVG FLD TRIALS	40.00	0.260000
25003SB	SUGAR-MOLASSES	21 COOKED-NFS		P 0.250000	0.650000	AVG FLD TRIALS	40.00	0.260000
25003SB	SUGAR-MOLASSES	22 COOKED-FRESH-BAKED		P 0.250000	0.650000	AVG FLD TRIALS	40.00	0.260000
25003SB	SUGAR-MOLASSES	31 COOKED-FRESH OR CANNED		P 0.250000	0.650000	AVG FLD TRIALS	40.00	0.260000
27002OA	CORN,GRAIN-OIL	18 PROCESSED OIL	7F0620	P 0.250000	0.100000	AVG FLD TRIALS	70.00	0.070000
50000DB	MILK-NON-FAT SOL	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000DB	MILK-NON-FAT SOL	21 COOKED-NFS	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000DB	MILK-NON-FAT SOL	31 COOKED-CANNED	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000FA	MILK-FAT SOLIDS	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000FA	MILK-FAT SOLIDS	21 COOKED-NFS	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000FA	MILK-FAT SOLIDS	31 COOKED-CANNED	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000SA	MILK SUG (LACT)	21 COOKED-NFS	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
50000SA	MILK SUG (LACT)	31 COOKED-CANNED	7F0620	P 0.020000	0.000300	AVG FLD TRIALS	100.00	0.000300
53001BA	BEEF-MEAT BYP	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001BA	BEEF-MEAT BYP	26 COOKED-FRESH-PICKLED,CORNED,OR CURED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001BB	BEEF-OTH ORGAN	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001BB	BEEF-OTH ORGAN	31 COOKED-CANNED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001DA	BEEF DRIED	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	22 COOKED-FRESH-BAKED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	23 COOKED-FRESH-BOILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	24 COOKED-FRESH-BROILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001FA	BEEF-FAT	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001KA	BEEF-KIDNEY	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001LA	BEEF-LIVER	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.002000		100.00	0.002000
53001LA	BEEF-LIVER	31 COOKED-FRESH OR CANNED	7F0620	P 0.020000	0.002000		100.00	0.002000
53001MA	BEEF-LEAN	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001MA	BEEF-LEAN	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001MA	BEEF-LEAN	22 COOKED-FRESH-BAKED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001MA	BEEF-LEAN	23 COOKED-FRESH-BOILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53001MA	BEEF-LEAN	24 COOKED-FRESH-BROILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002BA	GOAT-MEAT BYP	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002BB	GOAT-OTH ORGAN	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002FA	GOAT FAT	23 COOKED-FRESH-BOILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002FA	GOAT FAT	25 COOKED-FRESH-FRIED						

Table 1, continued

ANTICIPATED RESIDUE INFORMATION FOR CASWELL NUMBER 063 DATE: 07/27/89 PAGE: 3

CHEMICAL	STUDY TYPE	EFFECTS	REFERENCE DOSES	DATA GAPS/COMMENTS	STATUS
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A.I. CODE C80301	LEL= 4.9700 mg/kg	two male dogs.		co-critical; NOEL=0.5 mg/	EPA verified 06/22/88.
CFR No. 180.220	150.00 ppm	Evidence of oncogenicity		kg/kg/day.	
	ONCO Class C (HED NOTE).	in rats (mammary).		Q* calculated.	On IRIS.

FOOD CODE	FOOD	FOOD FORM	PET.#	TOLERANCE (ppm)	ANTICIPATED RESIDUE (ppm)	AR STATISTIC TYPE	% CROP TREATED	RES. VALUE USED IN TAS RUN (ppm)
53002KA	GOAT KIDNEY	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002LA	GOAT LIVER	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.002000		100.00	0.002000
53002MA	GOAT LEAN	23 COOKED FRESH BOILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53002MA	GOAT LEAN	25 COOKED FRESH FRIED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53003AA	HORSE	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005BA	SHEEP-MEAT BYP	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005BB	SHEEP-OTH ORGAN	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005FA	SHEEP-FAT	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005KA	SHEEP-KIDNEY	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005LA	SHEEP-LIVER	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.002000		100.00	0.002000
53005MA	SHEEP-LEAN	21 COOKED NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53005MA	SHEEP-LEAN	31 COOKED-FRESH OR CANNED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006BA	PORK MEAT BYP	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006BB	PORK OTH ORGAN	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006BB	PORK OTH ORGAN	26 COOKED-FRESH-PICKLED,CORNED, OR CURED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006FA	PORK-FAT	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006FA	PORK FAT	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006FA	PORK-FAT	23 COOKED FRESH BOILED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006FA	PORK-FAT	25 COOKED-FRESH FRIED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006FA	PORK-FAT	26 COOKED-FRESH PICKLED,CORNED,OR CURED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006KA	PORK-KIDNEY	21 COOKED NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006LA	PORK-LIVER	21 COOKED NFS	7F0620	P 0.020000	0.002000		100.00	0.002000
53006LA	PORK-LIVER	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.002000		100.00	0.002000
53006MA	PORK-LEAN	21 COOKED-NFS	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006MA	PORK-LEAN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
53006MA	PORK-LEAN	26 COOKED-FRESH-PICKLED,CORNED,OR CURED	7F0620	P 0.020000	0.001000	AVG FLD TRIALS	100.00	0.001000
55008BA	TURKEY-BYP	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008BA	TURKEY-BYP	26 COOKED-FRESH-PICKLED,CORNED,OR CURED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008LA	TURKEY ORGAN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008LA	TURKEY ORGAN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MA	TURKEY W/O SKIN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MA	TURKEY W/O SKIN	31 COOKED-FRESH OR CANNED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MA	TURKEY W/O SKIN	62 COOKED-FRESH OR FROZEN-BAKED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MB	TURKEY+SKIN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MB	TURKEY+SKIN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55008MC	TURKEY-UNSPEC	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55013PA	POULTRY,OTH-BYP	00 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55013LA	POULTRY,ORGAN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55013MA	POULTRY,OTHER	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AA	EGGS-WHOLE	10 RAW-FRESH OR NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000

Table 1, continued

ANTICIPATED RESIDUE INFORMATION FOR CASWELL NUMBER 063 DATE: 07/27/89 PAGE: 4

CHEMICAL	STUDY TYPE	EFFECTS	REFERENCE DOSES	DATA GAPS/COMMENTS	STATUS
Atrazine	1yr feeding- dog	Significant decr P-II	ADI UF -->100	No data gaps.	HED complete 07/09/86.
Caswell #063	NOEL= 0.4800 mg/kg	waves in F at day 175 &	OPP RfD= 0.005000		EPA verified 05/20/87.
CAS No 1912-24-9	15.00 ppm	cardiac toxicity seen in	EPA RfD= 0.005000	Rat Reproduction study as	HED reassess 06/03/88.
A.I. CODE: 080803	LEL= 4.9700 mg/kg	two male dogs.		co-critical; NOEL=0.5 mg/	EPA verified 06/22/88.
CFR No. 180.220	150.00 ppm	Evidence of oncogenicity		kg/kg/day.	
	ONCO Class C (HED WOE)	in rats (mammary).		Q* calculated.	On IRIS.

FOOD CODE	FOOD	FOOD FORM	PET #	TOLERANCE (ppm)	ANTICIPATED RESIDUE (ppm)	AR STATISTIC TYPE	% CROP TREATED	RES. VALUE USED IN TAS RUN (ppm)
55014AA	EGGS WHOLE	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AA	EGGS WHOLE	22 COOKED-FRESH-BAKED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AA	EGGS WHOLE	24 COOKED-FRESH-BOILED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AA	EGGS WHOLE	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AB	EGGS-WHITE ONLY	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AB	EGGS-WHITE ONLY	22 COOKED-FRESH-BAKED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AB	EGGS-WHITE ONLY	24 COOKED-FRESH OR FROZEN-BAKED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AB	EGGS-WHITE ONLY	31 COOKED-FROZEN	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AC	EGGS-YOLK ONLY	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AC	EGGS-YOLK ONLY	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AC	EGGS-YOLK ONLY	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55014AC	EGGS YOLK ONLY	31 COOKED-FRESH OR CANNED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015BA	CHICKEN BYP	10 NOT SPECIFIED (NO CONSUMPTION)	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015LA	CHICKEN-ORGAN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015LA	CHICKEN-ORGAN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015LA	CHICKEN-ORGAN	26 COOKED-FRESH-PICKLED,CORNED,OR CURED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MA	CHICKEN-W/O SKIN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MA	CHICKEN-W/O SKIN	22 COOKED-FRESH-BAKED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MA	CHICKEN-W/O SKIN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MA	CHICKEN-W/O SKIN	31 COOKED-FRESH OR CANNED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MA	CHICKEN-W/O SKIN	53 COOKED-CANNED-BOILED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MB	CHICKEN+SKIN	21 COOKED-NFS	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
55015MB	CHICKEN+SKIN	25 COOKED-FRESH-FRIED	7F0620	P 0.020000	0.000000	AVG FLD TRIALS	100.00	0.000000
65015AA	WATER-FOOD BASED	10 RAW-FRESH OR NFS		N 0.003000	0.003000	ODW HAL	100.00	0.003000
65015AA	WATER-FOOD BASED	21 COOKED-NFS		N 0.003000	0.003000	ODW HAL	100.00	0.003000
65015AC	WATER--NON-FOOD	10 RAW-FRESH OR NFS		N 0.003000	0.003000	ODW HAL	100.00	0.003000

Table 2

DATE: 07/27/89 PAGE: 1

CHEMICAL INFORMATION	STUDY TYPE	EFFECTS	REFERENCE DOSES	DATA GAPS/COMMENTS	STATUS
Atrazine	lyr fe-feed dog	Significant decr P-II	ADI UF -->100	No data gaps.	HED complete 07/09/86.
Caswell #063	NOEL= 0.4800 mg/kg	waves in F at day 175 &	OPP RfD= 0.005000		EPA verified 05/20/87.
CAS No.		toxicity seen in	EPA RfD= 0.005000	Rat Reproduction study is	HED reassess 06/03/88.
A.I.				co-critical; NOEL 0.5 mg/	EPA verified 06/22/88.
CFR No.		oncogenicity		kg/kg/day	
		(summary)		Q* calculated.	On IRIS.

POPULATION SUBGROUP	TMRC (MG/KG BODY WEIGHT/DAY) CURRENT TMRC*	NEW TMRC**	NEW TMRC AS PERCENT OF RFD	DIFFERENCE AS PERCENT OF RFD	EFFECT OF ANTICIPATED RESIDUES ARC	%RFD
U.S. POPULATION - 48 STATES	0.000991	0.001091	21.829000	2.011260	0.000199	3.97132
U.S. POPULATION - SPRING SEASON	0.000954	0.001053	21.060580	1.968180	0.000193	3.86120
U.S. POPULATION - SUMMER SEASON	0.000988	0.001094	21.875440	2.105660	0.000205	4.09686
U.S. POPULATION - FALL SEASON	0.001000	0.001100	22.008120	2.004460	0.000195	3.90396
U.S. POPULATION - WINTER SEASON	0.000997	0.001097	21.940340	1.967260	0.000193	3.85098
NORTHEAST		0.001066	21.320	1.789000	0.000176	3.51150
NORTH CENTRAL	0.001015	0.001116	22.320740	2.032740	0.000200	4.00076
SOUTHERN REGION	0.001059	0.001063	21.267720	2.084220	0.000206	4.11176
WESTERN REGION	0.000998	0.001105	22.107880	2.153880	0.000203	4.06566
HISPANICS	0.001100	0.001219	24.378240	2.386180	0.000231	4.62098
NON-HISPANIC WHITES	0.000980	0.001079	21.570340	1.963720	0.000191	3.82724
NON-HISPANIC BLACKS	0.000959	0.001065	21.301200	2.126360	0.000212	4.24144
NON-HISPANIC OTHERS	0.000998	0.001105	22.099960	2.146780	0.000201	4.01892
NURSING INFANTS (< 1 YEAR OLD)	0.000629	0.000767	15.339240	2.760400	0.000193	3.86352
NON-NURSING INFANTS (< 1 YEAR OLD)	0.002326	0.002750	54.991380	8.472320	0.000607	12.13392
FEMALES (13+ YEARS, PREGNANT)	0.000710	0.000786	15.725420	1.532440	0.000144	2.88574
FEMALES 13+ YEARS, NURSING	0.000827	0.000914	18.280000	1.747420	0.000160	3.20450
CHILDREN (1-6 YEARS OLD)	0.002429	0.002639	52.785160	4.206500	0.000448	8.96460
CHILDREN (7-12 YEARS OLD)	0.001668	0.001797	35.930700	2.572200	0.000297	5.93842
MALES (13-19 YEARS OLD)	0.001107	0.001197	23.936100	1.789700	0.000198	3.95534
FEMALES (13-19 YEARS OLD, NOT PREG OR NURSING)	0.000835	0.000965	19.290100	1.581260	0.000171	3.41352
MALES (20 YEARS AND OLDER)	0.000690	0.000767	15.335780	1.533680	0.000142	2.83164
FEMALES (20 YEARS AND OLDER, NOT PREG OR NURS)	0.000597	0.000676	13.512180	1.566580	0.000136	2.72512

*Current TMRC does not include new or pending tolerances.
**New TMRC includes new, pending, and published tolerances.