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RE: TSCA Section 8(e) Notification of Furfural

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Gentlemen:

This TSCA Section 8(e) substantial risk notification concerning a definitive developmental toxicity study in rats with furfural is being submitted by []. The CAS Registry for this chemical (2-furaldehyde) is 98-01-1. The study was performed at WIL Research Laboratories, Inc., Ashland, Ohio, under their Study No. []. The information summarized below was received on September 3, 1997 via a final report (copy enclosed).

Both maternal and developmental toxicity of furfural were evaluated. The study was designed to use 25 female rats per group that had been cohabited with male rats of the same strain and source. Day of mating confirmation was designated as day "0" of gestation. Bred females were assigned to groups at random and received single daily oral (gavage) doses of either vehicle control material or the test article in vehicle at dosage levels of 50, 100, and 150 mg/kg/day. Dose volume was maintained at 5 ml/kg. The vehicle control was reverse osmosis treated water, sparged with nitrogen. The control and test material were administered during the period of major organogenesis, gestation days 6 through 15. Individual dosages were based on the most recently recorded body weights. Clinical observations, body weights, and food consumption were recorded. All surviving dams were terminated and a laparohysterectomy performed on gestation day 20. The uteri and ovaries were examined and the numbers of fetuses, early and late resorptions, total implantations, and corpora lutea were recorded. Mean gravid uterine weights and net body weight changes were calculated for each group. The fetuses were weighed, sexed, and examined for external, soft tissue, and skeletal malformations and variations.



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FINAL REPORT

**Volume 1 of 2
(Text and Tables 1-26)**

SANITIZED

STUDY TITLE

A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS

EPA GUIDELINE NUMBER

40 CFR 798.4900

STUDY DIRECTOR

Mark D. Nemec, B.S., D.A.B.T.

STUDY INITIATED ON

December 16, 1996

STUDY COMPLETED ON

August 29, 1997

PERFORMING LABORATORY

WIL Research Laboratories, Inc.
1407 George Road
Ashland, OH 44805-9281

LABORATORY STUDY NUMBER

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A Developmental Toxicity Study of Furfural in Rats

COMPLIANCE STATEMENT

This study, designated [] was conducted in compliance with the United States Environmental Protection Agency (EPA) Good Laboratory Practice Standards (40 CFR Parts 160 and 792), October 16, 1989 and September 18, 1989; the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF) Good Laboratory Practice Standards (59 NohSan No. 3850), August 10, 1984; the Organization for Economic Cooperation and Development (OECD) Principles of Good Laboratory Practice [C(81) 30 (Final) Annex 2], 1981; the Standard Operating Procedures of WIL Research Laboratories, Inc.; and the protocol as approved by the sponsor. The protocol for this study was designed to be in accordance with the United States Environmental Protection Agency (EPA) Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Pesticide Assessment Guidelines (Subdivision F; series 83-3); the EPA Toxic Substances Control Act (TSCA) Health Effects Test Guidelines (40 CFR 798.4900); the OECD Guidelines for Testing of Chemicals, Health Effects Test Guidelines, Section 414, May 12, 1981; and the Japanese MAFF Agricultural Chemical Laws and Regulations Testing Guidelines for Toxicology Studies (59 NohSan No. 4200), January 28, 1985.

Mark D. Nemec

Mark D. Nemec, B.S., D.A.B.T.
Study Director

8/29/97

Date

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A Developmental Toxicity Study of Furfural in Rats

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A Developmental Toxicity Study of Furfural in Rats

I. SUMMARY

The potential maternal toxicity and developmental toxicity of furfural were evaluated. The test article, furfural, in the vehicle, reverse osmosis treated water (deionized and sparged with nitrogen), was administered to three groups of 25 bred Cri:CD[®](SD)BR rats once daily from gestation days 6 through 15. Dosing was terminated on April 15, 1997 (corresponding to gestation days 10 to 14) in the 150 mg/kg/day group due to significant maternal toxicity. The animals, however, remained on study to assess reversibility. Dosage levels were 50, 100 and 150 mg/kg/day administered at a dose volume of 5 ml/kg. A concurrent control group composed of 25 bred females received the vehicle, reverse osmosis treated water (deionized and sparged with nitrogen), on a comparable regimen at 5 ml/kg. The route of administration was oral by gastric intubation. Clinical observations, body weights and food consumption were recorded. On gestation day 20, a laparohysterectomy was performed on all surviving animals. The uteri and ovaries were examined and the numbers of fetuses, early and late resorptions, total implantations and corpora lutea were recorded. Mean gravid uterine weights and net body weight changes were calculated for each group. The fetuses were weighed, sexed and examined for external, soft tissue and skeletal malformations and variations.

In the 100 and 150 mg/kg/day groups, 3 and 16 females, respectively, died between gestation days 6 and 15. All other maternal animals survived to the scheduled necropsy on gestation day 20. At the necropsy of the animals that died, one and two females in the 100 and 150 mg/kg/day groups, respectively, had foamy contents in the trachea and firm lungs, and three females in the 150 mg/kg/day group had mottled or dark red lungs. Treatment-related clinical findings in the 50, 100 and/or 150 mg/kg/day groups included hypoactivity, vocalization, decreased defecation, red material around the eyes and mouth, labored respiration, rales, rapid respiration, gasping, prostration and lethargy. Tremors and head held low were noted sporadically in the 50 mg/kg/day group and more frequently in the 100 and 150 mg/kg/day groups. In addition, exophthalmia was observed in all of the treated groups from gestation days 6-18. In the 150 mg/kg/day group, a mean body weight loss and reductions in food consumption were observed during gestation days 6-9. Body weight gain and food consumption remained inhibited in the surviving females in

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this group during gestation days 9-12. Body weight gain and food consumption in this group were comparable to the control group values following the termination of dosing (gestation days 12-16 and 16-20). Mean body weights, body weight gains, net body weights, net body weight gains, gravid uterine weights and food consumption in the 50 and 100 mg/kg/day groups were unaffected by treatment with the test article.

A slightly reduced mean fetal body weight in the 150 mg/kg/day group was interpreted to be an equivocal indication of developmental toxicity. Intrauterine growth and survival were unaffected by test article administration in the 50 and 100 mg/kg/day groups. The malformations observed in the treated groups were considered to be spontaneous in origin. The fetal developmental variations noted in this study were observed infrequently or at a similar frequency in the control group.

Based on the results of this study, the NOAEL (no observable adverse effect level) for maternal toxicity was considered to be less than 50 mg/kg/day and the NOAEL for developmental toxicity was considered to be 100 mg/kg/day. However, a complete assessment of the potential prenatal toxicity of furfural in the 150 mg/kg/day group was precluded by maternal mortalities, a reduced number of litters available for evaluation and limited duration of administration.

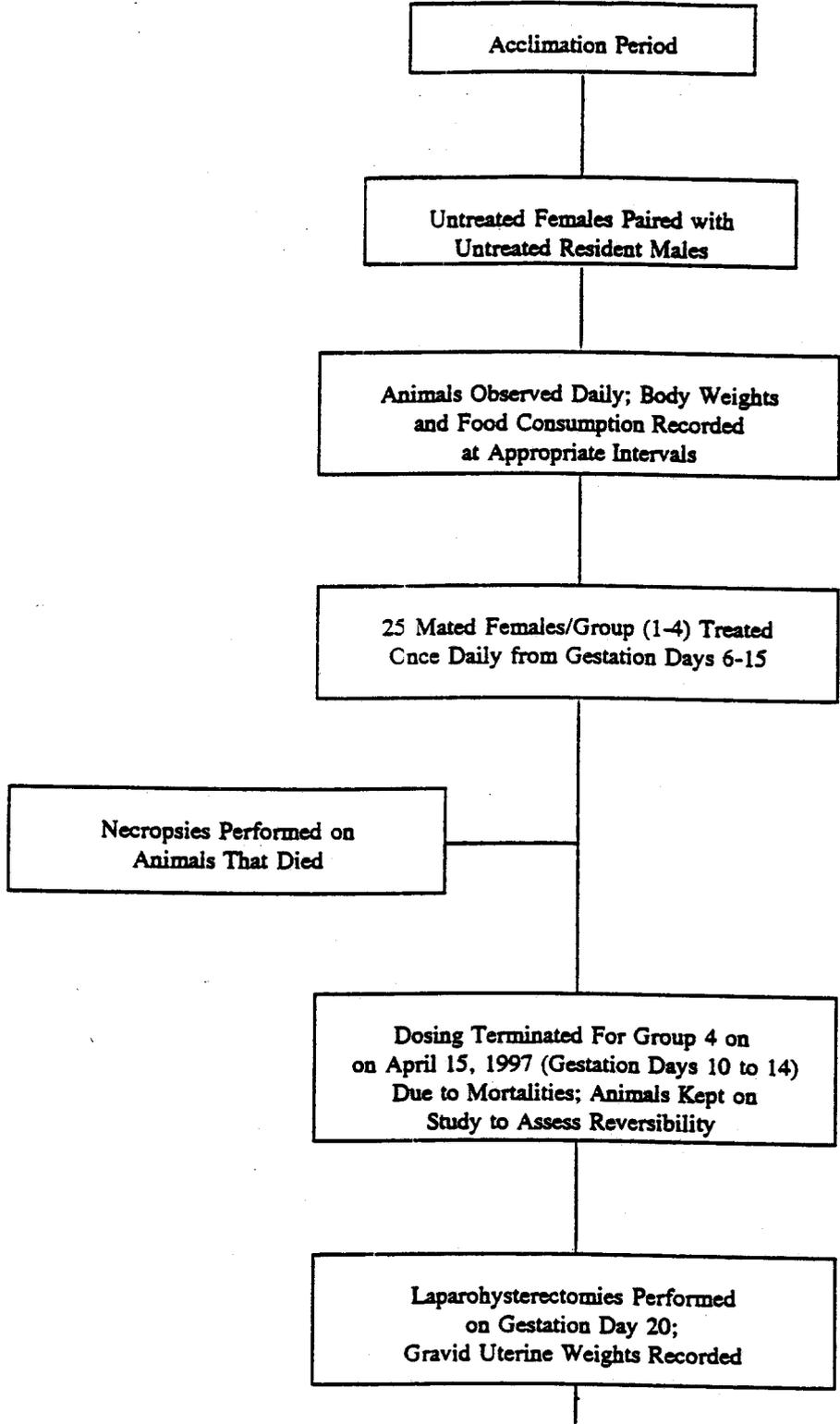
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II. OBJECTIVE

The objective of the study was to determine the potential maternal toxicity and developmental toxicity of furfural in the CrI:CD[®](SD)BR rat. The selected route of administration was oral since this is the intended route of clinical administration for the human. The animal model was selected on the basis of availability of historical control data and susceptibility of the species to known developmental toxicants.

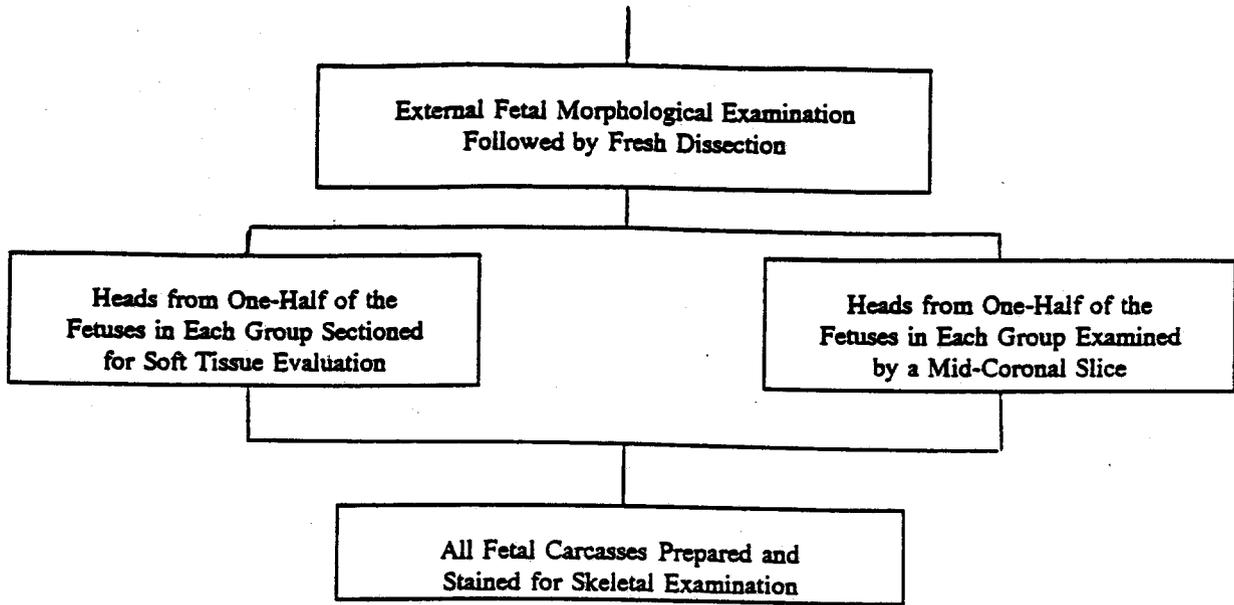
The study was conducted to establish a NOAEL (no observable adverse effect level) as well as a level inducing discernible maternal toxicity and developmental toxicity, but not one that would affect maternal survival.

III. STUDY DESIGN



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III. STUDY DESIGN (continued)



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IV. EXPERIMENTAL PROCEDURES

A. INTRODUCTION

The experimental phase of the study was initiated with the assignment of mated rats to treatment groups on April 1, 1997 and concluded with the last laparohysterectomy on April 25, 1997. The dosing period was from April 7, 1997, to April 20, 1997. Dosing was terminated on April 15, 1997 (corresponding to gestation days 10 to 14) in the 150 mg/kg/day group due to significant maternal toxicity. The animals, however, remained on study to assess reversibility. Dose levels were selected based on the results of a preliminary range-finding study with furfural []

B. TEST AND CONTROL ARTICLES

1. TEST ARTICLE IDENTIFICATION

The test article, furfural, was received from []
[] on December 20, 1996, as follows:

<u>Identification</u>	<u>No. of Containers Received</u>	<u>Description</u>
[Furfural CAS No. 98-01-1]	2 Bottles Gross weight: #1-1712.0 g* #2-1709.9 g	Clear, yellowish to dark amber liquid

* = Bottle used in []

Purity data for the test article provided by the sponsor indicated a purity of 99.4%. Purity analyses conducted at WIL Research Laboratories, Inc., prior to and after completion of dosing indicated that the test article purity was 99.8% and 100%, respectively. For the purposes of dose calculations, the test article was considered to be 100% furfural. The test article was stored in a sealed container at room temperature and protected from light inside a fire cabinet. An approximate one-gram reserve sample of the test article was taken on January 8, 1997, and stored in the Archives at WIL Research Laboratories, Inc.

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2. VEHICLE CONTROL ARTICLE IDENTIFICATION

The vehicle control article utilized in preparation of the test mixtures and for administration to the control group was reverse osmosis treated water, deionized and sparged with nitrogen.

3. PREPARATION

An appropriate amount of the vehicle, reverse osmosis treated water (deionized and sparged with nitrogen), was dispensed into a properly labeled storage container for administration to the control group. A stir bar was added and the vehicle was stirred continuously throughout the sampling and dosing procedures. A sufficient amount of the vehicle was dispensed daily for administration to the control group.

The appropriate amount of the test article, furfural, was weighed for each group into a labeled, precalibrated storage container. A sufficient amount of the vehicle was added to bring the volume of each preparation to the calibration mark. A stir bar was added and the preparations were stirred continuously throughout the sampling, dispensing and dosing procedures. A sufficient volume of each test group formulation was dispensed daily for administration to the treated groups.

Preparations for all dose groups were prepared weekly (April 7 and April 14, 1997). The test article formulations were stored at room temperature protected from light. The dosing preparations were visually inspected for homogeneity by the study director on April 7, 1997, and were found to be acceptable for use.

4. ADMINISTRATION

The test mixtures were administered orally by gavage, via a 16-gauge stainless steel gavage cannula (Popper and Sons, Inc., New Hyde Park, New York), as a single daily dose from gestation days 6 through 15. Dosing was terminated on April 15, 1997 (corresponding to gestation days 10 to 14) in the 150 mg/kg/day group due to significant maternal toxicity. The animals, however, remained on study to assess reversibility. A dosage volume of 5 ml/kg was used for all dosage levels. The control animals received the vehicle, reverse osmosis treated water (deionized and sparged with nitrogen), on a comparable regimen at 5 ml/kg. Individual dosages were based on the most recently recorded body weights to

provide the correct mg/kg/day dose. The following diagram presents the study group assignment:

<u>Group Number</u>	<u>Test Article</u>	<u>Dosage Level (mg/kg/day)</u>	<u>Concentration (mg/ml)</u>	<u>Dosage Volume (ml/kg)</u>	<u>Number of Females</u>
1	Vehicle control	0	0	5	25
2	Furfural	50	10	5	25
3	Furfural	100	20	5	25
4	Furfural	150	30	5	25

5. SAMPLING AND ANALYSES

The test article was analyzed on January 20, 1997, and April 23, 1997 by the Analytical Chemistry Department at WIL Research Laboratories, Inc., to verify identity and purity. On March 31, 1997 (prior to the initiation of dosing), duplicate 10-ml aliquots were collected from the middle stratum of the control group formulation and from the top, middle and bottom strata of each treated group formulation. One set of these samples was analyzed for homogeneity. The second set of samples was combined and stored for 8-day stability verification. For the April 7 and 14, 1997 weekly dosing preparations, a 10-ml aliquot was collected from the middle stratum of each dosing formulation, including the control, and analyzed for concentration. The methodology and results of these analyses are presented in Appendix A. The dosing formulations were homogeneous, stable for 8 days and contained the amounts of the test article specified in the protocol.

C. ANIMAL RECEIPT AND ACCLIMATION

One hundred twenty-five sexually mature, virgin female rats, Cri:CD[®](SD)BR, were received in good health from Charles River Laboratories, Inc., Portage, Michigan, on March 20, 1997. The animals were approximately 70 days old. Upon receipt, each female was observed by a qualified technician. The animals were initially weighed on March 21, 1997. All animals were uniquely identified by a Monel metal eartag displaying the animal number and housed for 12 days for acclimation purposes. During the acclimation period, the animals were observed twice daily for mortality and moribundity.

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D. ANIMAL HOUSING

Upon arrival and until pairing, all animals were individually housed in clean, wire-mesh cages suspended above cage-board. The animals were paired for mating in the home cage of the male. Following positive identification of mating, the females were returned to an individual suspended wire mesh cage; nesting material was not required as the females were euthanized prior to the date of expected parturition. Animals were maintained in accordance with the "Guide for the Care and Use of Laboratory Animals²." The animal facilities at WIL Research Laboratories, Inc., are accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International).

E. DIET, DRINKING WATER AND MAINTENANCE

The basal diet used in this study was PMI Feeds, Inc.[®] Certified Rodent LabDiet[®] 5002. This diet is a certified feed with appropriate analyses performed by the manufacturer and provided to WIL Research Laboratories, Inc. Municipal water supplying the facility is sampled for contaminants according to Standard Operating Procedures. The results of these analyses are maintained at WIL Research Laboratories, Inc. Contaminants were not present in animal feed or water at concentrations expected to interfere with the objectives of this study. Drinking water delivered by an automatic watering system and the basal diet were provided *ad libitum* throughout the acclimation period and during the study.

F. ENVIRONMENTAL CONDITIONS

All animals were housed throughout the acclimation period and during the study in an environmentally-controlled room. Controls were set to maintain a temperature of $72^{\circ} \pm 4^{\circ}\text{F}$ and a relative humidity between 30% and 70%. Room temperature and relative humidity were recorded daily. Temperatures ranged from 71.4°F to 72.7°F and relative humidity ranged from 34.7% to 49.4% during the study period. Light timers were calibrated to provide a 12-hour light/12-hour dark photoperiod. Air handling units were set to provide approximately 10 fresh air changes per hour.

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G. ASSIGNMENT OF ANIMALS TO TREATMENT GROUPS AND BREEDING PROCEDURES

At the conclusion of the acclimation period, all available females were weighed and examined in detail for physical abnormalities. At the discretion of the study director, animals judged to be in good health and meeting acceptable body weight requirements (a minimum of 220 g) were placed in a suspended wire-mesh cage with a resident male from the same strain and source for breeding. Resident males were untreated, sexually mature rats and utilized exclusively for breeding. These rats were maintained under similar laboratory conditions as the females. A breeding record containing the male and female identification numbers and the dates of cohabitation was prepared. The selected females were approximately 12 weeks old when paired for breeding.

Positive evidence of mating was confirmed by the presence of a copulatory plug or the presence of sperm in a vaginal smear. Each mating pair was examined daily. The day on which evidence of mating was identified was termed day 0 of gestation and the animals were then separated.

The experimental design for [] consisted of three furfural treated groups and one control group. The bred females were consecutively assigned in a block design to groups containing 25 rats each by the following randomization procedure. The first mated female and the appropriate gestation day 0 designation were recorded and the female was assigned to group 1, the second mated female was assigned to group 2, and the third to group 3, etc. This process was continued daily until 25 females were placed into each group. Body weight values ranged from 225 g to 290 g on day 0 of gestation.

H. MATERNAL OBSERVATIONS DURING GESTATION

1. CLINICAL OBSERVATIONS AND SURVIVAL

All rats were observed twice daily for moribundity and mortality. Individual detailed clinical observations were recorded prior to test article administration from day 0 through 20 of gestation. Animals were also observed for signs of toxicity approximately one hour following dosing.

Animals not surviving to the scheduled euthanization were necropsied, and the cause of death or moribundity was recorded, if possible. In addition, the number and location of implantation sites and corpora lutea were recorded.

2. BODY WEIGHTS AND GRAVID UTERINE WEIGHTS

Individual maternal body weights were recorded on gestation days 0, 6-16 (daily) and 20. A group mean body weight was calculated for each of these days. Mean body weight changes were calculated for each corresponding interval and also for intervals 6-9, 9-12, 12-16, 6-16 and 0-20.

Gravid uterine weight was collected and net body weight (the day 20 body weight minus the weight of the uterus and contents) and net body weight change (the day 0-20 body weight change minus the weight of the uterus and contents) were calculated and presented for each gravid female at the scheduled laparohysterectomy.

3. FOOD CONSUMPTION

Individual food consumption was recorded on gestation days 0, 6-16 (daily) and 20. Food intake was reported as g/animal/day and g/kg/day for the corresponding body weight change intervals.

I. GESTATION DAY 20 LAPAROHYSTERECTOMY

All surviving maternal animals were euthanized by carbon dioxide inhalation on gestation day 20. The thoracic, abdominal and pelvic cavities were opened by a ventral midline incision and the contents examined. In all instances, the *post mortem* findings were correlated with the *ante mortem* comments and any abnormalities were recorded. The uterus and ovaries were excised. The number of corpora lutea on each ovary was recorded. The trimmed uterus was weighed, opened and the number and location of all fetuses, early and late resorptions and the total number of implantation sites were recorded. The individual uterine distribution of implantation sites was documented using the following procedure. All implantation sites, including resorptions, were numbered in consecutive order beginning with the left distal to the left proximal uterine horn, noting the position of the cervix, and continuing from the right proximal to the right distal uterine horn.

Maternal tissues were preserved in 10% neutral buffered formalin for possible future histopathological examination only as indicated by the gross findings.

Uteri with no macroscopic evidence of nidation were opened and subsequently placed in 10% ammonium sulfide solution for detection of early implantation loss as described by Salewski³.

Intrauterine data were summarized using two methods of calculation. An example of each method of calculation follows:

1. Group Mean Litter Basis:

$$\text{Postimplantation Loss/Litter} = \frac{\text{No. Dead Fetuses, Resorptions (Early/Late)/Group}}{\text{No. Gravid Females/Group}}$$

2. Proportional Litter Basis:

$$\text{Summation per Group (\%)} = \frac{\text{Postimplantation Loss/Litter (\%)}^2}{\text{No. of Litters/Group}}$$

$$a = \frac{\text{No. Dead Fetuses, Resorptions (Early/Late)/Litter}}{\text{No. Implantation Sites/Litter}} \times 100$$

J. FETAL MORPHOLOGICAL EXAMINATION

Each fetus was sexed, weighed and tagged for identification. Fetal tags contained the WIL study number, the female number and the fetus number. A detailed external examination of each fetus was conducted to include, but was not limited to, an examination of the eyes, palate and external orifices, and each finding was recorded. Crown-rump measurements were recorded for late resorptions, if present, and the tissues were discarded. Each fetus was examined visceraally by a modification of the Stuckhardt and Poppe⁴ fresh dissection technique to include the heart and major blood vessels. The sex of each fetus was confirmed by internal examination. Fetal kidneys were examined and graded for renal papillae development by a method described in Woo and Hoar⁵.

Heads from approximately one-half of the fetuses in each litter were placed in Bouin's fixative for subsequent soft-tissue examination by the Wilson⁶ sectioning technique. The heads from the remaining one-half of the fetuses were examined by

a mid-coronal slice. All carcasses were eviscerated and fixed in 100% ethyl alcohol, with the following exception. Fetus no. 65070-11 (Group 2) and fetus no. 65015-11 (Group 4) were inadvertently not placed in alcohol and therefore, no skeletal exam was performed. This deviation from the protocol had no effect on the outcome of the study because only 2 of 980 fetuses in this study were excluded from the skeletal examination. Following fixation in alcohol, each fetus was macerated in potassium hydroxide and stained with Alizarin Red S by a method similar to that described by Dawson⁷. External, visceral and skeletal findings were recorded as developmental variations (alterations in anatomic structure that are considered to have no significant biological effects on animal health or conformity, representing slight deviations from normal) or malformations (those structural anomalies that alter general body conformity, disrupt or interfere with body function, or may be incompatible with life).

The fetal developmental findings were summarized by: 1) presenting the incidence of a given finding both as a percentage of the number of fetuses and the number of litters available for examination in the group; and 2) considering the litter as the basic unit for comparison and calculating the number of affected fetuses in a litter on a proportional basis as follows:

$$\text{Summation per Group (\%)} = \frac{\text{Viable Fetuses Affected/Litter(\%)^a}{\text{No. of Litters/Group}}$$

$$a = \frac{\text{No. Viable Fetuses Affected/Litter}}{\text{No. Viable Fetuses/Litter}} \times 100$$

K. STATISTICAL ANALYSES

All analyses were conducted using two-tailed tests for a minimum significance level of 5%, comparing each treated group to the vehicle control group. Means were presented with the standard deviation (S.D.) and the number of animals (N) used to calculate the mean. The following statistical tests were performed by a Digital® MicroVAX® 3400 computer (with appropriate programming) in this laboratory and are referenced on the report tables:

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STATISTICAL TEST

PARAMETER

- One-way ANOVA with
Dunnett's test^a

Corpora Lutea, Total
Implantations, Fetal Body
Weights, Maternal Body
Weights and Weight
Changes, Maternal Net Body
Weight Changes and Gravid
Uterine Weights, Maternal
Food Consumption

- Kruskal-Wallis test with
Mann-Whitney U test^a

Litter Proportions of
Intrauterine Data (Considering
the Litter, Rather than the
Fetus, as the Experimental
Unit), Litter Proportions of
Malformations and Variations

L. DATA RETENTION

The sponsor will have title to all documentation records, raw data, specimens or other work product generated during the performance of the study. All work product including raw paper data and specimens will be retained in the Archives at WIL Research Laboratories, Inc., as specified in the protocol.

Raw data in magnetic form, a retention sample of the test article and the original final report will be retained in the Archives at WIL Research Laboratories, Inc., in compliance with regulatory requirements.

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V. RESULTS

A. CLINICAL OBSERVATIONS AND SURVIVAL

Summary Data: Tables 1, 2, 3

Individual Data: Tables 15, 16

In the 100 and 150 mg/kg/day groups, 3 and 16 females, respectively, died between gestation days 6 and 15. The remaining 22 and 9 females in these same respective dose groups survived to study termination (gestation day 20). Clinical findings related to treatment with the test article noted exclusively in the 150 mg/kg/day group at the daily examinations and/or one hour following dosing included prostration, lethargy, decreased defecation and/or red material around the eyes and mouth. Treatment-related clinical observations noted one hour following dosing in the 100 and 150 mg/kg/day groups included hypoactivity, labored respiration, rales, rapid respiration and gasping. Labored respiration, vocalization, hypoactivity and rapid respiration were also noted in the 150 mg/kg/day group at the daily examinations. Other findings for animals in these groups were also observed at a dose level of 50 mg/kg/day and are discussed below.

All animals in the control and 50 mg/kg/day groups survived to the scheduled necropsy on gestation day 20. Tremors and head held low were noted sporadically in the 50 mg/kg/day group and more frequently in the 100 and 150 mg/kg/day groups at the daily examinations and/or one hour following dosing. In addition, exophthalmia was noted in all of the treated groups beginning on gestation day 6 and continuing through gestation day 18. Other clinical findings in all of the treated groups, such as hair loss on various body surfaces, occurred similarly in the control group, in single animals or in a manner that was not suggestive of a relationship to treatment with the test article.

B. BODY WEIGHTS AND GRAVID UTERINE WEIGHTS

Summary Data: Tables 4, 5, 6

Individual Data: Tables 17, 18, 19

A statistically significant ($p < 0.01$) mean body weight loss occurred in the 150 mg/kg/day group during gestation days 6-9. During this interval, six of the 12 surviving gravid females in this group lost between 6 and 60 grams of body weight.

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During gestation days 9-12, mean body weight gain in the 150 mg/kg/day group was reduced when compared to the control group value; the difference was not statistically significant. During the remainder of the treatment period (gestation days 12-16), dosing was discontinued for this group and mean body weight gain was comparable to the control group. When the entire treatment period (gestation days 6-16) was evaluated, mean body weight gain in this group was reduced; the difference from the control group was not statistically significant. During gestation days 16-20, mean body weight gain in the 150 mg/kg/day group was comparable to the control group value. Mean body weights throughout the study, net body weight, net body weight gain and gravid uterine weight in this group were comparable to the control values.

Mean body weights, body weight gains, gravid uterine weights, net body weights and net body weight gains in the 50 and 100 mg/kg/day groups were unaffected by test article administration. Values in these groups were similar to the control group values; none of the differences were statistically significant.

C. FOOD CONSUMPTION

Summary Data: Tables 7, 8

Individual Data: Tables 20, 21

Food consumption, evaluated as g/animal/day and g/kg/day, was reduced in the surviving 150 mg/kg/day group females during gestation days 6-9 and 9-12; the differences from the control group were statistically significant ($p < 0.01$). During the remainder of the treatment period (gestation days 12-16), dosing was discontinued for this group and food consumption was comparable to the control group values. When the entire treatment period (gestation days 6-16) was evaluated, food consumption in the 150 mg/kg/day group was slightly reduced; the differences from the control group were not statistically significant. During the post-treatment period (gestation days 16-20), food consumption in this group was comparable to the control group.

Food consumption in the 50 and 100 mg/kg/day groups was unaffected by treatment with the test article. Food consumption values in these groups were similar to the control group values; the differences were not statistically significant.

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D. NECROPSY DATA

Individual Data: Table 22

In the 100 and 150 mg/kg/day groups, 3 and 16 females, respectively, died between gestation days 6 and 15. At necropsy, one and two females in the 100 and 150 mg/kg/day groups, respectively, had foamy contents in the trachea and firm lungs. Three females in the 150 mg/kg/day group had mottled or dark red lungs. Two females (nos. 65046 and 65072) in the 150 mg/kg/day group each had a dilated renal pelvis. One female (no. 65089) in the 150 mg/kg/day group had dark red contents in the jejunum. Female no. 65061 in this same group had an autolyzed intestine (entire length) and an entirely resorbed litter. Uterine findings for the remaining females that died consisted of the following. Two 100 mg/kg/day group females and thirteen females 150 mg/kg/day group had normally developing implantations. One and two females in the 100 and 150 mg/kg/day groups, respectively, were nongravid.

At the scheduled necropsy on gestation day 20, no test article-related internal findings were observed at any dose level. Female no. 65035 in the control group had green purulent material in the vagina and was nongravid. Another female (no. 65082) in this group had fused placentae (site no. 16 to no. 17). In the 100 mg/kg/day group, female no. 65001 had a dilated renal pelvis and female no. 65090 had yellow fluid contents in the uterus. All other females were internally normal.

E. GESTATION DAY 20 LAPAROHYSTERECTOMY DATA

Summary Data: Tables 9, 10

Individual Data: Tables 23, 24, 25

Historical Control Data: Appendices B, C

Mean fetal body weight was slightly reduced in the 150 mg/kg/day group (3.3 g) when compared to the control group value (3.5 g), but was equal to the minimum mean value in the WIL historical control data (3.3 g). However, only seven gravid females in this group survived to the scheduled necropsy on gestation day 20 and one litter (female no. 65080) had a low mean fetal body weight (2.5 g). It should be noted that dose administration was not sustained throughout organogenesis at the 150 mg/kg/day dose level. Therefore, the reduced mean fetal body weight in the high

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dose group was interpreted to be potential evidence of developmental toxicity. Other parameters evaluated in the 150 mg/kg/day group (postimplantation loss, live litter size, fetal sex ratio and the mean numbers of corpora lutea and implantation sites) were comparable to the control group values; no statistically significant differences were noted.

Intrauterine growth and survival were unaffected by test article administration at dose levels of 50 and 100 mg/kg/day. No statistically significant differences from the control were noted. It should be noted that the litter of one female (no. 65102) in the control group had a low mean fetal body weight (2.0 g).

F. FETAL MORPHOLOGICAL DATA

Summary Data: Tables 11, 12, 13, 14

Individual Data: Table 26

Historical Control Data: Appendices B, C

The number of fetuses (litters) available for morphological evaluation were 284(20), 307(21), 280(22) and 109(7) in the control, 50, 100 and 150 mg/kg/day groups, respectively. In these same respective dose groups, 3(3), 0(0), 2(2) and 1(1) fetuses (litters) had malformations.

1. EXTERNAL MALFORMATIONS AND VARIATIONS

External malformations were observed in 2(2), 0(0), 2(2) and 1(1) fetuses (litters) in the control, 50, 100 and 150 mg/kg/day groups, respectively. Fetus no. 65038-03 in the control group had astomia, maxillary micrognathia, mandibular micrognathia, microphthalmia, anophthalmia and absent facial papillae. Control group fetus no. 65066-11 had fetal anasarca. In the 100 mg/kg/day group, fetus no. 65071-14 had vertebral agenesis. Fetus no. 65090-01 had hydrocephaly with a dome-shaped head. The anomaly consisted of increased cavitation of both lateral ventricles and the third ventricle. Fetus no. 65080-08 in the 150 mg/kg/day group had microphthalmia (bilateral). No other external malformations were observed.

No external developmental variations were observed in fetuses at any dose level.

2. VISCERAL MALFORMATIONS AND VARIATIONS

One fetus (no. 65020-16) in the control group had hydrocephaly. The anomaly consisted of increased cavitation of both lateral ventricles and the third ventricle. Fetus no. 65066-11 in this same group had a small right kidney and a heart and great vessel anomaly that consisted of a missing ductus arteriosus and common truncus arteriosus, the pulmonary arteries arising from the ascending aorta, thickened semilunar valves and an opening in the anterior portion of the septum. No other soft tissue malformations were noted.

One fetus (no. 65064-06) in the 100 mg/kg/day group had a major blood vessel variation. The variation consisted of the right subclavian and right carotid arteries arising independently from the aortic arch (no brachiocephalic trunk was present).

Fetus no. 65066-11 in the control group also had reddened and enlarged adrenal glands. This finding was not classified as either a malformation or variation and was not included in any tabulation.

3. SKELETAL MALFORMATIONS AND VARIATIONS

No skeletal malformations were observed in fetuses at any dose level.

Skeletal developmental variations noted similarly in all study groups, including the control, consisted of ossified cervical centrum no. 1, unossified hyoid, 14th rudimentary ribs, bent ribs and sternbrae no. 5 and/or no. 6 unossified. The only statistically significant ($p < 0.05$) difference between the control and treated groups was a decreased incidence of reduced ossification of the 13th ribs in the 50 mg/kg/day group (0% per litter) when compared to the concurrent control group value (2.8% per litter). However, the finding was attributed to biological variation and was not considered to be treatment-related as decreased incidences of this finding were not observed in the 100 and 150 mg/kg/day groups (1.9 and 2.7% per litter, respectively). Other skeletal developmental variations in the treated groups occurred infrequently and were not considered to be related to treatment with the test article.

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4. SUMMARY OF EXTERNAL, VISCERAL AND SKELETAL EXAMINATION

Fetal external, visceral and skeletal malformations were observed in 3(3), 0(0), 2(2) and 1(1) fetuses (litters) in the control, 50, 100 and 150 mg/kg/day groups, respectively, and were considered to be spontaneous in origin. A complete assessment of the potential prenatal toxicity of furfural in the 150 mg/kg/day group was precluded by excessive maternal mortalities and limited duration of administration. No statistically significant differences were noted between the control and treated groups in the incidence of malformations. Fetal developmental variations in the treated groups occurred infrequently, at frequencies similar to those in the control group and/or at incidences that were within the range of the WIL historical control data. No relationship to treatment was apparent.

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VI. DISCUSSION AND CONCLUSIONS

In the 100 and 150 mg/kg/day groups, 3 and 16 females, respectively, died between gestation days 6 and 15. Due to the significant maternal toxicity noted in the 150 mg/kg/day group, dosing was terminated on April 15, 1997 (corresponding to gestation days 10 to 14), and the animals remained on study to assess reversibility. Following termination of dosing in the high dose group, body weight gain and food consumption were comparable to the control group for the remainder of gestation. All other females survived to the scheduled necropsy on gestation day 20. Treatment-related clinical observations in the 100 and/or 150 mg/kg/day groups included hypoactivity, vocalization, decreased defecation, red material around the eyes and mouth, labored respiration, rales, rapid respiration, gasping, prostration and lethargy. Tremors and head held low were noted sporadically in the 50 mg/kg/day group and more frequently in the 100 and 150 mg/kg/day groups. In addition, exophthalmia was observed in all of the treated groups from gestation days 6-18. These findings were noted at the daily examinations and/or one hour following dosing. No other treatment-related clinical findings were observed.

In the 150 mg/kg/day group, a statistically significant mean body weight loss or reduced mean body weight gain and reductions in food consumption were noted during gestation days 6-9 and 9-12. During gestation days 12-16 and 16-20, mean body weight gain and food consumption in the 150 mg/kg/day group were comparable to the control group value. Mean body weights, net body weight, net body weight gain and gravid uterine weight in the 150 mg/kg/day group were similar to the control group values. Body weight data and food consumption in the 50 and 100 mg/kg/day groups were unaffected by treatment with the test article.

At the necropsies of the animals that died, foamy contents in the trachea and firm lungs were noted in one and two females in the 100 and 150 mg/kg/day groups, respectively, and mottled or dark red lungs were noted in three females in the 150 mg/kg/day group. At the scheduled necropsy on gestation day 20, no test article-related internal findings were noted.

A slightly reduced mean fetal body weight in the 150 mg/kg/day group was interpreted to be an equivocal indication of developmental toxicity. Other parameters evaluated in the 150 mg/kg/day group (postimplantation loss, live litter size, fetal sex ratio

and numbers of corpora lutea and implantation sites) were comparable to the control group values. Intrauterine growth and survival were not adversely affected at the 50 and 100 mg/kg/day dose levels.

Fetuses (litters) available for morphological examination numbered 284(20), 307(21), 280(22) and 109(7) in the control, 50, 100 and 150 mg/kg/day, respectively. Malformations were observed in 3(3), 0(0), 2(2) and 1(1) fetuses (litters) in these same respective dose groups and were considered to be spontaneous in origin. The fetal developmental variations noted in this study were observed infrequently or at a similar frequency in the control group.

In conclusion, maternal toxicity was expressed by mortalities at dose levels of 100 and 150 mg/kg/day, inhibition of body weight gain and food consumption at a dose level of 150 mg/kg/day and changes in the clinical condition of the animals at dose levels of 50, 100 and 150 mg/kg/day. Equivocal developmental toxicity (slightly reduced mean fetal body weight) was observed at a dose level of 150 mg/kg/day. No developmental toxicity was observed at dose levels of 50 and 100 mg/kg/day. Based on the results of this study, the NOAEL (no observable adverse effect level) for maternal toxicity was considered to be less than 50 mg/kg/day and the NOAEL for developmental toxicity was considered to be 100 mg/kg/day. However, a complete assessment of the potential prenatal toxicity of furfural in the 150 mg/kg/day group was precluded by maternal mortalities, a reduced number of litters available for evaluation and limited duration of administration.

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Study Director

8/29/97
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VIII. QUALITY ASSURANCE UNIT STATEMENT

<u>Date(s) of Inspection(s)</u>	<u>Phase Inspected</u>	<u>Date(s) Findings Reported to Study Director</u>	<u>Date(s) Findings Reported to Management</u>
3/31, 4/1/97	Cohabitation and Confirmation of Breeding	4/1/97	5/28/97
4/7/97	Test Material Preparation/Analysis	4/7/97	5/28/97
4/10/97	Animal Care and Equipment	4/11/97	5/28/97
4/21/97	Laparohysterectomy/Fetal External Examination	4/21/97	5/28/97
6/6, 10/97	Study Records (A-2)(page 26-33)	6/10/97	7/29/97
6/26, 27, 7/10/97	Study Records (I-1)	7/10/97	8/29/97
6/27, 7/10/97	Study Records (A-1, A-2)	7/10/97	8/29/97
6/30, 7/1-2, 7, 10/97	Study Records (N-1)	7/10/97	8/29/97
7/23-25, 28-30/97	Draft Report (without Analytical)	7/30/97	8/29/97
7/30/97	Draft Report (Analytical)	7/30/97	8/29/97

This study was conducted and inspected in accordance with the current EPA, OECD and MAFF Good Laboratory Practice Regulations, the Standard Operating Procedures of WIL Research Laboratories, Inc., and the sponsor's protocol and protocol amendments. Quality Assurance inspections during the conduct of the study and findings from review of the raw data and draft report are documented and have been reported to the study director. A status report is submitted to management monthly.

Raw data in magnetic form, a retention sample of the test article and the original final report will be retained at WIL Research Laboratories, Inc.

 Deborah L. Little
 Manager of Quality Assurance

 Date

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IX. REFERENCES

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A Developmental Toxicity Study of Furfural in Rats

TABLES 1-26

TABLE 1.

A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
SUMMARY OF MATERNAL SURVIVAL AND PREGNANCY STATUS

DOSE GROUP :	1		2		3		4	
	NO.	%	NO.	%	NO.	%	NO.	%
FEMALES ON STUDY	25		25		25		25	
FEMALES THAT ABORTED OR DELIVERED	0	0.0	0	0.0	0	0.0	0	0.0
FEMALES THAT DIED	0	0.0	0	0.0	3	12.0	16	64.0
FEMALES THAT ABORTED NONGRAVID	0	0.0	0	0.0	0	0.0	0	0.0
GRAVID	0	0.0	0	0.0	1	33.3	2	12.5
FEMALES THAT WERE EUTHANIZED NONGRAVID	0	0.0	0	0.0	2	66.7	14	87.5
GRAVID	0	0.0	0	0.0	0	0.0	0	0.0
FEMALES EXAMINED AT SCHEDULED NECROPSY NONGRAVID	25	100.0	25	100.0	22	88.0	9	36.0
GRAVID	5	20.0	4	16.0	0	0.0	2	22.2
WITH RESORPTIONS ONLY	20	80.0	21	84.0	22	100.0	7	77.8
WITH VIABLE FETUSES	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL FEMALES GRAVID	20	100.0	21	100.0	22	100.0	7	100.0
1- 0 MG/KG/DAY	20	80.0	21	84.0	24	96.0	21	84.0
2- 50 MG/KG/DAY								
3- 100 MG/KG/DAY								
4- 150 MG/KG/DAY								

TABLE 2 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

----- F E M A L E -----

TABLE RANGE: 04-01-97 TO 04-25-97
 GROUP: 1 2 3 4

	1	2	3	4
NORMAL				
-NO SIGNIFICANT CLINICAL OBSERVATIONS	472/25	466/24	456/25	262/25
DISPOSITION				
-FOUND DEAD	0/0	0/0	3/3	16/16
-SENT TO LAB FOR SCHEDULED LAPAROHYSTERECTOMY; GESTATION DAY 20	25/25	25/25	22/22	9/9
BEHAVIOR/CNS				
-HYPOACTIVE	0/0	0/0	0/0	11/3
-PROSTRATE	0/0	0/0	0/0	2/1
-TREMORS	0/0	0/0	0/0	5/3
-HEAD HELD LOW	0/0	0/0	0/0	10/2
BODY/INTEGUMENT				
-HAIR LOSS RIGHT FORELIMB	47/4	57/6	0/0	38/2
-HAIR LOSS LEFT FORELIMB	36/4	53/4	4/1	39/3
-DRIED BROWN MATTING RIGHT FORELIMB	1/1	0/0	0/0	18/3
-DRIED BROWN MATTING LEFT FORELIMB	0/0	0/0	0/0	17/3
-HAIR LOSS RIGHT ABDOMINAL AREA	20/2	0/0	5/1	0/0
-WET CLEAR MATTING RIGHT FORELIMB	0/0	0/0	0/0	2/1
-WET CLEAR MATTING LEFT FORELIMB	0/0	0/0	0/0	2/1

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 2 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

----- F E M A L E -----

TABLE RANGE: 04-01-97 TO 04-25-97
 GROUP: 1 2 3 4

	1	2	3	4
BODY/INTEGUMENT				
-WET CLEAR MATTING VENTRAL THORACIC AREA	0/0	0/0	0/0	1/1
-WET YELLOW MATTING ABDOMINAL AREA	0/0	0/0	0/0	10/3
-HAIR LOSS RIGHT HINDLIMB	6/1	2/1	0/0	0/0
-HAIR LOSS RIGHT INGUINAL AREA	5/1	1/1	0/0	0/0
-HAIR LOSS VENTRAL THORACIC AREA	0/0	0/0	2/1	0/0
-HAIR LOSS LEFT INGUINAL AREA	4/1	1/1	0/0	0/0
-HAIR LOSS LEFT ABDOMINAL AREA	7/1	0/0	2/1	0/0
-DRIED BROWN MATTING VENTRAL THORACIC AREA	0/0	0/0	0/0	2/1
-WET YELLOW MATTING UROGENITAL AREA	0/0	0/0	0/0	4/2
-HAIR LOSS LEFT LATERAL ABDOMINAL AREA	0/0	4/1	0/0	0/0
-HAIR LOSS RIGHT DORSAL POSTERIOR AREA	0/0	10/2	1/1	0/0
-HAIR LOSS LEFT DORSAL POSTERIOR AREA	0/0	5/1	1/1	0/0
-DRIED RED MATERIAL UROGENITAL AREA	0/0	0/0	0/0	4/1
-UNKEMPT IN APPEARANCE	0/0	0/0	0/0	3/1
CARDIO-PULMONARY				
-LABORED RESPIRATION	0/0	0/0	0/0	1/1
-RALES	0/0	0/0	0/0	3/3
-RAPID RESPIRATION	0/0	0/0	0/0	5/3
EYES/EARS/NOSE				
-DRIED RED MATERIAL AROUND NOSE	0/0	1/1	0/0	23/5

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 2 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

----- F E M A L E -----

TABLE RANGE:	04-01-97 TO 04-25-97			
	1	2	3	4
GROUP:				
EYES/EARS/NOSE				
-EXOPHTHALMIA BOTH EYES	0/0	2/1	21/7	4/2
-DRIED RED MATERIAL AROUND LEFT EYE	0/0	0/0	0/0	20/3
-DRIED RED MATERIAL AROUND RIGHT EYE	0/0	0/0	0/0	21/4
-WET CLEAR MATTING AROUND NOSE	0/0	0/0	0/0	1/1
EXCRETA				
-DECREASED DEFECACTION	0/0	0/0	0/0	12/3
ORAL/DENTAL				
-DRIED RED MATERIAL AROUND MOUTH	0/0	0/0	0/0	18/3
-WET CLEAR MATTING AROUND MOUTH	0/0	0/0	0/0	3/1
1- 0 MG/KG/DAY				
2- 50 MG/KG/DAY				
3- 100 MG/KG/DAY				
4- 150 MG/KG/DAY				

TABLE 3 (1-HOUR POST-DOSING)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

----- F E M A L E -----

TABLE RANGE:
 GROUP:

04-07-97 TO 04-20-97

3

2

1

4

	1	2	3	4
BEHAVIOR/CNS				
-HYPOACTIVE	0/0	0/0	5/5	9/7
-PROSTRATE	0/0	0/0	0/0	3/3
-TREMORS	0/0	1/1	9/6	20/14
-HEAD HELD LOW	0/0	1/1	7/5	19/14
-VOCALIZATION	0/0	0/0	1/1	6/6
-LETHARGIC	0/0	0/0	0/0	3/2
BODY/INTEGUMENT				
-LIMITED USE OF HINDLIMBS	0/0	0/0	0/0	1/1
CARDIO-PULMONARY				
-LABORED RESPIRATION	0/0	0/0	3/2	12/11
-RALES	0/0	0/0	2/2	1/1
-RAPID RESPIRATION	0/0	0/0	4/4	4/4
-GASPING	0/0	0/0	3/2	1/1
EYES/EARS/NOSE				
-DRIED RED MATERIAL AROUND NOSE	0/0	0/0	0/0	2/2
-EXOPHTHALMIA BOTH EYES	0/0	29/16	43/17	32/20
-DRIED RED MATERIAL AROUND RIGHT EYE	0/0	0/0	0/0	1/1
-WET CLEAR MATTING AROUND NOSE	0/0	0/0	1/1	0/0

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 3 (1-HOUR POST-DOSE)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

----- F E M A L E -----

TABLE RANGE:		04-07-97 TO 04-20-97			
GROUP:	1	2	3	4	
EXCRETA					
-DIARRHEA	0/0	0/0	1/1	0/0	
ORAL/DENTAL					
-DRIED RED MATERIAL AROUND MOUTH	0/0	0/0	0/0	1/1	
-MET CLEAR MATTING AROUND MOUTH	0/0	0/0	2/1	0/0	
1- 0 MG/KG/DAY	2- 50 MG/KG/DAY	3- 100 MG/KG/DAY	4- 150 MG/KG/DAY		

TABLE 4
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
MEAN BODY WEIGHTS (GRAMS) DURING GESTATION

GROUP :		1	2	3	4
DAY 0	MEAN S.D./N	250. 8.0/20	252. 11.3/21	247. 9.6/24	252. 13.1/21
DAY 6	MEAN S.D./N	282. 13.6/20	288. 14.6/21	278. 12.2/24	285. 19.5/21
DAY 7	MEAN S.D./N	286. 15.0/20	292. 14.6/21	278. 14.0/24	282. 23.8/18
DAY 8	MEAN S.D./N	290. 14.3/20	296. 15.6/21	282. 15.1/23	288. 27.7/14
DAY 9	MEAN S.D./N	294. 16.4/20	299. 15.3/21	284. 14.2/22	277. 35.9/12
DAY 10	MEAN S.D./N	299. 14.9/20	303. 15.3/21	289. 13.9/22	288. 43.3/10
DAY 11	MEAN S.D./N	304. 14.7/20	309. 14.7/21	293. 15.6/22	287. 51.8/ 9
DAY 12	MEAN S.D./N	308. 15.9/20	312. 15.3/21	297. 15.1/22	286. 58.0/ 8
DAY 13	MEAN S.D./N	313. 16.5/20	319. 16.7/21	303. 16.2/22	291. 62.7/ 8
DAY 14	MEAN S.D./N	316. 15.6/20	324. 17.4/21	309. 14.9/22	297. 67.4/ 8

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP USING A TWO-TAILED DUNNETT'S TEST
NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 4

A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN BODY WEIGHTS (GRAMS) DURING GESTATION

GROUP :		1	2	3	4
DAY 15	MEAN	324.	331.	315.	321.
	S.D./N	17.0/20	17.1/21	17.1/22	54.8/ 7
DAY 16	MEAN	334.	342.	324.	331.
	S.D./N	17.0/20	18.2/21	18.7/22	53.2/ 7
DAY 20	MEAN	397.	408.	385.	400.
	S.D./N	22.1/20	24.6/21	30.0/22	54.8/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP USING A TWO-TAILED DUNNETT'S TEST
 NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

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TABLE 5
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
MEAN BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

GROUP :	1	2	3	4
DAY 0- 6 MEAN	33.	36.	31.	33.
S.D./N	8.5/20	10.0/21	8.0/24	8.9/21
DAY 6- 7 MEAN	4.	4.	0.	-4.**
S.D./N	5.1/20	3.9/21	8.7/24	9.8/18
DAY 7- 8 MEAN	4.	4.	4.	-1.
S.D./N	4.9/20	3.6/21	7.6/23	9.0/14
DAY 8- 9 MEAN	4.	3.	2.	-9.**
S.D./N	5.0/20	4.3/21	5.6/22	14.7/12
DAY 9- 10 MEAN	4.	4.	5.	3.
S.D./N	5.0/20	4.6/21	4.3/22	10.1/10
DAY 10- 11 MEAN	5.	6.	4.	1.
S.D./N	3.9/20	4.7/21	5.4/22	8.0/ 9
DAY 11- 12 MEAN	4.	3.	4.	3.
S.D./N	4.2/20	4.6/21	3.6/22	7.0/ 8
DAY 12- 13 MEAN	5.	7.	6.	5.
S.D./N	6.0/20	3.6/21	6.1/22	6.7/ 8
DAY 13- 14 MEAN	3.	6.	6.	6.
S.D./N	4.9/20	5.1/21	4.6/22	6.7/ 8
DAY 14- 15 MEAN	8.	7.	6.	8.
S.D./N	6.3/20	5.1/21	6.5/22	5.1/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
MEAN DIFFERENCES CALCULATED FROM INDIVIDUAL DIFFERENCES
NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 5
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

GROUP :	1	2	3	4
DAY 15- 16 MEAN S.D./N	10. 6.2/20	11. 6.6/21	9. 6.2/22	10. 4.6/ 7
DAY 16- 20 MEAN S.D./N	64. 9.4/20	66. 10.8/21	61. 16.1/22	69. 8.7/ 7
DAY 6- 9 MEAN S.D./N	12. 6.6/20	11. 5.5/21	7. 8.3/22	-13.** 28.8/12
DAY 9- 12 MEAN S.D./N	13. 5.3/20	13. 7.1/21	12. 6.5/22	4. 23.5/ 8
DAY 12- 16 MEAN S.D./N	26. 5.0/20	31. 7.2/21	27. 9.8/22	32. 6.7/ 7
DAY 6- 16 MEAN S.D./N	51. 8.2/20	55. 12.1/21	47. 13.0/22	40. 45.0/ 7
DAY 0- 20 MEAN S.D./N	148. 17.2/20	156. 21.5/21	138. 28.3/22	146. 50.4/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 ** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
 MEAN DIFFERENCES CALCULATED FROM INDIVIDUAL DIFFERENCES
 NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 6
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN GRAVID UTERINE WEIGHTS AND NET BODY WEIGHT CHANGES (GRAMS)

	GROUP:			
	1	2	3	4
INITIAL BODY WT.	250. 8.0 20	252. 11.3 21	247. 9.7 22	254. 11.2 27
TERMINAL BODY WT.	397. 22.1 20	408. 24.6 21	385. 30.0 22	400. 54.8 27
GRAVID UTERINE WT.	78.6 13.84 20	80.0 16.46 21	70.8 23.02 22	81.3 14.25 27
NET BODY WT.	318.9 14.24 20	328.0 17.22 21	314.3 18.23 22	319.1 42.26 27
NET BODY WT. CHANGE	69.3 9.19 20	76.2 12.41 21	67.3 16.01 22	65.0 39.09 27

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP USING A TWO-TAILED DUNNETT'S TEST

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TABLE 7
A DEVELOPMENTAL TOXICITY STUDY OF FUREURAL IN RATS
MEAN FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

GROUP :		1	2	3	4
DAY 0-6	MEAN	22.	23.	22.	23.
	S.D./N	2.4/20	1.8/21	2.2/24	3.1/21
DAY 6-7	MEAN	23.	24.	20.	16.**
	S.D./N	3.5/19	3.0/21	5.2/24	7.7/17
DAY 7-8	MEAN	23.	25.	21.	20.
	S.D./N	2.5/20	2.8/21	4.6/23	8.1/13
DAY 8-9	MEAN	22.	23.	20.	13.**
	S.D./N	2.5/20	2.6/21	4.0/22	10.6/12
DAY 9-10	MEAN	23.	24.	21.	17.**
	S.D./N	2.3/20	2.4/21	3.2/22	9.6/10
DAY 10-11	MEAN	22.	24.	21.	18.
	S.D./N	2.2/20	3.1/21	4.3/22	10.4/9
DAY 11-12	MEAN	24.	25.	22.	19.*
	S.D./N	2.7/20	3.1/21	3.4/22	11.6/8
DAY 12-13	MEAN	24.	25.	23.	20.
	S.D./N	2.6/20	3.1/21	3.2/22	10.8/8
DAY 13-14	MEAN	24.	25.	24.	21.
	S.D./N	2.3/20	2.5/21	2.6/22	9.6/8
DAY 14-15	MEAN	25.	26.	25.	24.
	S.D./N	2.2/20	2.4/21	3.0/22	6.1/7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

* = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.05 LEVEL USING A TWO-TAILED DUNNETT'S TEST
 ** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
 NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 7
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

GROUP :	1	2	3	4
DAY 15- 16 MEAN	25.	26.	25.	26.
S.D./N	2.8/20	3.0/21	2.8/22	4.0/ 7
DAY 16- 20 MEAN	27.	28.	27.	28.
S.D./N	2.3/20	1.9/21	3.4/22	2.4/ 7
DAY 6- 9 MEAN	22.	24.	21.	17.**
S.D./N	2.5/20	2.6/21	3.6/22	8.4/12
DAY 9- 12 MEAN	23.	24.	22.	17.**
S.D./N	2.3/20	2.4/21	2.9/22	10.7/ 8
DAY 12- 16 MEAN	24.	26.	24.	25.
S.D./N	2.1/20	2.1/21	2.1/22	5.0/ 7
DAY 6- 16 MEAN	23.	25.	23.	22.
S.D./N	1.9/20	2.0/21	2.2/22	6.9/ 7
DAY 0- 20 MEAN	24.	25.	23.	24.
S.D./N	2.0/20	1.5/21	2.0/22	4.4/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 ** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
 NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 8
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
MEAN FOOD CONSUMPTION DURING GESTATION (GRAMS/KG/DAY)

GROUP :	1	2	3	4
DAY 0- 6 MEAN S.D./N	81. 6.8/20	86. 5.6/21	84. 6.9/24	84. 8.2/21
DAY 6- 7 MEAN S.D./N	79. 9.7/19	82. 8.5/21	73. 18.2/24	57.** 24.4/17
DAY 7- 8 MEAN S.D./N	79. 7.0/20	83. 7.1/21	74. 14.6/23	68. 25.8/13
DAY 8- 9 MEAN S.D./N	74. 5.9/20	78. 6.3/21	72. 12.6/22	42.** 34.3/12
DAY 9- 10 MEAN S.D./N	76. 5.7/20	79. 6.6/21	74. 9.8/22	56.** 30.9/10
DAY 10- 11 MEAN S.D./N	74. 5.4/20	78. 9.0/21	73. 13.0/22	58.* 32.3/ 9
DAY 11- 12 MEAN S.D./N	77. 5.8/20	80. 8.9/21	76. 10.3/22	60.* 35.7/ 8
DAY 12- 13 MEAN S.D./N	76. 6.8/20	79. 8.1/21	76. 9.3/22	65. 31.8/ 8
DAY 13- 14 MEAN S.D./N	75. 6.9/20	78. 6.4/21	77. 8.2/22	69. 29.2/ 8
DAY 14- 15 MEAN S.D./N	77. 5.0/20	80. 6.6/21	81. 9.0/22	75. 11.0/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
* = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.05 LEVEL USING A TWO-TAILED DUNNETT'S TEST
** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 8

A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
MEAN FOOD CONSUMPTION DURING GESTATION (GRAMS/KG/DAY)

PAGE 2

GROUP :	1	2	3	4
DAY 15- 16 MEAN S.D./N	76. 7.0/20	78. 7.3/21	79. 7.4/22	81. 7.8/ 7
DAY 16- 20 MEAN S.D./N	74. 5.0/20	73. 4.6/21	76. 6.6/22	77. 8.3/ 7
DAY 6- 9 MEAN S.D./N	78. 5.7/20	81. 6.5/21	74. 10.9/22	58.** 26.6/12
DAY 9- 12 MEAN S.D./N	76. 4.5/20	79. 6.1/21	75. 7.9/22	56.** 33.6/ 8
DAY 12- 16 MEAN S.D./N	77. 4.5/20	79. 4.5/21	79. 5.2/22	78. 4.5/ 7
DAY 6- 16 MEAN S.D./N	76. 3.9/20	79. 4.5/21	76. 5.0/22	70. 17.4/ 7
DAY 0- 20 MEAN S.D./N	76. 3.9/20	79. 3.0/21	78. 4.1/22	77. 6.1/ 7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

** = SIGNIFICANTLY DIFFERENT FROM CONTROL GROUP 1 AT 0.01 LEVEL USING A TWO-TAILED DUNNETT'S TEST
NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 9
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF MEAN FETAL DATA AT THE SCHEDULED NECROPSY

GROUP	SEX		VIABLE FETUSES	DEAD FETUSES	RESORPTIONS		IMPLANTATION LOSS		IMPLANTATION SITES	CORPORA LUTEA	PRE IMPLANTATION LOSS	FETAL WEIGHTS IN GRAMS	NO. OF GRAVID FEMALES
	M	F			EARLY	LATE	POST	LOSS					
1	TOTAL 134	150	284	0	14	1	15	299	351	52	NA	20	
	MEAN 6.7	7.5	14.2	0.0	0.7	0.1	0.8	15.0	17.6	2.6	3.5		
	S.D. 1.66	2.01	1.88	0.00	0.80	0.22	0.85	1.96	2.56	2.14	0.45		
2	TOTAL 154	153	307	0	13	0	13	320	362	42	NA	21	
	MEAN 7.3	7.3	14.6	0.0	0.6	0.0	0.6	15.2	17.2	2.0	3.5		
	S.D. 2.61	2.31	3.11	0.00	0.67	0.00	0.67	2.98	2.32	1.95	0.22		
3	TOTAL 141	139	280	0	18	0	18	298	358	60	NA	22	
	MEAN 6.4	6.3	12.7	0.0	0.8	0.0	0.8	13.5	16.3	2.7	3.5		
	S.D. 3.13	2.70	4.17	0.00	0.66	0.00	0.66	4.37	2.53	3.60	0.28		
4	TOTAL 56	53	109	0	7	0	7	116	132	16	NA	7	
	MEAN 8.0	7.6	15.6	0.0	1.0	0.0	1.0	16.6	18.9	2.3	3.3		
	S.D. 2.89	2.64	1.81	0.00	1.41	0.00	1.41	0.98	1.68	1.60	0.43		

NONE SIGNIFICANTLY DIFFERENT FROM CONTROL
 NA = NOT APPLICABLE

MEAN NUMBER OF IMPLANTATION SITES, MEAN NUMBER OF CORPORA LUTEA AND MEAN FETAL BODY WEIGHTS COMPARED USING DUNNETT'S TEST

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 10
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF MEAN FETAL DATA AT SCHEDULED NECROPSY (% PER LITTER)

GROUP NUMBER:	1	2	3	4
CORPORA LUTEA				
MEAN	17.6	17.2	16.3	18.9
S.D.	2.56	2.32	2.53	1.68
N	20	21	22	7
IMPLANTATION SITES				
MEAN	15.0	15.2	13.5	16.6
S.D.	1.96	2.98	4.37	0.98
N	20	21	22	7
VIABLE FETUSES (%)				
MEAN	95.1	95.2	94.3	93.9
S.D.	5.27	6.28	4.79	8.56
N	20	21	22	7
DEAD FETUSES (%)				
MEAN	0.0	0.0	0.0	0.0
S.D.	0.00	0.00	0.00	0.00
N	20	21	22	7
EARLY RESORPTIONS (%)				
MEAN	4.6	4.8	5.8	6.1
S.D.	5.09	6.29	4.80	8.59
N	20	21	22	7
LATE RESORPTIONS (%)				
MEAN	0.3	0.0	0.0	0.0
S.D.	1.25	0.00	0.00	0.00
N	20	21	22	7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

PROPORTIONAL (%) DATA COMPARED USING THE KRUSKAL-WALLIS TEST
 CORPORA LUTEA AND IMPLANTATION SITES COMPARED USING DUNNETT'S TEST
 NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP

TABLE 10
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF MEAN FETAL DATA AT SCHEDULED NECROPSY (% PER LITTER)

GROUP NUMBER:	1	2	3	4
TOTAL RESORPTIONS (%)				
MEAN	4.9	4.8	5.8	6.1
S.D.	5.29	6.29	4.80	8.59
N	20	21	22	7
PRE-IMPLANTATION LOSS (%)				
MEAN	14.0	12.1	17.6	11.7
S.D.	11.20	14.32	24.77	7.31
N	20	21	22	7
POST-IMPLANTATION LOSS (%)				
MEAN	4.9	4.8	5.8	6.1
S.D.	5.29	6.29	4.80	8.59
N	20	21	22	7
MALES (%)				
MEAN	47.5	48.3	51.0	51.0
S.D.	10.91	16.90	19.34	17.96
N	20	21	22	7
FEMALES (%)				
MEAN	52.5	51.7	49.0	49.0
S.D.	10.91	16.90	19.34	17.96
N	20	21	22	7
MALE FETAL WEIGHTS (g)				
MEAN	3.6	3.6	3.6	3.4
S.D.	0.44	0.18	0.32	0.47
N	20	20	21	7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

PROPORTIONAL (%) DATA COMPARED USING THE KRUSKAL-WALLIS TEST
 FETAL WEIGHTS COMPARED USING DUNNETT'S TEST
 NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP

TABLE 10.
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 SUMMARY OF MEAN FETAL DATA AT SCHEDULED NECROPSY (% PER LITTER)

GROUP NUMBER:	1	2	3	4
FEMALE FETAL WEIGHTS (g)				
MEAN	3.4	3.5	3.4	3.2
S.D.	0.45	0.24	0.20	0.45
N	20	21	20	7
COMBINED FETAL WEIGHTS (g)				
MEAN	3.5	3.5	3.5	3.3
S.D.	0.45	0.22	0.28	0.43
N	20	21	21	7

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 FETAL WEIGHTS COMPARED USING DUNNETT'S TEST
 NONE SIGNIFICANTLY DIFFERENT FROM THE CONTROL GROUP

TABLE 11
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 NUMBER OF FETUSES AND LITTERS WITH MALFORMATIONS - SUMMARY

	FETUSES				LITTERS			
	1	2	3	4	1	2	3	4
NUMBER EXAMINED EXTERNALLY	284	307	280	109	20	21	22	7
FETAL ANASARCA	1	0	0	0	1	0	0	0
MICROPTHALMIA AND/OR ANOPHTHALMIA	1	0	0	1	1	0	0	1
ASTOMIA	1	0	0	0	1	0	0	0
MAXILLARY MICROGNATHIA	1	0	0	0	1	0	0	0
FACIAL PAPILLA(E) MISPLACED OR ABSENT	1	0	0	0	1	0	0	0
HYDROCEPHALY WITH OR WITHOUT DOME HEAD	0	0	1	0	0	0	1	0
MANDIBULAR MICROGNATHIA	1	0	0	0	1	0	0	0
VERTEBRAL AGENESIS	0	0	1	0	0	0	1	0
NUMBER EXAMINED VISCERALLY	284	307	280	109	20	21	22	7
KIDNEY(S) - SMALL	1	0	0	0	1	0	0	0
HEART AND/OR GREAT VESSEL ANOMALY	1	0	0	0	1	0	0	0
HYDROCEPHALY	1	0	0	0	1	0	0	0
NUMBER EXAMINED SKELETALLY	284	306	280	108	20	21	22	7
NUMBER WITH FINDINGS	0	0	0	0	0	0	0	0
TOTAL NUMBER WITH MALFORMATIONS								
EXTERNAL :	2	0	2	1	2	0	2	1
SOFT TISSUE :	2	0	0	0	2	0	0	0
SKELETAL :	0	0	0	0	0	0	0	0
COMBINED :	3	0	2	1	3	0	2	1

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

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TABLE 12
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF MALFORMATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:	DOSE GROUP:			
	1	2	3	4
NUMBER OF LITTERS EXAMINED EXTERNALLY	20	21	22	7
FETAL ANASARCA	MEAN 0.4 S.D. 1.60	0.0 0.00	0.0 0.00	0.0 0.00
MICROPHthalmia AND/OR ANOPHTHALMIA	MEAN 0.3 S.D. 1.49	0.0 0.00	0.0 0.00	1.0 2.52
ASTOMIA	MEAN 0.3 S.D. 1.49	0.0 0.00	0.0 0.00	0.0 0.00
MANDIBULAR AGNATHIA	MEAN 0.3 S.D. 1.49	0.0 0.00	0.0 0.00	0.0 0.00
MAXILLARY MICROGNATHIA	MEAN 0.3 S.D. 1.49	0.0 0.00	0.0 0.00	0.0 0.00
FACIAL PAPILLA(E) MISPLACED OR ABSENT	MEAN 0.3 S.D. 1.49	0.0 0.00	0.0 0.00	0.0 0.00
HYDROCEPHALY WITH OR WITHOUT DOME HEAD	MEAN 0.0 S.D. 0.00	0.0 0.00	4.5 21.32	0.0 0.00
FILAMENTOUS TAIL	MEAN 0.0 S.D. 0.00	0.0 0.00	0.3 1.42	0.0 0.00

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST

TABLE 12
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF MALFORMATIONS - SUMMARY
 % PER LITTER

NUMBER OF LITTERS EXAMINED VISCERALLY	DOSE GROUP:			
	1	2	3	4
KIDNEY(S) - SMALL	20	21	22	7
	MEAN 0.4	0.0	0.0	0.0
	S.D. 1.60	0.00	0.00	0.00
HEART AND/OR GREAT VESSEL ANOMALY	0.4	0.0	0.0	0.0
	S.D. 1.60	0.00	0.00	0.00
HYDROCEPHALY	0.3	0.0	0.0	0.0
	S.D. 1.40	0.00	0.00	0.00

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST

TABLE 12
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF MALFORMATIONS - SUMMARY
 % PER LITTER

		DOSE GROUP:			
		1	2	3	4
NUMBER OF LITTERS EXAMINED SKELETALLY		20	21	22	7
NUMBER OF LITTERS WITH FINDINGS		0	0	0	0
1- 0 MG/KG/DAY	2- 50 MG/KG/DAY	3- 100 MG/KG/DAY	4- 150 MG/KG/DAY		

NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST

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TABLE 12
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF MALFORMATIONS - SUMMARY
 % PER LITTER

	DOSE GROUP:			
	1	2	3	4
NUMBER OF LITTERS EXAMINED	20	21	22	7
TOTAL MALFORMATIONS				
PERCENT PER LITTER WITH EXTERNAL MALFORMATIONS	MEAN 0.7	0.0	4.8	1.0
	S.D. 2.13	0.00	21.30	2.52
PERCENT PER LITTER WITH SOFT TISSUE MALFORMATIONS	MEAN 0.7	0.0	0.0	0.0
	S.D. 2.07	0.00	0.00	0.00
PERCENT PER LITTER WITH SKELETAL MALFORMATIONS	MEAN 0.0	0.0	0.0	0.0
	S.D. 0.00	0.00	0.00	0.00
TOTAL PERCENT PER LITTER WITH MALFORMATIONS	MEAN 1.0	0.0	4.8	1.0
	S.D. 2.45	0.00	21.30	2.52

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST

TABLE 13
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 NUMBER OF FETUSES AND LITTERS WITH VARIATIONS - SUMMARY

	DOSE GROUP:				FETUSES				LITTERS			
	1	2	3	4	1	2	3	4	1	2	3	4
NUMBER EXAMINED EXTERNALLY	284	307	280	109					20	21	22	7
NUMBER WITH FINDINGS	0	0	0	0					0	0	0	0
NUMBER EXAMINED VISCERALLY	284	307	280	109					20	21	22	7
MAJOR BLOOD VESSEL VARIATION	0	0	1	0					0	0	1	0
NUMBER EXAMINED SKELETALLY	284	306	280	108					20	21	22	7
STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	13	10	19	7					7	5	7	3
CERVICAL CENTRUM #1 OSSIFIED	57	30	41	10					15	13	14	4
REDUCED OSSIFICATION OF THE 13TH RIB(S)	8	0	3	3					4	0	2	3
14TH RUDIMENTARY RIB(S)	8	6	8	4					5	4	3	2
HYOID UNOSSIFIED	4	3	11	6					3	3	4	3
BENT RIB(S)	6	6	5	2					4	2	3	1
STERNEBRA(E) #1, #2, #3 AND/OR #4 UNOSSIFIED	2	0	2	0					1	0	2	0
ENTIRE STERNUM UNOSSIFIED	0	1	0	2					0	1	0	1
7TH CERVICAL RIB(S)	3	0	2	1					2	0	2	1
REDUCED OSSIFICATION OF THE SKULL	0	1	0	0					0	1	0	0
25 PRESACRAL VERTEBRAE	3	1	0	0					2	1	0	0
PUBIS UNOSSIFIED	3	0	0	1					1	0	0	1
1- 0 MG/KG/DAY	2- 50 MG/KG/DAY	3- 100 MG/KG/DAY	4- 150 MG/KG/DAY									

[]

TABLE 14
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF VARIATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:		1	2	3	4
NUMBER OF LITTERS EXAMINED EXTERNALLY		20	21	22	7
NUMBER OF LITTERS WITH FINDINGS		0	0	0	0
1- 0 MG/KG/DAY	2- 50 MG/KG/DAY	3- 100 MG/KG/DAY	4- 150 MG/KG/DAY	NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST	

TABLE 14
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF VARIATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:		1	2	3	4
NUMBER OF LITTERS EXAMINED VISCERALLY		20	21	22	7
MAJOR BLOOD VESSEL VARIATION					
MEAN		0.0	0.0	0.4	0.0
S.D.		0.00	0.00	1.78	0.00
1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY					
NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST					

TABLE 14
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF VARIATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:	NUMBER OF LITTERS EXAMINED SKELETALLY						
	1	2	3	4	7	20	22
STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	MEAN 4.4	3.0	11.1			6.2	
	S.D. 8.23	7.05	23.39			8.70	
CERVICAL CENTRUM #1 OSSIFIED	MEAN 19.0	10.7	14.3			9.6	
	S.D. 19.03	11.86	16.81			11.47	
REDUCED OSSIFICATION OF THE 13TH RIB(S)	MEAN 2.8	0.0*	1.9			2.7	
	S.D. 6.62	0.00	7.22			3.39	
14TH RUDIMENTARY RIB(S)	MEAN 2.7	1.8	3.2			4.0	
	S.D. 5.66	4.21	8.64			8.07	
HYOID UNOSSIFIED	MEAN 1.4	0.8	3.3			5.7	
	S.D. 3.72	2.07	7.69			7.99	
BENT RIB(S)	MEAN 2.0	1.8	1.6			1.9	
	S.D. 4.92	5.83	4.90			5.04	
STERNEBRA(E) #1, #2, #3 AND/OR #4 UNOSSIFIED	MEAN 0.7	0.0	4.9			0.0	
	S.D. 2.98	0.00	21.30			0.00	
ENTIRE STERNUM UNOSSIFIED	MEAN 0.0	0.3	0.0			1.9	
	S.D. 0.00	1.45	0.00			5.04	
7TH CERVICAL RIB(S)	MEAN 1.0	0.0	0.6			1.0	
	S.D. 3.15	0.00	2.03			2.52	
REDUCED OSSIFICATION OF THE SKULL	MEAN 0.0	0.3	0.0			0.0	
	S.D. 0.00	1.36	0.00			0.00	

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

* = SIGNIFICANTLY DIFFERENT FROM THE CONTROLS AT THE 0.05 LEVEL USING THE MANN-WHITNEY U TEST

TABLE 14
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF VARIATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:

NUMBER OF LITTERS EXAMINED SKELETALLY

25 PRESACRAL VERTEBRAE

PUBIS UNOSSIFIED

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY
 NONE SIGNIFICANTLY DIFFERENT USING THE MANN-WHITNEY U TEST

	1	2	3	4
	20	21	22	7
MEAN	1.0	0.4	0.0	0.0
S.D.	3.20	1.82	0.00	0.00
MEAN	1.7	0.0	0.0	1.0
S.D.	7.45	0.00	0.00	2.52

TABLE 14
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 MEAN LITTER PROPORTIONS OF VARIATIONS - SUMMARY
 % PER LITTER

DOSE GROUP:

	1	2	3	4
NUMBER OF LITTERS EXAMINED	20	21	22	7

TOTAL VARIATIONS

PERCENT PER LITTER WITH EXTERNAL VARIATIONS

	1	2	3	4
MEAN	0.0	0.0	0.0	0.0
S.D.	0.00	0.00	0.00	0.00

PERCENT PER LITTER WITH SOFT TISSUE VARIATIONS

	1	2	3	4
MEAN	0.0	0.0	0.4	0.0
S.D.	0.00	0.00	1.78	0.00

PERCENT PER LITTER WITH SKELETAL VARIATIONS

	1	2	3	4
MEAN	30.8	17.7**	32.1	30.4
S.D.	15.99	11.48	24.69	16.36

TOTAL PERCENT PER LITTER WITH VARIATIONS

	1	2	3	4
MEAN	30.8	17.7**	32.5	30.4
S.D.	15.99	11.48	24.23	16.36

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

** = SIGNIFICANTLY DIFFERENT FROM THE CONTROLS AT THE 0.01 LEVEL USING THE MANN-WHITNEY U TEST

TABLE 15 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY								
65056	1	0	1	1	1	1	1	1	1	P
65062	1	1	1	1	1	1	1	1	1	P
65084	1	2	1	1	1	1	1	1	1	P
65102	1	3	1	1	1	1	1	1	1	P
64988	1	4	1	1	1	1	1	1	1	P
65017	1	5	1	1	1	1	1	1	1	P
65042	1	6	1	1	1	1	1	1	1	P
65048	1	7	1	1	1	1	1	1	1	P
65073	1	8	1	1	1	1	1	1	1	P
65099	1	9	1	1	1	1	1	1	1	P
65067	1	0	1	1	1	1	1	1	1	P
65000	2	1	1	1	1	1	1	1	1	P
65005	2	2	1	1	1	1	1	1	1	P
65024	2	3	1	1	1	1	1	1	1	P
65036	2	4	1	1	1	1	1	1	1	P
65049	2	5	1	1	1	1	1	1	1	P
65060	2	6	1	1	1	1	1	1	1	P
64996	2	7	1	1	1	1	1	1	1	P
65011	2	8	1	1	1	1	1	1	1	P
65023	2	9	1	1	1	1	1	1	1	P
65040	2	0	1	1	1	1	1	1	1	P
65057	2	1	1	1	1	1	1	1	1	P
65075	2	2	1	1	1	1	1	1	1	P
64998	2	3	1	1	1	1	1	1	1	P
65025	2	4	1	1	1	1	1	1	1	P

SENT TO LAB FOR SCHEDULED LAPAROHYSTERECTOMY;
 GESTATION DAY 20

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 15 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY																				
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
TREMORS	65061	4																				1
	65006	4																				1 1
HEAD HELD LOW	65080	4																				P P P P P
	65061	4																				P P P P P
HAIR LOSS RIGHT FORELIMB	65035	1																				1 1 1 1 1 1 1 1 2 1
	65066	1																				1 1 1 1 1 2 1 2 2 2
	65048	1																				1 1 1 1 1 1 2 2 2 2 2
	65099	1																				1 2 2 2 2 2 2 1 2 2 2 2 2
	65049	2																				1
	64998	2																				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	65058	2																				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	65103	2																				2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 2 2 2 2
	65027	2																				1
	65101	2																				1 1 1
	65047	4																				1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 2 2
	65093	4																				1 1
HAIR LOSS LEFT FORELIMB	65035	1																				1 1 1 1 1 2 1
	65066	1																				1 1 1 1 2 2 1 2 2 2
	65048	1																				1 1 1 1 1 1 1 1 1 2 2 2 1
	65099	1																				2 1
	64998	2																				1 1
	65058	2																				1 1
	65103	2																				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 1
	65101	2																				1

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 15 (DAILY EXAMINATIONS)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY																
		0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	2
HAIR LOSS RIGHT HINDLIMB	65099	1											1	2	1	1	1	1
	65103	2													1	1		
HAIR LOSS RIGHT INGUINAL AREA	65099	1											1	1	2	2	3	
	65103	2																1
HAIR LOSS VENTRAL THORACIC AREA	65028	3												1				1
HAIR LOSS LEFT INGUINAL AREA	65099	1											1	1	1	1		
	65103	2																1
HAIR LOSS LEFT ABDOMINAL AREA	65099	1																
	65090	3											1	1	2	2	2	2
DRIED BROWN MATTING VENTRAL THORACIC AREA	65080	4																2
	65061	4																2
HAIR LOSS LEFT LATERAL ABDOMINAL AREA	64998	2																1
	64998	2																1
HAIR LOSS LEFT DORSAL POSTERIOR AREA	64998	2																1
	65028	3																1

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 16 (1-HOUR POST-DOSING)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY																			
		0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	2		
TREMORS	65065	4	1																		
	65080	4	1																		
	65053	4																			
	65061	4																			
	65083	4																			
	65093	4																			
	64987	4																			
	65032	4																			
	65046	4																			
	65072	4																			
	65089	4																			
HEAD HELD LOW	65070	2																			
	65064	3																			
	65090	3																			
	65029	3																			
	65045	3																			
	65085	3																			
	65030	4																			
	65039	4																			
	65007	4																			
	65034	4																			
	65065	4																			
	65080	4																			
	65053	4																			
	65061	4																			
	65083	4																			

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 16 (1-HOUR POST-DOSING)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION ANIMAL GROUP 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
 GESTATIONAL DAY 1 2

LABORED RESPIRATION

65080 4 P
 65093 4 P
 64987 4 P P
 65046 4 P
 65072 4 P

RALES

64999 3 P
 65064 3 P
 65083 4 P

RAPID RESPIRATION

65059 3 P
 65078 3 P
 65045 3 P
 65085 3 P
 65039 4 P
 65080 4 P
 65083 4 P
 65032 4 P

GASPING

65064 3 P P
 65029 3 P
 65061 4 P

DRIED RED MATERIAL AROUND NOSE

65061 4 3
 65032 4 1

EXOPHTHALMIA BOTH EYES

65024 2 P

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 16 (1-HOUR POST-DOSING)
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY
WET CLEAR MATTING AROUND NOSE	65045 3	1 1 1 1 1 1 1 1 1 1 2
DIARRHEA	65085 3	P
DRIED RED MATERIAL AROUND MOUTH	65061 4	3
WET CLEAR MATTING AROUND MOUTH	65045 3	1 2

GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE

1- 0 MG/KG/DAY 2- 50 MG/KG/DAY 3- 100 MG/KG/DAY 4- 150 MG/KG/DAY

TABLE 17
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAY 0	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	DAY 11	DAY 12	DAY 13
64988	NG	255.	293.	302.	304.	302.	294.	292.	299.
64989	G	230.	262.	269.	264.	278.	283.	287.	282.
64995	G	246.	278.	278.	284.	293.	294.	295.	307.
65003	G	238.	265.	270.	275.	282.	291.	292.	294.
65010	G	247.	282.	286.	287.	291.	295.	294.	302.
65016	NG	239.	267.	280.	281.	284.	280.	274.	268.
65017	G	255.	291.	315.	317.	313.	322.	326.	336.
65020	G	251.	293.	297.	313.	313.	314.	328.	329.
65022	G	254.	301.	298.	306.	310.	320.	325.	320.
65035	NG	237.	271.	264.	273.	281.	277.	277.	273.
65038	G	246.	279.	280.	288.	291.	290.	300.	302.
65041	G	262.	300.	309.	317.	327.	331.	335.	333.
65042	G	257.	293.	313.	316.	311.	320.	324.	339.
65048	G	246.	252.	266.	271.	278.	291.	291.	298.
65054	G	261.	297.	296.	305.	309.	315.	319.	328.
65055	G	254.	287.	297.	300.	311.	319.	322.	325.
65056	G	255.	291.	296.	301.	304.	304.	315.	317.
65062	NG	251.	255.	259.	256.	259.	260.	263.	256.
65066	G	248.	276.	289.	283.	291.	294.	292.	305.
65067	G	245.	272.	277.	277.	282.	286.	293.	293.
65073	G	238.	274.	281.	282.	280.	288.	290.	298.
65082	G	256.	300.	304.	311.	318.	318.	317.	330.
65084	NG	245.	242.	252.	255.	248.	251.	254.	251.
65099	G	252.	279.	294.	294.	298.	305.	309.	318.
65102	G	249.	276.	287.	291.	290.	297.	297.	304.
MEAN		250.	282.	290.	294.	299.	304.	308.	313.
S.D.		8.0	13.6	14.3	16.4	14.9	14.7	15.9	16.5
N		20	20	20	20	20	20	20	20

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 17
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	0 MG/KG/DAY			
	DAY 14	DAY 15	DAY 16	DAY 20
DAMS FROM GROUP 1:				
64988 NG	288.	280.	287.	288. SCHEDULED NECROPSY DAY 20
64989 G	293.	297.	312.	376. SCHEDULED NECROPSY DAY 20
64995 G	307.	321.	325.	382. SCHEDULED NECROPSY DAY 20
65003 G	299.	300.	320.	374. SCHEDULED NECROPSY DAY 20
65010 G	310.	318.	323.	391. SCHEDULED NECROPSY DAY 20
65016 NG	264.	265.	262.	272. SCHEDULED NECROPSY DAY 20
65017 G	334.	333.	351.	421. SCHEDULED NECROPSY DAY 20
65020 G	322.	346.	351.	422. SCHEDULED NECROPSY DAY 20
65022 G	333.	339.	350.	413. SCHEDULED NECROPSY DAY 20
65035 NG	279.	273.	284.	299. SCHEDULED NECROPSY DAY 20
65038 G	304.	318.	327.	389. SCHEDULED NECROPSY DAY 20
65041 G	344.	351.	368.	440. SCHEDULED NECROPSY DAY 20
65042 G	339.	340.	352.	430. SCHEDULED NECROPSY DAY 20
65048 G	301.	302.	315.	383. SCHEDULED NECROPSY DAY 20
65054 G	324.	338.	344.	410. SCHEDULED NECROPSY DAY 20
65055 G	330.	332.	351.	395. SCHEDULED NECROPSY DAY 20
65056 G	319.	326.	334.	400. SCHEDULED NECROPSY DAY 20
65062 NG	259.	264.	264.	271. SCHEDULED NECROPSY DAY 20
65066 G	307.	313.	323.	383. SCHEDULED NECROPSY DAY 20
65067 G	296.	303.	317.	364. SCHEDULED NECROPSY DAY 20
65073 G	301.	308.	318.	392. SCHEDULED NECROPSY DAY 20
65082 G	331.	349.	354.	425. SCHEDULED NECROPSY DAY 20
65084 NG	252.	250.	254.	261. SCHEDULED NECROPSY DAY 20
65099 G	323.	328.	324.	395. SCHEDULED NECROPSY DAY 20
65102 G	307.	313.	316.	364. SCHEDULED NECROPSY DAY 20
MEAN	316.	324.	334.	397.
S.D.	15.6	17.0	17.0	22.1
N	20	20	20	20

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 17
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	50 MG/KG/DAY																							
	DAY 0	6	7	8	9	10	11	12	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
DAMS FROM GROUP 2:																								
G	256.	281.	290.	297.	299.	295.	302.	304.	314.	302.	302.	302.	304.	314.	297.	299.	295.	302.	304.	314.	302.	302.	304.	314.
G	267.	307.	314.	315.	324.	332.	335.	331.	342.	335.	335.	331.	331.	342.	315.	324.	332.	335.	331.	342.	335.	335.	331.	331.
NG	254.	298.	302.	310.	312.	320.	313.	312.	309.	313.	313.	312.	312.	309.	310.	312.	320.	313.	312.	309.	313.	312.	312.	309.
G	251.	276.	280.	281.	287.	292.	307.	302.	306.	292.	307.	302.	302.	306.	281.	287.	292.	307.	302.	306.	292.	307.	302.	306.
G	242.	273.	277.	281.	281.	284.	296.	297.	298.	284.	296.	297.	297.	298.	281.	284.	296.	297.	297.	298.	296.	297.	297.	298.
G	244.	278.	278.	287.	292.	297.	302.	302.	312.	292.	302.	302.	308.	312.	287.	292.	297.	302.	308.	312.	302.	302.	308.	312.
G	249.	291.	294.	294.	302.	305.	309.	307.	311.	302.	309.	307.	307.	311.	294.	302.	305.	309.	307.	311.	307.	307.	311.	311.
G	252.	294.	290.	295.	291.	292.	300.	296.	304.	292.	300.	296.	296.	304.	295.	292.	292.	300.	296.	304.	296.	296.	304.	304.
G	258.	309.	309.	319.	322.	325.	327.	334.	341.	322.	327.	327.	334.	341.	319.	322.	325.	327.	334.	341.	327.	327.	334.	341.
G	254.	286.	290.	292.	296.	304.	317.	315.	324.	296.	317.	315.	315.	324.	292.	296.	304.	317.	315.	324.	317.	315.	315.	324.
G	225.	249.	256.	259.	261.	271.	277.	280.	281.	261.	271.	277.	280.	281.	259.	261.	271.	277.	280.	281.	277.	277.	280.	281.
G	254.	283.	279.	281.	287.	292.	285.	290.	294.	287.	292.	285.	290.	294.	281.	287.	292.	285.	290.	294.	285.	285.	290.	294.
G	248.	306.	312.	318.	315.	317.	322.	320.	328.	315.	317.	322.	320.	328.	318.	315.	317.	322.	320.	328.	317.	317.	322.	320.
G	256.	299.	301.	301.	307.	314.	324.	324.	333.	307.	314.	324.	324.	333.	301.	307.	314.	324.	324.	333.	307.	307.	314.	333.
G	241.	277.	280.	282.	289.	297.	301.	302.	309.	289.	301.	302.	302.	309.	282.	289.	297.	301.	302.	309.	301.	302.	309.	309.
G	264.	297.	298.	310.	310.	314.	321.	329.	333.	310.	314.	321.	329.	333.	310.	310.	314.	321.	329.	333.	321.	329.	333.	333.
NG	243.	271.	272.	272.	277.	285.	283.	277.	278.	277.	283.	277.	277.	278.	272.	277.	285.	283.	277.	278.	277.	277.	278.	278.
G	258.	285.	295.	296.	307.	298.	304.	298.	317.	307.	304.	307.	307.	317.	296.	307.	298.	304.	307.	317.	304.	307.	307.	317.
G	267.	309.	315.	320.	316.	328.	332.	338.	347.	316.	332.	332.	338.	347.	320.	316.	328.	332.	338.	347.	332.	332.	338.	347.
G	232.	280.	286.	283.	283.	288.	298.	288.	319.	283.	298.	298.	303.	319.	283.	283.	288.	298.	303.	319.	298.	298.	303.	319.
G	269.	285.	293.	296.	302.	306.	311.	311.	324.	302.	311.	311.	317.	324.	296.	302.	306.	311.	317.	324.	311.	311.	317.	324.
G	259.	299.	305.	309.	311.	312.	316.	316.	330.	311.	316.	316.	327.	330.	309.	311.	312.	316.	327.	330.	316.	316.	327.	330.
NG	236.	244.	241.	251.	255.	254.	255.	251.	256.	255.	255.	255.	251.	256.	251.	255.	254.	255.	251.	256.	255.	255.	251.	256.
G	243.	279.	288.	292.	291.	297.	308.	308.	323.	291.	308.	308.	316.	323.	292.	291.	297.	308.	308.	316.	308.	308.	316.	323.
NG	250.	277.	281.	286.	291.	293.	293.	293.	296.	291.	293.	293.	296.	296.	286.	291.	293.	293.	296.	296.	293.	293.	296.	296.
MEAN	252.	288.	292.	296.	299.	303.	309.	312.	319.	299.	303.	309.	312.	319.	296.	299.	303.	309.	312.	319.	309.	309.	312.	319.
S.D.	11.3	14.6	14.6	15.6	15.3	15.3	14.7	15.3	16.7	15.3	15.3	14.7	15.3	16.7	15.6	15.3	15.3	14.7	15.3	16.7	14.7	14.7	15.3	16.7
N	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 17
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 2: 50 MG/KG/DAY				
	DAY 14	15	16	20	
64992 G	310.	315.	326.	379.	SCHEDULED NECROPSY DAY 20
64996 G	348.	358.	359.	417.	SCHEDULED NECROPSY DAY 20
64998 NG	323.	307.	296.	289.	SCHEDULED NECROPSY DAY 20
65000 G	311.	320.	336.	397.	SCHEDULED NECROPSY DAY 20
65005 G	307.	315.	330.	390.	SCHEDULED NECROPSY DAY 20
65011 G	321.	333.	339.	411.	SCHEDULED NECROPSY DAY 20
65023 G	321.	336.	333.	402.	SCHEDULED NECROPSY DAY 20
65024 G	302.	305.	312.	346.	SCHEDULED NECROPSY DAY 20
65025 G	353.	355.	368.	433.	SCHEDULED NECROPSY DAY 20
65027 G	327.	336.	355.	427.	SCHEDULED NECROPSY DAY 20
65036 G	293.	297.	311.	364.	SCHEDULED NECROPSY DAY 20
65040 G	301.	317.	322.	386.	SCHEDULED NECROPSY DAY 20
65044 G	335.	341.	354.	428.	SCHEDULED NECROPSY DAY 20
65049 G	335.	348.	364.	418.	SCHEDULED NECROPSY DAY 20
65057 G	316.	330.	336.	410.	SCHEDULED NECROPSY DAY 20
65058 G	346.	348.	349.	424.	SCHEDULED NECROPSY DAY 20
65060 NG	283.	282.	272.	281.	SCHEDULED NECROPSY DAY 20
65063 G	327.	330.	345.	421.	SCHEDULED NECROPSY DAY 20
65069 G	353.	358.	383.	452.	SCHEDULED NECROPSY DAY 20
65070 G	317.	314.	329.	405.	SCHEDULED NECROPSY DAY 20
65075 G	329.	338.	350.	415.	SCHEDULED NECROPSY DAY 20
65079 G	339.	340.	352.	430.	SCHEDULED NECROPSY DAY 20
65086 NG	264.	260.	253.	270.	SCHEDULED NECROPSY DAY 20
65101 G	320.	325.	339.	413.	SCHEDULED NECROPSY DAY 20
65103 NG	311.	292.	288.	289.	SCHEDULED NECROPSY DAY 20
MEAN	324.	331.	342.	408.	
S.D.	17.4	17.1	18.2	24.6	
N	21	21	21	21	

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 17
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 3: 100 MG/KG/DAY												
	DAY 0	6	7	8	9	10	11	12	13				
G	236.	260.	263.	262.	272.	275.	276.	280.	289.				
G	254.	293.	300.	303.	302.	307.	312.	313.	331.				
G	246.	291.	288.	NA	NA	NA	NA	NA	NA				
G	233.	269.	272.	265.	270.	279.	286.	290.	290.				
G	236.	272.	266.	281.	278.	289.	282.	293.	294.				
G	233.	262.	266.	262.	266.	274.	283.	285.	290.				
G	244.	276.	277.	284.	287.	298.	297.	304.	304.				
G	245.	270.	272.	281.	281.	289.	291.	288.	294.				
G	260.	286.	282.	267.	NA	NA	NA	NA	NA				
G	233.	274.	276.	281.	289.	298.	300.	298.	307.				
G	259.	295.	297.	306.	302.	307.	318.	319.	324.				
G	245.	286.	287.	291.	301.	310.	316.	320.	325.				
G	256.	285.	298.	298.	285.	286.	275.	277.	299.				
G	253.	270.	272.	280.	277.	283.	289.	292.	295.				
G	252.	276.	282.	279.	286.	292.	300.	299.	300.				
NG	263.	257.	264.	NA	NA	NA	NA	NA	NA				
G	250.	267.	261.	264.	259.	265.	269.	272.	278.				
G	251.	278.	287.	292.	293.	295.	301.	307.	317.				
G	268.	301.	297.	301.	305.	303.	315.	320.	320.				
G	237.	258.	259.	264.	270.	269.	272.	283.	281.				
G	257.	294.	296.	312.	314.	313.	317.	323.	330.				
G	252.	293.	276.	284.	278.	289.	299.	301.	317.				
G	254.	276.	248.	268.	271.	270.	277.	284.	286.				
G	245.	277.	288.	287.	287.	289.	292.	293.	301.				
G	240.	265.	272.	273.	278.	279.	281.	284.	289.				
MEAN	247.	278.	278.	282.	284.	289.	293.	297.	303.				
S.D.	9.6	12.2	14.0	15.1	14.2	13.9	15.6	15.1	16.2				
N	24	24	24	23	22	22	22	22	22				

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
NA = NOT APPLICABLE

TABLE 17
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAY 14					DAY 15					DAY 16					DAY 20				
	DAMS FROM GROUP 3: 100 MG/KG/DAY																			
64986	G	294.	304.	302.	343.	SCHEDULED NECROPSY DAY 20														
64993	G	328.	333.	343.	420.	SCHEDULED NECROPSY DAY 20														
64999	G	NA	NA	NA	NA	GRAVID, DIED DAY 7														
65001	G	293.	298.	311.	345.	SCHEDULED NECROPSY DAY 20														
65004	G	308.	314.	316.	377.	SCHEDULED NECROPSY DAY 20														
65008	G	297.	303.	315.	380.	SCHEDULED NECROPSY DAY 20														
65018	G	313.	334.	339.	415.	SCHEDULED NECROPSY DAY 20														
65028	G	301.	304.	325.	358.	SCHEDULED NECROPSY DAY 20														
65029	G	NA	NA	NA	NA	GRAVID, DIED DAY 8														
65033	G	313.	326.	334.	418.	SCHEDULED NECROPSY DAY 20														
65037	G	331.	338.	352.	414.	SCHEDULED NECROPSY DAY 20														
65043	G	333.	346.	350.	412.	SCHEDULED NECROPSY DAY 20														
65045	G	306.	307.	321.	398.	SCHEDULED NECROPSY DAY 20														
65050	G	311.	324.	329.	411.	SCHEDULED NECROPSY DAY 20														
65051	G	305.	311.	326.	378.	SCHEDULED NECROPSY DAY 20														
65059	NG	NA	NA	NA	NA	NONGRAVID, DIED DAY 7														
65064	G	287.	293.	303.	353.	SCHEDULED NECROPSY DAY 20														
65071	G	316.	314.	328.	398.	SCHEDULED NECROPSY DAY 20														
65074	G	323.	334.	351.	416.	SCHEDULED NECROPSY DAY 20														
65077	G	287.	296.	304.	364.	SCHEDULED NECROPSY DAY 20														
65078	G	338.	337.	341.	390.	SCHEDULED NECROPSY DAY 20														
65085	G	314.	320.	329.	411.	SCHEDULED NECROPSY DAY 20														
65090	G	295.	284.	279.	311.	SCHEDULED NECROPSY DAY 20														
65105	G	305.	308.	320.	389.	SCHEDULED NECROPSY DAY 20														
65109	G	294.	298.	304.	371.	SCHEDULED NECROPSY DAY 20														
MEAN		309.	315.	324.	385.															
S.D.		14.9	17.1	18.7	30.0															
N		22	22	22	22															

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
 NA = NOT APPLICABLE

TABLE 17
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 4: 150 MG/KG/DAY												
	DAY 0	6	7	8	9	10	11	12	13				
G	247.	292.	275.	266.	245.	NA							
G	249.	270.	NA										
G	242.	269.	274.	273.	277.	276.	284.	288.	293.	293.	293.	293.	293.
G	259.	297.	303.	310.	308.	313.	322.	334.	333.	333.	333.	333.	333.
NG	273.	313.	300.	298.	NA								
G	249.	271.	NA										
G	260.	298.	297.	310.	314.	319.	324.	324.	324.	324.	324.	324.	324.
G	266.	308.	308.	310.	288.	300.	309.	321.	329.	329.	329.	329.	329.
G	264.	314.	315.	325.	330.	337.	336.	333.	345.	345.	345.	345.	345.
G	258.	297.	299.	302.	302.	315.	318.	NA	NA	NA	NA	NA	NA
G	239.	264.	262.	NA									
G	259.	287.	260.	NA									
NG	260.	269.	264.	260.	254.	251.	262.	261.	261.	261.	261.	261.	261.
G	239.	272.	267.	269.	234.	NA							
G	237.	277.	281.	283.	288.	296.	293.	299.	307.	307.	307.	307.	307.
G	248.	287.	NA										
G	258.	296.	298.	296.	290.	297.	NA						
G	252.	285.	261.	256.	225.	213.	204.	197.	189.	189.	189.	189.	189.
G	238.	268.	269.	NA									
G	248.	272.	269.	258.	NA								
G	251.	279.	264.	242.	228.	210.	197.	195.	197.	197.	197.	197.	197.
G	290.	333.	333.	330.	NA								
G	230.	247.	240.	NA									
NG	262.	296.	NA										
NG	252.	265.	250.	248.	238.	246.	258.	265.	272.	272.	272.	272.	272.
MEAN	252.	285.	282.	288.	277.	288.	287.	286.	291.	291.	291.	291.	291.
S.D.	13.1	19.5	23.8	27.7	35.9	43.3	51.8	58.0	62.7	62.7	62.7	62.7	62.7
N	21	21	18	14	12	10	9	8	8	8	8	8	8

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
 NA = NOT APPLICABLE

TABLE 17.
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHTS (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 4: 150 MG/KG/DAY			
	DAY 14	DAY 15	DAY 16	DAY 20
64987	NA	NA	NA	NA GRAVID, DIED DAY 10
64990	NA	NA	NA	NA GRAVID, DIED DAY 6
65002	298.	308.	322.	380. SCHEDULED NECROPSY DAY 20
65006	338.	349.	364.	420. SCHEDULED NECROPSY DAY 20
65007	NA	NA	NA	NA NONGRAVID, DIED DAY 8
65012	NA	NA	NA	NA GRAVID, DIED DAY 6
65014	353.	356.	366.	443. SCHEDULED NECROPSY DAY 20
65015	333.	336.	348.	423. SCHEDULED NECROPSY DAY 20
65019	353.	370.	373.	450. SCHEDULED NECROPSY DAY 20
65030	NA	NA	NA	NA GRAVID, DIED DAY 12
65032	NA	NA	NA	NA GRAVID, DIED DAY 7
65034	NA	NA	NA	NA GRAVID, DIED DAY 8
65039	262.	267.	269.	275. SCHEDULED NECROPSY DAY 20
65046	NA	NA	NA	NA GRAVID, DIED DAY 10
65047	316.	323.	328.	398. SCHEDULED NECROPSY DAY 20
65052	NA	NA	NA	NA GRAVID, DIED DAY 7
65053	NA	NA	NA	NA GRAVID, DIED DAY 11
65061	183.	NA	NA	NA GRAVID, DIED DAY 15
65065	NA	NA	NA	NA GRAVID, DIED DAY 7
65072	NA	NA	NA	NA GRAVID, DIED DAY 8
65080	201.	206.	219.	289. SCHEDULED NECROPSY DAY 20
65081	NA	NA	NA	NA GRAVID, DIED DAY 8
65083	NA	NA	NA	NA GRAVID, DIED DAY 7
65089	NA	NA	NA	NA NONGRAVID, DIED DAY 6
65093	277.	278.	277.	289. SCHEDULED NECROPSY DAY 20
MEAN	297.	321.	331.	400.
S.D.	67.4	54.8	53.2	54.8
N	8	7	7	7

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
NA = NOT APPLICABLE

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAYS FROM GROUP 1: 0 MG/KG/DAY												
	0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14				
64988	NG	38.	9.	0.	2.	-2.	-8.	-2.	-8.	-2.	7.	-11.	
64989	G	32.	2.	5.	-5.	14.	5.	4.	5.	4.	-5.	11.	
64995	G	32.	-3.	3.	6.	9.	1.	1.	1.	1.	12.	0.	
65003	G	27.	8.	-3.	5.	7.	9.	1.	2.	2.	2.	5.	
65010	G	35.	8.	-4.	1.	4.	4.	-1.	8.	8.	8.	8.	
65016	NG	28.	4.	9.	1.	3.	-4.	-6.	-4.	-6.	-6.	-4.	
65017	G	36.	15.	9.	2.	-4.	9.	4.	10.	10.	10.	-2.	
65020	G	42.	-2.	6.	16.	0.	1.	14.	1.	1.	1.	-7.	
65022	G	47.	1.	-4.	8.	4.	10.	5.	-5.	-5.	-5.	13.	
65035	NG	34.	5.	-12.	9.	8.	-4.	0.	-4.	-4.	-4.	6.	
65038	G	33.	-5.	6.	8.	3.	-1.	10.	2.	2.	2.	2.	
65041	G	38.	8.	1.	8.	10.	4.	4.	-2.	-2.	-2.	11.	
65042	G	36.	10.	10.	3.	-5.	9.	4.	15.	15.	15.	0.	
65048	G	6.	3.	11.	5.	7.	13.	0.	7.	7.	7.	3.	
65054	G	36.	5.	-6.	9.	4.	6.	4.	9.	9.	9.	-4.	
65055	G	33.	8.	2.	3.	11.	8.	3.	3.	3.	3.	5.	
65056	G	36.	3.	2.	5.	3.	0.	11.	2.	2.	2.	2.	
65062	NG	4.	4.	0.	-3.	3.	1.	3.	-7.	-7.	-7.	3.	
65066	G	28.	8.	5.	-6.	8.	3.	-2.	13.	13.	13.	2.	
65067	G	27.	2.	3.	0.	5.	4.	7.	0.	0.	0.	3.	
65073	G	36.	0.	7.	1.	-2.	8.	2.	8.	8.	8.	3.	
65082	G	44.	-2.	6.	7.	7.	0.	-1.	13.	13.	13.	1.	
65084	NG	-3.	7.	3.	3.	-7.	3.	3.	-3.	-3.	-3.	1.	
65099	G	27.	8.	7.	0.	4.	7.	4.	9.	9.	9.	5.	
65102	G	27.	2.	9.	4.	-1.	7.	0.	7.	7.	7.	3.	
MEAN		33.	4.	4.	4.	4.	5.	4.	5.	4.	5.	3.	
S.D.		8.5	5.1	4.9	5.0	5.0	3.9	4.2	6.0	6.0	6.0	4.9	
N		20	20	20	20	20	20	20	20	20	20	20	

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAYS FROM GROUP 1: 0 MG/KG/DAY							SCHEDULED NECROPSY DAY		
	14-15	15-16	16-20	6-9	9-12	12-16	6-16		0-20	
64988	NG	-8.	7.	1.	11.	-12.	-5.	-6.	33.	SCHEDULED NECROPSY DAY 20
64989	G	4.	15.	64.	2.	23.	25.	50.	146.	SCHEDULED NECROPSY DAY 20
64995	G	14.	4.	57.	6.	11.	30.	47.	136.	SCHEDULED NECROPSY DAY 20
65003	G	1.	20.	54.	10.	17.	28.	55.	136.	SCHEDULED NECROPSY DAY 20
65010	G	8.	5.	68.	5.	7.	29.	41.	144.	SCHEDULED NECROPSY DAY 20
65016	NG	1.	-3.	10.	14.	-7.	-12.	-5.	33.	SCHEDULED NECROPSY DAY 20
65017	G	-1.	18.	70.	26.	9.	25.	60.	166.	SCHEDULED NECROPSY DAY 20
65020	G	24.	5.	71.	20.	15.	23.	58.	171.	SCHEDULED NECROPSY DAY 20
65022	G	6.	11.	63.	5.	19.	25.	49.	159.	SCHEDULED NECROPSY DAY 20
65035	NG	-6.	11.	15.	2.	4.	7.	13.	62.	SCHEDULED NECROPSY DAY 20
65038	G	14.	9.	62.	9.	12.	27.	48.	143.	SCHEDULED NECROPSY DAY 20
65041	G	7.	17.	72.	17.	18.	33.	68.	178.	SCHEDULED NECROPSY DAY 20
65042	G	1.	12.	78.	23.	8.	28.	59.	173.	SCHEDULED NECROPSY DAY 20
65048	G	1.	13.	68.	19.	20.	24.	63.	137.	SCHEDULED NECROPSY DAY 20
65054	G	14.	6.	66.	8.	14.	25.	47.	149.	SCHEDULED NECROPSY DAY 20
65055	G	2.	19.	44.	13.	22.	29.	64.	141.	SCHEDULED NECROPSY DAY 20
65056	G	7.	8.	66.	10.	14.	19.	43.	145.	SCHEDULED NECROPSY DAY 20
65062	NG	5.	0.	7.	1.	7.	1.	9.	20.	SCHEDULED NECROPSY DAY 20
65066	G	6.	10.	60.	7.	9.	31.	47.	135.	SCHEDULED NECROPSY DAY 20
65067	G	7.	14.	47.	5.	16.	24.	45.	119.	SCHEDULED NECROPSY DAY 20
65073	G	7.	10.	74.	8.	8.	28.	44.	154.	SCHEDULED NECROPSY DAY 20
65082	G	18.	5.	71.	11.	6.	37.	54.	169.	SCHEDULED NECROPSY DAY 20
65084	NG	-2.	4.	7.	13.	-1.	0.	12.	16.	SCHEDULED NECROPSY DAY 20
65099	G	5.	-4.	71.	15.	15.	15.	45.	143.	SCHEDULED NECROPSY DAY 20
65102	G	6.	3.	48.	15.	6.	19.	40.	115.	SCHEDULED NECROPSY DAY 20
MEAN		8.	10.	64.	12.	13.	26.	51.	148.	
S.D.		6.3	6.2	9.4	6.6	5.3	5.0	8.2	17.2	
N		20	20	20	20	20	20	20	20	

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAYS												
	0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14				
DAMS FROM GROUP 2: 50 MG/KG/DAY													
64992	G	25.	9.	7.	2.	-4.	7.	7.	2.	10.	-4.		
64996	G	40.	7.	1.	9.	8.	3.	-4.	11.	6.			
64998	NG	44.	4.	8.	2.	8.	-7.	-1.	-3.	14.			
65000	G	25.	4.	1.	6.	5.	15.	-5.	4.	5.			
65005	G	31.	4.	4.	0.	3.	12.	1.	1.	9.			
65011	G	34.	0.	9.	5.	5.	5.	6.	4.	9.			
65023	G	42.	3.	0.	8.	3.	4.	-2.	4.	10.			
65024	G	42.	-4.	5.	-4.	1.	8.	-4.	8.	-2.			
65025	G	51.	0.	10.	3.	3.	2.	7.	7.	12.			
65027	G	32.	4.	2.	4.	8.	13.	-2.	9.	3.			
65036	G	24.	7.	3.	2.	10.	6.	3.	1.	12.			
65040	G	29.	-4.	2.	6.	5.	-7.	5.	4.	7.			
65044	G	58.	6.	6.	-3.	2.	5.	-2.	8.	7.			
65049	G	43.	2.	0.	6.	7.	10.	0.	9.	2.			
65057	G	36.	3.	2.	7.	8.	4.	1.	7.	7.			
65058	G	33.	1.	12.	0.	4.	7.	8.	4.	13.			
65060	NG	28.	1.	0.	5.	8.	-2.	-6.	1.	5.			
65063	G	27.	10.	1.	11.	-9.	6.	3.	10.	10.			
65069	G	42.	6.	5.	-4.	12.	4.	6.	9.	6.			
65070	G	48.	6.	-3.	0.	5.	10.	5.	16.	-2.			
65075	G	16.	8.	3.	6.	4.	5.	6.	7.	5.			
65079	G	40.	6.	4.	2.	1.	4.	11.	3.	9.			
65086	NG	8.	-3.	10.	4.	-1.	1.	-4.	5.	8.			
65101	G	36.	9.	4.	-1.	6.	11.	8.	7.	-3.			
65103	NG	27.	4.	5.	5.	2.	0.	3.	2.	13.			
MEAN		36.	4.	4.	3.	4.	6.	3.	7.	6.			
S.D.		10.0	3.9	3.6	4.3	4.6	4.7	4.6	3.6	5.1			
N		21	21	21	21	21	21	21	21	21			

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 2: 50 MG/KG/DAY							SCHEDULED NECROPSY DAY 20	
	DAY 14-15	15-16	16-20	6-9	9-12	12-16	6-16		0-20
64992	G	5.	11.	53.	18.	5.	22.	45.	123.
64996	G	10.	1.	58.	17.	7.	28.	52.	150.
64998	NG	-16.	-11.	-7.	14.	0.	-16.	-2.	35.
65000	G	9.	16.	61.	11.	15.	34.	60.	146.
65005	G	8.	15.	60.	8.	16.	33.	57.	148.
65011	G	12.	6.	72.	14.	16.	31.	61.	167.
65023	G	15.	-3.	69.	11.	5.	26.	42.	153.
65024	G	3.	7.	34.	-3.	5.	16.	18.	94.
65025	G	2.	13.	65.	13.	12.	34.	59.	175.
65027	G	9.	19.	72.	10.	19.	40.	69.	173.
65036	G	4.	14.	53.	12.	19.	31.	62.	139.
65040	G	16.	5.	64.	4.	3.	32.	39.	132.
65044	G	6.	13.	74.	9.	5.	34.	48.	180.
65049	G	13.	16.	54.	8.	17.	40.	65.	162.
65057	G	14.	6.	74.	12.	13.	34.	59.	169.
65058	G	2.	1.	75.	13.	19.	20.	52.	160.
65060	NG	-1.	-10.	9.	6.	0.	-5.	1.	38.
65063	G	3.	15.	76.	22.	0.	38.	60.	163.
65069	G	5.	25.	69.	7.	22.	45.	74.	185.
65070	G	-3.	15.	76.	3.	20.	26.	49.	173.
65075	G	9.	12.	65.	17.	15.	33.	65.	146.
65079	G	1.	12.	78.	12.	16.	25.	53.	171.
65086	NG	-4.	-7.	17.	11.	-4.	2.	9.	34.
65101	G	5.	14.	74.	12.	25.	23.	60.	170.
65103	NG	-19.	-4.	1.	14.	5.	-8.	11.	39.
MEAN		7.	11.	66.	11.	13.	31.	55.	156.
S.D.		5.1	6.6	10.8	5.5	7.1	7.2	12.1	21.5
N		21	21	21	21	21	21	21	21

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 18
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 3: 100 MG/KG/DAY												
	DAY 0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14				
64986	G	24.	3.	-1.	10.	3.	1.	4.	9.	5.			
64993	G	39.	7.	3.	-1.	5.	5.	1.	18.	-3.			
64999	G	45.	-3.	NA	NA	NA	NA	NA	NA	NA			
65001	G	36.	3.	-7.	5.	9.	7.	4.	0.	3.			
65004	G	36.	-6.	15.	-3.	11.	-7.	11.	1.	14.			
65008	G	29.	4.	-4.	4.	8.	9.	2.	5.	7.			
65018	G	32.	1.	7.	3.	11.	-1.	7.	0.	9.			
65028	G	25.	2.	9.	0.	8.	2.	-3.	6.	7.			
65029	G	26.	-4.	-15.	NA	NA	NA	NA	NA	NA			
65033	G	41.	2.	5.	8.	9.	2.	-2.	9.	6.			
65037	G	36.	2.	9.	-4.	5.	11.	1.	5.	7.			
65043	G	41.	1.	4.	10.	9.	6.	4.	5.	8.			
65045	G	29.	13.	0.	-13.	1.	-11.	2.	22.	7.			
65050	G	17.	2.	8.	-3.	6.	6.	3.	3.	16.			
65051	G	24.	6.	-3.	7.	6.	8.	-1.	1.	5.			
65059	NG	-6.	7.	NA	NA	NA	NA	NA	NA	NA			
65064	G	17.	-6.	3.	-5.	6.	4.	3.	6.	9.			
65071	G	27.	9.	5.	1.	2.	6.	6.	10.	-1.			
65074	G	33.	-4.	4.	4.	-2.	12.	5.	0.	3.			
65077	G	21.	1.	5.	6.	-1.	3.	11.	-2.	6.			
65078	G	37.	2.	16.	2.	-1.	4.	6.	7.	8.			
65085	G	41.	-17.	8.	-6.	11.	10.	2.	16.	-3.			
65090	G	22.	-28.	20.	3.	-1.	7.	7.	2.	9.			
65105	G	32.	11.	-1.	0.	2.	3.	1.	8.	4.			
65109	G	25.	7.	1.	5.	1.	2.	3.	5.	5.			
MEAN		31.	0.	4.	2.	5.	4.	4.	6.	6.			
S.D.		8.0	8.7	7.6	5.6	4.3	5.4	3.6	6.1	4.6			
N		24	24	23	22	22	22	22	22	22			

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
 NA = NOT APPLICABLE

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 3: 100 MG/KG/DAY									
	DAY14-15	15-16	16-20	6-9	9-12	12-16	6-16	0-20		
G	10.	-2.	41.	12.	8.	22.	42.	107.	SCHEDULED NECROPSY	DAY 20
G	5.	10.	77.	9.	11.	30.	50.	166.	SCHEDULED NECROPSY	DAY 20
G	NA	NA	NA	NA	NA	NA	NA	NA	GRAVID, DIED	DAY 7
G	5.	13.	34.	1.	20.	21.	42.	112.	SCHEDULED NECROPSY	DAY 20
G	6.	2.	61.	6.	15.	23.	44.	141.	SCHEDULED NECROPSY	DAY 20
G	6.	12.	65.	4.	19.	30.	53.	147.	SCHEDULED NECROPSY	DAY 20
G	21.	5.	76.	11.	17.	35.	63.	171.	SCHEDULED NECROPSY	DAY 20
G	3.	21.	33.	11.	7.	37.	55.	113.	SCHEDULED NECROPSY	DAY 20
G	NA	NA	NA	NA	NA	NA	NA	NA	GRAVID, DIED	DAY 8
G	13.	8.	84.	15.	9.	36.	60.	185.	SCHEDULED NECROPSY	DAY 20
G	7.	14.	62.	7.	17.	33.	57.	155.	SCHEDULED NECROPSY	DAY 20
G	13.	4.	62.	15.	19.	30.	64.	167.	SCHEDULED NECROPSY	DAY 20
G	1.	14.	77.	0.	-8.	44.	36.	142.	SCHEDULED NECROPSY	DAY 20
G	13.	5.	82.	7.	15.	37.	59.	158.	SCHEDULED NECROPSY	DAY 20
G	6.	15.	52.	10.	13.	27.	50.	126.	SCHEDULED NECROPSY	DAY 20
NG	NA	NA	NA	NA	NA	NA	NA	NA	NONGRAVID, DIED	DAY 7
G	6.	10.	50.	-8.	13.	31.	36.	103.	SCHEDULED NECROPSY	DAY 20
G	-2.	14.	70.	15.	14.	21.	50.	147.	SCHEDULED NECROPSY	DAY 20
G	11.	17.	65.	4.	15.	31.	50.	148.	SCHEDULED NECROPSY	DAY 20
G	9.	8.	60.	12.	13.	21.	46.	127.	SCHEDULED NECROPSY	DAY 20
G	-1.	4.	49.	20.	9.	18.	47.	133.	SCHEDULED NECROPSY	DAY 20
G	6.	9.	82.	-15.	23.	28.	36.	159.	SCHEDULED NECROPSY	DAY 20
G	-11.	-5.	32.	-5.	13.	-5.	3.	57.	SCHEDULED NECROPSY	DAY 20
G	3.	12.	69.	10.	6.	27.	43.	144.	SCHEDULED NECROPSY	DAY 20
G	4.	6.	67.	13.	6.	20.	39.	131.	SCHEDULED NECROPSY	DAY 20
MEAN	6.	9.	61.	7.	12.	27.	47.	138.		
S.D.	6.5	6.2	16.1	8.3	6.5	9.8	13.0	28.3		
N	22	22	22	22	22	22	22	22		

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
NA = NOT APPLICABLE

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAYS												
	0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14				
DAMS FROM GROUP 4: 150 MG/KG/DAY													
64987	G	45.	-17.	-9.	-21.	NA	NA	NA	NA	NA	NA	NA	NA
64990	G	21.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65002	G	27.	5.	-1.	4.	8.	4.	5.	5.	5.	5.	5.	5.
65006	G	38.	6.	7.	-2.	5.	12.	-1.	-1.	-1.	-1.	-1.	-1.
65007	NG	40.	-13.	-2.	NA	NA	NA	NA	NA	NA	NA	NA	NA
65012	G	22.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65014	G	38.	-1.	13.	4.	5.	0.	11.	11.	11.	11.	11.	11.
65015	G	42.	0.	2.	-22.	12.	12.	8.	8.	8.	8.	8.	8.
65019	G	50.	1.	10.	5.	-1.	-3.	12.	12.	12.	12.	12.	12.
65030	G	39.	2.	3.	0.	3.	NA	NA	NA	NA	NA	NA	NA
65032	G	25.	-2.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65034	G	28.	-27.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65039	NG	9.	-5.	-4.	-6.	-3.	-1.	0.	0.	0.	0.	0.	0.
65046	G	33.	-5.	2.	-35.	NA	NA	NA	NA	NA	NA	NA	NA
65047	G	40.	4.	2.	5.	8.	6.	8.	8.	8.	8.	8.	8.
65052	G	39.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65053	G	38.	2.	-2.	-6.	7.	NA	NA	NA	NA	NA	NA	NA
65061	G	33.	-24.	-5.	-31.	-12.	-7.	-8.	-8.	-8.	-8.	-8.	-8.
65065	G	30.	1.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65072	G	24.	-3.	-11.	NA	NA	NA	NA	NA	NA	NA	NA	NA
65080	G	28.	-15.	-22.	-14.	-18.	-2.	2.	2.	2.	2.	2.	2.
65081	G	43.	0.	-3.	NA	NA	NA	NA	NA	NA	NA	NA	NA
65083	G	17.	-7.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65089	NG	34.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
65093	NG	13.	-15.	-2.	-10.	8.	12.	7.	7.	7.	7.	7.	7.
MEAN		33.	-4.	-1.	-9.	3.	1.	3.	3.	3.	3.	3.	3.
S.D.		8.9	9.8	9.0	14.7	10.1	8.0	7.0	6.7	6.7	6.7	6.7	6.7
N		21	18	14	12	10	9	8	8	8	8	8	8

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
NA = NOT APPLICABLE

TABLE 18
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL BODY WEIGHT CHANGES (GRAMS) DURING GESTATION

PREGNANCY STATUS	DAMS FROM GROUP 4: 150 MG/KG/DAY									
	DAY14-15	15-16	16-20	6-9	9-12	12-16	6-16	0-20		
G	NA	NA	NA	-47.	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 10
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 6
G	10.	14.	58.	8.	11.	34.	53.	138.	138.	SCHEDULED NECROPSY DAY 20
G	11.	15.	56.	11.	26.	30.	67.	161.	161.	SCHEDULED NECROPSY DAY 20
NG	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA NONGRAVID, DIED DAY 8
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 6
G	3.	10.	77.	16.	10.	42.	68.	183.	183.	SCHEDULED NECROPSY DAY 20
G	3.	12.	75.	-20.	33.	27.	40.	157.	157.	SCHEDULED NECROPSY DAY 20
G	17.	3.	77.	16.	3.	40.	59.	186.	186.	SCHEDULED NECROPSY DAY 20
G	NA	NA	NA	5.	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 12
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 7
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 8
NG	5.	2.	6.	-15.	7.	8.	0.	15.	15.	SCHEDULED NECROPSY DAY 20
G	NA	NA	NA	-38.	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 10
G	7.	5.	70.	11.	11.	29.	51.	161.	161.	SCHEDULED NECROPSY DAY 20
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 7
G	NA	NA	NA	-6.	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 11
G	NA	NA	NA	-60.	-28.	NA	NA	NA	NA	NA GRAVID, DIED DAY 15
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 7
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 8
G	5.	13.	70.	-51.	-33.	24.	-60.	38.	38.	SCHEDULED NECROPSY DAY 20
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 8
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA GRAVID, DIED DAY 7
NG	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA NONGRAVID, DIED DAY 6
NG	1.	-1.	12.	-27.	27.	12.	12.	37.	37.	SCHEDULED NECROPSY DAY 20
MEAN	8.	10.	69.	-13.	4.	32.	40.	146.		
S.D.	5.1	4.6	8.7	28.8	23.5	6.7	45.0	50.4		
N	7	7	7	12	8	7	7	7		

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
NA = NOT APPLICABLE

TABLE 19
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL GRAVID UTERINE WT. AND NET BODY WT. CHANGE (GRAMS)

DAM #	PREGNANCY STATUS	GROUP	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
		1:	0 MG/KG/DAY				
64988	NG		255.	288.	NA	NA	NA
64989	G		230.	376.	79.8	296.2	66.2
64995	G		246.	382.	75.3	306.7	60.7
65003	G		238.	374.	70.9	303.1	65.1
65010	G		247.	391.	71.3	319.7	72.7
65016	NG		239.	272.	NA	NA	NA
65017	G		255.	421.	89.3	331.7	76.7
65020	G		251.	422.	92.3	329.7	78.7
65022	G		254.	413.	89.4	323.6	69.6
65035	NG		237.	299.	NA	NA	NA
65038	G		246.	389.	75.9	313.1	67.1
65041	G		262.	440.	102.7	337.3	75.3
65042	G		257.	430.	79.5	350.5	93.5
65048	G		246.	383.	79.8	303.2	57.2
65054	G		261.	410.	87.8	322.2	61.2
65055	G		254.	395.	73.7	321.3	67.3
65056	G		255.	400.	77.4	322.6	67.6
65062	NG		251.	271.	NA	NA	NA
65066	G		248.	383.	81.8	301.2	53.2
65067	G		245.	364.	57.4	306.6	61.6
65073	G		238.	392.	86.5	305.5	67.5
65082	G		256.	425.	89.5	335.5	79.5
65084	NG		245.	261.	NA	NA	NA
65099	G		252.	395.	74.8	320.2	68.2
65102	G		249.	364.	36.9	327.1	78.1
MEAN			250.	397.	78.6	318.9	69.3
S.D.			8.0	22.1	13.84	14.24	9.19
N			20	20	20	20	20

G = GRAVID, NG = NONGRAVID, NOT INCLUDED IN CALCULATION OF THE MEAN
 NA = NOT APPLICABLE

TABLE 19
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL GRAVID UTERINE WT. AND NET BODY WT. CHANGE (GRAMS)

DAM #	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
64992	G	256.	379.	63.6	315.4	59.4
64996	G	267.	417.	79.1	337.9	70.9
64998	NG	254.	289.	NA	NA	NA
65000	G	251.	397.	88.1	308.9	57.9
65005	G	242.	390.	76.2	313.8	71.8
65011	G	244.	411.	86.4	324.6	80.6
65023	G	249.	402.	66.3	335.7	86.7
65024	G	252.	346.	20.4	325.6	73.6
65025	G	258.	433.	84.0	349.0	91.0
65027	G	254.	427.	86.9	340.1	86.1
65036	G	225.	364.	85.6	278.4	53.4
65040	G	254.	386.	75.8	310.2	56.2
65044	G	248.	428.	88.5	339.5	91.5
65049	G	256.	418.	66.5	351.5	95.5
65057	G	241.	410.	81.5	328.5	87.5
65058	G	264.	424.	87.1	336.9	72.9
65060	NG	243.	281.	NA	NA	NA
65063	G	258.	421.	88.5	332.5	74.5
65069	G	267.	452.	100.2	351.8	84.8
65070	G	232.	405.	91.8	313.2	81.2
65075	G	269.	415.	82.0	333.0	64.0
65079	G	259.	430.	93.9	336.1	77.1
65086	NG	236.	270.	NA	NA	NA
65101	G	243.	413.	87.0	326.0	83.0
65103	NG	250.	289.	NA	NA	NA
MEAN		252.	408.	80.0	328.0	76.2
S.D.		11.3	24.6	16.46	17.22	12.41
N		21	21	21	21	21

G = GRAVID, NG = NONGRAVID, NOT INCLUDED IN CALCULATION OF THE MEAN
 NA = NOT APPLICABLE

TABLE 19
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL GRAVID UTERINE WT. AND NET BODY WT. CHANGE (GRAMS)

DAM #	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
GROUP 3: 100 MG/KG/DAY						
64986	G	236.	343.	36.0	307.0	71.0
64993	G	254.	420.	80.3	339.7	85.7
65001	G	233.	345.	39.0	306.0	73.0
65004	G	236.	377.	73.4	303.6	67.6
65008	G	233.	380.	79.7	300.3	67.3
65018	G	244.	415.	106.7	308.3	64.3
65028	G	245.	358.	62.3	295.7	50.7
65033	G	233.	418.	92.6	325.4	92.4
65037	G	259.	414.	79.3	334.7	75.7
65043	G	245.	412.	73.1	338.9	93.9
65045	G	256.	398.	76.0	322.0	66.0
65050	G	253.	411.	92.6	318.4	65.4
65051	G	252.	378.	76.6	301.4	49.4
65064	G	250.	353.	66.0	287.0	37.0
65071	G	251.	398.	79.2	318.8	67.8
65074	G	268.	416.	92.5	323.5	55.5
65077	G	237.	364.	77.7	286.3	49.3
65078	G	257.	390.	34.3	355.7	98.7
65085	G	252.	411.	77.9	333.1	81.1
65090	G	254.	311.	6.8	304.2	50.2
65105	G	245.	389.	84.4	304.6	59.6
65109	G	240.	371.	72.1	298.9	58.9
MEAN		247.	385.	70.8	314.3	67.3
S.D.		9.7	30.0	23.02	18.23	16.01
N		22	22	22	22	22

G = GRAVID

TABLE 19.
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL GRAVID UTERINE WT. AND NET BODY WT. CHANGE (GRAMS)

DAM #	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
GROUP 4: 150 MG/KG/DAY						
65002	G	242.	380.	73.8	306.2	64.2
65006	G	259.	420.	79.5	340.5	81.5
65014	G	260.	443.	101.6	341.4	81.4
65015	G	266.	423.	89.4	333.6	67.6
65019	G	264.	450.	92.0	358.0	94.0
65039	NG	260.	275.	NA	NA	NA
65047	G	237.	398.	74.4	323.6	86.6
65080	G	251.	289.	58.5	230.5	-20.5
65093	NG	252.	289.	NA	NA	NA
MEAN		254.	400.	81.3	319.1	65.0
S.D.		11.2	54.8	14.25	42.26	39.09
N		7	7	7	7	7

G = GRAVID, NG = NONGRAVID, NOT INCLUDED IN CALCULATION OF THE MEAN
NA = NOT APPLICABLE

TABLE 20
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

PREGNANCY STATUS	DAY													
	0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14					
DAMS FROM GROUP 1: 0 MG/KG/DAY														
64988	23.	24.	22.	21.	23.	17.	19.	21.	21.	18.				
64989	G	19.	20.	18.	19.	21.	20.	24.	24.	22.				
64995	G	20.	19.	18.	20.	20.	21.	23.	23.	22.				
65003	G	18.	22.	23.	21.	22.	24.	26.	26.	21.				
65010	G	23.	26.	21.	19.	22.	24.	20.	20.	25.				
65016	NG	21.	23.	24.	21.	20.	17.	14.	14.	12.				
65017	G	22.	24.	25.	23.	23.	28.	28.	28.	25.				
65020	G	23.	24.	27.	24.	25.	28.	24.	24.	27.				
65022	G	23.	24.	23.	22.	23.	26.	21.	21.	21.				
65035	NG	21.	21.	15.	23.	21.	21.	20.	20.	17.				
65038	G	21.	20.	21.	21.	21.	21.	20.	20.	25.				
65041	G	25.	29.	26.	26.	25.	28.	25.	25.	22.				
65042	G	24.	26.	27.	27.	24.	25.	28.	28.	29.				
65048	G	17.	14.	21.	19.	22.	21.	22.	22.	22.				
65054	G	25.	24.	21.	23.	25.	26.	26.	26.	26.				
65055	G	23.	51.A	23.	22.	24.	27.	27.	27.	23.				
65056	G	24.	21.	22.	23.	24.	24.	23.	23.	25.				
65062	NG	19.	18.	19.	14.	22.	17.	16.	16.	18.				
65066	G	19.	25.	21.	17.	18.	22.	21.	21.	21.				
65067	G	21.	22.	21.	22.	22.	23.	21.	21.	25.				
65073	G	20.	19.	22.	20.	17.	20.	22.	22.	20.				
65082	G	24.	24.	24.	23.	24.	23.	25.	25.	23.				
65084	NG	17.	19.	17.	18.	19.	15.	19.	19.	16.				
65099	G	21.	26.	27.	22.	24.	24.	25.	25.	24.				
65102	G	18.	21.	23.	21.	21.	21.	21.	21.	25.				
MEAN	22.	23.	23.	22.	23.	22.	24.	24.	24.	24.				
S.D.	2.4	3.5	2.5	2.5	2.3	2.2	2.7	2.6	2.6	2.3				
N	20	19	20	20	20	20	20	20	20	20				

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN
 A = OBVIOUS ERRONEOUS VALUE - NOT INCLUDED IN CALCULATION OF MEAN

TABLE 20
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

PREGNANCY	STATUS DAY										0-20		
	14-15	15-16	16-20	6-9	9-12	12-16	6-16	6-16	0-20	0-20			
DAMS FROM GROUP 1: 0 MG/KG/DAY													
64988	19.	46.	23.	22.	20.	26.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
64989	22.	23.	26.	19.	20.	23.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
64995	23.	21.	24.	19.	21.	22.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65003	24.	24.	26.	22.	23.	24.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
65010	25.	27.	30.	22.	23.	24.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
65016	19.	17.	19.	23.	20.	16.	19.	19.	19.	19.	19.	19.	SCHEDULED NECROPSY DAY 20
65017	25.	29.	29.	24.	26.	27.	26.	26.	26.	26.	26.	26.	SCHEDULED NECROPSY DAY 20
65020	29.	31.	30.	25.	26.	28.	26.	26.	26.	26.	26.	26.	SCHEDULED NECROPSY DAY 20
65022	23.	23.	25.	23.	24.	22.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
65035	16.	21.	23.	20.	21.	19.	20.	20.	20.	20.	20.	20.	SCHEDULED NECROPSY DAY 20
65038	22.	25.	26.	21.	21.	23.	22.	22.	22.	22.	22.	22.	SCHEDULED NECROPSY DAY 20
65041	28.	28.	30.	27.	27.	26.	26.	26.	26.	26.	26.	26.	SCHEDULED NECROPSY DAY 20
65042	28.	29.	31.	27.	27.	29.	27.	27.	27.	27.	27.	27.	SCHEDULED NECROPSY DAY 20
65048	23.	23.	24.	18.	21.	23.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65054	24.	26.	27.	23.	25.	26.	24.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
65055	25.	24.	26.	23.	25.	25.	24.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
65056	25.	24.	26.	22.	22.	24.	24.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
65062	22.	21.	19.	17.	19.	19.	19.	19.	19.	19.	19.	19.	SCHEDULED NECROPSY DAY 20
65066	22.	23.	24.	21.	20.	22.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65067	22.	23.	25.	22.	22.	23.	22.	22.	22.	22.	22.	22.	SCHEDULED NECROPSY DAY 20
65073	26.	21.	26.	20.	19.	22.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65082	27.	27.	29.	24.	23.	26.	24.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
65084	17.	19.	17.	18.	17.	18.	18.	18.	18.	18.	18.	18.	SCHEDULED NECROPSY DAY 20
65099	27.	22.	29.	25.	24.	25.	25.	25.	25.	25.	25.	25.	SCHEDULED NECROPSY DAY 20
65102	24.	27.	28.	22.	22.	24.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
MEAN	25.	25.	27.	22.	23.	24.	23.	23.	23.	24.	24.	24.	
S.D.	2.2	2.8	2.3	2.5	2.3	2.1	1.9	1.9	2.0	2.0	2.0	2.0	
N	20	20	20	20	20	20	20	20	20	20	20	20	

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 20
 A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
 INDIVIDUAL FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

PREGNANCY STATUS	DAYS FROM GROUP 2: 50 MG/KG/DAY													
	0-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14					
64992	G	22.	24.	28.	25.	26.	22.	22.	25.	22.	22.	22.	22.	25.
64996	G	26.	32.	27.	30.	27.	27.	27.	29.	27.	27.	27.	27.	29.
64998	NG	25.	22.	25.	22.	25.	25.	25.	21.	25.	22.	22.	22.	21.
65000	G	22.	24.	23.	23.	23.	23.	22.	24.	23.	25.	25.	25.	23.
65005	G	22.	21.	21.	21.	21.	21.	19.	23.	21.	24.	24.	23.	23.
65011	G	22.	21.	20.	22.	20.	21.	22.	25.	21.	18.	18.	27.	27.
65023	G	25.	26.	26.	25.	26.	24.	25.	30.	24.	24.	24.	26.	26.
65024	G	25.	24.	27.	19.	24.	22.	20.	20.	22.	25.	25.	18.	18.
65025	G	25.	25.	28.	25.	25.	29.	25.	26.	29.	33.	33.	24.	24.
65027	G	21.	19.	21.	20.	21.	26.	24.	21.	26.	23.	23.	27.	27.
65036	G	19.	21.	21.	19.	21.	22.	22.	21.	22.	24.	24.	23.	23.
65040	G	22.	22.	20.	21.	20.	16.	20.	22.	16.	21.	21.	22.	22.
65044	G	27.	27.	29.	25.	29.	23.	29.	26.	23.	22.	22.	25.	25.
65049	G	24.	25.	24.	23.	24.	26.	25.	26.	26.	28.	28.	27.	27.
65057	G	25.	24.	23.	23.	23.	24.	24.	25.	25.	24.	24.	25.	25.
65058	G	24.	22.	24.	22.	24.	22.	22.	25.	28.	27.	27.	25.	25.
65060	NG	21.	23.	22.	20.	22.	20.	20.	17.	22.	18.	18.	19.	19.
65063	G	23.	22.	25.	24.	20.	24.	20.	19.	24.	26.	26.	23.	23.
65069	G	23.	23.	27.	25.	25.	24.	25.	25.	24.	28.	28.	28.	28.
65070	G	24.	20.	23.	21.	23.	21.	23.	24.	25.	27.	27.	25.	25.
65075	G	23.	28.	25.	24.	25.	24.	25.	31.	25.	27.	27.	28.	28.
65079	G	23.	25.	26.	24.	24.	24.	24.	26.	22.	26.	26.	25.	25.
65086	NG	20.	20.	21.	21.	21.	21.	21.	17.	22.	24.	24.	20.	20.
65101	G	22.	25.	27.	25.	25.	30.	25.	28.	22.	24.	24.	27.	27.
65103	NG	22.	23.	25.	22.	24.	24.	24.	21.	24.	25.	25.	22.	22.
MEAN		23.	24.	25.	23.	24.	24.	24.	25.	24.	25.	25.	25.	25.
S.D.		1.8	3.0	2.8	2.6	2.4	3.1	3.1	3.1	3.1	3.1	3.1	2.5	2.5
N		21	21	21	21	21	21	21	21	21	21	21	21	21

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE 20
A DEVELOPMENTAL TOXICITY STUDY OF FURFURAL IN RATS
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION (GRAMS/ANIMAL/DAY)

PREGNANCY STATUS	DAYS FROM GROUP 2: 50 MG/KG/DAY											
	DAY 14-15	15-16	16-20	6-9	9-12	12-16	6-16	0-20				
64992 G	25.	21.	25.	26.	24.	23.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
64996 G	27.	29.	26.	30.	28.	28.	28.	28.	28.	28.	28.	SCHEDULED NECROPSY DAY 20
64998 NG	17.	14.	18.	23.	23.	19.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65000 G	25.	24.	27.	23.	23.	24.	24.	24.	24.	24.	24.	SCHEDULED NECROPSY DAY 20
65005 G	24.	24.	27.	21.	21.	24.	21.	22.	22.	22.	22.	SCHEDULED NECROPSY DAY 20
65011 G	21.	25.	25.	21.	23.	23.	23.	22.	22.	23.	23.	SCHEDULED NECROPSY DAY 20
65023 G	26.	28.	29.	26.	26.	26.	26.	26.	26.	26.	26.	SCHEDULED NECROPSY DAY 20
65024 G	27.	21.	26.	23.	22.	23.	23.	23.	23.	23.	23.	SCHEDULED NECROPSY DAY 20
65025 G	30.	28.	28.	26.	27.	29.	27.	27.	27.	27.	27.	SCHEDULED NECROPSY DAY 20
65027 G	26.	27.	29.	20.	24.	26.	20.	24.	26.	26.	27.	SCHEDULED NECROPSY DAY 20
65036 G	23.	24.	24.	20.	22.	24.	20.	22.	22.	24.	22.	SCHEDULED NECROPSY DAY 20
65040 G	24.	23.	26.	21.	19.	23.	21.	21.	23.	23.	21.	SCHEDULED NECROPSY DAY 20
65044 G	26.	26.	26.	27.	26.	25.	26.	26.	25.	26.	26.	SCHEDULED NECROPSY DAY 20
65049 G	31.	28.	30.	24.	26.	29.	24.	26.	26.	29.	26.	SCHEDULED NECROPSY DAY 20
65057 G	28.	29.	29.	23.	25.	27.	23.	25.	27.	27.	25.	SCHEDULED NECROPSY DAY 20
65058 G	25.	24.	27.	23.	25.	27.	23.	25.	25.	25.	24.	SCHEDULED NECROPSY DAY 20
65060 NG	19.	18.	18.	22.	20.	19.	20.	20.	19.	19.	20.	SCHEDULED NECROPSY DAY 20
65063 G	27.	29.	28.	24.	21.	26.	24.	24.	26.	26.	24.	SCHEDULED NECROPSY DAY 20
65069 G	26.	31.	30.	25.	25.	28.	26.	26.	28.	28.	26.	SCHEDULED NECROPSY DAY 20
65070 G	25.	29.	28.	21.	24.	27.	24.	24.	27.	27.	24.	SCHEDULED NECROPSY DAY 20
65075 G	27.	31.	28.	26.	27.	28.	27.	27.	28.	28.	27.	SCHEDULED NECROPSY DAY 20
65079 G	26.	26.	28.	25.	24.	26.	25.	25.	26.	26.	25.	SCHEDULED NECROPSY DAY 20
65086 NG	22.	19.	21.	21.	20.	21.	21.	21.	21.	21.	21.	SCHEDULED NECROPSY DAY 20
65101 G	30.	29.	32.	26.	28.	28.	27.	27.	28.	28.	27.	SCHEDULED NECROPSY DAY 20
65103 NG	20.	17.	19.	23.	23.	21.	22.	22.	21.	21.	22.	SCHEDULED NECROPSY DAY 20
MEAN	26.	26.	28.	24.	24.	26.	24.	24.	24.	26.	25.	25.
S.D.	2.4	3.0	1.9	2.6	2.4	2.1	2.6	2.4	2.4	2.1	2.0	1.5
N	21	21	21	21	21	21	21	21	21	21	21	21

G = GRAVID NG = NONGRAVID - WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TRIAGE of 8(e) Submissions

Date sent to triage: _____

NON-CAP

CAP

Submission number: 14026 A

TSCA Inventory: **Y** N D

STUDY TYPE (circle appropriate):

Cheng-Chun Lee (E609C)

ATOX SBTOX SEN w/NEUR

Larry Newsome (E425)

ECO AQUATO

~~Katherine Anitole (E611G)~~

RTOX/DTOX

Daljit Sawhney (E611A)

CTOX STOX

Deborah Norris (E602)

NEUR

Jeff Beaubier (E608)

EPI

Ron Ward (E611F)

IMMUNO/ALLERG

David Lai (E611B)

CARC

Michael Cimino (E611D)

GTOX

Leonard Keifer (E611C)

META/PHARM

NOTES:

CECATS/TRIAGE TRACKING DATABASE ENTRY FORM

CECATS DATA:
Submission # SEHO-1097-14026S SEQ A

TYPE: (INT) SUPP FLWP
SUBMITTER NAME: Confident

INFORMATION REQUESTED FLWP DATE
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)

VOLUNTARY ACTIONS
(0401) NO ACTION REPORTED
0402 STUDIES PLANNED/UNDERWAY
0403 NOTIFICATION OF WORKER/OTHERS
0404 LABEL/MSDS CHANGES
0406 PROCESS/HANDLING CHANGES
0407 PRODUCTION DISCONTINUED
0408 CONFIDENTIAL

DISPOSITION
(0639) REFER TO CHEMICAL SCREENING
0678 CAP NOTICE

SUB DATE: 9-28-97 OTS DATE: 9-30-97 CSRAD DATE: 11-14-97

CHEMICAL NAME: Surfural CAS #: 98-01-1

INFORMATION TYPE:	P F C	INFORMATION TYPE:	P F C	INFORMATION TYPE:	P F C
0201 ONCO (HUMAN)	01 02 04	0216 EPI/CLIN	01 02 04	0241 IMMUNO (ANIMAL)	01 02 04
0202 ONCO (ANIMAL)	01 02 04	0217 HUMAN EXPOS (PROD CONTAM)	01 02 04	0242 IMMUNO (HUMAN)	01 02 04
0203 CELL TRANS (IN VITRO)	01 02 04	0218 HUMAN EXPOS (ACCIDENTAL)	01 02 04	(0243) CHEM/PHY'S PROP	01 02 04
0204 MUTA (IN VITRO)	01 02 04	0219 HUMAN EXPOS (MONITORING)	01 02 04	0244 CLASTO (IN VITRO)	01 02 04
0205 MUTA (IN VIVO)	01 02 04	0220 ECO/AQUA TOX.	01 02 04	0245 CLASTO (ANIMAL)	01 02 04
0206 REPRO/TERATO (HUMAN)	01 02 04	0221 ENV. OCC/REL/FATE	01 02 04	0246 CLASTO (HUMAN)	01 02 04
(0207) REPRO/TERATO (ANIMAL)	01 02 04	0222 EMER. INCL OF ENV. CONTAM.	01 02 04	0247 DNA DAM/REPAIR	01 02 04
0208 NEURO (HUMAN)	01 02 04	(0223) PROD/COMP/CHEM ID	01 02 04	0248 PROD/USE/PROC	01 02 04
0209 NEURO (ANIMAL)	01 02 04	0224 REPORTING RATIONALE	01 02 04	0251 MSDS	01 02 04
0210 ACUTE TOX. (HUMAN)	01 02 04	0225 CONFIDENTIAL	01 02 04	0299 OTHER	01 02 04
0211 CHR. TOX. (HUMAN)	01 02 04	0226 CONFIDENTIAL	01 02 04		
0212 ACUTE TOX. (ANIMAL)	01 02 04	0227 ALLERG (HUMAN)	01 02 04		
0213 SUBACUTE TOX. (ANIMAL)	01 02 04	0228 ALLERG (ANIMAL)	01 02 04		
0214 SUB CHRONIC TOX. (ANIMAL)	01 02 04	0239 METAB/PHARMACO (ANIMAL)	01 02 04		
0215 CHRONIC TOX. (ANIMAL)	01 02 04	0240 METAB/PHARMACO (ANIMAL)	01 02 04		

TRIAGE DATA: **NON-CBI INVENTORY:** YES (CONTINUE) NO (DROP) DETERMINE
ONGOING REVIEW: YES (DROP/REFER) NO (CONTINUE) REFER
SPECIES: rat **TOXICOLOGICAL CONCERN:** LOW MEDIUM HIGH
USE: --- **PRODUCTION:**

COMMENTS:

"14026A"="M"=" FEMALE CRL:CD (SD) BR RATS (3 GROUPS OF 25 THAT HAD BEEN COHABITED WITH MALE RATS) RECEIVED SINGLE DAILY ORAL DOSES OF EITHER CONTROL MATERIAL OR FURALDEHYDE (CAS NO. 98-01-1) AT LEVELS OF 50, 100 AND 150 MG/KG DURING GESTATIONS DAYS 6 THROUGH 15. ALL SURVIVING DAMS WERE TERMINATED AND A LAPAROHYSTERECTOMY PERFORMED ON GESTATION DAY 20. THE UTERI AND OVARIES WERE EXAMINED AND NUMBER OF FETUSES, EARLY AND LATE RESORPTIONS, TOTAL IMPLANTATIONS, AND COPORA LUTEA WERE RECORDED. MEAN UTERINE WEIGHTS AND NET BODY WEIGHT CHANGES WERE CALCULATED FOR EACH GROUP. THE FETUSES WERE WEIGHED, SEXED, AND EXAMINED FOR EXTERNAL, SOFT TISSUE, AND SKELETAL MALFORMATIONS AND VARIATIONS. IN THE 100 AND 150 MG/KG GROUPS, 3 AND 16 ANIMALS DIED, RESPECTIVELY, BETWEEN GESTATION DAYS 6 AND 15. TREATMENT- RELATED CLINICAL FINDINGS IN THE 50, 100 AND/OR 150 MG/KG/ DAY GROUPS INCLUDED HYPOACTIVITY, VOCALIZATION, DECREASED DEFECATION, RED MATERIAL AROUND THE EYES AND MOUTH, LABORED RESPIRATION, RALES, RAPID RESPIRATION, GASPING, PROSTRATION, AND LETHARGY. TREMORS AND HEAD HELD LOW WERE NOTED SPORADICALLY IN THE 50 MG/KG/DAY GROUP AND AT HIGHER FREQUENCY IN THE MID- AND HIGH-DOSE GROUPS. EXOPHTHALMIA WAS OBSERVED IN ALL OF THE TREATED GROUPS FROM GESTATION DAYS 6-18. MEAN BODY WEIGHT LOSS AND FOOD CONSUMPTION REDUCTION WERE OBSERVED DURING GESTATION DAYS 6-9 IN THE 150 MG/KG/DAY GROUP. A SLIGHTLY REDUCED MEAN FETAL BODY WEIGHT IN THE 150 MG/KG/DAY WAS INTERPRETED AS BEING AN EQUIVOCAL INDICATION OF DEVELOPMENTAL TOXICITY. THE NO OBSERVABLE ADVERSE EFFECT LEVEL (NOAEL) FOR MATERNAL TOXICITY WAS CONSIDERED TO BE LESS THAN 50 MG/KG/DAY. THE NOAEL FOR DEVELOPMENTAL TOXICITY WAS CONSIDERED TO BE 100 MG/KG/DAY."