

FINAL REPORT



Contents: Volume 1 of 2
Text, Summary Tables, and Appendices A-F

Study Title: A Dermal Prenatal Developmental Toxicity Study of
Distillates (Petroleum), Light Catalytic Cracked in Rats

Laboratory Project ID: WIL-402017

Author: Jeffrey H. Charlap, MS

Test Guidelines: OPPTS 870.3700
OECD Guideline 414

Study Completion Date: 12 July 2012

Performing Laboratory: WIL Research Laboratories, LLC
1407 George Road
Ashland, OH 44805-8946

Sponsor: American Petroleum Institute
1220 L Street, NW
Washington, DC 20005

Total Number of Pages: 402

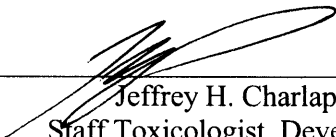
COMPLIANCE STATEMENT

The following is a detailed description of all differences between the practices used in this study, WIL-402017, and those required by the United States EPA GLP Standards (40 CFR Part 792), 18 September 1989; the OECD Principles of GLP [C(97) 186/Final], 26 November 1997; WIL Research's SOPs; and the protocol as approved by the Sponsor.

- The Sponsor conducted test substance characterization according to non-GLP standards and provided the characterization report to WIL Research (presented in Appendix B).
- The stability of the bulk test substance was not provided; however, it is the professional judgment of the Sponsor that the formulations are considered stable under the conditions of the study. The expiration date for the test substance is unknown.

These exceptions had no effect on the integrity or quality of the study.

The study was conducted in general accordance with the United States EPA Health Effects Test Guidelines OPPTS 870.3700, Prenatal Developmental Toxicity Study, August, 1998 and the OECD Guidelines for Testing of Chemicals Guideline 414, Prenatal Developmental Toxicity Study, 22 January 2001.



Jeffrey H. Charlap, MS
Staff Toxicologist, Developmental
and Reproductive Toxicology
Study Director

12 July 2012
Date

TABLE OF CONTENTS

VOLUME 1	<u>Page</u>
Compliance Statement.....	2
Table of Contents	3
Index of Tables	6
Index of Appendices.....	7
1. Summary.....	9
1.1. Objective	9
1.2. Study Design	9
1.3. Results.....	10
1.4. Conclusions.....	12
2. Introduction.....	13
2.1. General Study Information	13
2.2. Key Study Dates	13
2.3. Participating Scientists.....	13
2.4. WIL Research Key Study Personnel.....	14
3. Study Design.....	15
4. Experimental Procedures - Materials and Methods.....	16
4.1. Test Substance and Vehicle	16
4.1.1. Test Substance	16
4.1.2. Vehicle	16
4.1.3. Preparation	16
4.1.4. Sampling and Analyses.....	17
4.2. Test System, Animal Receipt, and Acclimation	18
4.3. Animal Housing.....	19
4.4. Diet, Drinking Water, and Maintenance	19
4.5. Environmental Conditions	20
4.6. Assignment of Animals to Treatment Groups and Breeding Procedures.....	20

VOLUME 1 (continued)	<u>Page</u>
4.7. Organization of Test Groups, Dosage Levels, and Treatment Regimen	21
5. Parameters Evaluated	24
5.1. Maternal Observations during Gestation	24
5.1.1. Clinical Observations and Survival	24
5.1.2. Dermal Observations	24
5.1.3. Body Weights and Gravid Uterine Weights	24
5.1.4. Food Consumption.....	25
5.1.5. Anatomic Pathology and Laparohysterectomy	25
5.1.5.1. Unscheduled Deaths.....	25
5.1.5.2. Gestation Day 20 Laparohysterectomy.....	25
5.1.5.3. Organ Weights	27
5.2. Fetal Morphological Examination	27
5.3. Data Acquisition and Analysis.....	28
5.3.1. Acquisition and Reporting	28
5.3.2. Statistical Analyses	29
6. Results	31
6.1. Analyses of Dosing Formulations.....	31
6.2. Maternal Clinical Observations and Survival	31
6.3. Dermal Observations	33
6.4. Maternal Body Weights and Gravid Uterine Weights.....	34
6.5. Maternal Food Consumption	35
6.6. Anatomic Pathology and Laparohysterectomy	36
6.6.1. Macroscopic Examinations	36
6.6.2. Organ Weights	37
6.6.3. Gestation Day 20 Laparohysterectomy Data	37
6.7. Fetal Morphological Data	39
6.7.1. External Malformations and Variations.....	39
6.7.2. Visceral Malformations and Variations	40

VOLUME 1 (continued)	<u>Page</u>
6.7.3. Skeletal Malformations and Variations	41
6.7.4. Summary of External, Visceral, and Skeletal Examinations	44
7. Discussion.....	45
8. Conclusions.....	47
9. Report Review and Approval	48
10. Quality Assurance Statement.....	49
11. References.....	51
12. Data Retention.....	53
13. Abbreviations	54

INDEX OF TABLES

VOLUME 1 (continued)	<u>Page</u>
S1. Summary of Maternal Survival and Pregnancy Status	56
S2. Summary of Clinical Findings (Daily Examinations)	57
S3. Summary of Post-Dose Findings.....	59
S4. Summary of Clinical Findings (Dermal Observations)	60
S5. Summary of Body Weights during Gestation [g]	61
S6. Summary of Body Weight Changes during Gestation [g].....	63
S7. Summary of Gravid Uterine Wts. and Net Body Wt. Changes [g]	65
S8. Summary of Food Consumption during Gestation [g/animal/day]	66
S9. Summary of Food Consumption during Gestation [g/kg/day]	68
S10. Summary of Maternal Macroscopic Findings.....	70
S11. Summary of Organ Wts. and Organ Wts. Relative to Brain Wts. (Unscheduled Death).....	71
S12. Summary of Organ Wts. and Organ Wts. Relative to Brain Wts. (Scheduled Necropsy)	72
S13. Summary of Fetal Data at Scheduled Necropsy	73
S14. Summary of Fetal Data at Scheduled Necropsy [% per litter].....	74
S15. Summary of Fetuses and Litters with Malformations [absolute no.]	77
S16. Summary of Litter Proportions of Malformations	78
S17. Summary of Fetuses and Litters with Variations [absolute no.].....	82
S18. Summary of Litter Proportions of Variations	84

INDEX OF APPENDICES

VOLUME 1 (continued)	<u>Page</u>
A. Study Protocol and Deviations	90
B. Test Substance Characterization (Sponsor-Provided Data)	127
C. Analyses of Dosing Formulations (WIL Research Laboratories, LLC)	138
D. Animal Room Environmental Conditions	158
E. Scoring Criteria for Dermal Reactions	164
F. WIL Developmental Historical Control Data Version 3.10 [CrI:CD(SD) Rats]	166
VOLUME 2	
G. Individual Animal Data	181
A1. Individual Clinical Observations (Daily Examinations)	182
A2. Individual Post-Dose Observations (At Time of Dosing)	219
A3. Individual Post-Dose Observations (1-2 Hours Post-Dosing)	223
A4. Individual Dermal Observations	229
A5. Individual Body Weights during Gestation [g]	244
A6. Individual Body Weight Changes during Gestation [g]	249
A7. Individual Gravid Uterine Wts. and Net Body Wt. Changes [g]	254
A8. Individual Food Consumption during Gestation [g/animal/day]	259
A9. Individual Food Consumption during Gestation [g/kg/day]	264
A10. Individual Maternal Macroscopic Findings	269
A11. Individual Organ Weights [g] (Unscheduled Death)	275

VOLUME 2 (continued)

Page

A12. Individual Organ Weights Relative to Brain Weights [g/100 g] (Unscheduled Death)	276
A13. Individual Organ Weights [g] (Scheduled Necropsy)	277
A14. Individual Organ Weights Relative to Brain Weights [g/100 g] (Scheduled Necropsy)	282
A15. Individual Fetal Data at Scheduled Necropsy	287
A16. Individual Fetal Data at Scheduled Necropsy [% per litter]	292
A17. Individual Fetal Weights [g]	297
A18. Individual Fetal External, Visceral and Skeletal Findings	302

1. SUMMARY

1.1. OBJECTIVE

The objectives of the study were to determine the effects of prenatal, dermal exposure to the test substance on pregnant rats and developing offspring, to provide data to verify/expand the domain of the polycyclic aromatic compounds (PAC) prenatal models for predicting the toxicity of high-boiling petroleum substances from their PAC content, and to further test the hypothesis that developmental toxicity endpoints are more sensitive to effects of high-boiling petroleum substances than other reproductive endpoints, such as fertility or reproductive organ weight and histopathology.

1.2. STUDY DESIGN

The test substance, distillates (petroleum), light catalytic cracked (CAS no. 64741-59-9), in the vehicle (mineral oil) was administered by dermal application to the dorsal scapular area (approximately 10% of total body surface area) of 3 groups (Groups 3-5) of 25 bred female Crl:CD(SD) rats once daily from gestation days 0 through 19; animals were exposed to the test substance for 6 hours each day. Exposure levels were 100, 450, and 750 mg/kg/day administered at a dosage volume of 1.5 mL/kg. A concurrent vehicle control group (Group 2) composed of 25 bred females received the vehicle on a comparable regimen. A concurrent sham control group (Group 1) was subjected to the same procedures (*i.e.* shaving, collaring, sham dosing with a glass rod, and removal of residual test substance) as Groups 2-5; however, no vehicle or test substance was applied to these animals. The females were approximately 13 weeks of age at the initiation of dose administration. All animals were observed twice daily for mortality and moribundity. Clinical observations, body weights, and food consumption were recorded at appropriate intervals. On gestation day 20, a laparohysterectomy was performed on each surviving female. The uteri, placentae, and ovaries were examined, and the numbers of fetuses, early and late resorptions, total implantations, and corpora lutea were recorded. Gravid uterine weights were recorded, and net body weights and net body weight changes were calculated. Selected organs from all females euthanized *in extremis*

or surviving to the scheduled necropsy were weighed. The fetuses were weighed, sexed, and examined for external, visceral, and skeletal malformations and developmental variations.

1.3. RESULTS

Test substance-related mortality and moribundity were noted at 750 mg/kg/day. In the 750 mg/kg/day group, 1 female was euthanized *in extremis* on gestation day 13 and 1 female was found dead on gestation day 16. Clinical findings noted for these females included body pale and cool to touch, red vaginal discharge, and/or red material around the eyes and nose. All females in the sham control, vehicle control, 100, and 450 mg/kg/day groups and all other females in the 750 mg/kg/day group survived to the scheduled necropsy on gestation day 20.

Test substance-related clinical findings were noted in the 450 and 750 mg/kg/day groups at the daily examinations and/or 1 to 2 hours following exposure and consisted of yellow and/or red material around the urogenital area, red vaginal discharge, and/or body pale and cool to touch. The finding of yellow material around the urogenital area was noted primarily at the beginning of the test substance exposure period (gestation days 1-5) whereas the other test substance-related clinical findings were noted primarily during the latter part of the test substance exposure period (gestation days 9-20). No remarkable clinical findings were noted at the daily examinations or 1 to 2 hours following dose administration in the 100 mg/kg/day group. Test substance-related dermal observations consisting of very slight to moderate erythema, very slight to slight edema, and/or desquamation were noted in 24 of 25 females in the 750 mg/kg/day group throughout the treatment period. No remarkable dermal observations were noted at 100 or 450 mg/kg/day.

Test substance-related reductions in mean food consumption with corresponding lower mean body weight gains and/or losses were noted in the 450 and 750 mg/kg/day groups generally throughout the treatment period. The reductions in body weight gain during the

latter portion of gestation in the 450 and 750 mg/kg/day groups were partially attributed to the decreased number of viable fetuses and lower fetal weights in these groups. In addition, mean net body weights, net body weight gains, and gravid uterine weights for females in these groups were lower than those in the vehicle control group. Mean maternal body weights, body weight gains, net body weight, net body weight gain, gravid uterine weight, and food consumption in the 100 mg/kg/day group were similar to the vehicle control group.

In the 750 mg/kg/day group, the macroscopic finding of small thymus was noted in 5 females and was considered test substance-related. No remarkable macroscopic findings were noted at 100 or 450 mg/kg/day. Test substance-related, lower mean thymus weights (absolute and relative to brain weights) were noted in the 450 and 750 mg/kg/day groups compared to the vehicle control group. No test substance-related organ weight changes were noted at 100 mg/kg/day.

In the 450 and 750 mg/kg/day groups, increased mean litter proportions of postimplantation loss (primarily early resorptions) with corresponding decreases in the mean numbers and litter proportions of viable fetuses were noted. In addition, mean fetal weights in the 450 and 750 mg/kg/day groups were lower than the vehicle control group. These effects on intrauterine growth and survival at 450 and 750 resulted in lower mean gravid uterine weights at these exposure levels. Test substance-related skeletal developmental variations (reduced ossification of the skull, pubis unossified, reduced ossification of the vertebral arches, sternebra(e) nos. 5 and/or 6 unossified, cervical centrum no.1 ossified, and sternebra(e) nos. 1, 2, 3, and/or 4 unossified [metacarpal(s) and/or metatarsal(s) unossified, entire sternum unossified, and unco-ossified vertebral centra noted in the 750 mg/kg/day group only]) were noted at 450 and 750 mg/kg/day. No test substance-related skeletal malformations were noted in the 450 and 750 mg/kg/day groups. Intrauterine growth and survival and fetal morphology at 100 mg/kg/day were unaffected by test substance administration.

The vehicle control group performed similarly to the sham control group during the study, indicating that the vehicle (mineral oil) does not produce maternal or developmental toxicity.

1.4. CONCLUSIONS

Mortality and moribundity, as well as dermal observations were noted in maternal animals at 750 mg/kg/day. In addition, adverse clinical findings, reductions in food consumption and corresponding lower mean body weight gains or losses, and lower thymus weights (absolute and relative to brain weight) were noted at dosage levels of 450 and/or 750 mg/kg/day. No evidence of maternal toxicity was noted at 100 mg/kg/day. Therefore, a dosage level of 100 mg/kg/day was considered to be the no-observed-adverse-effect level (NOAEL) for maternal toxicity. Increased postimplantation loss with corresponding decreased mean numbers and litter proportions of viable fetuses, as well as lower mean fetal weights and reduced fetal skeletal ossification indicative of developmental delay were noted at 450 and 750 mg/kg/day. Therefore, a dosage level of 100 mg/kg/day was considered to be the NOAEL for embryo/fetal development when distillates (petroleum), light catalytic cracked was administered by dermal application to bred CrI:CD(SD) rats.

2. INTRODUCTION

2.1. GENERAL STUDY INFORMATION

This report presents the data from “A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked in Rats.” Due to software spacing constraints, the study title is presented as “Rat Dermal Dev Tox Study of Distillates, Light Catalytic Cracked” on the report tables.

The study protocol and deviations from the protocol are presented in Appendix A. A list of abbreviations potentially used in this report is presented in Section 13.

The computer protocol reference number and type of data collected were identified as follows:

<u>Computer Protocol</u>	<u>Type of Data Collected</u>
WIL-402017	Main study data

2.2. KEY STUDY DATES

<u>Date(s)¹</u>	<u>Event(s)</u>
31 August 2011	Study initiation date (date protocol signed by Study Director)
6 September 2011	Experimental starting date (animal receipt)
20 September 2011	Experimental start date (initiation of test substance exposure; first gestation day 0)
20 September - 12 October 2011	Test substance exposure period
13 October 2011	Last laparohysterectomy
6 December 2011	Experimental termination/completion date (last fetal skeletal examination)

2.3. PARTICIPATING SCIENTISTS

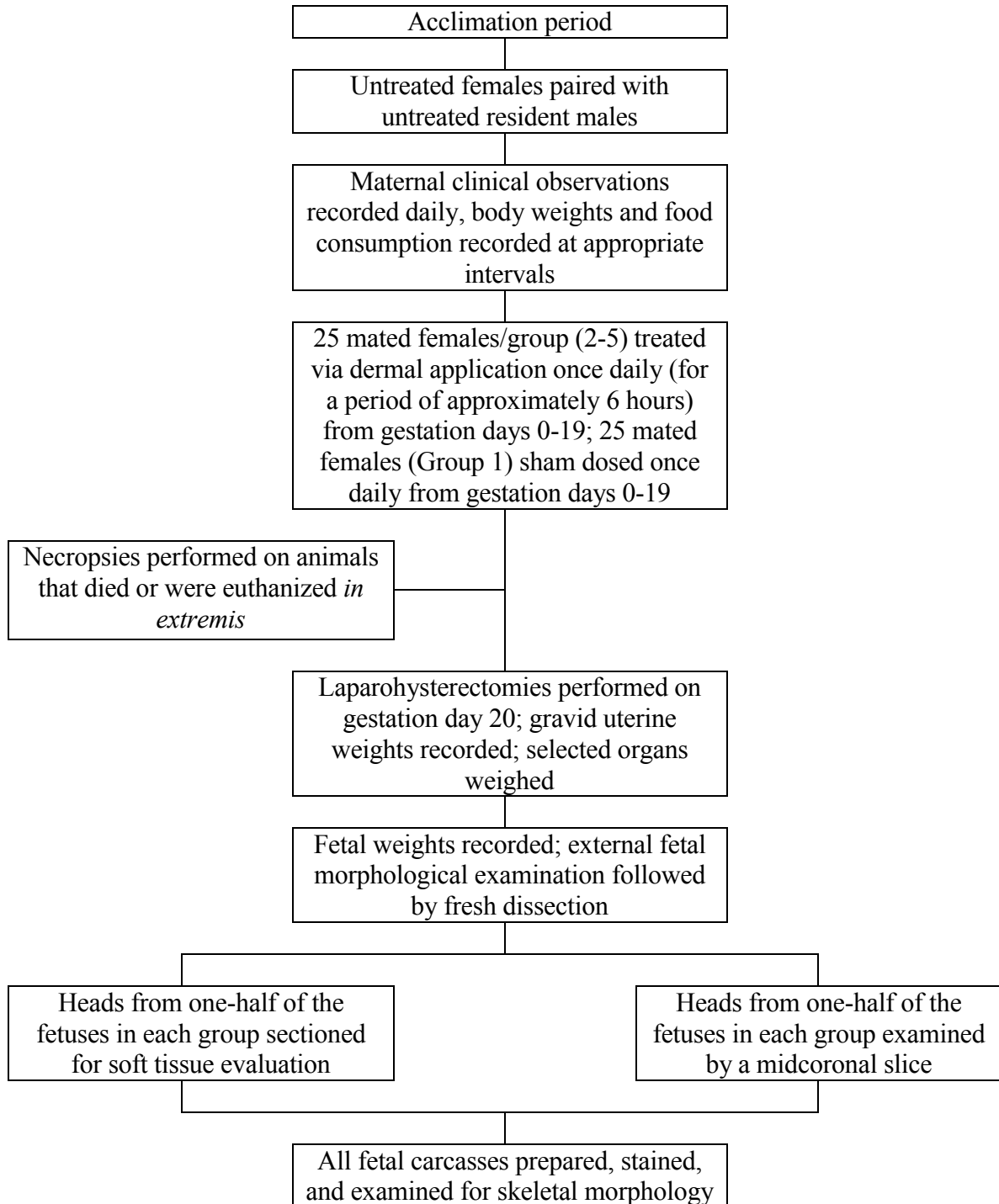
Analyses of Dosing Formulations	Robert E. Boes, MS WIL Research Laboratories, LLC
---------------------------------	--

¹ Date ranges represent the first and last dates of evaluation.

2.4. WIL RESEARCH KEY STUDY PERSONNEL

Eric S. Bodle, PhD	Assistant Director, Analytical Chemistry
Sally A. Keets, AS	Senior Operations Manager, Vivarium
Carol A. Kopp, BS, LAT	Manager, Gross Pathology and Developmental Toxicology Laboratory
Gwendalyn M. Maginnis, DVM	Clinical Veterinarian
John S. Moore, BS, RLATG	Operations Manager, Developmental, Reproductive, and Neurotoxicology
Theresa M. Rafeld, CPhT	Group Manager, Formulations Laboratory
Michael J. Schlosser, PhD, DABT	Vice President, Analytical, Metabolism, & In Vitro Toxicology Services
Bennett J. Varsho, MPH, DABT	Director, Operations
Robert A. Wally, BS	Operations Manager, Reporting & Technical Support Services

3. STUDY DESIGN



4. EXPERIMENTAL PROCEDURES - MATERIALS AND METHODS

4.1. TEST SUBSTANCE AND VEHICLE

4.1.1. TEST SUBSTANCE

The test substance, distillates (petroleum), light catalytic cracked, was received from EPL Archives, Inc., Sterling, VA, on behalf of the Sponsor, on 24 August 2011, as follows:

Identification	Physical Description
Distillates (petroleum), light catalytic cracked (CAS No. 64741-59-9; Site #17, Sample #5) [WIL ID no. 11012A]	Yellow clear liquid

A test substance characterization was provided by the Sponsor and is presented in Appendix B. For purposes of dose calculations, the purity of the test substance was considered to be 100.0%. The test substance was stored at room temperature, protected from light, and was considered stable under these conditions. A reserve sample of the test substance was collected and stored in the WIL Research Archives.

4.1.2. VEHICLE

The vehicle used in preparation of the test substance formulations and for administration to the vehicle control group was mineral oil, USP (lot nos. 2AB0895 and 2AF0729, exp. dates: 16 May 2013 and 3 August 2013, respectively, manufactured by Spectrum Chemical Manufacturing Corporation, New Brunswick, NJ).

4.1.3. PREPARATION

A sufficient amount of mineral oil was transferred to a formulation container approximately weekly for administration to the vehicle control group (Group 2); aliquots were prepared for daily dispensation and stored at room temperature, protected from light.

Dosing formulations were prepared at the test substance concentrations indicated in the following table:

Group Number	Treatment	Exposure Level (mg/kg/day)	Test Substance Concentration ^a (mg/mL)
1	Sham Control	NA	NA
2	Vehicle Control	0	0
3	Test Substance ^b	100	66.7
4	Test Substance ^b	450	300
5	Test Substance ^b	750	500

^a = The dosing formulations were not adjusted for purity.

^b = The test substance for this study was distillates (petroleum), light catalytic cracked (CAS no. 64741-59-9).

NA = Not applicable

The test substance formulations were weight/volume (test substance/vehicle) mixtures. The test substance formulations were prepared approximately weekly as single formulations for each exposure level, divided into aliquots for daily dispensation, and stored at room temperature, protected from light. The test substance formulations were stirred continuously throughout the preparation, sampling, and dose administration procedures.

4.1.4. SAMPLING AND ANALYSES

Analyses to demonstrate the homogeneity, stability, and resuspension homogeneity of the test substance formulations at concentrations of 50 and 500 mg/mL following 8 and 15 days of room temperature storage were conducted previously (Bodle, 2011, WIL-402027). Therefore, stability and resuspension homogeneity analyses were not conducted during the current study.

Samples for homogeneity and concentration analyses were collected from the top, middle, and bottom strata of each dosing formulation (including the vehicle control group) prepared for use on the first and last days of dosing. One set of samples from each collection was subjected to the appropriate analyses. The remaining set of samples

was stored at room temperature as back-up. All analyses were conducted by the WIL Research Analytical Chemistry Department using a validated high performance liquid chromatography method with ultraviolet absorbance detection. Details about the methodology and results of these analyses are presented in Appendix C, and the results are summarized in Section 6.1.

4.2. TEST SYSTEM, ANIMAL RECEIPT, AND ACCLIMATION

Sexually mature, virgin female Sprague Dawley [CrI:CD(SD)] rats were used as the test system on this study. This species and strain of animal is recognized as appropriate for developmental toxicity studies. WIL Research has historical control data on the background incidence of fetal malformations and developmental variations in the CrI:CD(SD) rat. This animal model has been proven to be susceptible to the effects of developmental toxicants. The number of animals selected for this study (see Section 4.7.) was based on the United States EPA Health Effects Test Guidelines OPPTS 870.3700, Prenatal Developmental Toxicity Study, August 1998 and the OECD Guidelines for Testing of Chemicals Guideline 414, Prenatal Developmental Toxicity Study, January 2011.

CrI:CD(SD) rats (155 females) were received in good health from Charles River Laboratories, Inc., Raleigh, NC, on 6 September 2011. The animals were approximately 79 days old upon receipt. Each female was examined by a qualified biologist on the day of receipt. The day following receipt, all animals were weighed and clinical observations were recorded. Each rat was uniquely identified by a Monel[®] metal ear tag displaying the animal number and housed for 14 days for acclimation purposes. During the acclimation period, the rats were observed twice daily for mortality and changes in general appearance and behavior.

Animals were acclimated to wearing Elizabethan-style collars on an incremental basis, starting with approximately 1 hour and ending with approximately 24 hours of

acclimation, starting approximately 1 week prior to the initiation of dose application as outlined below:

Study Day	Approximate Acclimation Period (Hours)
-7	1
-6	4
-5	8
-4	24

4.3. ANIMAL HOUSING

Upon arrival and until pairing, all rats were individually housed in clean, stainless steel wire-mesh cages suspended above cage-board. The cage-board was changed at least 3 times per week. The rats were paired for mating in the home cage of the male. Following positive evidence of mating, the females were returned to individual suspended wire-mesh cages; 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 Animals* (National Research Council, 1996). The animal facilities at WIL Research are fully accredited by AAALAC International.

4.4. DIET, DRINKING WATER, AND MAINTENANCE

The basal diet used in this study, PMI Nutrition International, LLC Certified Rodent LabDiet[®] 5002, was a certified feed with appropriate analyses performed by the manufacturer and provided to WIL Research. Feed lots used during the study were documented in the study records. The feeders were changed and sanitized once per week. Municipal water supplying the facility was regularly sampled for contaminants according to WIL Research's SOPs. The results of the diet and water analyses are maintained at WIL Research. No contaminants were present in animal feed or water at concentrations sufficient to interfere with the objectives of this study. Reverse osmosis-purified (on-site) drinking water, delivered by an automatic watering system, and the basal diet

were provided *ad libitum* throughout the acclimation period and during the study. The animal feed containers were provided without savers and lids to accommodate feeding with collars.

4.5. ENVIRONMENTAL CONDITIONS

All rats were housed throughout the acclimation period and during the study in an environmentally controlled room. The room temperature and humidity controls were set to maintain environmental conditions of $71^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($22^{\circ}\text{C} \pm 3^{\circ}\text{C}$) and $50\% \pm 20\%$, respectively. Room temperature and relative humidity data were monitored continuously and were scheduled for automatic collection on an hourly basis. These data are summarized in Appendix D. Actual mean daily temperature ranged from 70.3°F to 70.6°F (21.3°C to 21.4°C) and mean daily relative humidity ranged from 39.2% to 53.5% during the study. Fluorescent lighting provided illumination for a 12-hour light (0600 hours to 1800 hours)/12-hour dark photoperiod. The light status (on or off) was recorded once every 15 minutes. Air handling units were set to provide a minimum of 10 fresh air changes per hour.

4.6. 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, each animal judged to be in good health and meeting acceptable body weight requirements was 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 Crl:CD(SD) rats utilized exclusively for breeding; males were received from Charles River Laboratories, Inc. 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 maintained. The selected females were approximately 13 weeks old when paired for breeding.

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

The experimental design consisted of 3 test substance-treated groups, 1 vehicle control group, and 1 sham control group composed of 25 rats per group. The bred females were assigned to groups using a WTDMS™ computer program which randomized the animals based on stratification of the gestation day 0 body weights in a block design. Animals not assigned to study were euthanized by carbon dioxide inhalation and discarded. Body weight values ranged from 221 g to 317 g on gestation day 0.

4.7. ORGANIZATION OF TEST GROUPS, DOSAGE LEVELS, AND TREATMENT REGIMEN

On the day prior to the initiation of dose administration, and as often as necessary thereafter, the hair was clipped (in a manner that would not abrade the skin) from the dorsal scapular area; repeated clippings were performed prior to or at least 2-4 hours after dose administration. A different set of clippers was used for the sham control, vehicle control, and the test substance-treated groups to avoid the potential for cross-contamination (see Deviations from the Protocol); a record of hair removal is retained in the raw data. The vehicle or test substance was applied evenly to the clipped, unabraded skin and spread evenly using a glass rod (to ensure contact with an area of approximately 10% of the total body surface area), once daily (for a period of 6 hours) during gestation days 0-19.

The four corners of the application site were marked with indelible ink to allow proper identification of the treated and untreated skin. Elizabethan-style collars were applied to all animals to minimize ingestion of the test substance. The collars were worn continually during the exposure period and removed only during weighing procedures. At the end of the 6-hour exposure period, the test sites were gently patted using a disposable paper towel in an effort to remove any remaining test substance or vehicle

from the skin. If needed, the test site could be gently patted with gauze moistened with mineral oil and then patted again with dry gauze or a dry disposable paper towel. The area of test substance application was measured and recorded once per week for 2 representative (close to mean body weight) animals in each group. The total percentage of body surface to which the test substance was applied was to be approximately 10% of the total body surface area. The mean area of coverage was calculated as follows:

$$\text{Total body surface area (cm}^2\text{)} = K \cdot \text{body weight (grams)}^{(2/3)}$$

Where:

$$K = 9 \text{ for rats (Freireich } et al., 1966)$$

The following table presents the approximate percentages of body surface area covered by the test substance for each group/week.

Group Dosage Level (mg/kg/day)	Percent Coverage (%)				
	1 NA	2 0	3 100	4 450	5 750
Study Week 0	10.9	11.1	9.6	10.7	9.9
Study Week 1	10.9	10.6	10.9	11.2	10.5
Study Week 2	9.8	12.9	12.1	14.3	11.4
Study Week 3	10.7	12.0	13.1	11.1	13.6
Mean Coverage	10.6	11.7	11.4	11.8	11.3
Standard Deviation	0.6	1.0	1.5	1.7	1.6

NA = Not applicable

Individual dosages and dose volumes were based on the most recently recorded body weights to provide the correct mg/kg/day dose. All animals were dosed at approximately the same time each day.

The animals in the sham control group were subjected to the same procedures (*i.e.* shaving, collaring, sham dosing with glass rod, and removal of residual test substance) as the vehicle control and test substance-treated animals, but were not exposed to the vehicle or the test substance.

The following table presents the study group assignment:

Group Number	Treatment	Exposure Level (mg/kg/day)	Dosage Volume (mL/kg)	Number of Females
1	Sham Control	NA	NA	25
2	Vehicle Control	0	1.5	25
3	Test Substance ^a	100	1.5	25
4	Test Substance ^a	450	1.5	25
5	Test Substance ^a	750	1.5	25

^a = The test substance for this study was distillates (petroleum), light catalytic cracked (CAS no. 64741-59-9).

NA = Not applicable

Exposure levels were determined based on the results of previous studies and were provided by the Sponsor Representative after consultation with the WIL Study Director.

The selected route of administration for this study was dermal as this is a potential route of exposure for humans.

5. PARAMETERS EVALUATED

5.1. MATERNAL OBSERVATIONS DURING GESTATION

5.1.1. CLINICAL OBSERVATIONS AND SURVIVAL

All rats were observed twice daily, once in the morning and once in the afternoon, for moribundity and mortality. Individual clinical observations were recorded from gestation days 0 through 20 (prior to dose administration during the treatment period). Animals were also observed for signs of toxicity at the time of dose administration and approximately 1-2 hours following sham or dose administration. The absence or presence of findings was recorded for individual animals.

5.1.2. DERMAL OBSERVATIONS

The application site was scored daily (prior to dose administration) during the treatment period for erythema and edema in accordance with a 4-step grading system (Draize, 1965) of very slight, slight, moderate, and severe as described in Appendix E. Other remarkable dermal findings, if present, were recorded.

5.1.3. BODY WEIGHTS AND GRAVID UTERINE WEIGHTS

Individual maternal body weights were recorded on gestation days 0, 3, 6, 9, 12, 15, 18, and 20. Group mean body weights were calculated for each of these days. Mean body weight changes were calculated for each corresponding interval and also for gestation days 0-20. When body weights could not be determined for an animal during a given interval (due to an unscheduled death, weighing error, *etc.*), group mean values were calculated for that interval using the available data. The time periods when body weight values were unavailable for a given animal were designated as “NA” on the individual report tables. Collars were removed from the animals during the collection of body weights.

Gravid uterine weight was collected and net body weight (the gestation day 20 body weight exclusive of the weight of the uterus and contents) and net body weight change (the gestation day 0-20 body weight change exclusive of the weight of the uterus and

contents) were calculated and presented for each gravid female at the scheduled laparohysterectomy.

5.1.4. FOOD CONSUMPTION

Individual food consumption was recorded on gestation days 0, 3, 6, 9, 12, 15, 18, and 20. Food intake was reported as g/animal/day and g/kg/day for the corresponding body weight change intervals. When food consumption could not be determined for an animal during a given interval (due to an unscheduled death, weighing error, food spillage, *etc.*), group mean values were calculated for that interval using the available data. The time periods when food consumption values were unavailable for a given animal were designated as “NA” on the individual report tables.

5.1.5. ANATOMIC PATHOLOGY AND LAPAROHYSTERECTOMY

5.1.5.1. UNSCHEDULED DEATHS

A gross necropsy was performed on females that died or were euthanized (by carbon dioxide inhalation) *in extremis* during the course of the study. The cranial, thoracic, abdominal, and pelvic cavities were opened and the contents examined. Maternal tissues were retained in 10% neutral-buffered formalin for possible future histopathologic examination as described in Section 5.1.5.2. The number and location of implantation sites, corpora lutea, and viable fetuses were recorded. Recognizable fetuses were examined externally and preserved in 10% neutral-buffered formalin for possible future analysis. The females and all remaining products of conception were discarded.

5.1.5.2. GESTATION DAY 20 LAPAROHYSTERECTOMY

Laparohysterectomies and macroscopic examinations were performed blind to treatment group. All surviving females were euthanized on gestation day 20 by carbon dioxide inhalation. The cranial, thoracic, abdominal, and pelvic cavities were opened by a ventral mid-line incision, and the contents were examined. In all instances, the *postmortem* findings were correlated with the *antemortem* comments, and any abnormalities were recorded. The uterus and ovaries were then exposed and excised. The number of corpora

lutea on each ovary was recorded. The trimmed uterus was weighed and opened, and the number and location of all fetuses, early and late resorptions, and the total number of implantation sites were recorded. The placentae were also examined. 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.

The following tissues and organs were collected and placed in 10% neutral-buffered formalin:

Treated skin	Brain
Untreated skin (right hindlimb)	Thymus
Liver (2 sections)	All gross lesions ^a

^a = Representative sections of corresponding organs from a sufficient number of controls were retained for comparison.

Intrauterine data were summarized using 2 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:

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

Where:

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

5.1.5.3. ORGAN WEIGHTS

The liver, brain, and thymus were weighed from all animals euthanized *in extremis* or at the scheduled necropsy. Organ to brain weight ratios were calculated.

5.2. FETAL MORPHOLOGICAL EXAMINATION

Fetal examinations were performed blind to treatment group. Each viable fetus was examined externally, individually sexed, weighed, euthanized by a subcutaneous injection of sodium pentobarbital in the scapular region (if necessary), and tagged for identification. Fetal tags contained the WIL Research study number, the female number, and the fetus number. The detailed external examination of each fetus included, but was not limited to, an examination of the eyes, palate, and external orifices, and each finding was recorded. Crown-rump measurements and degrees of autolysis were recorded for late resorptions, a gross external examination was performed (if possible), and the tissues were discarded.

Each viable fetus was subjected to a visceral examination using a modification of the Stuckhardt and Poppe fresh dissection technique to include the heart and major blood vessels (Stuckhardt and Poppe, 1984). The sex of each fetus was confirmed by internal examination. Fetal kidneys were examined and graded for renal papillae development (Woo and Hoar, 1972). Heads from approximately one-half of the fetuses in each litter were placed in Bouin's fixative for subsequent soft-tissue examination by the Wilson sectioning technique (Wilson, 1965). The heads from the remaining one-half of the fetuses were examined by a midcoronal slice. All carcasses were eviscerated and fixed in 100% ethyl alcohol.

Following fixation in alcohol, each fetus was macerated in potassium hydroxide and stained with Alizarin Red S (Dawson, 1926) and Alcian Blue (Inouye, 1976). Fetuses were then examined for skeletal malformations and developmental variations.

External, visceral, and skeletal findings were recorded as developmental variations (alterations in anatomic structure that are considered to have no significant biological

effect on animal health or body conformity and/or occur at high incidence, representing slight deviations from normal) or malformations (those structural anomalies that alter general body conformity, disrupt or interfere with normal 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 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:

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

Where:

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

5.3. DATA ACQUISITION AND ANALYSIS

5.3.1. ACQUISITION AND REPORTING

Program/System	Description
Archive Management System (AMS)	In-house developed application for storage, maintenance, and retrieval of information for archived materials (<i>e.g.</i> , lab books, study data, wet tissues, slides, <i>etc.</i>)
InSight [®] Publisher	Electronic publishing system (output is Adobe Acrobat, PDF)
Master Schedule	Maintains the master schedule for the company.
Metasys DDC Electronic Environmental Control System	Controls and monitors animal room environmental conditions.
Microsoft [®] Office 2002 and 2007	Used in conjunction with the publishing software to generate study reports.
Provantis Dispense [™]	Comprehensive system (Instem LSS Limited) to manage test materials, including receipt, formulation instructions, and accountability.

Program/System	Description
WIL Formulations Dispense System (WFDS)	In-house developed system for use in conjunction with Provantis Dispense™ to ensure proper storage and use of formulations.
WIL Metasys	In-house developed system used to record and report animal room environmental conditions.
WIL Toxicology Data Management System™ (WTDMS™)	In-house developed system used for collection and reporting of in-life and <i>postmortem</i> data.

Note: Version numbers of WTDMS™ programs used for the study are presented on the report data tables (reporting programs); version numbers and release dates are otherwise maintained in the study records and/or facility records.

5.3.2. STATISTICAL ANALYSES

All statistical tests were performed using WTDMS™ unless otherwise noted. Analyses were conducted using two-tailed tests (except as noted otherwise) for minimum significance levels of 1% and 5%, comparing each test substance-treated group to the vehicle control group (Group 2). In addition, the vehicle control group (Group 2) was compared separately to the sham control group (Group 1). Each mean was presented with the standard deviation (S.D.), standard error (S.E.), and the number of animals (N) used to calculate the mean. Due to the use of significant figures and the different rounding conventions inherent in the types of software used, the means and standard deviations on the summary and individual tables may differ slightly. Therefore, the use of reported individual values to calculate subsequent parameters or means will, in some instances, yield minor variations from those listed in the report data tables. Where applicable, the litter was used as the experimental unit.

Mean maternal body weights (absolute and net), body weight changes (absolute and net), and food consumption, gravid uterine weights, numbers of corpora lutea, implantation sites, and viable fetuses, fetal body weights (separately by sex and combined), and organ weights were subjected to a parametric one-way ANOVA (Snedecor and Cochran, 1980) to determine intergroup differences. If the ANOVA revealed significant ($p < 0.05$) intergroup variance, Dunnett's test (Dunnett, 1964) or a two-sample t-test (Snedecor and Cochran, 1980), as appropriate, was used to compare the test substance-treated groups to

the vehicle control group and the vehicle control group to the sham control group. Mean litter proportions (percent per litter) of prenatal data (viable and nonviable fetuses, early and late resorptions, total resorptions, pre- and postimplantation loss, and fetal sex distribution), total fetal malformations and developmental variations (external, visceral, skeletal, and combined) and each particular external, visceral, and skeletal malformation or variation were subjected to the Kruskal-Wallis nonparametric ANOVA test (Kruskal and Wallis, 1952) to determine intergroup differences. If the ANOVA revealed significant ($p < 0.05$) intergroup variance, Dunn's test (Dunn, 1964) was used to compare the test substance-treated groups to the vehicle control group and the vehicle control group to the sham control group.

6. RESULTS

6.1. ANALYSES OF DOSING FORMULATIONS

Analyses of Dosing Formulations Report: Appendix C

The analyzed dosing formulations were within WIL Research's SOP range for suspensions (85% to 115%) and were homogeneous. Based on these results, the protocol-specified dosages of test substance were administered to the animals. The test substance was not detected in the vehicle formulation that was administered to the control group (Group 1).

Results of the analyses of dosing formulations are summarized below.

Text Table 1. Results of Homogeneity/Concentration Analyses

	Group 3 (66.7 mg/mL)	Group 4 (300 mg/mL)	Group 5 (500 mg/mL)
Homogeneity and Concentration Assessment of the 19 September 2011 Formulations			
Mean Concentration (mg/mL)	69.0	309	522
RSD (%)	0.61	0.84	0.74
Mean Concentration % of Target	103	103	104
Homogeneity and Concentration Assessment of the 6 October 2011 Formulations			
Mean Concentration (mg/mL)	67.8	277	513
RSD (%)	0.37	1.0	0.78
Mean Concentration % of Target	102	92.4	103

6.2. MATERNAL CLINICAL OBSERVATIONS AND SURVIVAL

Summary Data: Table S1, Table S2, Table S3

Individual Data: Table A1, Table A2, Table A3

Test substance-related mortality and moribundity was noted at 750 mg/kg/day. In the 750 mg/kg/day group, female no. 26715 was euthanized *in extremis* on gestation day 13 following clinical findings of body pale and cool to touch and red vaginal discharge at the daily examination and/or 1 to 2 hours following dose administration on the day prior to

and/or on the day of euthanasia. In addition, female no. 26615 in the 750 mg/kg/day group was found dead on gestation day 16; red vaginal discharge was noted for this female at the daily examination on the day prior to death. Both females had red material around the eyes and nose and/or hair loss on the forelimbs at the daily examinations generally during gestation days 2 through death/euthanasia. All other females survived to the scheduled euthanasia.

Test substance-related clinical findings were noted in the 450 and 750 mg/kg/day groups at the daily examinations and/or 1 to 2 hours following exposure. Increased incidences of yellow material around the urogenital area were noted in these groups primarily at the initiation of test substance exposure (gestation days 1-5) at the daily examinations. Dose-related increases in red material around the urogenital area, red vaginal discharge, and body pale and cool to touch were noted at 450 and/or 750 mg/kg/day primarily during the latter part of test substance exposure (gestation days 9-20); body pale and cool to touch were noted at the daily examinations whereas red material around the urogenital area and red vaginal discharge were noted at the daily examinations and 1 to 2 hours following dose administration.

Text Table 2. Clinical Observations

Clinical Observations ^a	Dosage (mg/kg/day)					Duration ^b
	0 (sham)	0 (vehicle)	100	450	750	
Daily Examinations						
yellow material urogenital area	0/0	1/1	5/4	17/12	17/10	GD 1-5
red material urogenital area	0/0	0/0	0/0	2/1	28/12	GD 9-20
body cool	0/0	0/0	0/0	4/4	10/8	GD 9-20
body pale	0/0	0/0	0/0	0/0	8/6	GD 13-20
red vaginal discharge	0/0	0/0	0/0	13/11	49/25	GD 11-20
1-2 Hours Post-Dosing						
red material urogenital area	0/0	0/0	0/0	1/1	6/4	GD 14-19
red vaginal discharge	1/1	3/3	5/5	8/5	26/15	GD 12-19

^a = Presented as total occurrences/number of animals.

^b = Primarily during these intervals.

GD = Gestation Days

Red material around the eyes and nose and lacrimation of the eyes were noted for all females in all groups, including the sham and vehicle control groups, throughout the treatment period (gestation days 0-20). Because these findings were found at similar frequencies in the sham control group, they are likely attributed to the animals' inability to groom and discomfort caused by the collar; therefore, these findings were not attributed to test substance administration.

No other test substance-related clinical findings were noted at the daily examinations or 1 to 2 hours following dose administration at any exposure level. Other findings noted in the test substance-treated groups, including hair loss on various body surfaces and scabbing on the forelimbs, occurred infrequently, at similar frequencies in the vehicle control group, and/or in a manner that was not dose-related.

6.3. DERMAL OBSERVATIONS

Summary Data: Table S4

Individual Data: Table A4

Test substance-related dermal observations consisting of very slight to moderate erythema, very slight to slight edema, and desquamation were noted in 24 of 25 females in the 750 mg/kg/day group throughout the treatment period (gestation days 1-20).

No remarkable dermal observations were noted in the 100 and 450 mg/kg/day groups. Observations noted in these groups occurred infrequently, at similar frequencies in the vehicle control group, and/or in a manner that was not dose-related.

Dermal observations noted in the vehicle control group were similar to the sham control group. Differences from the sham control group were slight and attributed to biological variability.

6.4. MATERNAL BODY WEIGHTS AND GRAVID UTERINE WEIGHTS

Summary Data: Table S5, Table S6, Table S7

Individual Data: Table A5, Table A6, Table A7

In the 450 and 750 mg/kg/day groups, test substance-related lower mean body weight gains and/or losses were noted at the beginning of the treatment period (gestation days 0-3, 3-6, and 6-9). Significance ($p < 0.01$) was achieved in the 750 mg/kg/day group during gestation days 6-9. In the 750 mg/kg/day group, significantly ($p < 0.01$) lower mean body weight gains/losses continued to be noted when compared to the vehicle control group throughout the remainder of the treatment period (9-12, 12-15, 15-18, and 18-20). In the 450 mg/kg/day group, mean body weight gains were similar to the vehicle control group during gestation days 9-12, but were then lower throughout the remainder of the treatment period (gestation days 12-15, 15-18, and 18-20); significance ($p < 0.05$) was achieved during gestation days 18-20. As a result, significantly ($p < 0.01$) lower mean body weight gains were noted in these groups for the overall treatment period (gestation days 0-20). In addition, mean body weights in these groups were significantly ($p < 0.01$ or $p < 0.05$) lower than the vehicle control group on gestation days 9-20 at 450 mg/kg/day (5.3% to 9.8% lower) and on gestation days 6-20 at 750 mg/kg/day (4.5% to 25.3% lower). Mean net body weights and net body weight gains in the 450 and 750 mg/kg/day groups were also significantly ($p < 0.01$ or $p < 0.05$) lower than the vehicle control group. Significantly ($p < 0.01$) lower mean gravid uterine weights noted in these groups were due to the decreased number of viable fetuses and lower fetal weights noted in these groups (see Section 6.6.3.). The decreased number of viable fetuses in the 450 and 750 mg/kg/day groups also contributed to the lower body weights and body weight losses/reduced body weight gains in these groups during the latter part of gestation (see Section 6.6.3.).

Mean maternal body weights, body weight gains, net body weight, net body weight gain, and gravid uterine weight in the 100 mg/kg/day group were similar to the vehicle control group. Differences from the vehicle control group were slight and not statistically significant.

Mean maternal body weights, body weight gains, net body weight, net body weight gain, and gravid uterine weight in the vehicle control group were similar to the sham control group. Differences from the sham control group were slight and not statistically significant.

6.5. MATERNAL FOOD CONSUMPTION

Summary Data: Table S8, Table S9

Individual Data: Table A8, Table A9

Test substance-related, lower mean food consumption, evaluated as g/animal/day and g/kg/day, was noted in the 450 and 750 mg/kg/day groups generally throughout the treatment period (gestation days 0-3, 3-6, 6-9, 9-12, 12-15, 15-18, and 18-20) and when the entire treatment period (gestation days 0-20) was evaluated. Differences from the vehicle control group were generally significant ($p < 0.01$ or $p < 0.05$) when evaluated as g/animal/day and were occasionally significant ($p < 0.01$ or $p < 0.05$) when evaluated as g/kg/day. The lower mean food consumption noted in these groups corresponded to the lower mean body weight gains and/or losses noted during the treatment period.

Maternal food consumption in the 100 mg/kg/day group was unaffected by test substance administration. Differences from the vehicle control group were slight and not statistically significant.

Mean food consumption in the vehicle control group was generally similar to the sham control group, with the following exceptions. Transient, significantly ($p < 0.01$) higher mean food consumption values were noted in the vehicle control group during gestation days 15-18. In addition, a significantly ($p < 0.01$) slightly higher g/kg/day mean food consumption value was noted when the entire treatment period (gestation days 0-20) was

evaluated compared to the sham control group; however, the magnitude of change was small (only 3 g/kg) and there was no corresponding effect when evaluated on a g/animal/day basis. No corresponding effects on mean body weight were noted in the vehicle control group, therefore, the aforementioned changes were attributed to biological variability.

6.6. ANATOMIC PATHOLOGY AND LAPAROHYSTERECTOMY

6.6.1. MACROSCOPIC EXAMINATIONS

Summary Data: Table S10

Individual Data: Table A10

Test substance-related mortality and moribundity were noted at 750 mg/kg/day. In the 750 mg/kg/day group, female no. 26715 was euthanized *in extremis* on gestation day 13 and female no. 26615 was found dead on gestation day 16; both females were noted with red matting on the skin on the urogenital area; this macroscopic finding correlated with the red vaginal discharge finding noted for these females. Female no. 26715 was noted with 15 normally developing implantations and 1 early resorption *in utero* and female no. 26615 had an entirely resorbed litter (17 early resorptions). All other females in the 750 mg/kg/day group survived to the scheduled necropsy.

At the scheduled necropsy on gestation day 20, small thymus was noted in 5 females in the 750 mg/kg/day group and was considered test substance-related. This finding corresponded to the significantly lower mean thymus weight observed in this group (see Section 6.6.2.).

No test substance-related internal findings were observed at dosage levels of 100 and 450 mg/kg/day. Macroscopic findings observed in these groups occurred infrequently and/or in a manner that was not dose-related. All females in all groups were determined to be gravid.

No remarkable macroscopic findings were noted in the vehicle control group compared to the sham control group. Findings noted in the vehicle control group were limited to single females.

6.6.2. ORGAN WEIGHTS

Summary Data: Table S11, Table S12

Individual Data: Table A11, Table A12, Table A13, Table A14

Test substance-related, lower mean thymus weights (absolute and relative to brain weight) were noted in the 450 and 750 mg/kg/day groups compared to the vehicle control group; the differences were significant ($p < 0.01$) in the 750 mg/kg/day group. Mean absolute thymus weights at 450 and 750 mg/kg/day were 16.7% and 53.7% lower, respectively, than the vehicle control group. Mean liver weights (absolute and relative to brain weight) and absolute brain weights in the 450 and 750 mg/kg/day groups were similar to the vehicle control group.

No test substance-related effects on organ weights (absolute and relative to brain weight) were observed in the 100 mg/kg/day. Differences from the vehicle control group were slight and not statistically significant.

Mean organ weights (absolute and relative to brain weight) in the vehicle control group were similar to the sham control group. Differences from the sham control group were slight and not statistically significant.

6.6.3. GESTATION DAY 20 LAPAROHYSTERECTOMY DATA

Summary Data: Table S13, Table S14

Individual Data: Table A15, Table A16, Table A17

Historical Control Data: Appendix F

The mean litter proportion of postimplantation loss (primarily early resorptions) in the 450 and 750 mg/kg/day groups (19.4% and 79.1% per litter, respectively) was higher than the vehicle control group (7.2% per litter). The difference was significant ($p < 0.01$).

in the 750 mg/kg/day group when compared to the vehicle control group and the value in both the 450 and 750 mg/kg/day groups exceeded the maximum mean value in the WIL historical control data (9.9% per litter). Five of the 23 surviving females in the 750 mg/kg/day group had 100% early resorptions; the female that was found dead also had an entirely resorbed litter. Corresponding lower mean numbers and litter proportions of viable fetuses were noted in the 450 and 750 mg/kg/day groups (12.5 and 3.3 fetuses per dam, respectively, and 80.6% and 20.9% per litter, respectively) compared to the vehicle control group (14.4 fetuses and 92.8% per litter, respectively). The differences were significant ($p < 0.01$) in the 750 mg/kg/day group when compared to the vehicle control group and the values in both the 450 and 750 mg/kg/day groups were generally below the minimum mean values in the WIL historical control data (12.2 fetuses per dam and 90.1% per litter, respectively). Additionally, mean male, female, and combined fetal weights in the 450 (3.2 g, 3.0 g, and 3.1 g, respectively) and 750 (2.8 g, 2.5 g, and 2.7 g, respectively) mg/kg/day groups were significantly ($p < 0.01$) lower than the vehicle control group (3.8 g, 3.6 g, and 3.7 g, respectively). The values were below the minimum mean values in the WIL historical control data (3.5 g, 3.4 g, and 3.4 g, respectively). Mean numbers of corpora lutea and implantation sites and fetal sex ratios in these groups were unaffected by test substance administration.

Intrauterine growth and survival were unaffected by test substance administration at 100 mg/kg/day. Differences from the vehicle control group were slight and not statistically significant.

Intrauterine growth and survival in the vehicle control group were similar to the sham control group. Differences from the sham control group were slight and not statistically significant with the following exception. Mean fetal sex ratios in the vehicle control group were significantly ($p < 0.05$) different from the sham control group; these values were within the range of the WIL historical control data and the differences were attributed to biological variability.

6.7. FETAL MORPHOLOGICAL DATA

Summary Data: Table S15, Table S16, Table S17, Table S18

Individual Data: Table A18

Historical Control Data: Appendix F

The numbers of fetuses (litters) available for morphological evaluation were 365(24), 361(25), 339(25), 312(25), and 75(18) in the sham control, vehicle control, 100, 450, and 750 mg/kg/day groups, respectively. Malformations were observed in 1(1), 2(2), 1(1), 4(4), and 1(1) fetuses (litters) in these same respective dose groups and were considered spontaneous in origin.

6.7.1. EXTERNAL MALFORMATIONS AND VARIATIONS

No test substance-related external malformations were noted for fetuses in the test substance-treated groups. In the 450 mg/kg/day group, fetus nos. 26622-16 and 26628-13 were noted with microphthalmia (left) and a cleft palate (entire length), respectively. Skeletal examination of the fetus with microphthalmia described the left orbit being smaller than normal. These malformations were not noted in the 750 mg/kg/day group; however, there were limited numbers of fetuses available for evaluation at 750 mg/kg/day. Cleft palate is the most common external malformation noted in the WIL historical control data and was only noted in a single low weight (2.6 g) fetus; therefore, this malformation was not considered test substance-related. Microphthalmia was also noted in 1 fetus each in the sham control and vehicle control groups; therefore, this malformation was not considered test substance-related.

In the vehicle control group, fetus nos. 26573-03 and 26676-06 were noted with a facial cleft (bilateral upper rostral region) and microphthalmia (right), respectively. Skeletal examination of the fetus with the facial cleft (no. 26573-03) revealed reduced ossification of the nasal, premaxilla, and maxilla bones and the nasal bones were fused along the internasal suture. Skeletal examination of the fetus with microphthalmia (no. 26676-06) revealed the right orbit being smaller than normal. In the sham control group, fetus

no. 26599-01 had exencephaly without open eyelid (bilateral) and microphthalmia (right). Skeletal examination of the fetus with exencephaly revealed absent frontal and parietal bones and microphthalmia with no apparent skeletal origin.

No external developmental variations were noted in fetuses in this study.

6.7.2. VISCERAL MALFORMATIONS AND VARIATIONS

No test substance-related visceral malformations were noted for fetuses in the test substance-treated groups. Two fetuses in the 450 mg/kg/day group were noted with visceral malformations. Fetus no. 26656-02 was noted with an absent kidney and ureter (left) and fetus no. 26675-08 had situs inversus (trachea, esophagus, heart, great and major vessels, lungs, liver, stomach, pancreas, spleen, kidneys, adrenal glands, and intestine laterally transposed). Fetus no. 26627-07 in the 100 mg/kg/day group was noted with an interventricular septal defect consisting of a 1 mm in diameter opening in the anterior portion of the septum. These visceral malformations were not noted in the 750 mg/kg/day group; however, there were limited numbers of fetuses available for evaluation at 750 mg/kg/day. These malformations were not considered test substance-related as they occurred in single fetuses, were not statistically significant from the vehicle control group when evaluated on a proportional basis, and/or the mean litter proportions were within the WIL historical control data range. No visceral malformations were noted in the sham control or vehicle control groups.

Visceral developmental variations in the test substance-treated groups consisted of renal papilla(e) not developed, pale and/or small spleen, accessory lobule(s) of the liver, accessory spleen, hemorrhagic ring around the iris, and/or major blood vessel variation (right carotid and subclavian arteries arose independently from the aortic arch [no brachiocephalic trunk]). These visceral developmental variations were not considered to be test substance-related as they occurred infrequently, did not occur in a dose-related manner, were not statistically significant from the vehicle control group when evaluated

on a proportional basis, and/or the mean litter proportions were within the ranges of the WIL developmental historical control data.

No significant differences in visceral developmental variations were noted between the vehicle control and sham control groups. Seven fetuses in 4 litters in the vehicle control group were noted with renal papilla(e) not developed and/or distended ureter(s); the mean litter proportion for this finding was within the ranges of the WIL developmental historical control data.

White area(s) of the liver were noted for fetus no. 26582-14 in the vehicle control group. Renal papilla(e) that were not fully developed (Woo and Hoar Grade 1) were noted for fetus no. 26665-05 in the vehicle control group, fetus nos. 26612-05 and 26648-17 in the 100 mg/kg/day group, and fetus nos. 26611-08, 26628-11, 26629-01, 26629-09, and 26629-11 in the 450 mg/kg/day group. These findings were not considered test substance-related as they occurred in single fetuses, similarly in the vehicle control group, and/or in a manner that was not dose-related, and were not classified as either a malformation or developmental variation, and were not included in any tabulation.

6.7.3. SKELETAL MALFORMATIONS AND VARIATIONS

There were no test substance-related skeletal malformations noted for fetuses in the test substance-treated groups. Fetus no. 26620-16 in the 750 mg/kg/day group was noted with a vertebral anomaly with associated rib anomaly consisting of absent arch and centra and fused ribs. In the 100 and 450 mg/kg/day groups, fetus nos. 26627-07 and 26675-08, respectively, had sternoschisis consisting of sternal bands not joined (entire length) and sternal band no. 2 not joined, respectively. These findings did not occur in a dose-related manner, were noted in single fetuses, and/or the mean litter proportions were within the range of values in the WIL historical control data, and therefore were not considered test substance-related. In the vehicle control group, fetus no. 26676-06 (with the external finding of microphthalmia) was noted with rib and costal cartilage anomalies consisting of fused ribs and fused and bifurcated costal cartilages.

Test substance-related skeletal developmental variations occurred in the 450 and 750 mg/kg/day groups. Higher incidences and mean litter proportions of reduced ossification of the skull, pubis unossified, reduced ossification of the vertebral arches, metacarpal(s) and/or metatarsal(s) unossified, sternebra(e) nos. 5 and/or 6 unossified, sternebra(e) nos. 1, 2, 3, and/or 4 unossified, entire sternum unossified, and unco-ossified vertebral centra were noted. In addition, lower incidence and mean litter proportion of cervical centrum no. 1 ossified was noted in the 450 and 750 mg/kg/day groups. Each aforementioned skeletal developmental variation was outside of the ranges in the WIL historical control data for both the 450 and/or 750 mg/kg/day groups. The reduced ossification findings were indicators of developmental delay and correlated with lower fetal weights noted in these groups. The mean litter proportion for sternebra(e) nos. 5 and/or 6 unossified achieved significance ($p < 0.01$) in both the 450 and 750 mg/kg/day groups.

Text Table 3. Skeletal Developmental Variations

Dose (mg/kg):	0 ^a	100	450	750	WIL HC Mean (Range)
Skeletal Developmental Variations:					
Absolute no. (% per litter)					
Reduced ossification of the skull	0 (0.0)	0 (0.0)	7 (2.9)	6 (14.7)	0.1 (0.0-1.0)
Pubis unossified	0 (0.0)	0.0	1 (0.3)	3 (3.6)	0.1 (0.0-2.3)
Reduced ossification of the vertebral arches	0 (0.0)	0 (0.0)	2 (0.8)	12 (22.5)	0.1 (0.0-1.1)
Metacarpal(s) and/or metatarsal(s) unossified	0 (0.0)	0 (0.0)	0 (0.0)	3 (4.0)	NA
Sternebra(e) nos. 5 and/or 6 unossified	42 (10.8)	59 (18.1)	132 (42.6**)	46 (62.6**)	6.4 (0.0-26.1)
Sternebra(e) nos. 1, 2, 3, and/or 4 unossified	1 (0.2)	1 (0.3)	8 (2.4)	3 (3.2)	0.2 (0.0-1.3)
Entire sternum unossified	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.8)	0.0 (0.0-0.4)
Unco-ossified vertebral centra	0 (0.0)	0 (0.0)	0 (0.0)	4 (5.6)	0.0 (0.0-0.5)
Cervical centrum no. 1 ossified	35 (9.7)	71 (19.8)	14 (3.9)	6 (7.2)	20.4 (6.6-35.8)

^a = Vehicle control.

WIL HC = WIL developmental historical control data presented as % per litter.

** = Significantly different from the vehicle control group at 0.01 using Dunnett's test.

Other skeletal developmental variations observed in the test substance-treated groups consisted of 14th rudimentary rib(s), 27 presacral vertebrae, 7th cervical rib(s), sternebra(e) malaligned (slight or moderate), reduced ossification of the 13th rib(s), and bent rib(s). These findings occurred infrequently or at a frequency similar to the vehicle control group, did not occur in a dose-related manner, and/or the mean litter proportions were within the WIL historical control data range.

No remarkable differences in skeletal malformations or developmental variations were noted between the vehicle control and sham control groups.

6.7.4. SUMMARY OF EXTERNAL, VISCERAL, AND SKELETAL EXAMINATIONS

The numbers of fetuses (litters) available for morphological evaluation were 365(24), 361(25), 339(25), 312(25), and 75(18) in the sham control, vehicle control, 100, 450, and 750 mg/kg/day groups, respectively. Malformations were observed in 1(1), 2(2), 1(1), 4(4), and 1(1) fetuses (litters) in these same respective dose groups and were considered spontaneous in origin.

Test substance-related skeletal developmental variations consisted of increased incidences of reduced ossification of the skull, pubis unossified, reduced ossification of the vertebral arches, metacarpal(s) and/or metatarsal(s) unossified, sternebra(e) nos. 5 and/or 6 unossified, sternebra(e) nos. 1, 2, 3, and/or 4 unossified, entire sternum unossified, and unco-ossified vertebral centra, and decreased incidences of cervical centrum no. 1 ossified in the 450 and 750 mg/kg/day groups. When the total developmental variations were evaluated on a proportional basis, the values in the 450 and 750 mg/kg/day groups (50.5% and 84.1% per litter, respectively) were significantly ($p < 0.01$ or $p < 0.05$) higher than the vehicle control group (27.2% per litter). These differences were primarily due to the significantly ($p < 0.01$ or $p < 0.05$) higher mean litter proportion of skeletal developmental variations noted in these groups were indicators of developmental delay and correlated to the lower fetal weights.

Fetal malformations and developmental variations noted in the 100 mg/kg/day group occurred infrequently or at a frequency similar to that in the vehicle control group, did not occur in a dose-related manner, and/or the mean litter proportions were within the WIL historical control data ranges.

No significant differences in fetal malformations or developmental variations were noted when the vehicle control group was compared to the sham control group.

7. DISCUSSION

The objectives of the study were to determine the effects of prenatal, dermal exposure to the test substance on pregnant rats and developing offspring, to provide data to verify/expand the domain of the polycyclic aromatic compounds (PAC) prenatal models for predicting the toxicity of high-boiling petroleum substances from their PAC content, and to further test the hypothesis that developmental toxicity endpoints are more sensitive to effects of high-boiling petroleum substances than other reproductive endpoints, such as fertility or reproductive organ weight and histopathology.

Developmental toxicity was evident at exposure levels of 450 and 750 mg/kg/day. Increased mean litter proportions of postimplantation loss (primarily early resorptions) with corresponding decreases in the mean numbers and litter proportions of viable fetuses were noted at these exposure levels; differences were statistically significant at 750 mg/kg/day. Five of the 23 surviving females in the 750 mg/kg/day group had 100% early resorptions; the female that was found dead also had an entirely resorbed litter. Additionally, mean fetal weights in the 450 and 750 mg/kg/day group were approximately 16.2% and 27.0% lower (statistically significant), respectively, than the vehicle control group. Test substance-related skeletal developmental variations (reduced ossification of the skull, pubis unossified, reduced ossification of the vertebral arches, sternebra(e) nos. 5 and/or 6 unossified, cervical centrum no.1 ossified, and sternebra(e) nos. 1, 2, 3, and/or 4 unossified [metacarpal(s) and/or metatarsal(s) unossified, entire sternum unossified, and unco-ossified vertebral centra noted in the 750 mg/kg/day group only]) were noted in these groups and were indicators of developmental delay and correlated to the lower fetal weights. These differences resulted in lower mean gravid uterine weights in these groups. There were no test substance-related malformations noted at 450 and 750 mg/kg/day.

Maternal toxicity was evident in the presence of developmental toxicity at 450 and 750 mg/kg/day. Mortality and moribundity were noted in the 750 mg/kg/day group, as 1 female was euthanized in extremis on gestation day 13 and 1 female was found dead on

gestation day 16. All other females survived to the scheduled necropsy on gestation day 20. Test substance-related clinical findings (yellow and/or red material around the urogenital area, red vaginal discharge and/or body pale and cool to touch) were noted at the daily examinations and/or 1 to 2 hours following exposure in both the 450 and 750 mg/kg/day groups, and dermal observations consisting of very slight to moderate erythema, very slight to slight edema, and desquamation were noted in the 750 mg/kg/day group.

Lower mean body weight gains and/or losses and reduced food consumption were noted in both the 450 and 750 mg/kg/day groups generally throughout the entire treatment period; differences were statistically significant from gestation days 18-20 at 450 mg/kg/day and generally throughout the treatment period at 750 mg/kg/day. As a result, mean body weights in these groups were 9.8% and 25.3% lower than the control group on gestation day 20. In addition, statistically significantly lower net body weights and net body weight gains were noted at 450 and 750 mg/kg/day. Lower mean thymus weights were also noted in the 450 and 750 mg/kg/day groups; the difference was statistically significant at 750 mg/kg/day. The lower thymus weights at 750 mg/kg/day correlated with the macroscopic finding of small thymus for 5 females.

There was no evidence of maternal toxicity at the exposure level of 100 mg/kg/day. In addition, intrauterine growth, survival, and fetal morphology at 100 mg/kg/day were unaffected by maternal test substance exposure.

The vehicle control group performed similarly to the sham control group during the study, indicating that the vehicle (mineral oil) does not produce maternal or developmental toxicity.

8. CONCLUSIONS

Mortality and moribundity, as well as dermal observations were noted in maternal animals at 750 mg/kg/day. In addition, adverse clinical findings, reductions in food consumption and corresponding lower mean body weight gains or losses, and lower thymus weights (absolute and relative to brain weight) were noted at dosage levels of 450 and/or 750 mg/kg/day. No evidence of maternal toxicity was noted at 100 mg/kg/day. Therefore, a dosage level of 100 mg/kg/day was considered to be the no-observed-adverse-effect level (NOAEL) for maternal toxicity. Increased postimplantation loss with corresponding decreased mean numbers and litter proportions of viable fetuses, as well as lower mean fetal weights and reduced fetal skeletal ossification indicative of developmental delay were noted at 450 and 750 mg/kg/day. Therefore, a dosage level of 100 mg/kg/day was considered to be the NOAEL for embryo/fetal development when distillates (petroleum), light catalytic cracked was administered by dermal application to bred CrI:CD(SD) rats.

9. REPORT REVIEW AND APPROVAL

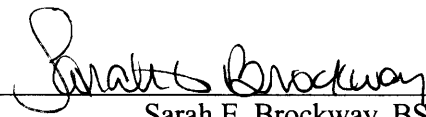
Report Authored and Approved By:



Jeffrey H. Charlap, MS
Staff Toxicologist, Developmental
and Reproductive Toxicology
Study Director

12 July 2012
Date

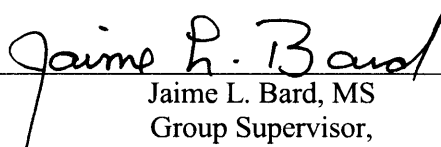
Report Prepared By:



Sarah E. Brockway, BS
Associate Study Analyst

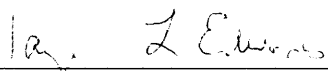
12 July 2012
Date

Report Reviewed By:



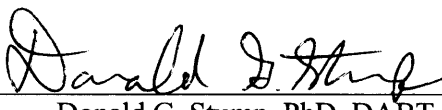
Jaime L. Bard, MS
Group Supervisor,
Reporting & Technical Support Services

11 Jul 2012
Date



Tammye L. Edwards, BS
Senior Toxicologist, Developmental
and Reproductive Toxicology

12 Jul 2012
Date



Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology

12 Jul 2012
Date

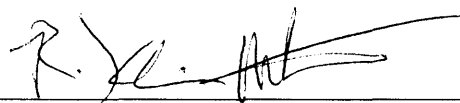
10. QUALITY ASSURANCE STATEMENT

<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>
31-Aug-2011	Protocol Review	31-Aug-2011	26-Sep-2011
09-Sep-2011	Protocol Amendment 1	09-Sep-2011	25-Oct-2011
09-Sep-2011	Protocol Amendment 2	09-Sep-2011	25-Oct-2011
19-Sep-2011	Cohabitation	19-Sep-2011	25-Oct-2011
20-Sep-2011	Protocol Amendment 3	20-Sep-2011	25-Oct-2011
20-Sep-2011	Confirmation of Breeding	20-Sep-2011	25-Oct-2011
20-Sep-2011	Test Article Administration	20-Sep-2011	25-Oct-2011
27-Oct-2011, 28-Oct-2011	Skeletals	28-Oct-2011	28-Nov-2011
03-Nov-2011	Protocol Amendment 4	03-Nov-2011	20-Dec-2011
03-Nov-2011, 04-Nov-2011, 07-Nov-2011, 08-Nov-2011	Study Records (I-1)	08-Nov-2011	20-Dec-2011
08-Nov-2011	Study Records (I-2)	08-Nov-2011	20-Dec-2011
08-Nov-2011	Study Records (Rx-2)	08-Nov-2011	20-Dec-2011
08-Nov-2011	Study Records (Rx-1)	08-Nov-2011	20-Dec-2011
09-Nov-2011	Protocol Amendment 5	09-Nov-2011	20-Dec-2011
01-Dec-2011	Study Records (N-1)	01-Dec-2011	16-Jan-2012
02-Dec-2011	Study Records (A-1)	02-Dec-2011	16-Jan-2012
08-Dec-2011	Analytical Chemistry Report	08-Dec-2011	16-Jan-2012
15-Dec-2011	Draft Report without Analyses of Dosing Formulations Appendix	15-Dec-2011	16-Jan-2012
21-Dec-2011	Study Records (N-2)	21-Dec-2011	16-Jan-2012

<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>
21-Dec-2011	Audited Draft Report without Analyses of Dosing Formulations Appendix	21-Dec-2011	16-Jan-2012
21-Dec-2011	Audited Analytical Chemistry Report	21-Dec-2011	16-Jan-2012
11-Jul-2012, 12-Jul-2012	Final Report	12-Jul-2012	12-Jul-2012

This study was inspected in accordance with the United States EPA GLP Standards (40 CFR Part 792), the OECD Principles of GLP [c(97)186/Final], WIL Research's SOPs, and the Sponsor's protocol and protocol amendments, with the following exception. The data located in Appendix B (Test Substance Characterization) were the responsibility of the Sponsor. A yearly internal facility inspection is conducted by the WIL Research Quality Assurance Department. A status report is submitted to management monthly.

This report accurately reflects the data generated during the study. The methods and procedures used in the study were those specified in the protocol, its amendments, and WIL Research's SOPs.



R. Kelvin Mentzer, BS, RQAP-GLP
Quality Assurance Representative

12 Jul 2012

Date

11. REFERENCES

Bodle, E.S. Analytical Validation and Stability Study of Distillates (Petroleum), Light Catalytic Cracked in Mineral Oil Formulations (Study No. WIL-402027). WIL Research Laboratories, LLC, Ashland, OH, **2011**.

Dawson, A.B. A note on the staining of the skeleton of cleared specimens with Alizarin Red S. *Stain Technology* **1926**, *1*, 123-124.

Draize, J.H. The appraisal of the safety of chemicals in food, drugs, and cosmetics. *Dermal Toxicity* **1965**, 46-59.

Dunn, O.J. Multiple comparisons using rank sums. *Technometrics* **1964**, *6*(3), 241-252.

Dunnett, C.W. New tables for multiple comparisons with a control. *Biometrics* **1964**, *20*, 482-491.

Inouye, M. Differential staining of cartilage and bone in fetal mouse-skeleton by Alcian blue and Alizarin red S. *Congenital Anomalies* **1976**, *16*, 171-173.

Freireich, E.J.; Gehan, E.A.; Rall, D.P.; Schmidt, L.H.; Skipper, H.E. Quantitative Comparison Toxicity of Anticancer Agents in Mouse, Rat, Hamster, Dog, Monkey, and Man. *Cancer Chemotherapy Reports* **1966**, *50*(4), 219-244.

Kruskal, W.H.; Wallis, W.A. Use of ranks in one-criterion variance analysis. *Journal of the American Statistical Association* **1952**, *47*, 583-621.

National Research Council. *Guide for the Care and Use of Laboratory Animals*, Institute of Laboratory Animal Resources, Commission on Life Sciences; National Academy Press: Washington, DC, **1996**.

Snedecor, G.W.; Cochran, W.G. One-Way Classifications; Analysis of Variance. In *Statistical Methods*, 7th ed.; The Iowa State University Press: Ames, IA, **1980**; pp 215-237.

Stuckhardt, J.L.; Poppe, S.M. Fresh visceral examination of rat and rabbit fetuses used in teratogenicity testing. *Teratogenesis, Carcinogenesis and Mutagenesis* **1984**, *4*, 181-188.

Wilson, J.G. Embryological Considerations in Teratology. In *Teratology: Principles and Techniques*; Wilson, J.G. and Warkany, J., Eds.; The University of Chicago Press: Chicago, IL, **1965**; pp 251-277.

Woo, D.C.; Hoar, R.M. Apparent hydronephrosis as a normal aspect of renal development in late gestation of rats: the effect of methyl salicylate. *Teratology* **1972**, 6, 191-196.

12. DATA RETENTION

The Sponsor has title to all documentation records, raw data, specimens, or other work product generated during the performance of the study. Any remaining dosing formulation samples were discarded upon issuance of the final report. All remaining work product generated by WIL Research, including raw paper data and specimens, are retained in the WIL Research Archives as specified in the study protocol.

Reserve samples of the test substance, pertinent electronic storage media, and the original final report are retained in the WIL Research Archives in compliance with regulatory requirements.

13. ABBREVIATIONS

The following abbreviations may apply to this report:

μ	-	micro
AAALAC	-	Association for Assessment and Accreditation of Laboratory Animal Care
ANOVA	-	analysis of variance
cm	-	centimeter
dB	-	decibels
dL	-	deciliter
EPA	-	Environmental Protection Agency
exp.	-	expiration
g	-	gram
GLP	-	Good Laboratory Practices
hr	-	hour(s)
kg	-	kilogram
L	-	liter
M	-	molar
mg	-	milligram
mL	-	milliliter
mm	-	millimeter
ms	-	milliseconds
mM	-	millimolar
NA	-	not applicable
no.	-	number
OECD	-	Organisation for Economic Cooperation and Development
OPPTS	-	Office of Prevention, Pesticides, and Toxic Substances
PAC	-	polycyclic aromatic compounds
ppm	-	parts per million
RSD	-	Relative standard deviation
SOP	-	standard operating procedure
TSCA	-	Toxic Substances Control Act
USP	-	United States Pharmacopeia
WIL Research	-	WIL Research Laboratories, LLC
WTDMS™	-	WIL Toxicology Data Management System
wt.	-	weight
wt.	-	weights

TABLES S1 - S18

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S1
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF MATERNAL SURVIVAL AND PREGNANCY STATUS

PAGE 1

DOSE GROUP :	1		2		3		4		5	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
FEMALES ON STUDY	25		25		25		25		25	
FEMALES THAT ABORTED OR DELIVERED	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
FEMALES THAT DIED	0	0.0	0	0.0	0	0.0	0	0.0	1	4.0
FEMALES THAT ABORTED	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NONGRAVID	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
GRAVID	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
FEMALES THAT WERE EUTHANIZED	0	0.0	0	0.0	0	0.0	0	0.0	1	4.0
NONGRAVID	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
GRAVID	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
FEMALES EXAMINED AT SCHEDULED NECROPSY	25	100.0	25	100.0	25	100.0	25	100.0	23	92.0
NONGRAVID	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
GRAVID	25	100.0	25	100.0	25	100.0	25	100.0	23	100.0
WITH RESORPTIONS ONLY	1	4.0	0	0.0	0	0.0	0	0.0	5	21.7
WITH VIABLE FETUSES	24	96.0	25	100.0	25	100.0	25	100.0	18	78.3
TOTAL FEMALES GRAVID	25	100.0	25	100.0	25	100.0	25	100.0	25	100.0

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PSPSv4.01
11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S2 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

PAGE 1

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

TABLE RANGE: GROUP:	1	09-20-11 TO 2	10-13-11 3	4	5
NORMAL					
-NO SIGNIFICANT CLINICAL OBSERVATIONS	68/25	69/24	67/24	58/25	47/24
DISPOSITION					
-EUTHANIZED IN EXTREMIS	0/ 0	0/ 0	0/ 0	0/ 0	1/ 1
-FOUND DEAD	0/ 0	0/ 0	0/ 0	0/ 0	1/ 1
-SCHEDULED EUTHANASIA; GESTATION DAY 20	25/25	25/25	25/25	25/25	23/23
BODY/INTEGUMENT					
-HAIR LOSS RIGHT FORELIMB	1/ 1	71/12	35/13	41/10	46/14
-HAIR LOSS LEFT FORELIMB	1/ 1	66/11	38/15	39/10	45/15
-SWOLLEN VENTRAL NECK	2/ 2	0/ 0	0/ 0	0/ 0	0/ 0
-WET YELLOW MATERIAL UROGENITAL AREA	0/ 0	1/ 1	5/ 4	17/12	17/10
-WET RED MATERIAL UROGENITAL AREA	0/ 0	0/ 0	0/ 0	0/ 0	2/ 2
-WET CLEAR RED MATERIAL DORSAL ABDOMINAL AREA	0/ 0	0/ 0	0/ 0	0/ 0	1/ 1
-BODY COOL	0/ 0	0/ 0	0/ 0	4/ 4	10/ 8
-HAIR LOSS RIGHT LATERAL ABDOMINAL AREA	0/ 0	0/ 0	0/ 0	0/ 0	3/ 1
-SCABBING RIGHT FORELIMB	0/ 0	0/ 0	0/ 0	0/ 0	3/ 2
-SCABBING LEFT FORELIMB	0/ 0	0/ 0	0/ 0	1/ 1	3/ 2
-DRIED RED MATERIAL UROGENITAL AREA	0/ 0	0/ 0	0/ 0	2/ 1	26/12
-BODY PALE	0/ 0	0/ 0	0/ 0	0/ 0	8/ 6
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY	

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S2 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

PAGE 2

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

TABLE RANGE: GROUP:	1	09-20-11 TO 2	10-13-11 3	4	5
EYES/EARS/NOSE					
-DRIED RED MATERIAL AROUND NOSE	439/25	414/25	441/25	448/25	432/25
-DRIED RED MATERIAL AROUND RIGHT EYE	181/23	161/24	218/25	207/25	290/25
-DRIED RED MATERIAL AROUND LEFT EYE	135/24	165/23	199/25	195/24	256/25
-LACRIMATION RIGHT EYE	7/ 2	4/ 4	12/ 7	19/13	13/ 9
-LACRIMATION LEFT EYE	4/ 4	5/ 5	9/ 7	17/13	15/10
-HAIR LOSS AROUND LEFT EYE	13/ 3	5/ 3	6/ 4	2/ 1	4/ 2
-HAIR LOSS AROUND RIGHT EYE	9/ 3	4/ 2	7/ 5	5/ 1	4/ 3
-HAIR LOSS AROUND NOSE	0/ 0	2/ 2	0/ 0	2/ 1	1/ 1
EXCRETA					
-WET RED VAGINAL DISCHARGE	0/ 0	0/ 0	0/ 0	13/11	49/25
-WET BROWN VAGINAL DISCHARGE	0/ 0	1/ 1	0/ 0	0/ 0	1/ 1
SPECIAL II					
-ANIMAL FOUND WITHOUT COLLAR	10/ 7	5/ 4	4/ 4	7/ 6	6/ 5

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PCSUV4.07
11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S3
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF POST-DOSE FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

PAGE 1

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

	TABLE RANGE: 09-20-11 TO 10-12-11				
	GROUP: 1	2	3	4	5

NORMAL					
TIME OF DOSE					
-NO SIGNIFICANT CLINICAL OBSERVATIONS	500/25	500/25	500/25	499/25	490/25
1-2 HOURS POST-DOSING					
-NO SIGNIFICANT CLINICAL OBSERVATIONS	499/25	497/25	494/25	485/25	463/25
BODY/INTEGUMENT					
1-2 HOURS POST-DOSING					
-WET RED MATERIAL UROGENITAL AREA	0/0	0/0	0/0	0/0	2/2
-DRIED RED MATERIAL UROGENITAL AREA	0/0	0/0	0/0	1/1	4/4
EXCRETA					
1-2 HOURS POST-DOSING					
-WET RED VAGINAL DISCHARGE	1/1	3/3	5/5	8/5	26/15
-WET BROWN VAGINAL DISCHARGE	0/0	0/0	1/1	7/6	0/0

1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY	

PPDTSuv1.48
12/02/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S4 (DERMAL OBSERVATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF CLINICAL FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

PAGE 1

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

TABLE RANGE: GROUP:	1	09-20-11 TO 2	10-13-11 3	4	5
DERMAL OBS					
-SCORED, NOT REMARKABLE	459/25	518/25	508/25	521/25	283/25
-NO ERYTHEMA	66/11	4/ 3	17/ 7	4/ 3	55/20
-ERYTHEMA - VERY SLIGHT	0/ 0	3/ 1	0/ 0	0/ 0	111/22
-ERYTHEMA - SLIGHT	0/ 0	0/ 0	0/ 0	0/ 0	64/10
-ERYTHEMA - MODERATE	0/ 0	0/ 0	0/ 0	0/ 0	1/ 1
-NO EDEMA	66/11	5/ 3	17/ 7	4/ 3	96/22
-EDEMA - VERY SLIGHT	0/ 0	2/ 1	0/ 0	0/ 0	133/19
-EDEMA - SLIGHT	0/ 0	0/ 0	0/ 0	0/ 0	2/ 2
-DESQUAMATION	66/11	7/ 3	17/ 7	4/ 3	202/23

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PCSUV4.07
11/15/2011

TABLE S5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF BODY WEIGHTS DURING GESTATION [G]

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY	
DAY	0	MEAN S.D. S.E. N	256. 16.2 3.2 25	257. 14.3 2.9 25	254. 14.1 2.8 25	259. 17.6 3.5 25	257. 12.2 2.4 25
DAY	3	MEAN S.D. S.E. N	263. 15.3 3.1 25	260. 19.7 3.9 25	260. 12.6 2.5 25	256. 18.3 3.7 25	253. 12.4 2.5 25
DAY	6	MEAN S.D. S.E. N	269. 21.7 4.3 25	267. 18.1 3.6 25	268. 12.7 2.5 25	257. 17.0 3.4 25	255.c 13.3 2.7 25
DAY	9	MEAN S.D. S.E. N	286. 19.0 3.8 25	283. 16.8 3.4 25	281. 14.2 2.8 25	268.d 18.3 3.7 25	264.d 12.6 2.5 25
DAY	12	MEAN S.D. S.E. N	304. 21.1 4.2 25	303. 19.2 3.8 25	298. 16.5 3.3 25	285.d 19.4 3.9 25	276.d 13.5 2.7 25

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF BODY WEIGHTS DURING GESTATION [G]

PAGE 2

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY	
DAY	15	MEAN	322.	320.	312.	298. d	284. d
		S.D.	25.0	23.1	17.6	21.7	16.0
		S.E.	5.0	4.6	3.5	4.3	3.3
		N	25	25	25	25	24
DAY	18	MEAN	359.	359.	348.	331. d	291. d
		S.D.	34.8	25.7	23.1	27.1	24.7
		S.E.	7.0	5.1	4.6	5.4	5.1
		N	25	25	25	25	23
DAY	20	MEAN	392.	387.	372.	349. d	289. d
		S.D.	39.1	29.9	29.3	36.3	31.4
		S.E.	7.8	6.0	5.9	7.3	6.5
		N	25	25	25	25	23

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PGBWSUV5.10
11/15/2011

TABLE S6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF BODY WEIGHT CHANGES DURING GESTATION [G]

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	0-	3					
		MEAN	8.	3.	5.	-3.	-4.
		S.D.	10.3	12.6	10.3	11.2	11.4
		S.E.	2.1	2.5	2.1	2.2	2.3
		N	25	25	25	25	25
DAY	3-	6					
		MEAN	6.	7.	8.	1.	2.
		S.D.	16.5	9.7	8.8	12.1	10.5
		S.E.	3.3	1.9	1.8	2.4	2.1
		N	25	25	25	25	25
DAY	6-	9					
		MEAN	17.	16.	13.	11.	9.d
		S.D.	12.5	8.8	5.1	9.9	6.4
		S.E.	2.5	1.8	1.0	2.0	1.3
		N	25	25	25	25	25
DAY	9-	12					
		MEAN	18.	20.	17.	17.	12.d
		S.D.	5.8	8.8	5.5	7.9	6.2
		S.E.	1.2	1.8	1.1	1.6	1.2
		N	25	25	25	25	25
DAY	12-	15					
		MEAN	18.	18.	15.	13.	7.d
		S.D.	7.2	6.7	5.9	8.3	8.0
		S.E.	1.4	1.3	1.2	1.7	1.6
		N	25	25	25	25	24

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01 using Dunnett's test

MEAN DIFFERENCES CALCULATED FROM INDIVIDUAL DIFFERENCES

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE S6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF BODY WEIGHT CHANGES DURING GESTATION [G]

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	15-	18					
		MEAN	37.	39.	36.	33.	7.d
		S.D.	12.4	7.1	10.1	10.1	16.9
		S.E.	2.5	1.4	2.0	2.0	3.5
		N	25	25	25	25	23
DAY	18-	20					
		MEAN	33.	28.	24.	18.c	-2.d
		S.D.	12.6	9.0	10.1	18.0	10.4
		S.E.	2.5	1.8	2.0	3.6	2.2
		N	25	25	25	25	23
DAY	0-	20					
		MEAN	137.	130.	118.	90.d	33.d
		S.D.	28.2	21.4	23.3	31.6	29.2
		S.E.	5.6	4.3	4.7	6.3	6.1
		N	25	25	25	25	23

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

MEAN DIFFERENCES CALCULATED FROM INDIVIDUAL DIFFERENCES

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PAGE 1

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
-----	-----	-----	-----	-----	-----
INITIAL BODY WT.					
MEAN	256.	257.	254.	259.	256.
S.D.	16.2	14.3	14.1	17.6	12.1
S.E.	3.2	2.9	2.8	3.5	2.5
N	25	25	25	25	23
TERMINAL BODY WT.					
MEAN	392.	387.	372.	349.d	289.d
S.D.	39.1	29.9	29.3	36.3	31.4
S.E.	7.8	6.0	5.9	7.3	6.5
N	25	25	25	25	23
GRAVID UTERINE WT.					
MEAN	83.0	83.0	73.2	62.0d	19.9d
S.D.	22.16	11.71	18.86	18.96	14.96
S.E.	4.43	2.34	3.77	3.79	3.12
N	25	25	25	25	23
NET BODY WT.					
MEAN	309.4	304.3	298.9	286.7c	268.9d
S.D.	22.57	22.30	20.05	24.65	18.89
S.E.	4.51	4.46	4.01	4.93	3.94
N	25	25	25	25	23
NET BODY WT. CHANGE					
MEAN	53.5	47.1	44.4	27.9d	12.6d
S.D.	15.77	13.40	17.81	22.60	18.09
S.E.	3.15	2.68	3.56	4.52	3.77
N	25	25	25	25	23
-----	-----	-----	-----	-----	-----

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

PUTSuv5.07
11/15/2011

TABLE S8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	0-	3				
		MEAN	20.	21.	19.	18.c
		S.D.	2.6	4.4	2.4	2.7
		S.E.	0.5	0.9	0.5	0.5
		N	25	25	25	25
DAY	3-	6				
		MEAN	22.	21.	23.	20.
		S.D.	2.3	3.4	1.8	2.3
		S.E.	0.5	0.7	0.4	0.5
		N	25	25	25	25
DAY	6-	9				
		MEAN	26.	27.	26.	24.d
		S.D.	3.4	2.0	3.0	2.7
		S.E.	0.7	0.4	0.6	0.6
		N	25	24	25	24
DAY	9-	12				
		MEAN	27.	27.	28.	26.
		S.D.	2.7	2.6	2.4	2.6
		S.E.	0.5	0.5	0.5	0.5
		N	25	25	25	25
DAY	12-	15				
		MEAN	29.	30.	29.	28.c
		S.D.	3.0	3.1	2.6	3.0
		S.E.	0.6	0.6	0.5	0.6
		N	25	25	25	25

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE S8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	15-	18					
		MEAN	28.	31.b	30.	28.c	26.d
		S.D.	3.9	2.3	2.5	3.7	4.8
		S.E.	0.8	0.5	0.5	0.7	1.0
		N	25	25	25	25	23
DAY	18-	20					
		MEAN	30.	31.	31.	28.	26.d
		S.D.	3.4	3.4	4.3	4.2	5.9
		S.E.	0.7	0.7	0.9	0.8	1.2
		N	25	25	25	25	23
DAY	0-	20					
		MEAN	26.	27.	26.	25.d	23.d
		S.D.	2.1	1.9	1.8	2.0	1.9
		S.E.	0.4	0.4	0.4	0.4	0.4
		N	25	25	25	25	23

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

b = Significantly different from control group 1 at 0.01 using two-sample t-test

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE S9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	0-	3				
		MEAN	79.	80.	75.	71. c
		S.D.	9.4	17.2	8.9	10.4
		S.E.	1.9	3.4	1.8	2.1
		N	25	25	25	25
DAY	3-	6				
		MEAN	83.	81.	85.	77.
		S.D.	6.5	11.7	6.5	10.2
		S.E.	1.3	2.3	1.3	2.0
		N	25	25	25	25
DAY	6-	9				
		MEAN	96.	97.	94.	93.
		S.D.	13.2	6.7	10.8	7.3
		S.E.	2.6	1.4	2.2	1.5
		N	25	24	25	24
DAY	9-	12				
		MEAN	92.	93.	96.	94.
		S.D.	6.3	7.9	7.9	8.0
		S.E.	1.3	1.6	1.6	1.6
		N	25	25	25	25
DAY	12-	15				
		MEAN	92.	96.	96.	96.
		S.D.	7.4	6.9	8.8	8.6
		S.E.	1.5	1.4	1.8	1.7
		N	25	25	25	24

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

c = Significantly different from control group 2 at 0.05 using Dunnett's test

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

TABLE S9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
DAY	15-	18					
		MEAN	82.	92.b	90.	90.	89.
		S.D.	7.5	5.2	6.3	9.4	13.8
		S.E.	1.5	1.0	1.3	1.9	2.9
		N	25	25	25	25	23
DAY	18-	20					
		MEAN	80.	84.	85.	84.	89.
		S.D.	7.7	8.6	9.7	9.7	19.0
		S.E.	1.5	1.7	1.9	1.9	4.0
		N	25	25	25	25	23
DAY	0-	20					
		MEAN	85.	88.b	88.	85.	84.c
		S.D.	4.3	4.3	5.5	4.4	5.9
		S.E.	0.9	0.9	1.1	0.9	1.2
		N	25	25	25	25	23

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

b = Significantly different from control group 1 at 0.01 using two-sample t-test

c = Significantly different from control group 2 at 0.05 using Dunnett's test

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PGFWSUV5.16
11/15/2011
R:11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S10
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF MATERNAL MACROSCOPIC FINDINGS

PAGE 1

GROUP :	1	2	3	4	5
NUMBER EXAMINED	25	25	25	25	25
NO SIGNIFICANT CHANGES OBSERVED	25	22	22	23	15
EUTHANIZED GESTATION DAY 13	0	0	0	0	1
SKIN: MATTING, RED	0	0	0	0	3
DIED GESTATION DAY 16	0	0	0	0	1
APPLICATION SITE: SCABBING	0	0	0	0	1
SKIN: HAIR LOSS	0	0	0	2	0
THYMUS: SMALL	0	0	1	0	5
VAGINA: CONTENTS, DARK RED	0	0	0	0	1
APPLICATION SITE: AREA(S), DEPRESSED	0	1	0	0	0
LIVER: AREA(S), WHITE	0	1	0	0	0
AXILLARY LYMPH NODES: ENLARGED	0	0	1	0	0
ORGAN DAMAGED AT NECROPSY	0	0	1	0	1
PINEAL BODY: DISCOLORATION, YELLOW	0	1	0	0	0
PINEAL BODY: FIRM	0	1	0	0	0
ORGAN LOST AT NECROPSY	0	0	0	0	1
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY	

PMGSIv4.04
05/16/2012

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S11 (UNSCHEDULED DEATH)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF ORGAN WTS. AND ORGAN WTS. RELATIVE TO BRAIN WTS.

PAGE 1

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
		FEMALES				
BRAIN (G)	MEAN	NA	NA	NA	NA	1.51
	S.D.					0.000
	S.E.					0.000
	N					1
LIVER (G)	MEAN	NA	NA	NA	NA	10.61
	S.D.					0.000
	S.E.					0.000
	N					1
LIVER (G/100 G BRAIN)	MEAN	NA	NA	NA	NA	702.649
	S.D.					0.0000
	S.E.					0.0000
	N					1
THYMUS (G)	MEAN	NA	NA	NA	NA	0.0815
	S.D.					0.00000
	S.E.					0.00000
	N					1
THYMUS (G/100 G BRAIN)	MEAN	NA	NA	NA	NA	5.397
	S.D.					0.0000
	S.E.					0.0000
	N					1

NA = NOT APPLICABLE
NONGRAVID WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBSTv5.26
12/01/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S12 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF ORGAN WTS. AND ORGAN WTS. RELATIVE TO BRAIN WTS.

PAGE 1

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	FEMALES 100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
BRAIN (G)	MEAN	1.91	1.91	1.93	1.90	1.87
	S.D.	0.077	0.082	0.062	0.074	0.060
	S.E.	0.015	0.016	0.012	0.015	0.012
	N	25	25	25	25	23
LIVER (G)	MEAN	15.70	16.51	16.40	16.31	16.79
	S.D.	2.180	1.768	1.444	1.578	2.209
	S.E.	0.436	0.354	0.289	0.316	0.461
	N	25	25	25	25	23
LIVER (G/100 G BRAIN)	MEAN	823.771	865.966	849.967	860.392	900.098
	S.D.	116.5193	86.7952	76.7227	73.3249	123.0966
	S.E.	23.3039	17.3590	15.3445	14.6650	25.6674
	N	25	25	25	25	23
THYMUS (G)	MEAN	0.2169	0.1806	0.1769	0.1505	0.0836d
	S.D.	0.08968	0.04779	0.05984	0.04699	0.03644
	S.E.	0.01794	0.00956	0.01197	0.00940	0.00777
	N	25	25	25	25	22
THYMUS (G/100 G BRAIN)	MEAN	11.396	9.442	9.145	7.933	4.482d
	S.D.	4.7495	2.3886	3.0291	2.4164	1.9595
	S.E.	0.9499	0.4777	0.6058	0.4833	0.4178
	N	25	25	25	25	22

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01 using Dunnett's test

NONGRAVID WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBSTv5.26
11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S13
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY

PAGE 1

GROUP	SEX M F	VIABLE FETUSES	DEAD FETUSES	RESORPTIONS EARLY LATE	POST IMPLANTATION LOSS	IMPLANTATION SITES	CORPORA LUTEA	PRE IMPLANTATION LOSS	FETAL WEIGHTS IN GRAMS	NO. OF GRAVID FEMALES
1 TOTAL	165 200	365	0	27 0	27	392	417	25	NA	25
MEAN	6.6 8.0	14.6	0.0	1.1 0.0	1.1	15.7	16.7	1.0	3.7	
S.D.	2.75 3.10	3.81	0.00	1.55 0.00	1.55	2.58	2.39	1.19	0.20	
S.E.	0.55 0.62	0.76	0.00	0.31 0.00	0.31	0.52	0.48	0.24	0.04	
2 TOTAL	196 165	361	0	28 1	29	390	413	23	NA	25
MEAN	7.8 6.6	14.4	0.0	1.1 0.0	1.2	15.6	16.5	0.9	3.7	
S.D.	2.39 2.31	2.31	0.00	1.17 0.20	1.18	2.40	2.26	1.73	0.25	
S.E.	0.48 0.46	0.46	0.00	0.23 0.04	0.24	0.48	0.45	0.35	0.05	
3 TOTAL	173 166	339	0	25 0	25	364	407	43	NA	25
MEAN	6.9 6.6	13.6	0.0	1.0 0.0	1.0	14.6	16.3	1.7	3.6	
S.D.	2.68 2.40	3.68	0.00	1.19 0.00	1.19	3.63	2.72	2.89	0.32	
S.E.	0.54 0.48	0.74	0.00	0.24 0.00	0.24	0.73	0.54	0.58	0.06	
4 TOTAL	148 164	312	0	71 1	72	384	428	44	NA	25
MEAN	5.9 6.6	12.5	0.0	2.8 0.0	2.9	15.4	17.1	1.8	3.1d	
S.D.	2.60 2.42	3.94	0.00	2.59 0.20	2.57	3.55	3.37	2.79	0.30	
S.E.	0.52 0.48	0.79	0.00	0.52 0.04	0.51	0.71	0.67	0.56	0.06	
5 TOTAL	32 43	75	0	273 8	281	356	391	35	NA	23
MEAN	1.4 1.9	3.3d	0.0	11.9 0.3	12.2	15.5	17.0	1.5	2.7d	
S.D.	1.12 2.74	3.35	0.00	4.20 0.88	4.07	3.04	2.83	1.62	0.49	
S.E.	0.23 0.57	0.70	0.00	0.88 0.18	0.85	0.63	0.59	0.34	0.12	

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01

NA = NOT APPLICABLE

MEAN NUMBER OF VIABLE FETUSES, MEAN NUMBER OF IMPLANTATION SITES, MEAN NUMBER OF CORPORA LUTEA,
FETAL WEIGHTS COMPARED USING DUNNETT'S TEST OR TWO-SAMPLE T-TEST

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PLSUV5.12
11/15/2011
R:12/01/2011

TABLE S14
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
CORPORA LUTEA					
MEAN	16.7	16.5	16.3	17.1	17.0
S.D.	2.39	2.26	2.72	3.37	2.83
S.E.	0.48	0.45	0.54	0.67	0.59
N	25	25	25	25	23
IMPLANTATION SITES					
MEAN	15.7	15.6	14.6	15.4	15.5
S.D.	2.58	2.40	3.63	3.55	3.04
S.E.	0.52	0.48	0.73	0.71	0.63
N	25	25	25	25	23
VIABLE FETUSES (%)					
MEAN	90.8	92.8	92.1	80.6	20.9d
S.D.	19.89	7.32	11.36	16.98	21.91
S.E.	3.98	1.46	2.27	3.40	4.57
N	25	25	25	25	23
DEAD FETUSES (%)					
MEAN	0.0	0.0	0.0	0.0	0.0
S.D.	0.00	0.00	0.00	0.00	0.00
S.E.	0.00	0.00	0.00	0.00	0.00
N	25	25	25	25	23
EARLY RESORPTIONS (%)					
MEAN	9.2	6.9	7.9	19.1	76.8d
S.D.	19.89	7.26	11.36	17.14	23.41
S.E.	3.98	1.45	2.27	3.43	4.88
N	25	25	25	25	23

PROPORTIONAL (%) DATA COMPARED USING DUNN'S TEST

CORPORA LUTEA AND IMPLANTATION SITES COMPARED USING DUNNETT'S TEST OR TWO-SAMPLE T-TEST

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01

TABLE S14
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
LATE RESORPTIONS (%)					
MEAN	0.0	0.2	0.0	0.3	2.3
S.D.	0.00	1.18	0.00	1.26	5.65
S.E.	0.00	0.24	0.00	0.25	1.18
N	25	25	25	25	23
TOTAL RESORPTIONS (%)					
MEAN	9.2	7.2	7.9	19.4	79.1d
S.D.	19.89	7.32	11.36	16.99	21.91
S.E.	3.98	1.46	2.27	3.40	4.57
N	25	25	25	25	23
PRE-IMPLANTATION LOSS (%)					
MEAN	6.2	5.3	10.8	9.7	9.2
S.D.	8.00	10.21	18.14	16.56	10.08
S.E.	1.60	2.04	3.63	3.31	2.10
N	25	25	25	25	23
POST-IMPLANTATION LOSS (%)					
MEAN	9.2	7.2	7.9	19.4	79.1d
S.D.	19.89	7.32	11.36	16.99	21.91
S.E.	3.98	1.46	2.27	3.40	4.57
N	25	25	25	25	23
MALES (%)					
MEAN	45.3	54.2a	51.1	46.9	58.5
S.D.	14.10	13.56	12.86	11.87	29.70
S.E.	2.88	2.71	2.57	2.37	7.00
N	24	25	25	25	18

PROPORTIONAL (%) DATA COMPARED USING DUNN'S TEST

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

a = Significantly different from control group 1 at 0.05

d = Significantly different from control group 2 at 0.01

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S14
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

PAGE 3

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	100 MG/KG/DAY	450 MG/KG/DAY	750 MG/KG/DAY
FEMALES (%)					
MEAN	54.7	45.8a	48.9	53.1	41.5
S.D.	14.10	13.56	12.86	11.87	29.70
S.E.	2.88	2.71	2.57	2.37	7.00
N	24	25	25	25	18
MALE FETAL WEIGHTS (g)					
MEAN	3.8	3.8	3.7	3.2d	2.8d
S.D.	0.23	0.24	0.39	0.29	0.48
S.E.	0.05	0.05	0.08	0.06	0.11
N	24	25	25	25	18
FEMALE FETAL WEIGHTS (g)					
MEAN	3.6	3.6	3.5	3.0d	2.5d
S.D.	0.22	0.28	0.25	0.36	0.46
S.E.	0.04	0.06	0.05	0.07	0.13
N	24	25	25	25	13
COMBINED FETAL WEIGHTS (g)					
MEAN	3.7	3.7	3.6	3.1d	2.7d
S.D.	0.20	0.25	0.32	0.30	0.49
S.E.	0.04	0.05	0.06	0.06	0.12
N	24	25	25	25	18

PROPORTIONAL (%) DATA COMPARED USING DUNN'S TEST
FETAL WEIGHTS COMPARED USING DUNNETT'S TEST OR TWO-SAMPLE T-TEST
MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

a = Significantly different from control group 1 at 0.05

d = Significantly different from control group 2 at 0.01

PLPSUv5.10
11/15/2011
R:12/01/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETUSES AND LITTERS WITH MALFORMATIONS [ABSOLUTE NO.]

PAGE 1

DAY 20

DOSE GROUP:	F E T U S E S					L I T T E R S				
	1	2	3	4	5	1	2	3	4	5
NUMBER EXAMINED EXTERNALLY	365	361	339	312	75	24	25	25	25	18
EXENCEPHALY WITH OR WITHOUT OPEN EYELID	1	0	0	0	0	1	0	0	0	0
MICROPHTHALMIA AND/OR ANOPHTHALMIA	1	1	0	1	0	1	1	0	1	0
CLEFT PALATE	0	0	0	1	0	0	0	0	1	0
FACIAL CLEFT	0	1	0	0	0	0	1	0	0	0
NUMBER EXAMINED VISCERALLY	365	361	339	312	75	24	25	25	25	18
KIDNEY AND URETER ABSENT	0	0	0	1	0	0	0	0	1	0
SITUS INVERSUS	0	0	0	1	0	0	0	0	1	0
INTERVENTRICULAR SEPTAL DEFECT	0	0	1	0	0	0	0	1	0	0
NUMBER EXAMINED SKELETALLY	365	361	339	312	75	24	25	25	25	18
VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY	0	0	0	0	1	0	0	0	0	1
STERNOSCHISIS	0	0	1	1	0	0	0	1	1	0
RIB ANOMALY	0	1	0	0	0	0	1	0	0	0
COSTAL CARTILAGE ANOMALY	0	1	0	0	0	0	1	0	0	0
TOTAL NUMBER WITH MALFORMATIONS										
EXTERNAL :	1	2	0	2	0	1	2	0	2	0
SOFT TISSUE :	0	0	1	2	0	0	0	1	2	0
SKELETAL :	0	1	1	1	1	0	1	1	1	1
COMBINED :	1	2	1	4	1	1	2	1	4	1
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY						

PMALv5.08
12/16/2011

PROJECT NO.:WIL-402017
 SPONSOR:AMERICAN PETROLEUM

TABLE S16
 RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 SUMMARY OF LITTER PROPORTIONS OF MALFORMATIONS
 % PER LITTER

PAGE 1
 DAY 20

DOSE GROUP:		1	2	3	4	5
NUMBER OF LITTERS EXAMINED EXTERNALLY		24	25	25	25	18
EXENCEPHALY WITH OR WITHOUT OPEN EYELID	MEAN	0.2	0.0	0.0	0.0	0.0
	S.D.	1.20	0.00	0.00	0.00	0.00
	S.E.	0.25	0.00	0.00	0.00	0.00
MICROPHTHALMIA AND/OR ANOPHTHALMIA	MEAN	0.2	0.2	0.0	0.3	0.0
	S.D.	1.20	1.11	0.00	1.67	0.00
	S.E.	0.25	0.22	0.00	0.33	0.00
CLEFT PALATE	MEAN	0.0	0.0	0.0	0.2	0.0
	S.D.	0.00	0.00	0.00	1.11	0.00
	S.E.	0.00	0.00	0.00	0.22	0.00
FACIAL CLEFT	MEAN	0.0	0.3	0.0	0.0	0.0
	S.D.	0.00	1.25	0.00	0.00	0.00
	S.E.	0.00	0.25	0.00	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

None significantly different from control group

DOSE GROUP:		1	2	3	4	5
NUMBER OF LITTERS EXAMINED VISCERALLY		24	25	25	25	18
KIDNEY AND URETER ABSENT	MEAN	0.0	0.0	0.0	0.2	0.0
	S.D.	0.00	0.00	0.00	1.11	0.00
	S.E.	0.00	0.00	0.00	0.22	0.00
SITUS INVERSUS	MEAN	0.0	0.0	0.0	0.3	0.0
	S.D.	0.00	0.00	0.00	1.43	0.00
	S.E.	0.00	0.00	0.00	0.29	0.00
INTERVENTRICULAR SEPTAL DEFECT	MEAN	0.0	0.0	0.3	0.0	0.0
	S.D.	0.00	0.00	1.54	0.00	0.00
	S.E.	0.00	0.00	0.31	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

None significantly different from control group

DOSE GROUP:		1	2	3	4	5
NUMBER OF LITTERS EXAMINED SKELETALLY		24	25	25	25	18
VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY	MEAN	0.0	0.0	0.0	0.0	0.9
	S.D.	0.00	0.00	0.00	0.00	3.93
	S.E.	0.00	0.00	0.00	0.00	0.93
STERNOSCHISIS	MEAN	0.0	0.0	0.3	0.3	0.0
	S.D.	0.00	0.00	1.54	1.43	0.00
	S.E.	0.00	0.00	0.31	0.29	0.00
RIB ANOMALY	MEAN	0.0	0.2	0.0	0.0	0.0
	S.D.	0.00	1.11	0.00	0.00	0.00
	S.E.	0.00	0.22	0.00	0.00	0.00
COSTAL CARTILAGE ANOMALY	MEAN	0.0	0.2	0.0	0.0	0.0
	S.D.	0.00	1.11	0.00	0.00	0.00
	S.E.	0.00	0.22	0.00	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

None significantly different from control group

PROJECT NO.:WIL-402017		TABLE S16				PAGE 4	
SPONSOR:AMERICAN PETROLEUM		RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED					
		SUMMARY OF LITTER PROPORTIONS OF MALFORMATIONS				DAY 20	
		% PER LITTER					
DOSE GROUP:		1	2	3	4	5	
NUMBER OF LITTERS EXAMINED		24	25	25	25	18	
TOTAL MALFORMATIONS							
PERCENT PER LITTER WITH EXTERNAL MALFORMATIONS	MEAN	0.2	0.5	0.0	0.6	0.0	
	S.D.	1.20	1.64	0.00	1.96	0.00	
	S.E.	0.25	0.33	0.00	0.39	0.00	
PERCENT PER LITTER WITH SOFT TISSUE MALFORMATIONS	MEAN	0.0	0.0	0.3	0.5	0.0	
	S.D.	0.00	0.00	1.54	1.77	0.00	
	S.E.	0.00	0.00	0.31	0.35	0.00	
PERCENT PER LITTER WITH SKELETAL MALFORMATIONS	MEAN	0.0	0.2	0.3	0.3	0.9	
	S.D.	0.00	1.11	1.54	1.43	3.93	
	S.E.	0.00	0.22	0.31	0.29	0.93	
TOTAL PERCENT PER LITTER WITH MALFORMATIONS	MEAN	0.2	0.5	0.3	1.1	0.9	
	S.D.	1.20	1.64	1.54	2.53	3.93	
	S.E.	0.25	0.33	0.31	0.51	0.93	

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY							

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

None significantly different from control group

PMALKv5.07
12/16/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETUSES AND LITTERS WITH VARIATIONS [ABSOLUTE NO.]

PAGE 1

DAY 20

DOSE GROUP:	F E T U S E S					L I T T E R S				
	1	2	3	4	5	1	2	3	4	5
NUMBER EXAMINED EXTERNALLY	365	361	339	312	75	24	25	25	25	18
NUMBER WITH FINDINGS	0	0	0	0	0	0	0	0	0	0
NUMBER EXAMINED VISCERALLY	365	361	339	312	75	24	25	25	25	18
RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	0	7	0	1	0	0	4	0	1	0
SPLEEN- PALE	1	0	0	2	0	1	0	0	1	0
SPLEEN- SMALL	1	0	0	2	0	1	0	0	1	0
LIVER- ACCESSORY LOBULE(S)	0	0	0	1	0	0	0	0	1	0
ACCESSORY SPLEEN(S)	0	0	1	0	0	0	0	1	0	0
MAJOR BLOOD VESSEL VARIATION	0	0	0	1	0	0	0	0	1	0
HEMORRHAGIC RING AROUND THE IRIS	0	0	0	0	1	0	0	0	0	1
NUMBER EXAMINED SKELETALLY	365	361	339	312	75	24	25	25	25	18
14TH RUDIMENTARY RIB(S)	36	24	22	13	3	12	6	10	9	3
CERVICAL CENTRUM #1 OSSIFIED	51	35	71	14	6	17	13	20	6	5
REDUCED OSSIFICATION OF THE SKULL	0	0	0	7	6	0	0	0	3	5
PUBIS UNOSSIFIED	1	0	0	1	3	1	0	0	1	2
REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	0	0	0	2	12	0	0	0	2	6
METACARPAL(S) AND/OR METATARSAL(S) UNOSSIFIED	0	0	0	0	3	0	0	0	0	3
STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	68	42	59	132	46	20	19	19	23	16
27 PRESACRAL VERTEBRAE	0	1	0	2	4	0	1	0	2	3
7TH CERVICAL RIB(S)	4	2	4	3	0	3	2	3	2	0
STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	1	1	1	8	3	1	1	1	5	2
ENTIRE STERNUM UNOSSIFIED	0	0	0	0	2	0	0	0	0	1
STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1	1	1	7	2	1	1	1	5	2
REDUCED OSSIFICATION OF THE 13TH RIB(S)	1	0	4	5	1	1	0	3	5	1
BENT RIB(S)	1	4	1	0	0	1	2	1	0	0
UNCO-OSSIFIED VERTEBRAL CENTRA	0	0	0	0	4	0	0	0	0	3
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY										

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF FETUSES AND LITTERS WITH VARIATIONS [ABSOLUTE NO.]

PAGE 2

DAY 20

	F E T U S E S					L I T T E R S				
DOSE GROUP:	1	2	3	4	5	1	2	3	4	5
NUMBER EXAMINED SKELETALLY 7TH STERNEBRA	365 1	361 0	339 0	312 0	75 0	24 1	25 0	25 0	25 0	18 0
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY						

PMALv5.08
12/16/2011

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED EXTERNALLY	24	25	25	25	18
NUMBER OF LITTERS WITH FINDINGS	0	0	0	0	0

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY
MODIFIED STATISTICS USED
For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.
None significantly different from control group

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF LITTER PROPORTIONS OF VARIATIONS
% PER LITTER

PAGE 2

DAY 20

DOSE GROUP:		1	2	3	4	5
NUMBER OF LITTERS EXAMINED VISCERALLY		24	25	25	25	18
RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	MEAN	0.0	1.9	0.0	0.2	0.0
	S.D.	0.00	4.98	0.00	1.11	0.00
	S.E.	0.00	1.00	0.00	0.22	0.00
SPLEEN- PALE	MEAN	0.3	0.0	0.0	0.5	0.0
	S.D.	1.70	0.00	0.00	2.50	0.00
	S.E.	0.35	0.00	0.00	0.50	0.00
SPLEEN- SMALL	MEAN	0.3	0.0	0.0	0.7	0.0
	S.D.	1.70	0.00	0.00	3.33	0.00
	S.E.	0.35	0.00	0.00	0.67	0.00
LIVER- ACCESSORY LOBULE(S)	MEAN	0.0	0.0	0.0	0.3	0.0
	S.D.	0.00	0.00	0.00	1.25	0.00
	S.E.	0.00	0.00	0.00	0.25	0.00
ACCESSORY SPLEEN(S)	MEAN	0.0	0.0	0.3	0.0	0.0
	S.D.	0.00	0.00	1.43	0.00	0.00
	S.E.	0.00	0.00	0.29	0.00	0.00
MAJOR BLOOD VESSEL VARIATION	MEAN	0.0	0.0	0.0	0.3	0.0
	S.D.	0.00	0.00	0.00	1.43	0.00
	S.E.	0.00	0.00	0.00	0.29	0.00
HEMORRHAGIC RING AROUND THE IRIS	MEAN	0.0	0.0	0.0	0.0	0.8
	S.D.	0.00	0.00	0.00	0.00	3.37
	S.E.	0.00	0.00	0.00	0.00	0.79

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.
None significantly different from control group

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF LITTER PROPORTIONS OF VARIATIONS
% PER LITTER

PAGE 3
DAY 20

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED SKELETALLY	24	25	25	25	18
14TH RUDIMENTARY RIB(S)	MEAN 10.0 S.D. 14.22 S.E. 2.90	6.1 18.26 3.65	6.2 9.19 1.84	4.3 6.59 1.32	3.4 8.01 1.89
CERVICAL CENTRUM #1 OSSIFIED	MEAN 13.8 S.D. 12.79 S.E. 2.61	9.7 13.53 2.71	19.8 20.87 4.17	3.9 9.23 1.85	7.2 14.42 3.40
REDUCED OSSIFICATION OF THE SKULL	MEAN 0.0 S.D. 0.00 S.E. 0.00	0.0 0.00 0.00	0.0 0.00 0.00	2.9 9.74 1.95	14.7 28.52 6.72
PUBIS UNOSSIFIED	MEAN 0.2 S.D. 1.13 S.E. 0.23	0.0 0.00 0.00	0.0 0.00 0.00	0.3 1.43 0.29	3.6 12.06 2.84
REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	MEAN 0.0 S.D. 0.00 S.E. 0.00	0.0 0.00 0.00	0.0 0.00 0.00	0.8 3.02 0.60	22.5 39.29 9.26
METACARPAL(S) AND/OR METATARSAL(S) UNOSSIFIED	MEAN 0.0 S.D. 0.00 S.E. 0.00	0.0 0.00 0.00	0.0 0.00 0.00	0.0 0.00 0.00	4.0 9.84 2.32
STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	MEAN 18.3 S.D. 17.72 S.E. 3.62	10.8 8.97 1.79	18.1 19.42 3.88	42.6d 29.13 5.83	62.6d 33.86 7.98
27 PRESACRAL VERTEBRAE	MEAN 0.0 S.D. 0.00 S.E. 0.00	0.3 1.25 0.25	0.0 0.00 0.00	0.6 1.94 0.39	4.3 12.21 2.88

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

d = Significantly different from control group 2 at 0.01 using Dunnett's test.

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE S18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
SUMMARY OF LITTER PROPORTIONS OF VARIATIONS
% PER LITTER

PAGE 4

DAY 20

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED SKELETALLY	24	25	25	25	18
7TH CERVICAL RIB(S)	MEAN 1.1 S.D. 3.13 S.E. 0.64	MEAN 0.5 S.D. 1.70 S.E. 0.34	MEAN 1.0 S.D. 2.94 S.E. 0.59	MEAN 0.8 S.D. 3.10 S.E. 0.62	MEAN 0.0 S.D. 0.00 S.E. 0.00
STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	MEAN 0.3 S.D. 1.36 S.E. 0.28	MEAN 0.2 S.D. 1.11 S.E. 0.22	MEAN 0.3 S.D. 1.67 S.E. 0.33	MEAN 2.4 S.D. 5.60 S.E. 1.12	MEAN 3.2 S.D. 11.83 S.E. 2.79
ENTIRE STERNUM UNOSSIFIED	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 2.8 S.D. 11.79 S.E. 2.78
STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	MEAN 0.2 S.D. 1.20 S.E. 0.25	MEAN 0.2 S.D. 1.11 S.E. 0.22	MEAN 0.2 S.D. 1.18 S.E. 0.24	MEAN 2.0 S.D. 4.33 S.E. 0.87	MEAN 3.2 S.D. 11.83 S.E. 2.79
REDUCED OSSIFICATION OF THE 13TH RIB(S)	MEAN 0.3 S.D. 1.36 S.E. 0.28	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 1.1 S.D. 3.15 S.E. 0.63	MEAN 1.3 S.D. 2.81 S.E. 0.56	MEAN 0.9 S.D. 3.93 S.E. 0.93
BENT RIB(S)	MEAN 0.2 S.D. 1.20 S.E. 0.25	MEAN 1.6 S.D. 6.74 S.E. 1.35	MEAN 0.3 S.D. 1.54 S.E. 0.31	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00
UNCO-OSSIFIED VERTEBRAL CENTRA	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 5.6 S.D. 14.00 S.E. 3.30

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.
None significantly different from control group

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED SKELETALLY	24	25	25	25	18
7TH STERNEBRA	MEAN 0.3	0.0	0.0	0.0	0.0
	S.D. 1.36	0.00	0.00	0.00	0.00
	S.E. 0.28	0.00	0.00	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

None significantly different from control group

PROJECT NO.:WIL-402017		TABLE S18				PAGE 6	
SPONSOR:AMERICAN PETROLEUM		RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED					
		SUMMARY OF LITTER PROPORTIONS OF VARIATIONS				DAY 20	
		% PER LITTER					
DOSE GROUP:		1	2	3	4	5	
NUMBER OF LITTERS EXAMINED		24	25	25	25	18	
TOTAL VARIATIONS							
PERCENT PER LITTER WITH EXTERNAL VARIATIONS		MEAN	0.0	0.0	0.0	0.0	0.0
		S.D.	0.00	0.00	0.00	0.00	0.00
		S.E.	0.00	0.00	0.00	0.00	0.00
PERCENT PER LITTER WITH SOFT TISSUE VARIATIONS		MEAN	0.3	1.9	0.3	1.7	0.8
		S.D.	1.70	4.98	1.43	4.31	3.37
		S.E.	0.35	1.00	0.29	0.86	0.79
PERCENT PER LITTER WITH SKELETAL VARIATIONS		MEAN	38.5	26.1a	41.1	50.2c	83.3d
		S.D.	20.18	22.55	21.01	26.95	25.60
		S.E.	4.12	4.51	4.20	5.39	6.03
TOTAL PERCENT PER LITTER WITH VARIATIONS		MEAN	38.5	27.2	41.4	50.5c	84.1d
		S.D.	20.18	22.94	21.08	26.90	25.90
		S.E.	4.12	4.59	4.22	5.38	6.11

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY							

MODIFIED STATISTICS USED

For statistical analyses, control group 1 was compared to group 2; control group 2 was compared to groups 3, 4 and 5.

a = Significantly different from control group 1 at 0.05 using two-sample t-test.

c = Significantly different from control group 2 at 0.05 using Dunnett's test.

d = Significantly different from control group 2 at 0.01 using Dunnett's test.

PMALKv5.07
12/16/2011
R:12/16/2011

APPENDIX A

Study Protocol and Deviations

DEVIATIONS FROM THE PROTOCOL

This study was conducted in accordance with the protocol and protocol amendments, except for the following.

- **Protocol Section 8.6.3** states that each sample would be collected using a class A glass volumetric pipette from the middle of each stratum of each formulation. On 19 September 2011, samples were collected using a syringe and dosing cannula.

Reason for Deviation: Due to the viscosity of the formulations, samples were unable to be collected using the method listed in the protocol; therefore, the protocol was subsequently amended to allow for collection using a syringe and dosing cannula.

- **Protocol Section 8.4** states that a different set of clippers would be used for control and treated animals to avoid potential for cross-contamination. From 20 September 2011 to 9 October 2011 the control and test substance animals were shaved but documentation of using separate clippers for the control animals was omitted at the time of shaving.

Reason for Deviation: Technician error.

- **Protocol Section 8.7.1** states that during the treatment period, each animal would be observed at the time of dosing and approximately 1-2 hours following each sham and dose administration for findings that are potentially related to treatment or that might change before the next scheduled observation. On 26 September 2011 (gestation day 4), female no. 26669 in the 450 mg/kg/day group did not receive an at time of dosing observation.

Reason for Deviation: Technician error.

DEVIATIONS FROM THE PROTOCOL (CONTINUED)

- **Protocol Sections 8.8.2.1 and 8.8.2.2** state that the thymus would be weighed and retained in 10% neutral-buffered formalin from all maternal animals euthanized at scheduled termination. The thymus from female no. 26620 in the 750 mg/kg/day group was lost during necropsy prior to a weight collection and therefore could not be retained.

Reason for Deviation: Technician error.

These deviations did not negatively impact the quality or integrity of the data nor the outcome of the study.



Study Number: WIL-402017

PROTOCOL AMENDMENT 5

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked in Rats

Protocol Modifications:

The following revision is made for Amendment 4:

1) 10 Statistical Methods:

For all statistical analysis, the treated groups (Groups 3, 4 and 5) will be compared to the vehicle group (Group 2), and the vehicle group (Group 2) will be compared to the sham group (Group 1). ~~All analysis~~ **The analysis between Groups 1 and 2** will be conducted using a two sample t-test (Snedecor and Cochran, 1980).

Reasons for Protocol Modification:

- 1) This modification clarifies the statistics to be performed.

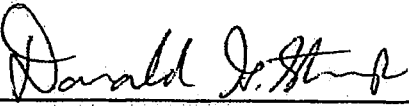
Approval:

Sponsor's approval was obtained via email on 09 Nov 2011.
Date

WIL Research Laboratories, LLC

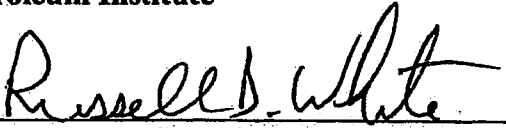

Jeffrey H. Charlap, MS
Study Director

09 Nov 2011
Date


Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology

9 Nov 2011
Date

American Petroleum Institute


Russell White, PhD
Sponsor Representative

10 Nov 2011
Date



Study Number: WIL-402017

PROTOCOL AMENDMENT 4

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked in Rats

Protocol Modifications:

The following paragraph is added:

1) 10 Statistical Methods:

For all statistical analysis, the treated groups (Groups 3, 4 and 5) will be compared to the vehicle group (Group 2), and the vehicle group (Group 2) will be compared to the sham group (Group 1). All analysis will be conducted using a two sample t-test (Snedecor and Cochran, 1980).

The following section is added:

2) 10.4 Organ Weight Data:

Organ weights (relative to brain weights) will be subjected to a parametric ANOVA test (Snedecor and Cochran, 1980) and Dunnett's test (1964) as described above.

Reasons for Protocol Modification:

- 1) This modification clarifies the statistics to be performed.
- 2) This modification adds information on the statistics to be performed on the organ weight data.

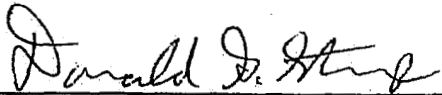
Approval:

Sponsor's approval was obtained via email on 04 Nov 2011.
Date

WIL Research Laboratories, LLC

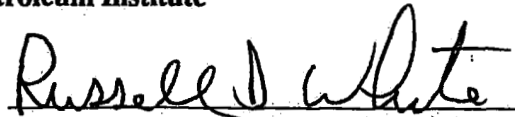


Jeffrey H. Charlap, MS
Study Director
04 Nov 2011
Date



Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology
4 Nov 2011
Date

American Petroleum Institute



Russell White, PhD
Sponsor Representative
10 Nov. 2011
Date



Study Number: WIL-402017

PROTOCOL AMENDMENT 3

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked In Rats

Protocol Modifications:

1) 8.6.3 Concentration and Homogeneity Analysis:

The second sentence of the first paragraph is revised as follows:

Each sample will be collected using a **syringe and dosing cannula** ~~class A glass volumetric pipette~~ from the middle of each stratum of each formulation.

Reasons for Protocol Modification:

- 1) This modification clarifies the method of sample collection the dosing formulations.

Approval:

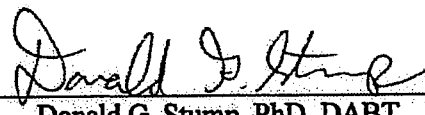
Sponsor's approval was obtained via email on 19 Sept 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

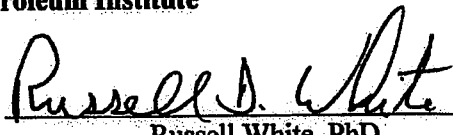
20 Sep 2011
Date



Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology

20 Sept 2011
Date

American Petroleum Institute



Russell White, PhD
Sponsor Representative

19 Oct. 2011
Date



Study Number: WIL-402017

PROTOCOL AMENDMENT 2

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked in Rats

Protocol Modifications:

1) 8.5.4 Treatment Regimen:

The last sentence in the first paragraph of the following section is revised as follows:

If the test substance does not cover at least 10% of the total body surface, the actual body surface area covered by the test substance will be documented for 2 representative rats/sex/group **once weekly**.

2) 8.6.3 Concentration and Homogeneity Analysis:

The first sentence in the first paragraph of the following section is revised as follows:

Two sets of duplicate samples will be collected from the top, middle, and bottom stratum of each ~~test substance~~ **dosing** formulation **on the first and last days of preparation**.

3) 8.8.3.3 Skeletal:

The following section is revised as follows:

Each eviscerated fetus, following fixation in alcohol, **will be macerated in potassium hydroxide and** stained with Alizarin Red S and Alcian Blue by a method similar to that described by Dawson (1926) and Inouye (1976). The skeletal examination will be made following this procedure.

Reasons for Protocol Modification:

- 1) This modification clarifies frequency the surface area will be documented if 10% of the body surface is not covered by the test substance.
- 2) This modification clarifies the samples that will be collected for each dosing formulation and when samples will be collected.
- 3) This modification clarifies the procedure for processing the fetal skeletons.

Approval:

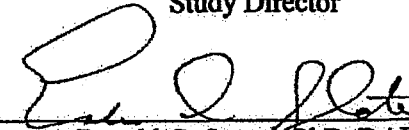
Sponsor's approval was obtained via email on 09 Sep 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

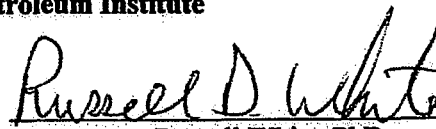
09 Sep 2011
Date



Donald G. Stump, PhD, DABT
FOR: Senior Director, Developmental and
Reproductive Toxicology

09 Sept. 2011
Date

American Petroleum Institute



Russell White, PhD
Sponsor Representative

13 October 2011
Date



Study Number: WIL-402017

PROTOCOL AMENDMENT 1

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Distillates (Petroleum), Light Catalytic Cracked in Rats

Protocol Modifications:

1) **8.6.1 Method and Frequency of Preparation:**

The following sentence in this section is revised:

The test substance will be prepared for dosing as a weight-to-volume mixture in ~~acetone~~ **mineral oil**.

2) **8.7.6 Premature Deliveries:**

The following sentence in this section is revised:

The **cranial**, thoracic, abdominal, pelvic cavities will be opened and the organs examined.

3) **8.8.1 Laparohysterectomy and Macroscopic Examination:**

The following sentence in this section is revised:

The **cranial**, thoracic, abdominal, pelvic cavities will be opened and the organs examined.

4) **8.8.2.1 Macroscopic Examination:**

The following section is revised as follows:

Treated skin
Untreated skin (right hindlimb)
Liver (2 sections)
Brain
Thymus
All gross lesions^a

5) Appendix A (see below) is added to this protocol as per section 8.7.2.

Reasons for Protocol Modification:

- 1) This sentence is being revised for correction of vehicle.
- 2) This sentence is being revised because the brain is being collected
- 3) This sentence is being revised because the brain is being collected.
- 4) This section is revised to collect untreated tissue and for clarification of the liver collection.
- 5) This modification adds Appendix A to the protocol.

Approval:

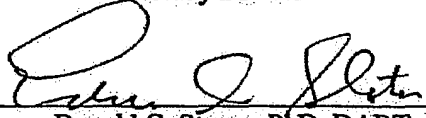
Sponsor's approval was obtained via email on 08 Sep 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

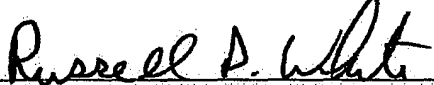
09 Sep 2011
Date



Donald G. Stump, PhD, DABT
For: Senior Director, Developmental and
Reproductive Toxicology

09 Sept. 2011
Date

Sponsor Name



Russell White, PhD
Sponsor Representative

03 Oct 2011
Date

APPENDIX A**SCORING CRITERIA FOR DERMAL REACTIONS****Evaluation of Dermal Reactions***

<u>Value</u>	<u>Erythema and Eschar Formation</u>	<u>Computer Designation</u>
0	No erythema	No erythema
1	Very slight erythema (barely perceptible, edges of area not well defined)	Very slight erythema
2	Slight erythema (pale red in color and edges definable)	Slight erythema
3	Moderate to severe erythema (definite red in color and area well defined)	Moderate erythema
4	Severe erythema (beet or crimson red) to slight eschar formation (injuries in depth)	Severe erythema
	<u>Edema Formation</u>	<u>Computer Designation</u>
0	No edema	No edema
1	Very slight edema (barely perceptible, edges of area not well defined)	Very slight edema
2	Slight edema (edges of area well defined by definite raising)	Slight edema
3	Moderate edema (raised approximately 1 mm)	Moderate edema
4	Severe edema (raised more than 1 mm and extending beyond area of exposure)	Severe edema

*Draize, J. H., 1965. The Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. Dermal Toxicity, pp. 46-59. Assoc. of Food and Drug Officials of the U.S., Topeka, Kansas.



Page 1 of 21

WIL-402017
August 31, 2011

PROTOCOL

A DERMAL PRENATAL DEVELOPMENTAL TOXICITY STUDY OF DISTILLATES (PETROLEUM), LIGHT CATALYTIC CRACKED IN RATS

(U.S. EPA OCSPP and OECD Guidelines)

WIL Study Number: WIL-402017

Submitted To:

American Petroleum Institute
1220 L Street, NW
Washington, DC 20005

WIL Research Laboratories, LLC
1407 George Road
Ashland, OH 44805-8946

1 OBJECTIVE:

The objectives of this study are to 1) To determine the effects of prenatal, dermal exposure to test material on pregnant rats and developing offspring. 2) To provide data to verify/expand the domain of the PAC (polycyclic aromatic compounds) prenatal models for predicting the toxicity of high-boiling petroleum substances from their PAC content. 3) To further test the hypothesis that developmental toxicity endpoints are more sensitive to effects of high-boiling petroleum substances than other reproductive endpoints, such as fertility or reproductive organ weight and histopathology.

This study will be conducted in accordance with the United States Environmental Protection Agency (EPA) Health Effects Test Guidelines OCSPP 870.3700, Prenatal Developmental Toxicity Study, August, 1998 and the Organisation of Economic Co-operation and Development Guidelines (OECD) for Testing of Chemicals Guideline 414, Prenatal Developmental Toxicity Study, January 2001. This study will be conducted in compliance with the EPA/TSCA and OECD [C(97) 186/Final] Principles of Good Laboratory Practice.

2 PERSONNEL INVOLVED IN THE STUDY:

2.1 Sponsor's Representative:

Russell White, PhD
American Petroleum Institute
1220 L Street, NW
Washington, DC 20005
Tel: (202) 682-8344
Email: whiter@api.org

2.2 Sponsor's Technical Monitor:

Katy O. Goyak, PhD
Senior Toxicologist
ExxonMobil Biomedical Sciences, Inc.
1545 Route 22 East
Annandale, New Jersey 08801
Tel: (908) 730-1017
Email: kathy.o.goyak@exxonmobil.com

2.3 WIL Study Director:

Jeffrey H. Charlap, M.S.
Staff Toxicologist, Developmental
and Reproductive Toxicology
Tel: (419) 289-8700
Fax: (419) 289-3650
Email: jcharlap@wilresearch.com

2.4 WIL Departmental Responsibilities:

Prägati Sawhney Coder, PhD, DABT
Senior Toxicologist, Developmental
and Reproductive Toxicology
Emergency Contact
Tel: (419) 289-8700
Fax: (419) 289-3650
E-mail: pscoder@wilresearch.com

Mark D. Nemec, BS, DABT
President and Chief Operating Officer

Donald G. Stump, PhD, DABT
Senior Director, Developmental
and Reproductive Toxicology

Eddie D. Slotter, PhD
Assistant Director, Developmental and
Reproductive Toxicology

Melissa J. Beck, PhD
Assistant Director, Neurosciences
and Head of Juvenile Toxicology

Bennett J. Varsho, MPH, DABT
Director, Operations

Gwendalyn M. Maginnis, DVM
Clinical Veterinarian

Carol A. Kopp, BS, LAT
Manager, Gross Pathology and
Developmental Toxicology Laboratory

George A. Parker, DVM, PhD, DACVP, DABT
Vice President, Pathology

Eric S. Bodle, PhD
Assistant Director, Analytical Chemistry

Ronald E. Wilson, BS
Director, Informational Systems

Heather L. Johnson, BS RQAP-GLP
Manager, Quality Assurance

Robert A. Wally, BS
Operations Manager, Reporting and
Technical Support Services

3 STUDY SCHEDULE:

Proposed Experimental Starting (Animal Receipt) Date:	September 06, 2011
Proposed Experimental Start (First Day of Dosing) Date:	September 20, 2011
Proposed Experimental Completion/Termination Date:	October 14, 2011
Proposed Audited Report Date:	December 22, 2011

4 TEST SUBSTANCE DATA:

4.1 Test Substance Shipment:

Test Substance is stored with applicable documentation of characterization at the Testing Facility.

If additional Test Substance is required, applicable documentation of characterization will be shipped under Sponsor's responsibility to:

Formulations Laboratory (WIL-402017; Jeffrey H. Charlap, MS)
Attn: Larry Blessing
WIL Research Laboratories, LLC
1407 George Road
Ashland, Ohio 44805-8946
Tel: (419) 289-8700
Fax: (419) 289-3650
Email: lblessing@wilresearch.com

4.2 Identification:

Distillates (petroleum), light catalytic cracked, (CAS# 64741-59-9), also known as Cat Cracked Distillate Light

4.3 Lot Number:

Site 17:Sample 5

4.4 Expiration/Retest Date:

Retest in 5 years

4.5 Purity:

100%

4.6 Stability:

The test substance is considered to be stable under the storage conditions provided by the Sponsor.

4.7 Physical Description:

To be documented by WIL Research Laboratories, LLC.

4.8 Storage Conditions:

Room temperature, protected from light.

4.9 Reserve Samples:

Reserve samples of the test substance will be taken in accordance with WIL Standard Operating Procedures and stored in the Archives at WIL Research Laboratories, LLC indefinitely, unless otherwise specified.

4.10 Personnel Safety:

Routine safety precautions apply. It is the responsibility of the Sponsor to notify the testing facility of any special handling requirements for the test substance. A Material Safety Data Sheet (MSDS) will be provided.

4.11 Test Substance Disposition:

Unless otherwise indicated, all unused test substance will be returned to the Sponsor contact listed below:

EPL Archives, Inc.
45610 Terminal Drive
Sterling, VA 20166
Attn: Joseph Ludi (703) 435-8780 x212

5 VEHICLE CONTROL DATA:**5.1 Identification:**

Mineral Oil, USP (Spectrum Chemicals and Laboratory Products).

5.2 Lot Number:

To be documented by WIL Research Laboratories, LLC.

5.3 Expiration/Retest Date:

To be documented by WIL Research Laboratories, LLC.

5.4 Stability:

The test substance is considered to be stable under the storage conditions provided by the Supplier.

5.5 Storage Conditions:

Room temperature, protected from light.

6 TEST SYSTEM:**6.1 Species:**

Rat

6.2 Strain:

Sprague Dawley Crl:CD(SD)

6.3 Source:

Charles River Laboratories, Inc.
(Facility to be documented in the study records)

6.4 Number of Study:

125 females (maximum of 155 purchased). A sufficient number of sexually mature untreated resident males of the same strain and source will be used to induce pregnancies. Animals not assigned to the study will be transferred to the stock animal colony or will be euthanized by carbon dioxide inhalation and the carcasses discarded.

The number of animals selected for this study is based on the US EPA Health Effects Test Guidelines OCSPP 870.3700, Prenatal Development Toxicity Study, August 1998 and the OECD Guidelines for Testing of Chemicals Guideline 414, Prenatal Developmental Toxicity Study, January 2001.

6.5 Body Weight Range:

A minimum of 220g at initiation of breeding.

6.6 Approximate Age:

80 to 120 days at the initiation of breeding.

6.7 Identification System:

The animals will be uniquely identified by a Monel[®] metal ear tag displaying the animal number. Individual cage cards will be affixed to each cage and will display the animal number, group number, study number, dosage level and sex of the animal.

6.8 Justification for Selection:

This species and strain of rat has been recognized as appropriate for developmental toxicity studies. WIL Research Laboratories, LLC has historical data on the background incidence of fetal malformations and developmental variations in the Crl:CD(SD) rat. This animal model has been proven to be susceptible to the effects of developmental toxicants.

7 SPECIFIC MAINTENANCE SCHEDULE:

7.1 Animal Housing:

Female rats will be individually housed (except during mating) in clean suspended wire-mesh cages in an environmentally controlled room during the study. The cages will be elevated above cage-board or other suitable material, which will be changed at least three times each week. Nesting material will not be provided, as euthanasia is scheduled prior to anticipated parturition. The cages will be subjected to routine cleaning at a frequency consistent with maintaining good animal health and WIL Standard Operating Procedures. The facilities at WIL Research Laboratories, LLC are accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International).

7.2 Environmental Conditions:

Controls will be set to maintain temperature at $71 \pm 5^{\circ}\text{F}$ ($22 \pm 3^{\circ}\text{C}$) and relative humidity at $50 \pm 20\%$. Temperature and relative humidity will be monitored continuously. Data for these two parameters will be scheduled for automatic collection on an hourly basis. Fluorescent lighting controlled by light timers will provide illumination for a 12-hour light/dark photoperiod. The ventilation rate will be set at a minimum of 10 room air changes per hour, 100% fresh air.

7.3 Drinking Water:

Reverse osmosis-purified water will be available *ad libitum*. Filters servicing the automatic watering system are changed regularly according to WIL Standard Operating Procedures. The municipal water supplying the laboratory is analyzed according to WIL Standard Operating Procedures on a routine basis to ensure that contaminants are not present in concentrations that would be expected to affect the outcome of the study.

7.4 Basal Diet:

PMI Nutrition International, LLC Certified Rodent LabDiet® 5002 will be offered *ad libitum* during the study **and provided without savers and lids to accommodate feeding with collars**. Periodic analyses of the certified feed are performed by the manufacturer to ensure that heavy metals and pesticides are not present at concentrations that would be expected to affect the outcome of the study. Results of the analyses are provided to WIL Research Laboratories, LLC by the manufacturer. Feeders will be changed and sanitized once per week.

8 EXPERIMENTAL DESIGN:

8.1 Animal Receipt and Quarantine:

Each rat will be inspected by a qualified technician upon receipt. Rats judged to be in good health and suitable as test animals will be immediately placed in quarantine for a minimum of 10 days. All rats will be initially weighed, permanently identified with a metal ear tag and receive a clinical observation. During the quarantine period, each rat will be observed twice daily for changes in general appearance and behavior. Body weights may be recorded prior to the initiation of breeding. Prior to the start of the in-life phase, those rats judged to be suitable test subjects will be identified. The animals will be acclimated to the Elizabethan-style collars prior to the mating period. The collars will be affixed to each rat for approximately 1, 4, 8 and at least 24 hours per day during the quarantine period.

8.2 Breeding Procedure:

At the conclusion of the quarantine period, female rats judged to be suitable test subjects and meeting acceptable body weight requirements will be cohabitated with untreated resident male rats (1:1) of the same strain and source in suspended wire-mesh cages for mating (home cage of the male). Detection of mating will be confirmed by evidence of a copulatory plug in the vagina or by a vaginal lavage for sperm. After confirmation of mating, the female will be returned to an individual suspended wire-mesh cage (assigned to a group), and the day will be designated as day 0 of gestation.

8.3 Randomization:

Mated females will be assigned to groups using a WIL Toxicology Data Management System (WTDMS™) computer program which assigns animals based on stratification of gestation day 0 body weights into a block design to one vehicle control group, one sham control group and three test substance groups of 25 rats each.

Any animal assigned to the study that is found dead, euthanized *in extremis* or exhibits abnormal clinical signs, reduced food consumption or body weight losses prior to the start of dosing may be replaced by an animal of appropriate gestation age when possible. Replacement animals will be arbitrarily assigned (not computer randomized) to the study based on comparable body weights (if possible) with respect to the animal that was replaced.

8.4 Route and Rationale of Test Substance Administration:

The route of administration will be dermal as this is a potential route of exposure for humans.

All animals will be clipped in the dorsal scapular area (covering approximately 10% of the body surface) prior to the start of dose administration and, as needed, thereafter during the administration period (repeated clippings will be performed prior to or at least 2-4 hours after dose administration). A different set of clippers will be used for control and treated animals to avoid potential for cross-contamination. Care will be taken not to abrade the skin. The test article and vehicle will be applied approximately in the center of the clipped area and distributed to avoid running.

Elizabethan-style collars will be used to minimize ingestion of the test material. Collars will be worn continually during the exposure period and removed during weighing. Collars will be fitted on the rats several days prior to the initiation of dosing and replaced as necessary during the dosing period.

8.5 Organization of Test Groups, Dosage Levels and Treatment Regimen:

8.5.1 Organization of Test Groups:

The dosage levels will be determined from results of previous studies and will be provided by the Sponsor Representative after consultation with the WIL Study Director.

The following table presents the study group arrangement.

Group Number	Test Substance	Dosage Level (mg/kg/day)	Dosage Concentration (mg/mL)	Dosage Volume (mL/kg)	Number of Females
1	Sham Control	0	0	0	25
2	Vehicle Control	0	0	1.5	25
3	Test substance ^a	100	66.7	1.5	25
4	Test substance ^a	450	300	1.5	25
5	Test substance ^a	750	500	1.5	25

a- The test substance used for Groups 3-5 is Distillates (petroleum), light cracked, (CAS-64741-59-9), also known as Cat Cracked Distillates Light.

8.5.2 Sham Control:

The Group 1 sham control animals will be subject to the same procedures (i.e. shaving, collaring, sham dosing with glass rod and removal of residual test substance) as animals in Groups 2-5. However, no vehicle or test substance will be applied to the sham control animals.

8.5.3 Vehicle Control Substance:

Mineral Oil, USP (Spectrum Chemicals and Laboratory Products).

8.5.4 Treatment Regimen:

The test substance will be administered as a single daily dose, applied over as much of the the clipped dorsal scapular area (approximately 10% of total body surface area) as possible and distributed to avoid running, from fertilization through the period of major organogenesis, gestation days 0 through 19. The four corners of the application site will be delineated on each presumed pregnant rat with indelible ink to allow proper identification of the treated and untreated skin. If the test substance does not cover at least 10% of the total body surface, the actual body surface area covered by the test substance will be documented for 2 representative rats/sex/group.

All animals will be dosed at approximately the same time each day. Following the 6-hour exposure period, the test site will be gently patted using a disposable paper towel in an effort to remove the residual test substance. If needed, the test site can be gently patted with gauze moistened with the vehicle and then again with dry gauze or dry disposable paper towel.

8.5.5 Adjustment of Doses:

Individual dosages will be calculated on the most recent body weight to provide the proper mg/kg/day dosage.

8.6 Preparation and Analysis of Test Substance Formulations:

8.6.1 Method and Frequency of Preparation:

The test substance will be prepared for dosing as a weight-to-volume mixture in acetone. The dosing formulations will be prepared approximately weekly. A complete and detailed description of the methods of test substance preparation will be included in the study records and described in the final report.

8.6.2 Homogeneity, Resuspension Homogeneity, and Stability of Test Substance Formulations

Analyses to demonstrate homogeneity and resuspension homogeneity as well as at least 15-day room temperature stability for the range of concentrations to be used on this study was conducted by the Analytical Chemistry Department at WIL Research Laboratories, LLC (WIL-402027, Bodle, Draft).

8.6.3 Concentration and Homogeneity Analysis

Two sets of duplicate samples will be collected from the top, middle, and bottom stratum of each test substance formulation. Each sample will be collected using a class A glass volumetric pipette from the middle of each stratum of each formulation. One set of duplicate samples will be stored at room temperature as reserve samples and will be discarded upon the Study Director's approval of results. The other set of samples will be analyzed using a method validated by WIL Research Laboratories, LLC to confirm concentration and homogeneity of the bulk test substance formulations.

An analytical chemistry report will be included as an appendix to the main report.

8.7 Maternal Observations During Gestation:

8.7.1 Appearance and Behavior:

Each rat will be observed twice daily for moribundity and mortality, once in the morning and once in the afternoon from gestation day 0 until euthanasia. Clinical observations will be recorded daily. Mortality and all signs of overt toxicity will be recorded on the day observed. The observations shall include, but are not limited to, evaluation for changes in appearance of skin and fur, eyes, mucous membranes, respiratory and circulatory system, autonomic and central nervous systems, somatomotor activity and behavior. All animals will also be observed on the day of necropsy and any findings will be recorded.

During the treatment period, each animal will be observed at the time of dosing and approximately 1 - 2 hours following each sham and dose administration for findings that are potentially related to treatment or that might change before the next scheduled observation. Additional post-dosing observations may be necessary and will be documented in the study records.

8.7.2 Dermal Observations:

Application sites will be examined for erythema, edema and other dermal findings daily (prior to dose administration) using a four-step grading system in accordance with the method of Draize (Appendix A), and inspected for remarkable changes. Other dermal findings, if present, will be noted.

8.7.3 Body Weights:

Individual body weights will be recorded once prior to breeding and on gestation days 0, 3, 6, 9, 12, 15, 18, and 20. Collars will be removed during collection of body weights.

8.7.4 Food Consumption:

Individual food consumption will be recorded on gestation days 0, 3, 6, 9, 12, 15, 18, and 20. Food intake will be reported as g/animal/day and g/kg/day for each corresponding body weight interval of gestation.

8.7.5 Deaths and Animals Euthanized *in Extremis*:

Females not surviving until the scheduled euthanasia will be necropsied and cause of death recorded, if possible. Rats not expected to survive to the next observation period (moribund) will be euthanized by carbon dioxide inhalation. The cranial, thoracic, abdominal and pelvic cavities will be opened and the organs examined. The number and location of implantation sites and viable fetuses will be recorded. Corpora lutea will also be counted and recorded. Uteri which appear nongravid by macroscopic examination will be opened and placed in a 10% ammonium sulfide solution (Salewski, 1964) for detection of early implantation loss. Gross lesions will be preserved in 10% neutral-buffered formalin for possible future histopathologic examination. Carcasses from adult animals will be discarded. Viable fetuses will be euthanized by a subcutaneous injection of sodium pentobarbital in the scapular region. Recognizable fetuses will be examined externally and preserved in 10% neutral-buffered formalin for possible future analysis. Maternal tissues will be collected and preserved as described in Section 8.8.2.1 and organ weights will be collected for animals euthanized *in extremis* only as described in Section 8.8.2.2.

8.7.6 Premature Deliveries:

Females that deliver prematurely will be euthanized by carbon dioxide inhalation that day. The thoracic, abdominal and pelvic cavities will be opened and the organs examined. The number and location of former implantation sites and viable fetuses will be recorded. Corpora lutea will also be counted and recorded. Gross lesions will be preserved in 10% neutral-buffered formalin for possible future histopathologic examinations. Carcasses from adult animals will be discarded. Viable fetuses or pups will be euthanized by a subcutaneous (scapular region) or intraperitoneal injection of sodium pentobarbital (as appropriate). Recognizable fetuses or pups will be examined externally and preserved

in 10% neutral buffered formalin for possible future analysis. Recognizable fetuses or pups aborted on GD 20 will be examined according to Section 8.8.3, if possible. Maternal tissues will be collected and preserved as described in Section 8.8.2.1 and organ weights will be collected as described in Section 8.8.2.2.

8.8 Scheduled Necropsy – Gestation Day 20:

8.8.1 Laparohysterectomy and Macroscopic Examination:

Laparohysterectomy and macroscopic examinations will be performed blind to treatment group. All surviving rats will be euthanized by carbon dioxide inhalation on gestation day 20. The thoracic, abdominal and pelvic cavities will be opened and the organs examined. The uterus of each dam will be excised and its adnexa trimmed. Corpora lutea will be counted and recorded. Gravid uterine weights will be obtained and recorded. The uterus of each dam will be opened and the number of viable and nonviable fetuses, early and late resorptions and total number of implantation sites will be recorded, and the placentae will be examined. The individual uterine distribution will be documented using the following procedure: all implantation sites, including early and late resorptions, will be numbered in consecutive fashion beginning with the left distal uterine horn, noting the position of the cervix and continuing from the proximal to the distal right uterine horn. Uteri which appear nongravid by macroscopic examination will be opened and placed in a 10% ammonium sulfide solution as described by Salewski (Salewski, 1964) for detection of early implantation loss. Maternal tissues will be preserved for future histopathologic examination in 10% neutral-buffered formalin only as deemed necessary by the gross findings. Representative sections of corresponding organs from a sufficient number of controls will be retained for comparison, if possible. The carcasses will be discarded.

8.8.2 Anatomic Pathology:

8.8.2.1 Macroscopic Examination:

At the time of necropsy, the following maternal tissues and organs will be collected and placed in 10% neutral-buffered formalin for possible future analysis:

Skin from the site of dose administration

Liver

Brain

Thymus

All gross lesions^a

- a Representative sections of corresponding organs from a sufficient number of controls will be retained for comparison, if possible.

8.8.2.2 Organ Weights:

The following organs will be weighed from all animals euthanized at scheduled termination, *in extremis*, or delivered prematurely. Organ-to-brain-weight ratios will be calculated.

Liver

Brain

Thymus gland

8.8.3 Fetal Examination:

Fetal examinations will be conducted without knowledge of treatment group. External, internal and skeletal fetal findings will be recorded as developmental variations or malformations. Representative photographs of all malformations, as appropriate, will be included in the study records. Corresponding low magnification photographs, depicting both the malformed fetus and a comparison control fetus, or normal littermate, will also be included in the study records as needed and as appropriate for comparison, when possible. Prenatal data (viable and nonviable fetuses, early and late resorptions, pre- and post-implantation loss and the fetal sex distribution) will be presented on a group mean basis and additionally as proportional data (% per litter).

8.8.3.1 External:

Each viable fetus will be examined in detail, sexed, weighed, euthanized by a subcutaneous injection of sodium pentobarbital in the scapular region and tagged. Nonviable fetuses (the degree of autolysis is minimal or absent) will be examined, crown-rump length measured, weighed, sexed and tagged individually. The crown-rump length of late resorptions (advanced degree of autolysis) will be measured, the degree of autolysis recorded, a gross external examination performed (if possible) and the tissue will be discarded.

8.8.3.2 Visceral (Internal):

Fetuses will be examined for visceral anomalies by dissection in the fresh (non-fixed) state. The thoracic and abdominal cavities will be opened and dissected using a technique described by Stuckhardt and Poppe (1984). Fetal kidneys will be examined and graded for renal papillae development (Woo and Hoar, 1972). This examination will include the heart and major vessels. The sex of all fetuses will be confirmed by internal examination.

The heads will be removed from approximately one-half of the fetuses in each litter and placed in Bouin's solution for subsequent processing and soft-tissue examination using the Wilson sectioning technique (Wilson, 1965).

The heads from the remaining one-half of the fetuses in each litter will be examined by a mid-coronal slice.

All carcasses, including the carcasses without heads, will be eviscerated, skinned and fixed in 100% ethyl alcohol for subsequent examination of skeletons.

8.8.3.3 Skeletal:

Each eviscerated fetus, following fixation in alcohol, will be stained with Alizarin Red S and Alcian Blue by a method similar to that described by Dawson (1926) and Inouye (1976). The skeletal examination will be made following this procedure.

9 DURATION OF STUDY:

The quarantine, breeding and gestation phases of the study will require approximately two months. The laparohysterectomy phase of the study and processing and evaluation of the fetal specimens will require approximately four weeks.

10 STATISTICAL METHODS:

All analyses will be two-tailed for significance levels of 5% and 1%. All statistical tests will be performed using a computer with appropriate programming as referenced below. Data from nongravid females will be excluded from calculation of means and from comparative statistics. The litter, rather than the fetus, will be considered as the experimental unit.

10.1 Maternal In-Life Data:

Continuous data variables [mean body weights (absolute and net), body weight gains (absolute and net) and food consumption of each interval] will be subjected to a parametric one-way analysis of variance (ANOVA) (Snedecor and Cochran, 1980) to determine intergroup difference. If the results of the ANOVA are significant ($p < 0.05$), Dunnett's test (Dunnett, 1964) will be applied to the data.

10.2 Laparohysterectomy Data:

The group mean numbers of corpora lutea, implantation sites, viable fetuses, maternal gravid uterine weights and mean fetal weight (separately by sex, and combined) will be subjected to a parametric one-way analysis of variance (ANOVA) (Snedecor and Cochran, 1980) and Dunnett's test (1964) as described above. The mean litter proportions of prenatal data (% per litter of viable and nonviable fetuses, early and late resorptions, total resorptions, pre- and post implantation loss and the fetal sex distribution) will be subjected to the Kruskal-Wallis nonparametric ANOVA test (Kruskal and Wallis, 1952) to determine intergroup difference. If the results of the ANOVA are significant ($p < 0.05$), the Dunn's Test (Dunn, 1964) will be applied to the data.

10.3 Fetal Morphology Data:

The mean litter proportion (% per litter) of total fetal malformations and developmental variations (external, visceral, skeletal and combined) and of each particular external, visceral and skeletal malformation or variation will be tabulated. The mean litter proportions of fetal malformations and developmental variations will be subjected to the Kruskal-Wallis nonparametric ANOVA test (1952) followed by the Dunn's Test (1964) (if appropriate) as described above

11 QUALITY ASSURANCE:

The study will be audited by the WIL Quality Assurance Department while in progress to assure compliance with Good Laboratory Practice Regulations, adherence to the protocol and to WIL Standard Operating Procedures. The protocol, protocol amendments, raw data, draft report and final report will be audited by the WIL Quality Assurance Department prior to submission to the Sponsor to assure that the final report accurately describes the conduct and the findings of the study. This study will be conducted in compliance with the EPA/TSCA and OECD [C(97) 186/Final] Principles of Good Laboratory Practice.

This study will be included on the WIL master list of regulated studies.

12 RECORDS TO BE MAINTAINED:

All original raw data records, as defined by WIL SOPs and the applicable GLPs, will be stored as described in Section 13 in the Archives at WIL Research Laboratories, LLC.

13 WORK PRODUCT:

The Sponsor will have title to all documentation records, raw data, specimens and other work product generated during the performance of the study. Any remaining samples (e.g. formulation or blood/plasma/serum) will be discarded after issuance of the Final Report. All work product, including raw paper data, pertinent electronic storage media and specimens, will be retained at no charge for six months following issuance of the final report in the Archives at WIL Research Laboratories, LLC. Thereafter, WIL Research Laboratories, LLC will charge a monthly archiving fee for retention of all work product. All work product will be stored in compliance with regulatory requirements.

Any work product, including documents, specimens, and samples, that are required by this protocol, its amendments, or other written instructions of the Sponsor, to be shipped by WIL Research Laboratories, LLC to another location will be appropriately packaged and labeled as defined by WIL's SOPs and delivered to a common carrier for shipment. WIL Research Laboratories, LLC will not be responsible for shipment following delivery to the common carrier.

All work product generated at a performing laboratory will be retained at an appropriate archive facility as designated by the SOPs of the performing laboratory.

14 REPORTS:

The final report will contain a summary, test article information, methods and procedures, appropriate individual animal and summary data tables, WIL Historical Control Data, supporting sub-reports (e.g. analytical chemistry report etc.), a copy of the protocol and amendment(s), if any, and an interpretation and discussion of the study results. The final report will be comprehensive and shall define level(s) inducing toxic effects as well as no-effect level(s) under the conditions of this investigation. The report will contain all information necessary to conform with current EPA OCSPP and OECD specifications.

WIL Research Laboratories, LLC will submit an electronic copy (PDF and MS Word copy of the report text for editing and comments) of the audited draft report in a timely manner upon completion of data collection prior to issuance of the final report. It is expected that the Sponsor will review the draft report and provide comments to WIL Research Laboratories, LLC within a two-month time frame following submission. WIL Research Laboratories, LLC shall provide a revised draft report that

incorporates the Sponsor's reasonable revisions and suggestions. One revision will be permitted as part of the cost of the study; additional changes or revisions may be made, at extra cost. WIL Research Laboratories, LLC shall submit the final report within two weeks of receiving authorization to finalize the report from the Sponsor. If the Sponsor's comments and/or authorization to finalize the report have not been received at WIL Research Laboratories, LLC within one year following submission of the draft report, WIL Research Laboratories, LLC may elect to finalize the report following appropriate written notification to the Sponsor. Two electronic copies (PDF) of the final report on CD-R will be provided; requests for paper copies of the final report may result in additional charges.

15 ANIMAL WELFARE ACT COMPLIANCE:

This study will comply with all applicable sections of the Final Rules of the Animal Welfare Act (AWA) regulations (9 CFR Parts 1, 2 and 3). The Sponsor should make particular note of the following:

- The Sponsor Representative's signature on this protocol documents for the Study Director the Sponsor's assurance that the study described in this protocol does not unnecessarily duplicate previous experiments.
- Whenever possible, procedures used in this study have been designed to avoid or minimize discomfort, distress or pain to animals. All methods are described in this study protocol or in written laboratory Standard Operating Procedures.
- Animals that experience severe or chronic pain or distress that cannot be relieved will be painlessly euthanized as deemed appropriate by the veterinary staff and Study Director. The Sponsor will be advised by the Study Director of all circumstances which could lead to this action in as timely a manner as possible.
- Methods of euthanasia used during this study are in conformance with the above-referenced regulation.
- The Sponsor/Study Director has considered alternatives to procedures that may cause more than momentary or slight pain or distress to the animals and has provided a written narrative description (AWA covered species only) of the methods and sources used to determine that alternatives are not available.

16 PROTOCOL MODIFICATION:

Modification of the protocol may be accomplished during the course of this investigation. However, no changes will be made in the study design without the verbal or written permission of the Sponsor. In the event that the Sponsor verbally requests or approves a change in the protocol, such changes will be made by appropriate documentation in the form of a protocol amendment. All alterations of

the protocol and reasons for the modification(s) will be signed by the Study Director and the Sponsor Representative.

17 REFERENCES:

Bodle, E.S. Analytical Validation and Stability Study of Distillates (Petroleum), Light Catalytic Cracked in Mineral Oil Formulations (Study No. WIL-402027), WIL Research Laboratories, LLC, Ashland, OH, Draft.

Dawson, A.B. A note on the staining of the skeleton of cleared specimens with Alizarin Red S. *Stain Technology* **1926**, *1*, 123-124.

Dunn, O.J. Multiple comparisons using rank sums. *Technometrics* **1964**, *6*(3), 241-252.

Dunnett, C.W. New tables for multiple comparisons with a control. *Biometrics* **1964**, *20*, pp. 482-491.

Inouye, M. Differential staining of cartilage and bone in fetal mouse-skeleton by Alcian blue and Alizarin red S. *Congenital Anomalies* **1976**, *16*, 171-173.

Kruskal, W.H.; Wallis, W.A. Use of ranks in one-criterion variance analysis. *Journal of the American Statistical Association* **1952**, *47*, 583-621.

Salewski, E. Färbemethode zum makroskopischen Nachweis von Implantationsstellen am Uterus der Ratte. [Staining method for a macroscopic test for implantation sites in the uterus of the rat]. *Naunyn - Schmiedeberg's Archiv für Experimentelle Pathologie und Pharmakologie* **1964**, *247*, 367.

Snedecor, G.W.; Cochran, W.G. One Way Classifications; Analysis of Variance. In *Statistical Methods*, 7th ed.; The Iowa State University Press: Ames, IA, **1980**; pp. 215-237.

Stuckhardt, J.L.; Poppe, S.M. Fresh visceral examination of rat and rabbit fetuses used in teratogenicity testing. *Teratogenesis, Carcinogenesis and Mutagenesis* **1984**, *4*, 181-188.

Wilson, J.G. Embryological Considerations in Teratology. In *Teratology: Principles and Techniques*; Wilson, J.G. and Warkany, J., Eds.; The University of Chicago Press: Chicago, IL, **1965**; pp. 251-277.

Woo, D.C.; Hoar, R.M. Apparent hydronephrosis as a normal aspect of renal development in late gestation of rats: the effect of methyl salicylate. *Teratology* **1972**; *6*, 191-196.

18 PROTOCOL APPROVAL:

Sponsor approval received via email on 31 Aug 2011.
Date

American Petroleum Institute

Russell White
Russell White
Sponsor Representative

1 Sept. 2011
Date

WIL Research Laboratories, LLC

Jeffrey H. Charlap, MS
Jeffrey H. Charlap, MS
Study Director

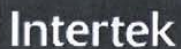
31 Aug 2011
Date

Melissa J Beck
for: Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology

31 Aug 2011
Date

APPENDIX B

Test Substance Characterization (Sponsor-Provided Data)



Report of Analysis

Sample ID: 2009-DRPK-000651-027	Date Taken: 16-January-2009
Drawn By: Client	Date Submitted: 16-January-2009
Sample Designated As: Crude Oil	Date Tested: 16-January-2009
Representing: Site#16 Sx #7 (As Received)	

Method	Test	Result	Units
ASTM D1319	Hydrocarbon Types (Aromatics, Olefins, Saturates) by FIA		
	Comment	Too Dark To Run	
ASTM D7169	Boiling Point Distribution of Samples with Residues by High Temperature GC		
	Boiling Point Distribution	See Attached Report	

Sample ID: 2009-DRPK-000651-028	Date Taken: 16-January-2009
Drawn By: Client	Date Submitted: 16-January-2009
Sample Designated As: Crude Oil	Date Tested: 26-January-2009
Representing: Site#17 Sx #5 (As Received)	

Method	Test	Result	Units
ASTM D4052	Density of Liquids by Digital Density Meter		
	Relative Density @ 60/60°F	0.9181	
	API Gravity @ 60°F	22.6	*API
ASTM D2887	Boiling Range Distribution of Petroleum Fractions by GC (Simulated Distillation)		
	Boiling Point Distribution	See Attached Report	
ASTM D1319	Hydrocarbon Types (Aromatics, Olefins, Saturates) by FIA		
	Aromatics	60.0	Vol %
	Olefins	6.5	Vol %
	Saturates	33.4	Vol %
ASTM D5186	Determination of Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels and Aviation Turbine Fuels by Supercritical Fluid Chromatography		
	Monoaromatics by SFC	28.9	Wt %
	Polynuclear Aromatics by SFC	36.1	Wt %
	Total Aromatics	65.0	Wt %

Sample ID: 2009-DRPK-000651-029	Date Taken: 16-January-2009
Drawn By: Client	Date Submitted: 16-January-2009
Sample Designated As: Crude Oil	Date Tested: 21-January-2009
Representing: Site#17 Sx #10 (As Received)	

Method	Test	Result	Units
ASTM D7169	Boiling Point Distribution of Samples with Residues by High Temperature GC		
	Boiling Point Distribution	See Attached Report	

Sample ID: 2009-DRPK-000651-030	Date Taken: 16-January-2009
Drawn By: Client	Date Submitted: 16-January-2009
Sample Designated As: Crude Oil	Date Tested: 16-January-2009
Representing: Site#18 Sx #1 (As Received)	

Method	Test	Result	Units
ASTM D1319	Hydrocarbon Types (Aromatics, Olefins, Saturates) by FIA		
	Comment	Couldn't Run (Water)	
ASTM D7169	Boiling Point Distribution of Samples with Residues by High Temperature GC		

Simdist-2000
ITS Caleb Brett - Houston

SAMPLE:	09-0651-28 (Site #17 Sx. #5)	Injection Date:	0090117203514-0600
FILE:	C:\CP32 Instruments\D2887 & D3710\Data\2009\JAN-09\09-0651-28.0005.CDF	Report Date:	1/17/09 22:12
PROCEDURE:	C:\CP32 Instruments\D2887 & D3710\PROCEDURES\122308-D2887.prc		
EXCEL FILE:	C:\CP32 Instruments\D2887 & D3710\Reports\2009\JAN-09\09-0651-28_0005_CDF.xls		

Boiling Point Distribution Report

ASTM D2887 Simulated Distillation

%Off	BP °F	BP °C	%Off	BP °F	BP °C	%Off	BP °F	BP °C
IBP	308.4	153.6	40%	494.2	256.8	80%	643.0	339.5
1%	331.1	166.2	41%	497.4	258.6	81%	646.7	341.5
2%	349.6	176.5	42%	503.3	261.8	82%	649.5	343.1
3%	363.3	184.0	43%	508.2	264.6	83%	654.1	345.6
4%	368.9	187.2	44%	512.4	266.9	84%	657.7	347.6
5%	374.9	190.5	45%	514.9	268.3	85%	662.5	350.3
6%	377.9	192.2	46%	518.2	270.1	86%	668.0	353.3
7%	386.7	197.0	47%	521.3	271.9	87%	673.1	356.2
8%	390.2	199.0	48%	524.4	273.5	88%	677.6	358.7
9%	394.8	201.5	49%	526.6	274.8	89%	681.5	360.8
10%	398.0	203.3	50%	530.1	276.7	90%	687.1	364.0
11%	400.1	204.5	51%	533.9	278.8	91%	693.4	367.4
12%	403.8	206.5	52%	537.7	281.0	92%	699.4	370.8
13%	407.2	208.4	53%	541.2	282.9	93%	704.9	373.8
14%	410.1	210.1	54%	544.4	284.7	94%	712.8	378.2
15%	413.2	211.8	55%	548.8	287.1	95%	720.5	382.5
16%	415.7	213.2	56%	552.7	289.3	96%	729.4	387.4
17%	419.7	215.4	57%	555.5	290.8	97%	741.5	394.1
18%	426.0	218.9	58%	560.2	293.4	98%	759.4	404.1
19%	429.6	220.9	59%	565.7	296.5	99%	792.0	422.2
20%	434.2	223.4	60%	568.4	298.0	FBP	838.1	447.8
21%	438.0	225.6	61%	571.4	299.7			
22%	441.8	227.7	62%	574.3	301.3			
23%	445.6	229.8	63%	577.9	303.3			
24%	446.8	230.5	64%	581.3	305.2			
25%	448.0	231.1	65%	583.7	306.5			
26%	450.3	232.4	66%	587.3	308.5			
27%	452.0	233.3	67%	592.8	311.6			
28%	455.3	235.2	68%	596.8	313.8			
29%	460.7	238.2	69%	600.7	316.0			
30%	464.1	240.1	70%	604.7	318.2			
31%	469.1	242.9	71%	607.6	319.8			
32%	474.8	246.0	72%	611.0	321.7			
33%	479.0	248.3	73%	614.3	323.5			
34%	481.5	249.7	74%	618.1	325.6			
35%	483.3	250.7	75%	621.7	327.6			
36%	485.7	252.0	76%	626.7	330.4			
37%	487.5	253.0	77%	631.6	333.1			
38%	488.7	253.7	78%	634.1	334.5			
39%	492.0	255.6	79%	638.8	337.1			

Start Elution Time (mins):	0.203	Sample Wt:	0 g
End Elution Time (mins):	27.881	Solvent Wt:	0 g
		Material Balance:	100.0 wt%
Blank File:	C:\CP32 Instruments\D2887 & D3710\Data\2009\JAN-09\CS2-BLANK1.0002.CDF		
Calib File:	D:\CP32 Instruments\D2887 & D3710\DATA\RTMIX-060905.0006.CDF		
Resp Factor:	1.000E+00		

CHARACTERIZATION AND QUANTITATION OF POLYNUCLEAR AROMATIC
COMPOUNDS (PAC) IN HPV KEROSENE, GAS OIL, HEAVY FUEL OIL AND
HYDROCARBON WASTE SAMPLES BY PRR ("MOBIL" METHOD 2) PAC

STUDY NO.: 2009-0102

MATERIALS TESTED: 46 assorted HPV oils

CRU SAMPLE NOS.: 010901 - 010949

REQUESTER: American Petroleum Institute
1220 L Street, NW
Washington, DC 2005-4070

LIAISON: T. A. Roy

STUDY PERFORMED BY: Port Royal Research, LLC
61 S. Port Royal Drive
Hilton Head, SC 29928

EXPERIMENTAL START DATE: January 9, 2009

EXPERIMENTAL TERMINATION DATE: February 10, 2009

 2/12/09
T.A. Roy Date
Study Director

DISTRIBUTION

♣ Study Director
API Liaison (original)

T.A. Roy
P. Podhasky

TABLE OF CONTENTS

	Page
Signatures	i
Results (Tables I and II)	1
Discussion	6
Appendix	
Correspondence	
Sample Description and Identification Sheets	
PRR Test Article Receipt Log	
Study Worksheets PRR ("Mobil" Method 2) PAC	
6-PAC Standard Response/Correction Factor Determinations & Standard Chromatograms	
Test Material GC/MS Chromatograms (Group Assignments)	

RESULTS**PRR ("MOBIL" METHOD 2) PAC**

The polynuclear aromatics (PAC) were isolated by following PRR Standard Operating Procedure No. A.3.1. The total weight percent PAC and the group percentages of the total Wt.% are as follows:

TABLE I

source/chemical abstract no.	sample identification	total Wt. %	Group Percentages of total Wt. %						
			I	II	III	IV	V	VI	≥VII
SITE 13, SAMPLE 2, CAS# 64742-81-0	KEROSENE	1.90	20	80	0	0	0	0	0
SITE 26, SAMPLE 21, CAS# 8008-20-6	KEROSENE	1.93	30	70	0	0	0	0	0
SITE 9, SAMPLE 8, CAS# 64742-81-0	KEROSENE	2.23	30	70	0	0	0	0	0
SITE 25, SAMPLE 7, CAS# 64742-81-0	KEROSENE	3.38	30	70	0	0	0	0	0
SITE 28, SAMPLE 7, CAS# 64742-81-0	KEROSENE	2.04	30	70	1	0	0	0	0
SITE 26, SAMPLE 18, CAS# 64741-59-9	GAS OILS	32.50	10	60	30	0	0	0	0
SITE 7, SAMPLE 2, CAS# 64741-82-8	GAS OILS	0.18	20	50	30	1	0	0	0
SITE 26, SAMPLE 12, CAS# 64741-82-8	GAS OILS	1.38	50	50	4	0	0	0	0
SITE 22, SAMPLE 1, CAS# 64742-80-9	GAS OILS	5.09	10	70	10	0	0	0	0
SITE 3, SAMPLE 2, CAS# 64742-80-9	GAS OILS	3.38	1	70	30	0	0	0	0
SITE 26, SAMPLE 2, CAS# 64742-80-9	GAS OILS	4.38	8	70	20	0	0	0	0
SITE 28, SAMPLE 2, CAS# 64741-59-9	GAS OILS	39.80	1	70	20	0	0	0	0
SITE 17, SAMPLE 5, CAS# 64741-59-9	GAS OILS	23.90	10	70	20	0	0	0	0
SITE 5, SAMPLE 1, CAS# 64741-59-9	GAS OILS	38.20	0	90	10	0	0	0	0
SITE 1, SAMPLE 7, CAS# 64741-59-9	GAS OILS	31.50	0	70	30	0	0	0	0
SITE 28, SAMPLE 8, CAS# 64742-80-9	GAS OILS	2.52	6	80	20	0	0	0	0
SITE 12, SAMPLE 18, CAS# 64742-80-9	GAS OILS	7.39	3	50	50	0	0	0	0

TABLE 1 (CONTINUED)

source/chemical abstract no.	sample identification	total Wt. %	Group Percentages of total Wt. %						
			I	II	III	IV	V	VI	≥ VII
SITE 12, SAMPLE 5, CAS# 64741-82-8	GAS OILS	9.82	5	80	10	0	0	0	0
SITE 2, SAMPLE 7, CAS# 64741-82-8	GAS OILS	12.00	30	40	30	0	0	0	0
SITE 9, SAMPLE 4, CAS# 64741-82-8	GAS OILS	7.91	4	50	40	2	0	0	0
SITE 29, SAMPLE 1, CAS# 68333-23-3	INDIVIDUAL	0.38	20	70	9	0	0	0	0
SITE 9, SAMPLE 3, CAS# 64741-81-7	HEAVY FUEL OILS	11.30	0	6	20	30	20	10	2
SITE 6, SAMPLE 3, CAS# 64741-62-4	HEAVY FUEL OILS	44.40	0	2	70	20	5	4	0
SITE 1, SAMPLE 4, CAS# 64741-62-4	HEAVY FUEL OILS	30.50	0	2	60	30	7	3	0
SITE 2, SAMPLE 6, CAS# 64741-81-7	HEAVY FUEL OILS	10.00	0	10	40	20	10	9	3
SITE 8, SAMPLE 1, CAS# 64741-81-7	HEAVY FUEL OILS	16.50	0	3	40	30	20	8	2
SITE 30, SAMPLE 3, CAS# 64741-62-4	HEAVY FUEL OILS	43.20	0	3	30	30	20	10	4
SITE 17, SAMPLE 10, CAS# 64741-62-4	HEAVY FUEL OILS	31.00	0	1	20	40	20	10	5
SITE 30, SAMPLE 2, CAS# 64741-81-7	HEAVY FUEL OILS	18.40	0	3	20	30	20	20	10
SITE 12, SAMPLE 2, CAS# 64741-62-4	HEAVY FUEL OILS	52.00	0	2	30	30	20	10	5
SITE 21, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	1.80	2	80	20	0	0	0	0
SITE 28, SAMPLE 5, CAS# 68477-26-9	HYDROCARBON WASTES	4.11	30	70	5	0	0	0	0
SITE 1, SAMPLE 10, CAS# 68477-26-9	HYDROCARBON WASTES	15.70	10	60	20	2	0	0	0
SITE 2, SAMPLE 4, CAS# 68477-26-9	HYDROCARBON WASTES	12.70	5	70	30	2	0	0	0
SITE 16, SAMPLE 7, CAS# 68477-26-9	HYDROCARBON WASTES	5.21	3	50	20	10	7	5	0
SITE 26, SAMPLE 10, CAS# 68477-26-9	HYDROCARBON WASTES	0.33	0	30	60	9	5	2	0
SITE 21, SAMPLE 3, CAS# 68956-70-7	HYDROCARBON WASTES	0.35	0	50	40	5	2	0	0
SITE 4, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	1.74	4	50	30	8	5	0	0
SITE 10, SAMPLE 2, CAS# 68956-48-9	HYDROCARBON WASTES	2.60	3	80	20	0	0	0	0
SITE 2, SAMPLE 3, CAS# 68477-26-9	HYDROCARBON WASTES	16.40	10	40	30	10	7	8	0
SITE 10 SAMPLE 1, CAS# 68477-26-9	HYDROCARBON WASTES	2.01	7	70	20	0	0	0	0
SITE 2, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	15.90	10	50	20	6	5	6	0

TABLE 1 CONTINUED

source/chemical abstract no.	sample identification	total Wt. %	Group Percentages of total Wt. %						
			I	II	III	IV	V	VI	≥VII
SITE 23, SAMPLE 17, CAS# 68956-70-7	HYDROCARBON WASTES	2.83	0	10	20	10	20	20	20
SITE 5, SAMPLE 3, CAS# 68956-48-9	HYDROCARBON WASTES	9.66	0	50	40	5	2	0	0
SITE 26, SAMPLE 16, CAS# 68956-70-7	HYDROCARBON WASTES	3.46	0	10	70	10	3	2	0

Percentages are reported to one significant figure where groups I through VII represent benzenes and two- through seven-fused ring aromatics, respectively.

Table II below reports these same results as the weight percent of the total in each ring group:

TABLE II

source/chemical abstract no.	sample identification	total Wt. %	Group Wt%						
			I	II	III	IV	V	VI	≥VII
SITE 13, SAMPLE 2, CAS# 64742-81-0	KEROSENE	1.90	0.38	1.52	0.00	0.00	0.00	0.00	0.00
SITE 26, SAMPLE 21, CAS# 8008-20-6	KEROSENE	1.93	0.58	1.35	0.00	0.00	0.00	0.00	0.00
SITE 9, SAMPLE 8, CAS# 64742-81-0	KEROSENE	2.23	0.67	1.56	0.00	0.00	0.00	0.00	0.00
SITE 25, SAMPLE 7, CAS# 64742-81-0	KEROSENE	3.38	1.01	2.37	0.00	0.00	0.00	0.00	0.00
SITE 28, SAMPLE 7, CAS# 64742-81-0	KEROSENE	2.04	0.61	1.43	0.02	0.00	0.00	0.00	0.00
SITE 26, SAMPLE 18, CAS# 64741-59-9	GAS OILS	32.50	3.25	19.50	9.75	0.00	0.00	0.00	0.00
SITE 7, SAMPLE 2, CAS# 64741-82-8	GAS OILS	0.18	0.04	0.09	0.05	0.00	0.00	0.00	0.00
SITE 26, SAMPLE 12, CAS# 64741-82-8	GAS OILS	1.38	0.69	0.69	0.06	0.00	0.00	0.00	0.00
SITE 22, SAMPLE 1, CAS# 64742-80-9	GAS OILS	5.09	0.51	3.56	0.51	0.00	0.00	0.00	0.00
SITE 3, SAMPLE 2, CAS# 64742-80-9	GAS OILS	3.38	0.03	2.37	1.01	0.00	0.00	0.00	0.00

TABLE II (CONTINUED)

source/chemical abstract no.	sample identification	total Wt. %	Group Wt%						
			I	II	III	IV	V	VI	≥VII
SITE 26, SAMPLE 2, CAS# 64742-80-9	GAS OILS	4.38	0.35	3.07	0.88	0.00	0.00	0.00	0.00
SITE 28, SAMPLE 2, CAS# 64741-59-9	GAS OILS	39.80	0.40	27.86	7.96	0.00	0.00	0.00	0.00
SITE 17, SAMPLE 5, CAS# 64741-59-9	GAS OILS	23.90	2.39	16.73	4.78	0.00	0.00	0.00	0.00
SITE 5, SAMPLE 1, CAS# 64741-59-9	GAS OILS	38.20	0.00	34.38	3.82	0.00	0.00	0.00	0.00
SITE 1, SAMPLE 7, CAS# 64741-59-9	GAS OILS	31.50	0.00	22.05	9.45	0.00	0.00	0.00	0.00
SITE 28, SAMPLE 8, CAS# 64742-80-9	GAS OILS	2.52	0.15	2.02	0.50	0.00	0.00	0.00	0.00
SITE 12, SAMPLE 18, CAS# 64742-80-9	GAS OILS	7.39	0.22	3.70	3.70	0.00	0.00	0.00	0.00
SITE 12, SAMPLE 5, CAS# 64741-82-8	GAS OILS	9.82	0.49	7.86	0.98	0.00	0.00	0.00	0.00
SITE 2, SAMPLE 7, CAS# 64741-82-8	GAS OILS	12.00	3.60	4.80	3.60	0.00	0.00	0.00	0.00
SITE 9, SAMPLE 4, CAS# 64741-82-8	GAS OILS	7.91	0.32	3.96	3.16	0.16	0.00	0.00	0.00
SITE 29, SAMPLE 1, CAS# 68333-23-3	INDIVIDUAL	0.38	0.08	0.27	0.03	0.00	0.00	0.00	0.00
SITE 9, SAMPLE 3, CAS# 64741-81-7	HEAVY FUEL OILS	11.30	0.00	0.68	2.26	3.39	2.26	1.13	0.23
SITE 6, SAMPLE 3, CAS# 64741-62-4	HEAVY FUEL OILS	44.40	0.00	0.89	31.08	8.88	2.22	1.78	0.00
SITE 1, SAMPLE 4, CAS# 64741-62-4	HEAVY FUEL OILS	30.50	0.00	0.61	18.30	9.15	2.14	0.92	0.00
SITE 2, SAMPLE 6, CAS# 64741-81-7	HEAVY FUEL OILS	10.00	0.00	1.00	4.00	2.00	1.00	0.90	0.30
SITE 8, SAMPLE 1, CAS# 64741-81-7	HEAVY FUEL OILS	16.50	0.00	0.50	6.60	4.95	3.30	1.32	0.33
SITE 30, SAMPLE 3, CAS# 64741-62-4	HEAVY FUEL OILS	43.20	0.00	1.30	12.96	12.96	8.64	4.32	1.73
SITE 17, SAMPLE 10, CAS# 64741-62-4	HEAVY FUEL OILS	31.00	0.00	0.31	6.20	12.40	6.20	3.10	1.55
SITE 30, SAMPLE 2, CAS# 64741-81-7	HEAVY FUEL OILS	18.40	0.00	0.55	3.68	5.52	3.68	3.68	1.84
SITE 12, SAMPLE 2, CAS# 64741-62-4	HEAVY FUEL OILS	52.00	0.00	1.04	15.60	15.60	10.40	5.20	2.60
SITE 21, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	1.80	0.04	1.44	0.36	0.00	0.00	0.00	0.00
SITE 28, SAMPLE 5, CAS# 68477-26-9	HYDROCARBON WASTES	4.11	1.23	2.88	0.21	0.00	0.00	0.00	0.00
SITE 1, SAMPLE 10, CAS# 68477-26-9	HYDROCARBON WASTES	15.70	1.57	9.42	3.14	0.31	0.00	0.00	0.00
SITE 2, SAMPLE 4, CAS# 68477-26-9	HYDROCARBON WASTES	12.70	0.64	8.89	3.81	0.25	0.00	0.00	0.00
SITE 16, SAMPLE 7, CAS# 68477-26-9	HYDROCARBON WASTES	5.21	0.16	2.61	1.04	0.52	0.36	0.26	0.00
SITE 26, SAMPLE 10, CAS# 68477-26-9	HYDROCARBON WASTES	0.33	0.00	0.10	0.20	0.03	0.02	0.01	0.00

source/chemical abstract no.	sample identification	total Wt. %	Group Wt%						
			I	II	III	IV	V	VI	≥VII
SITE 21, SAMPLE 3, CAS# 68956-70-7	HYDROCARBON WASTES	0.35	0.00	0.18	0.14	0.02	0.01	0.00	0.00
SITE 4, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	1.74	0.07	0.87	0.52	0.14	0.09	0.00	0.00
SITE 10, SAMPLE 2, CAS# 68956-48-9	HYDROCARBON WASTES	2.60	0.08	2.08	0.52	0.00	0.00	0.00	0.00
SITE 2, SAMPLE 3, CAS# 68477-26-9	HYDROCARBON WASTES	16.40	1.64	6.56	4.92	1.64	1.15	1.31	0.00
SITE 10 SAMPLE 1, CAS# 68477-26-9	HYDROCARBON WASTES	2.01	0.14	1.41	0.40	0.00	0.00	0.00	0.00
SITE 2, SAMPLE 2, CAS# 68477-26-9	HYDROCARBON WASTES	15.90	1.59	7.95	3.18	0.95	0.80	0.95	0.00
SITE 2, SAMPLE 1, CAS# 68477-26-9	HYDROCARBON WASTES	16.20	3.24	6.48	3.24	1.46	1.13	0.97	0.00
SITE 23, SAMPLE 17, CAS# 68956-70-7	HYDROCARBON WASTES	2.83	0.00	0.28	0.57	0.28	0.57	0.57	0.57
SITE 5, SAMPLE 3, CAS# 68956-48-9	HYDROCARBON WASTES	9.66	0.00	4.83	3.86	0.48	0.19	0.00	0.00
SITE 26, SAMPLE 16, CAS# 68956-70-7	HYDROCARBON WASTES	3.46	0.00	0.35	2.42	0.35	0.10	0.07	0.00

DISCUSSION

Four of the samples were analyzed in duplicate, one each from the four categories of streams, kerosene, gas oil, heavy fuel oil and hydrocarbon waste. The relative percent difference (%RPD)¹ for the duplicate values were 22.5, 6.0, 3.6 and 6.8% for the four categories, respectively. Generally, RPD values ≤20% are considered to be within precision standards. The kerosene value is outside this limit and likely reflects the variable loss of volatile components from this stream which is outside the designed scope and limitation of the PAC2 assay.

¹ RPD = (R1 - R2)/[(R1 + R2)/2] X 100 where R1 and R2 are replicates 1 and 2.

APPENDIX C

Analyses of Dosing Formulations (WIL Research Laboratories, LLC)

A Dermal Prenatal Developmental Toxicity Study
of Distillates (Petroleum), Light Catalytic Cracked in Rats

Analyses of Dosing Formulations

Analytical Chemistry Department

WIL Research Laboratories, LLC



TABLE OF CONTENTS

	<u>Page</u>
Table of Contents	2
Index of Figures.....	3
Index of Tables	3
1. Summary.....	4
2. Introduction.....	4
2.1. Key Study Dates	5
2.2. Key Study Personnel.....	5
3. Experimental Methods and Materials	5
3.1. High Performance Liquid Chromatography	5
3.2. Preparation of Calibration Stock Solution	6
3.3. Preparation of Calibration Standards	6
3.4. Preparation of Quality Control Stock Solutions	7
3.5. Preparation of Quality Control Samples	7
3.6. Formulation Sample Processing	7
3.7. Concentration Quantitation.....	8
4. Results and Discussion.....	9
4.1. Specificity/Selectivity	11
4.2. Assay Acceptability	11
4.3. Test Substance Homogeneity/Concentration Assessment of Formulations	12
5. Conclusion	13
6. Report Review and Approval	14
7. References.....	15
8. Abbreviations	16

INDEX OF FIGURES

	<u>Page</u>
1. Representative Chromatogram of a 25.0 µg CAS# 64741-59-9/mL Calibration Standard	9
2. Representative Chromatogram of a Processed 500 mg CAS# 64741-59-9/mL Quality Control Sample	10
3. Representative Chromatogram of a Processed 500 mg CAS# 64741-59-9/mL Formulation Sample.....	10
4. Chromatogram of a Processed Vehicle Blank Sample	11

INDEX OF TABLES

1. Homogeneity/Concentration Assessment of the 19 September 2011 Formulations	18
2. Homogeneity/Concentration Assessment of the 6 October 2011 Formulations	19

1. SUMMARY

A high performance liquid chromatography method using ultraviolet absorbance detection at a wavelength of 254 nm for the determination of distillates (petroleum), light catalytic cracked (CAS# 64741-59-9) concentration in mineral oil formulations containing test substance ranging in concentration from 50.0 to 500 mg/mL was validated in a previous study (Bodle, 2011, WIL-402027). In the present study, test substance homogeneity/concentration acceptability was assessed in formulations used for dose administration and prepared at target concentrations of 66.7, 300, and 500 mg CAS# 64741-59-9/mL.

The results of the test substance homogeneity/concentration assessment in formulations used for dose administration and prepared at target concentrations of 66.7, 300, and 500 mg CAS# 64741-59-9/mL met the WIL Research SOP acceptance criteria, *i.e.*, the RSD for the mean concentration was $\leq 10\%$ at a concentration within the acceptable limits (85% to 115% of target). No test substance was detected in the analyzed vehicle administered to the control group.

2. INTRODUCTION

This report provides a detailed description and validation of a high performance liquid chromatography (HPLC) method using ultraviolet (UV) absorbance detection at a wavelength of 254 nm for the determination of distillates (petroleum), light catalytic cracked (CAS# 64741-59-9) concentration in mineral oil formulations containing test substance ranging in concentration from 50.0 to 500 mg/mL. The method was validated in a previous study (Bodle, 2011, WIL-402027) where assay specificity/selectivity, calibration reproducibility, precision, accuracy, and ruggedness were assessed. Also in the previous study, formulations prepared at target concentrations of 50 and 500 mg CAS# 64741-59-9/mL were analyzed to assess test substance homogeneity and, following up to 15 days of room temperature storage, resuspension homogeneity and stability. In the present study, formulations used for dose administration prepared at

target concentrations of 66.7, 300, and 500 mg CAS# 64741-59-9/mL were analyzed to assess test substance homogeneity/concentration acceptability.

A list of abbreviations potentially used in this report is presented in Section 8. (Abbreviations).

2.1. KEY STUDY DATES

<u>Date(s)</u>	<u>Event(s)</u>
19 September 2011	First date of analysis
7 October 2011	Last date of analysis

2.2. KEY STUDY PERSONNEL

J. Fabricio Beltran, BA	Associate Research Chemist, Analytical Chemistry
Robert E. Boes, MS	Associate Research Chemist, Analytical Chemistry
Donna K. Murphy	Chemist II, Analytical Chemistry
Gregory A. Hawks, AS	Group Supervisor, Reporting & Technical Support Services
Melissa A. Hull, BS	Group Manager, Reporting & Technical Support Services

3. EXPERIMENTAL METHODS AND MATERIALS

3.1. HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Instrument:	Agilent 1100 liquid chromatograph equipped with a variable wavelength detector, autosampler, and Dionex Chromeleon [®] software, or equivalent system
Column:	Phenomenex Jupiter [®] C4, 150 × 4.6 mm, 5-μm particle-size, 30 nm
Mobile Phase:	A: Deionized (DI) water B: Methanol (MeOH)

Gradient:	<u>Time</u> (minutes)	<u>A</u> (%)	<u>B</u> (%)
	0.0	50.0	50.0
	2.0	50.0	50.0
	7.0	10.0	90.0
	9.0	10.0	90.0
	9.1	50.0	50.0
	11.8	50.0	50.0

Flow Rate: 1.50 mL/minute

Column Temperature: 30°C

Detector: UV absorbance at 254 nm

Injection Volume: 10 µL

Retention Time: Approximately 5.5 to 9.0 minutes for CAS# 64741-59-9 peak group

Run Time: 11.8 minutes

3.2. PREPARATION OF CALIBRATION STOCK SOLUTION

The calibration standard stock solution was prepared at a concentration of 0.500 mg CAS# 64741-59-9/mL by transferring 28 µL of CAS# 64741-59-9 (WIL log no. 11012A, density of 0.92851 mg/mL) to a 50-mL volumetric flask. Approximately 40 mL of ethyl acetate (EtOAc) was added, and the preparation was mixed as needed to achieve dissolution of the test substance. Additional EtOAc was added as needed to obtain the desired concentration, and the solution was stirred to mix.

3.3. PREPARATION OF CALIBRATION STANDARDS

Aliquots of the calibration stock solution were combined in amber autosampler vials with appropriate volumes of EtOAc to obtain calibration standards ranging in concentration from 25.0 to 200 µg CAS# 64741-59-9/mL. At least single calibration standards were prepared at each concentration.

3.4. PREPARATION OF QUALITY CONTROL STOCK SOLUTIONS

The quality control (QC) stock solution was prepared at a concentration of 100 mg CAS# 64741-59-9/mL by transferring 2.70 mL of CAS# 64741-59-9 (WIL log no. 11012A, density of 0.92851 mg/mL) into a 25-mL volumetric flask. Approximately 20 mL of EtOAc was added, and the preparation was mixed and/or sonicated as needed to achieve dissolution of the test substance. Additional EtOAc was added as needed to obtain the desired concentration, and the solution was stirred to mix.

3.5. PREPARATION OF QUALITY CONTROL SAMPLES

As detailed in the following table, QC samples were prepared to simulate the processing of formulations at concentrations of 50.0, 250, and 500 mg CAS# 64741-59-9/mL (nominal QC concentrations) by combining aliquots of the QC stock solution, vehicle (mineral oil), and EtOAc in polypropylene tubes. The processed samples were mixed with vortex action. Portions of the processed samples were further diluted with EtOAc in amber autosampler vials or polypropylene tubes. QC samples were prepared in triplicate at each concentration; a single vehicle blank was prepared.

QC Level	QC Conc. (mg/mL)	Vehicle Volume (mL)	QC Stock Conc. (mg/mL)	QC Stock Volume (mL)	EtOAc Volume (mL)	Secondary Dilution	Final Conc. (µg/mL)
BQC	0	1.00	NA	NA	39.00	10-fold	0
QC1	50.0	1.00	100	0.500	38.50	10-fold	125
QC2	250	1.00	100	2.50	36.50	50-fold	125
QC3	500	1.00	100	5.00	34.00	100-fold	125

NA = Not applicable

3.6. FORMULATION SAMPLE PROCESSING

Quadruplicate formulation samples were collected using a syringe and dosing cannula and placed in polypropylene tubes. Two samples from each quadruplicate set were processed for analysis and the remaining 2 samples (back-up samples) were stored at room temperature and, if not processed for analysis, were discarded after Study

Director's acceptance of results. As detailed in the following table, formulation samples were processed by adding EtOAc and mixing with vortex action. Portions of the processed samples were further diluted with EtOAc in amber autosampler vials or polypropylene tubes. The vials were capped, and the diluted samples mixed with vortex action.

Group	Theoretical Test Substance Conc. (mg/mL)	Sample Volume (mL)	EtOAc Volume (mL)	Secondary Dilution	Theoretical Final Conc. (µg/mL)
2	0	1.0	39.00	10-fold	0
3	66.7	1.0	39.00	13.34-fold	125
4	300	1.0	39.00	60-fold	125
5	500	1.0	39.00	100-fold	125

3.7. CONCENTRATION QUANTITATION

Single injections were made of each calibration standard and processed QC and formulation sample. A calibration curve was constructed for each set of analyses. The CAS# 64741-59-9 peak heights (y) and the theoretical concentrations (x) of the calibration standards were fit with least-squares regression analysis to the linear function:

$$y = ax + b$$

Concentrations were calculated from the results of the regression analysis using Dionex Chromeleon[®] software. The concentration data were transferred to a Microsoft Excel[®] spreadsheet, where appropriate summary statistics, *i.e.*, mean, standard deviation (SD), relative standard deviation (RSD), and concentration as a percent of target concentration, were calculated and presented in tabular form. The concentrations of the formulation and QC samples were calculated by applying any necessary factors to correct for dilution and/or unit conversion.

4. **RESULTS AND DISCUSSION**

Under the described chromatographic conditions, the retention time of the test substance peak group was approximately 5.5 to 9.0 minutes. Figure 1, Figure 2, Figure 3, and Figure 4 are typical chromatograms of a calibration standard, a processed QC sample, a processed formulation sample, and a processed vehicle blank sample, respectively. The total analysis time required for each run was 11.8 minutes.

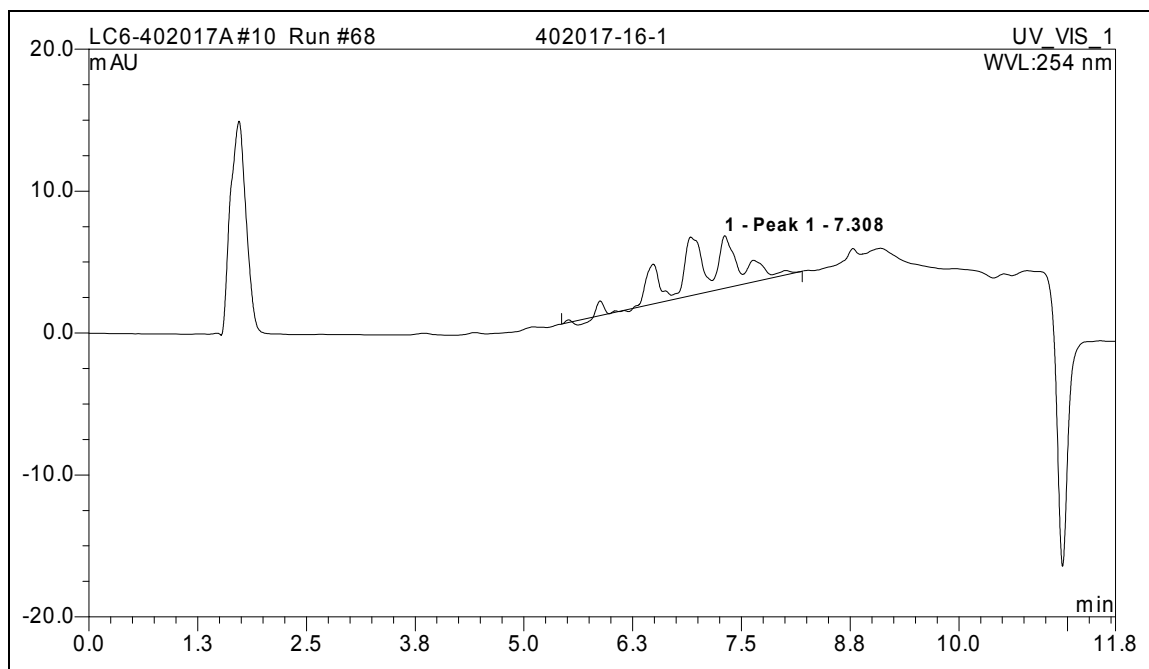


Figure 1: Representative Chromatogram of a 25.0 μg CAS# 64741-59-9/mL Calibration Standard

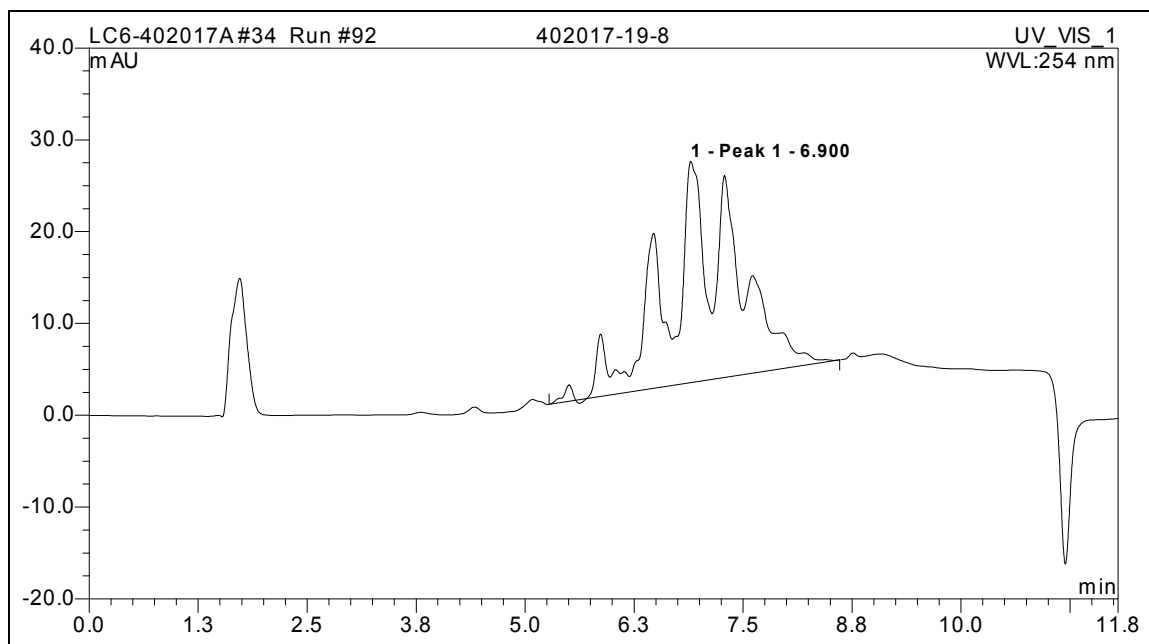


Figure 2: Representative Chromatogram of a Processed 500 mg CAS# 64741-59-9/mL Quality Control Sample

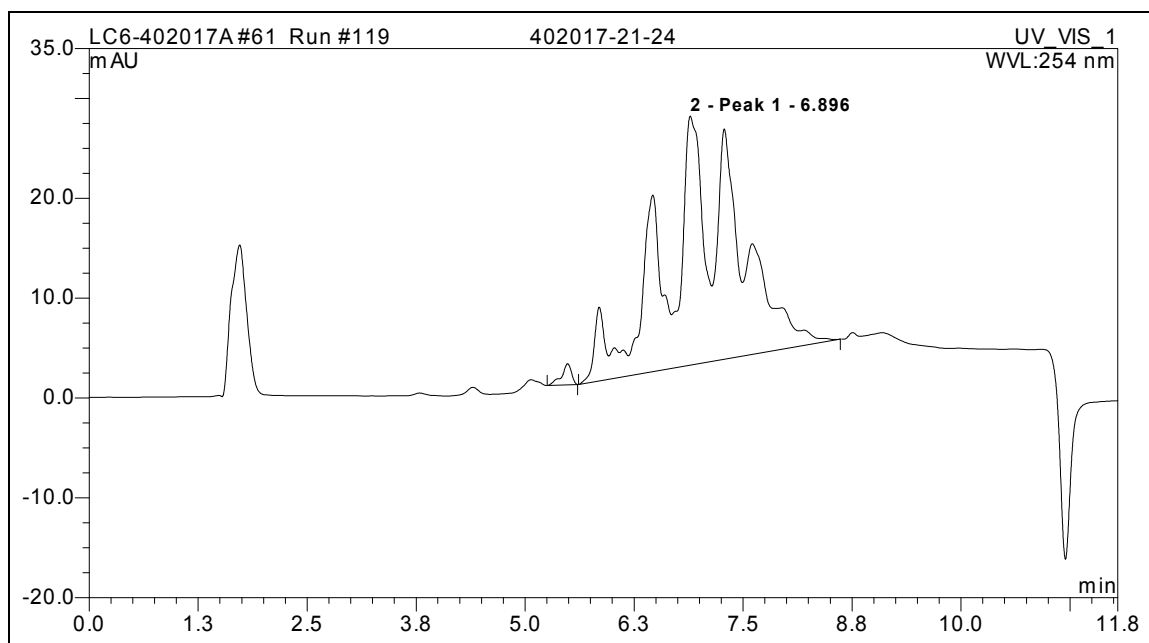


Figure 3: Representative Chromatogram of a Processed 500 mg CAS# 64741-59-9/mL Formulation Sample

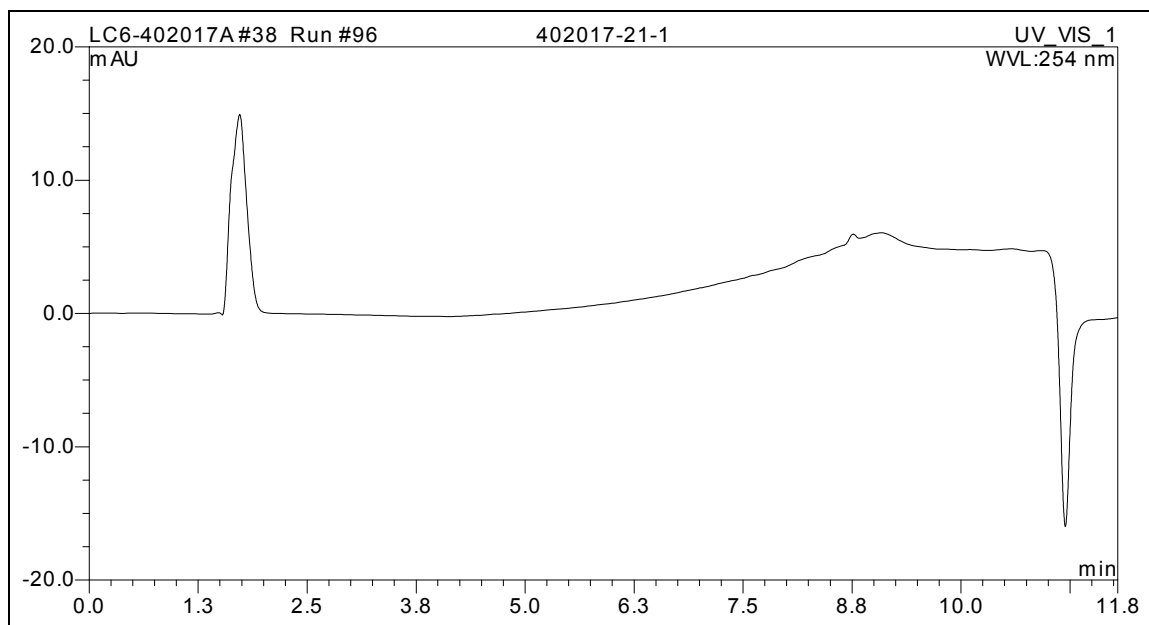


Figure 4: Chromatogram of a Processed Vehicle Blank Sample

4.1. SPECIFICITY/SELECTIVITY

As shown in Figure 4 (and in contrast to the chromatograms shown in Figure 1, Figure 2, and Figure 3), assay specificity/selectivity was confirmed when HPLC/UV analysis of processed vehicle samples revealed that there were no significant peaks (with signal-to-noise ratio [S/N] >10) at or near the retention time for the test substance peak groups (approximately 5.5 to 9.0 minutes).

4.2. ASSAY ACCEPTABILITY

In addition to the experimental samples, each analytical session consisted of (but was not limited to) calibration standards at 5 concentrations and triplicate QC samples prepared at each of 3 concentrations. In this study, the formulations were prepared at target concentrations of 66.7, 300, and 500 mg CAS# 64741-59-9/mL, and the QC samples were prepared at nominal concentrations of 50.0, 250, and 500 mg CAS# 64741 59-9/mL. For an analytical session to be considered valid, at least two-thirds of the calculated QC concentrations with at least 1 sample at each

concentration had to be 85% to 115% of the nominal QC concentration. All reported results were from analytical sessions that met the acceptance criteria.

4.3. TEST SUBSTANCE HOMOGENEITY/CONCENTRATION ASSESSMENT OF FORMULATIONS

Duplicate samples from the top, middle, and bottom strata of the formulations prepared on 19 September 2011 and 6 October 2011 at target test substance concentrations of 66.7, 300, and 500 mg /mL were analyzed to assess test substance homogeneity/concentration acceptability. In addition, duplicate sets from the middle stratum of the control group were collected and analyzed. The results of the homogeneity/concentration analysis are presented in Table 1 and Table 2, with the overall statistics summarized as follows:

Homogeneity/Concentration Assessment of the 19 September 2011 Formulations				
	Group 2 (0.0 mg/mL)	Group 3 (66.7 mg/mL)	Group 4 (300 mg/mL)	Group 5 (500 mg/mL)
Mean Concentration (mg/mL)	ND	69.0	309	522
SD	NA	0.42	2.6	3.9
RSD (%)	NA	0.61	0.84	0.74
Mean Concentration % of Target	NA	103	103	104

ND = No test substance chromatographic peaks detected

NA = Not applicable

Homogeneity/Concentration Assessment of the 6 October 2011 Formulations				
	Group 2 (0.0 mg/mL)	Group 3 (66.7 mg/mL)	Group 4 (300 mg/mL)	Group 5 (500 mg/mL)
Mean Concentration (mg/mL)	ND	67.8	277	513
SD	NA	0.25	2.8	4.0
RSD (%)	NA	0.37	1.0	0.78
Mean Concentration % of Target	NA	102	92.4	103

ND = No test substance chromatographic peak detected

NA = Not applicable

The homogeneity/concentration acceptability assessment of the 19 September 2011 and 6 October 2011 formulations met the WIL Research SOP requirement, *i.e.*, the RSD for the mean concentration was $\leq 10\%$ at a concentration within the acceptable limits (within 85% to 115% of target concentration). No test substance was detected in the analyzed vehicle administered to the control group (Group 2).

5. CONCLUSION

A validated HPLC/UV method was used for the determination of CAS# 64741-59-9 concentration in mineral oil formulations. The analytical results met the applicable WIL Research SOP acceptance criteria for test substance homogeneity/concentration acceptability in formulations used for dose administration. No test substance was detected in the analyzed vehicle administered to the control group.

6. REPORT REVIEW AND APPROVAL

WIL-402017 Analytical Chemistry Report

Report Approved by:

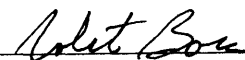


Jeffrey H. Charlap, MS
Staff Toxicologist, Developmental and
Reproductive Toxicology
Study Director

12 July 2012

Date

Report Prepared by:



Robert E. Boes, MS
Associate Research Chemist,
Analytical Chemistry

12 July 2012

Date

Report Reviewed by:



Eric S. Bodle, PhD
Assistant Director, Analytical Chemistry

12 Jul 2012

Date

7. REFERENCES

Bodle, E.S. Analytical Validation and Stability Study of Distillates (Petroleum), Light Catalytic Cracked in Mineral Oil Formulations (Study No. WIL-402027). WIL Research Laboratories, LLC, Ashland, OH, **2011**.

8. ABBREVIATIONS

The following abbreviations may apply to this report:

μ	-	micro
μL	-	microliter
ACN	-	acetonitrile
btm	-	bottom
cm	-	centimeter
DI	-	deionized
DMSO	-	dimethylsulfoxide
ESI+	-	positive electrospray ionization
FA	-	formic acid
g	-	gram
HPLC	-	high performance liquid chromatography
hr	-	hour(s)
IS	-	internal standard
kg	-	kilogram
L	-	liter
LLOQ	-	lower limit of quantitation
MC	-	methylcellulose
MeOH	-	methanol
mg	-	milligram
mL	-	milliliter
mm	-	millimeter
msec	-	milliseconds
MS	-	mass spectrometry
mM	-	millimolar
NA	-	not applicable
ND	-	not detected
ng	-	nanogram
QC	-	quality control
%RE	-	percent relative error
RSD	-	relative standard deviation
SD	-	standard deviation
SOP	-	standard operating procedure
SPE	-	solid phase extraction
UV	-	ultraviolet
v	-	volume
w	-	weight
WIL Research	-	WIL Research Laboratories, LLC

TABLES 1 - 2

Table 1. Homogeneity/Concentration Assessment of the 19 September 2011 Formulations
(Analyzed 19 Sept 2011)

<u>Group/Strata</u>	<u>Dose Conc</u> (mg/mL)	<u>Ref #</u> (402017-)	<u>Run #</u> (402017-)	<u>Analyzed Conc</u> (mg/mL)	<u>Percent of Target</u> (%)	<u>Mean Conc</u> (mg/mL)	<u>SD</u>	<u>RSD</u> (%)	<u>Mean Conc % of Target</u> (%)
2/Top	0	2 - 1	34		-----Not Detected-----				
		2 - 2	35		-----Not Detected-----				
2/Mid		2 - 3	36		-----Not Detected-----				
		2 - 4	37		-----Not Detected-----				
2/Btm		2 - 5	38		-----Not Detected-----				
		2 - 6	39		-----Not Detected-----				
3/Top	66.7	2 - 7	40	68.7	103	69.0	0.42	0.61	103
		2 - 8	41	68.4	103				
3/Mid		2 - 9	42	69.3	104				
		2 - 10	43	68.9	103				
3/Btm		2 - 11	44	69.0	103				
		2 - 12	45	69.6	104				
4/Top	300	2 - 13	46	305	102	309	2.6	0.84	103
		2 - 14	47	312	104				
4/Mid		2 - 15	48	309	103				
		2 - 16	49	311	104				
4/Btm		2 - 17	50	307	102				
		2 - 18	51	310	103				
5/Top	500	2 - 19	52	520	104	522	3.9	0.74	104
		2 - 20	53	521	104				
5/Mid		2 - 21	54	520	104				
		2 - 22	55	523	105				
5/Btm		2 - 23	56	518	104				
		2 - 24	57	529	106				

Table 2. Homogeneity/Concentration Assessment of the 6 October 2011 Formulations

(Analyzed 6 October 2011)

<u>Group/Strata</u>	<u>Dose Conc</u> (mg/mL)	<u>Ref #</u> (402017-)	<u>Run #</u> (402017-)	<u>Analyzed Conc</u> (mg/mL)	<u>Percent of Target</u> (%)	<u>Mean Conc</u> (mg/mL)	<u>SD</u>	<u>RSD</u> (%)	<u>Mean Conc % of Target</u> (%)
2/Top	0	21 - 1	96		-----Not Detected-----				
		21 - 2	97		-----Not Detected-----				
2/Mid		21 - 3	98		-----Not Detected-----				
		21 - 4	99		-----Not Detected-----				
2/Btm		21 - 5	100		-----Not Detected-----				
		21 - 6	101		-----Not Detected-----				
3/Top	66.7	21 - 7	102	67.3	101	67.8	0.25	0.37	102
		21 - 8	103	67.9	102				
3/Mid		21 - 9	104	67.8	102				
		21 - 10	105	67.9	102				
3/Btm		21 - 11	106	68.0	102				
		21 - 12	107	67.6	101				
4/Top	300	21 - 13	108	274	91.4	277	2.8	1.0	92.4
		21 - 14	109	278	92.6				
4/Mid		21 - 15	110	275	91.7				
		21 - 16	111	276	92.1				
4/Btm		21 - 17	112	278	92.5				
		21 - 18	113	282	94.1				
5/Top	500	21 - 19	114	512	102	513	4.0	0.78	103
		21 - 20	115	506	101				
5/Mid		21 - 21	116	515	103				
		21 - 22	117	518	104				
5/Btm		21 - 23	118	516	103				
		21 - 24	119	512	102				

results.xls 2H

Printed: 03Dec2011 11:16 AM

APPENDIX D

Animal Room Environmental Conditions

RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED

PROJECT NO.:WIL- 402017

TEMPERATURE/HUMIDITY - STUDY SUMMARY REPORT

SPONSOR: 402 - AMERICAN PETROLEUM

Page 1 of 5

STUDY SPECIFICATIONS: 402017

DATE IN 09/06/11 TIME IN 10:00

DATE OUT 10/13/11 TIME OUT 08:00

ROOM SPECIFICATIONS: B ROOM 87

LOW TEMPERATURE °F: 66.0 HIGH TEMPERATURE °F: 76.0 LOW HUMIDITY %RH: 30.0

TEST SYSTEM: Rat

LOW TEMPERATURE °C: 18.9 HIGH TEMPERATURE °C: 24.4 HIGH HUMIDITY %RH: 70.0

DATE	PRIMARY TEMP		SECONDARY TEMP		PRIMARY HUM	SECONDARY HUM
	MEAN (°F)	MEAN (°C)	MEAN (°F)	MEAN (°C)	MEAN (%RH)	MEAN (%RH)
09/06/11	70.4	21.3	70.3	21.3	48.4	49.2
09/07/11	70.4	21.3	70.3	21.3	48.8	49.4
09/08/11	70.6	21.4	70.5	21.4	48.1	48.9
09/09/11	70.5	21.4	70.4	21.3	48.4	49.2
09/10/11	70.3	21.3	70.2	21.2	48.3	49.0
09/11/11	70.5	21.4	70.4	21.3	48.2	49.0
09/12/11	70.4	21.3	70.3	21.3	48.8	49.6
09/13/11	70.5	21.4	70.4	21.3	48.2	49.0
09/14/11	70.4	21.3	70.3	21.3	48.5	49.2
09/15/11	70.4	21.3	70.4	21.3	44.0	44.7
09/16/11	70.4	21.3	70.3	21.3	43.0	43.7
09/17/11	70.6	21.4	70.5	21.4	43.5	44.2
09/18/11	70.5	21.4	70.4	21.3	48.3	48.9
09/19/11	70.4	21.3	70.3	21.3	52.9	53.3
09/20/11	70.4	21.3	70.3	21.3	53.5	54.0
09/21/11	70.6	21.4	70.5	21.4	53.1	53.6
09/22/11	70.5	21.4	70.4	21.3	52.0	52.7
09/23/11	70.5	21.4	70.4	21.3	52.5	53.0
09/24/11	70.5	21.4	70.4	21.3	45.9	46.6

RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED

PROJECT NO.:WIL- 402017

TEMPERATURE/HUMIDITY - STUDY SUMMARY REPORT

SPONSOR: 402 - AMERICAN PETROLEUM

Page 2 of 5

DATE	PRIMARY TEMP		SECONDARY TEMP		PRIMARY HUM	SECONDARY HUM
	MEAN (°F)	MEAN (°C)	MEAN (°F)	MEAN (°C)	MEAN (%RH)	MEAN (%RH)
09/25/11	70.5	21.4	70.4	21.3	46.9	47.6
09/26/11	70.6	21.4	70.5	21.4	47.9	48.6
09/27/11	70.6	21.4	70.5	21.4	44.9	45.6
09/28/11	70.5	21.4	70.3	21.3	45.5	46.3
09/29/11	70.5	21.4	70.3	21.3	44.7	45.5
09/30/11	70.4	21.3	70.3	21.3	40.0	40.6
10/01/11	70.4	21.3	70.3	21.3	40.2	40.8
10/02/11	70.5	21.4	70.4	21.3	39.2	39.8
10/03/11	70.5	21.4	70.4	21.3	40.7	41.3
10/04/11	70.3	21.3	70.2	21.2	41.7	42.4
10/05/11	70.4	21.3	70.3	21.3	40.6	41.3
10/06/11	70.3	21.3	70.2	21.2	43.3	44.0
10/07/11	70.5	21.4	70.4	21.3	42.8	43.5
10/08/11	70.5	21.4	70.3	21.3	42.8	43.5
10/09/11	70.5	21.4	70.4	21.3	43.1	43.8
10/10/11	70.4	21.3	70.3	21.3	40.7	41.4
10/11/11	70.6	21.4	70.4	21.3	41.7	42.4
10/12/11	70.5	21.4	70.3	21.3	43.3	44.0
10/13/11	70.3	21.3	70.2	21.2	43.4	44.1

DATE	PRIMARY TEMP			SECONDARY TEMP		PRIMARY HUM	SECONDARY HUM
	MEAN (°F)	MEAN (°C)		MEAN (°F)	MEAN (°C)	MEAN (%RH)	MEAN (%RH)
SUMMARY OF DAILY MEANS	MEAN	MIN	MAX				
PRIMARY TEMP °F:	70.5	70.3	70.6				
PRIMARY TEMP °C:	21.4	21.3	21.4				
SECONDARY TEMP °F:	70.3	70.2	70.5				
SECONDARY TEMP °C:	21.3	21.2	21.4				
PRIMARY HUM %RH:	45.7	39.2	53.5				
SECONDARY HUM %RH:	46.4	39.8	54.0				
N DAYS	38						

B ROOM 87 SUMMARY OF HOURLY VALUES

	PRIMARY TEMP				SECONDARY TEMP				PRIMARY HUM		SECONDARY HUM	
MEAN	70.5	°F	21.4	°C	70.3	°F	21.3	°C	45.7	%RH	46.4	%RH
MIN	68.9	°F	20.5	°C	68.9	°F	20.5	°C	35.8	%RH	36.5	%RH
MAX	71.8	°F	22.1	°C	71.6	°F	22.0	°C	70.1	%RH	69.1	%RH
SD	0.29		0.16		0.30		0.17		4.48		4.46	
SE	0.01		0.01		0.01		0.01		0.15		0.15	
N SAMPLES	884				884				884		884	
FIRST DAY	09/06/11											
LAST DAY	10/13/11											
N DAYS	38											

STUDY 402017 SUMMARY OF HOURLY VALUES

	PRIMARY TEMP				SECONDARY TEMP				PRIMARY HUM		SECONDARY HUM	
MEAN	70.5	°F	21.4	°C	70.3	°F	21.3	°C	45.7	%RH	46.4	%RH
MIN	68.9	°F	20.5	°C	68.9	°F	20.5	°C	35.8	%RH	36.5	%RH
MAX	71.8	°F	22.1	°C	71.6	°F	22.0	°C	70.1	%RH	69.1	%RH
SD	0.29		0.16		0.30		0.17		4.48		4.46	
SE	0.01		0.01		0.01		0.01		0.15		0.15	
N SAMPLES	884				884				884		884	
FIRST DAY	09/06/11											
LAST DAY	10/13/11											
N DAYS	38											

APPENDIX E

Scoring Criteria for Dermal Reactions

SCORING CRITERIA FOR DERMAL REACTIONS

Evaluation of Dermal Reactions*

<u>Value</u>	<u>Erythema and Eschar Formation</u>	<u>Computer Designation</u>
0	No erythema	No erythema
1	Very slight erythema (barely perceptible, edges of area not well defined)	Very slight erythema
2	Slight erythema (pale red in color and edges definable)	Slight erythema
3	Moderate to severe erythema (definite red in color and area well defined)	Moderate erythema
4	Severe erythema (beet or crimson red) to slight eschar formation (injuries in depth)	Severe erythema

<u>Value</u>	<u>Edema Formation</u>	<u>Computer Designation</u>
0	No edema	No edema
1	Very slight edema (barely perceptible, edges of area not well defined)	Very slight edema
2	Slight edema (edges of area well defined by definite raising)	Slight edema
3	Moderate edema (raised approximately 1 mm)	Moderate edema
4	Severe edema (raised more than 1 mm and extending beyond area of exposure)	Severe edema

* Draize, J.H. The appraisal of the safety of chemicals in foods, drugs and cosmetics. *Dermal Toxicity* **1965**, 46-59. Assoc. of Food and Drug Officials of the U.S., Topeka, Kansas and the EPA-OPPTS Health Effects Test Guidelines **1998**.

APPENDIX F

WIL Developmental Historical Control Data Version 3.10 [CrI:CD(SD) Rats]

Study Date Range: 4/21/1998-8/27/2010

Endpoint	Mean of Study Means								
	Total	Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
NO. OF DATASETS	168								
Total No. of Animals in the Control Group	4166								
No. of Animals That Died	6								
No. of Animals That Aborted	0								
No. of Animals That Delivered	0								
Percent Pregnant		96.6	4.55	0.35	100.0	76.0	100.0	96.0	100.0
No. Gravid	4026								
No. With Only Resorptions	6								
No. of Dams With Live Fetuses	4015								
No. Nongravid	253								
No. of Animals Examined at Laparohysterectomy	4160								
Mean Gravid Uterine Weight (g)		85.4	3.70	0.29	85.7	72.2	95.4	82.8	88.1
Mean No. Viable Fetuses/Dam		15.1	0.69	0.05	15.1	12.2	17.1	14.7	15.5
Total No. Viable Fetuses	60839								
Viable Fetuses (%/Litter)		95.1	1.57	0.12	95.4	90.1	98.0	94.0	96.2
Mean No. Postimplantation Loss/Dam		0.7	0.22	0.02	0.7	0.3	1.4	0.6	0.9
Total No. of Postimplantation Losses	3025								
Postimplantation Loss (%/Litter)		4.9	1.57	0.12	4.6	2.0	9.9	3.8	6.0
Early Resorptions (%/Litter)		4.8	1.59	0.12	4.5	1.5	9.9	3.6	5.8
Late Resorptions (%/Litter)		0.1	0.19	0.01	0.0	0.0	0.8	0.0	0.2
Dead Fetuses (%/Litter)		0.0	0.05	0.00	0.0	0.0	0.5	0.0	0.0
Mean No. Implantations/Dam		15.9	0.68	0.05	15.9	13.0	17.6	15.4	16.3
Mean No. Corpora Lutea/Dam		17.2	0.83	0.06	17.2	14.5	19.4	16.6	17.7
Mean No. Preimplantation Loss/Dam		1.4	0.59	0.05	1.3	0.3	3.1	0.9	1.7
Total No. Preimplantation Losses	5427								
Preimplantation Loss (%/Litter)		7.3	2.97	0.23	7.1	1.5	15.7	5.2	9.1
Total No. Male Fetuses	30376								
Total No. Female Fetuses	30463								
% Males/Litter1		49.9	2.70	0.21	49.8	43.1	56.7	47.9	51.8
% Females/Litter		50.1	2.70	0.21	50.2	43.3	56.9	48.2	52.1
Mean Fetal Body Weight (g)		3.7	0.11	0.01	3.6	3.4	3.9	3.6	3.7
Mean Male Body Weight (g)		3.8	0.12	0.01	3.7	3.5	4.0	3.7	3.8
Mean Female Body Weight (g)		3.6	0.11	0.01	3.6	3.4	3.8	3.5	3.6

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
MALFORMATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
TOTAL EXTERNAL MALFORMATIONS		0.1	0.21	0.02	0.0	0.0	1.3	0.0	0.2
TOTAL VISCERAL MALFORMATIONS		0.1	0.17	0.01	0.0	0.0	0.9	0.0	0.0
TOTAL SKELETAL MALFORMATIONS		0.1	0.23	0.02	0.0	0.0	1.1	0.0	0.3
TOTAL MALFORMATIONS		0.3	0.35	0.02	0.2	0.0	1.6	0.0	0.5
EXTERNAL									
Aglossia		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Anal Atresia		0.0	0.05	0.00	0.0	0.0	0.3	0.0	0.0
Apodia		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Astomia		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Carpal and/or Tarsal Flexure		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Cleft Face		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Cleft Lip		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Cleft Palate		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Craniorachischisis		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Cyclopia		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Ectromelia		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Exencephaly with or without Open Eyelid(s)		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Fetal Anasarca		0.0	0.12	0.01	0.0	0.0	1.3	0.0	0.0
Filamentous Tail		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Gastroschisis		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Hydrocephaly with or without Dome Head		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Mandibular Agnathia		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Mandibular Micrognathia		0.0	0.05	0.00	0.0	0.0	0.3	0.0	0.0
Maxillary Agnathia		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Meningoencephalocele		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
MALFORMATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
EXTERNAL									
Micromelia		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Microphthalmia and/or Anophthalmia		0.0	0.09	0.01	0.0	0.0	0.5	0.0	0.0
Omphalocele		0.0	0.05	0.00	0.0	0.0	0.3	0.0	0.0
Open Eyelid(s)		0.0	0.03	0.00	0.0	0.0	0.2	0.0	0.0
Proboscis-Like Nose		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Spina Bifida		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Tail- Short		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Umbilical Herniation of the Intestine		0.0	0.07	0.01	0.0	0.0	0.8	0.0	0.0
VISCERAL									
Aorta- Narrowed		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Epididymis- Absent		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Heart and/or Great Vessel Anomaly		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Hydrocephaly		0.0	0.08	0.01	0.0	0.0	0.8	0.0	0.0
Interrupted Aortic Arch		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Kidney(s)- Absent		0.0	0.03	0.00	0.0	0.0	0.4	0.0	0.0
Kidney(s) and/or Ureter(s) Absent		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Lung(s)- Lobular Agenesis		0.0	0.04	0.00	0.0	0.0	0.6	0.0	0.0
Lung(s)- Lobular Dysgenesis		0.0	0.06	0.00	0.0	0.0	0.5	0.0	0.0
Retrosophageal Aortic Arch		0.0	0.05	0.00	0.0	0.0	0.3	0.0	0.0
Situs Inversus		0.0	0.08	0.01	0.0	0.0	0.4	0.0	0.0
Testis- Absent		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Thyroid Gland(s)- Absent		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Transposition of the Great Vessels		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Vessel(s)- Malpositioned		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Vessel(s)- Malpositioned		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
MALFORMATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
SKELETAL									
14th Full Rib(s)		0.1	0.16	0.01	0.0	0.0	0.9	0.0	0.0
Bent Limb Bone(s)		0.0	0.08	0.01	0.0	0.0	1.0	0.0	0.0
Bent Scapula		0.0	0.08	0.01	0.0	0.0	1.0	0.0	0.0
Costal Cartilage Anomaly		0.0	0.05	0.00	0.0	0.0	0.3	0.0	0.0
Limb Bone(s)- Small		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Rib Anomaly		0.0	0.08	0.01	0.0	0.0	0.4	0.0	0.0
Rib(s)- Only 11 Pairs Present		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Rib(s)- Only 12 Pairs Present		0.0	0.07	0.01	0.0	0.0	0.5	0.0	0.0
Scapula- Misshapen		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Skull Anomaly		0.0	0.03	0.00	0.0	0.0	0.4	0.0	0.0
Sternebra(e)- Fused		0.0	0.08	0.01	0.0	0.0	1.0	0.0	0.0
Sternebra(e)- Malaligned (Severe)		0.0	0.05	0.00	0.0	0.0	0.4	0.0	0.0
Sternoschisis		0.0	0.07	0.01	0.0	0.0	0.6	0.0	0.0
Vertebral Agenesis		0.0	0.07	0.01	0.0	0.0	0.3	0.0	0.0
Vertebral Anomaly with or without Associated Rib Anomaly		0.0	0.11	0.01	0.0	0.0	0.7	0.0	0.0
Vertebral Centra Anomaly		0.0	0.06	0.00	0.0	0.0	0.5	0.0	0.0

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
VARIATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
TOTAL EXTERNAL VARIATIONS		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
TOTAL VISCERAL VARIATIONS		0.5	0.74	0.06	0.3	0.0	4.0	0.0	0.6
TOTAL SKELETAL VARIATIONS		33.7	6.68	0.52	33.6	18.0	50.4	29.7	37.3
TOTAL VARIATIONS		33.9	6.80	0.38	33.7	17.1	51.1	29.7	37.8
EXTERNAL									
Twinning		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
VISCERAL									
Adrenal Gland(s)- Accessory		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Adrenal Gland(s)- Enlarged		0.0	0.11	0.01	0.0	0.0	1.4	0.0	0.0
Adrenal Gland(s)- Pale		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Diaphragm- Thin		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Heart- Small		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Hemorrhagic Iris		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Hemorrhagic Ring Around the Iris		0.0	0.07	0.01	0.0	0.0	0.3	0.0	0.0
Kidney(s)- Small		0.0	0.03	0.00	0.0	0.0	0.3	0.0	0.0
Liver- Accessory Lobule(s)		0.0	0.16	0.01	0.0	0.0	1.6	0.0	0.0
Liver- Pale		0.0	0.04	0.00	0.0	0.0	0.3	0.0	0.0
Liver- Swollen		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Major Blood Vessel Variation		0.1	0.16	0.01	0.0	0.0	0.8	0.0	0.0
Renal Papilla(e) not Developed and/or Distended Ureter(s)		0.3	0.64	0.05	0.0	0.0	4.0	0.0	0.3
Retrocaval Ureter(s)		0.0	0.06	0.00	0.0	0.0	0.8	0.0	0.0
Spleen- Accessory		0.0	0.09	0.01	0.0	0.0	1.0	0.0	0.0
Spleen- Pale		0.0	0.07	0.01	0.0	0.0	0.3	0.0	0.0
Spleen- Small		0.0	0.13	0.01	0.0	0.0	1.4	0.0	0.0

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
VARIATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
VISCERAL									
Testis- Small		0.0	0.03	0.00	0.0	0.0	0.2	0.0	0.0
SKELETAL									
14th Rudimentary Rib(s)		7.0	3.15	0.25	6.4	0.0	18.9	4.8	8.7
25 Presacral Vertebrae		0.1	0.30	0.02	0.0	0.0	2.0	0.0	0.0
27 Presacral Vertebrae		0.2	0.27	0.02	0.0	0.0	1.8	0.0	0.3
7th Cervical Rib(s)		0.8	0.80	0.06	0.7	0.0	3.7	0.3	1.1
7th Sternebra		0.0	0.24	0.02	0.0	0.0	2.5	0.0	0.0
Bent Rib(s)		0.2	0.47	0.04	0.0	0.0	4.0	0.0	0.3
Cervical Centrum #1 Ossified		20.4	5.80	0.45	19.7	6.6	35.8	16.5	24.6
Entire Sternum Unossified		0.0	0.07	0.01	0.0	0.0	0.4	0.0	0.0
Extra Site of Ossification Anterior to Cervical Centrum #2		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Extra Site of Ossification Anterior to Rib #5		0.0	0.02	0.00	0.0	0.0	0.2	0.0	0.0
Extra Site of Ossification Anterior to Sternebra #1		0.0	0.04	0.00	0.0	0.0	0.4	0.0	0.0
Extra Site of Ossification Anterior to Sternebra #2		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Extra Site of Ossification Ventral to Cervical Centrum #2		0.0	0.02	0.00	0.0	0.0	0.3	0.0	0.0
Hyoid Unossified		1.3	0.99	0.08	1.2	0.0	4.4	0.4	1.9
Ischium Unossified		0.0	0.06	0.00	0.0	0.0	0.6	0.0	0.0
Pubis Unossified		0.1	0.22	0.02	0.0	0.0	2.3	0.0	0.0
Reduced Ossification of the 13th Rib(s)		0.6	0.67	0.05	0.5	0.0	3.6	0.2	0.8
Reduced Ossification of the Limb Bone(s)		0.0	0.03	0.00	0.0	0.0	0.2	0.0	0.0
Reduced Ossification of the Rib(s)		0.0	0.12	0.01	0.0	0.0	1.2	0.0	0.0
Reduced Ossification of the Skull		0.1	0.19	0.02	0.0	0.0	1.0	0.0	0.0
Reduced Ossification of the Vertebral Arches		0.1	0.19	0.02	0.0	0.0	1.1	0.0	0.2
Skull Bone(s)- Accessory		0.0	0.08	0.01	0.0	0.0	0.7	0.0	0.0
Sternebra(e) #1, #2, #3 and/or #4 Unossified		0.2	0.26	0.02	0.0	0.0	1.3	0.0	0.3

		Mean of Study Means							
NO. OF DATASETS		165							
Total No. of Fetuses/Litters Examined Externally		59744	3942						
Total No. of Fetuses/Litters Examined Viscerally		59550	3942						
Total No. of Fetuses/Litters Examined Skeletally		59537	3941						
VARIATIONS (% Per Litter)		Mean	S.D.	SEM	Median	Min	Max	25th Quartile	75th Quartile
SKELETAL									
Sternebra(e) #5 and/or #6 Unossified		6.4	5.87	0.46	4.1	0.0	26.1	2.5	8.8
Sternebra(e)- Malaligned (Slight or Moderate)		0.4	0.49	0.04	0.3	0.0	3.0	0.0	0.6
Sternebrae with Thread-Like Attachment		0.0	0.06	0.00	0.0	0.0	0.6	0.0	0.0
Unco-Ossified Vertebral Centra		0.0	0.06	0.01	0.0	0.0	0.5	0.0	0.0
Vertebral Centra Unossified		0.0	0.05	0.00	0.0	0.0	0.4	0.0	0.0

Modal Distribution of Fetal Body Weights

No. of Datasets in Historical Control

167

Range of Study Dates

4/21/1998 - 8/27/2010

No. of Dams in Historical Control

4279

No. of Dams with Live Fetuses

4015

Mean Fetal Body Weight Range (g)

3.4 - 3.9

Mean Fetal Body Weight (g)	3.4	3.5	3.6	3.7	3.8	3.9
Total No. Datasets	2	29	55	47	24	10
Mean Litter Size	15.1	15.4	15.2	15.2	14.6	14.5
Litter Size Range	15.0 - 15.1	14.4 - 17.1	13.7 - 16.7	13.7 - 16.6	12.2 - 15.8	13.8 - 15.3

Summary Incidence Malformations and Variations

(Total Number Fetuses/Litters Affected)

Ranked Uppermost to Nethermost

NO. OF DATASETS	165	
Total No. of Fetuses/Litters Examined Externally	59744	3942
Total No. of Fetuses/Litters Examined Viscerally	59550	3942
Total No. of Fetuses/Litters Examined Skeletally	59537	3941

MALFORMATIONS	Number	
	Fetuses	Litters
EXTERNAL		
Microphthalmia and/or Anophthalmia	18	18
Mandibular Micrognathia	7	7
Omphalocele	7	7
Fetal Anasarca	7	5
Umbilical Herniation of the Intestine	6	6
Anal Atresia	5	5
Filamentous Tail	5	5
Cleft Palate	4	4
Exencephaly with or without Open Eyelid(s)	3	3
Tail- Short	3	3
Aglossia	2	2
Carpal and/or Tarsal Flexure	2	2
Cyclopia	2	2
Mandibular Agnathia	2	2
Open Eyelid(s)	2	2
Apodia	1	1
Astomia	1	1
Cleft Face	1	1
Cleft Lip	1	1
Craniorachischisis	1	1
Ectromelia	1	1
Gastroschisis	1	1
Hydrocephaly with or without Dome Head	1	1

Summary Incidence Malformations and Variations

(Total Number Fetuses/Litters Affected)

Ranked Uppermost to Nethermost

NO. OF DATASETS	165	
Total No. of Fetuses/Litters Examined Externally	59744	3942
Total No. of Fetuses/Litters Examined Viscerally	59550	3942
Total No. of Fetuses/Litters Examined Skeletally	59537	3941

MALFORMATIONS	Number	
	Fetuses	Litters
EXTERNAL		
Maxillary Agnathia	1	1
Meningoencephalocele	1	1
Micromelia	1	1
Proboscis-Like Nose	1	1
Spina Bifida	1	1
VISCERAL		
Situs Inversus	14	14
Hydrocephaly	9	9
Lung(s)- Lobular Dysgenesis	7	6
Retrosophageal Aortic Arch	5	5
Kidney(s) and/or Ureter(s) Absent	4	4
Interrupted Aortic Arch	2	2
Thyroid Gland(s)- Absent	2	2
Transposition of the Great Vessels	2	2
Aorta- Narrowed	1	1
Epididymis- Absent	1	1
Heart and/or Great Vessel Anomaly	1	1
Kidney(s)- Absent	1	1
Lung(s)- Lobular Agenesis	1	1
Testis- Absent	1	1
Vessel(s)- Malpositioned	1	1
SKELETAL		
14th Full Rib(s)	45	39

Summary Incidence Malformations and Variations

(Total Number Fetuses/Litters Affected)

Ranked Uppermost to Nethermost

NO. OF DATASETS	165	
Total No. of Fetuses/Litters Examined Externally	59744	3942
Total No. of Fetuses/Litters Examined Viscerally	59550	3942
Total No. of Fetuses/Litters Examined Skeletally	59537	3941

MALFORMATIONS	Number	
	Fetuses	Litters
SKELETAL		
Vertebral Anomaly with or without Associated Rib Anomaly	23	20
Rib Anomaly	11	11
Vertebral Agenesis	10	10
Sternoschisis	10	9
Rib(s)- Only 12 Pairs Present	7	7
Vertebral Centra Anomaly	7	7
Costal Cartilage Anomaly	6	6
Sternebra(e)- Malaligned (Severe)	5	5
Bent Limb Bone(s)	5	3
Bent Scapula	5	3
Sternebra(e)- Fused	2	2
Limb Bone(s)- Small	1	1
Rib(s)- Only 11 Pairs Present	1	1
Scapula- Misshapen	1	1
Skull Anomaly	1	1

Summary Incidence Malformations and Variations

(Total Number Fetuses/Litters Affected)

Ranked Uppermost to Nethermost

NO. OF DATASETS	165	
Total No. of Fetuses/Litters Examined Externally	59744	3942
Total No. of Fetuses/Litters Examined Viscerally	59550	3942
Total No. of Fetuses/Litters Examined Skeletally	59537	3941

VARIATIONS	Number	
	Fetuses	Litters
EXTERNAL		
Twining	1	1
VISCERAL		
Renal Papilla(e) not Developed and/or Distended Ureter(s)	156	97
Major Blood Vessel Variation	47	45
Liver- Accessory Lobule(s)	16	10
Hemorrhagic Ring Around the Iris	12	12
Spleen- Pale	9	9
Spleen- Accessory	8	5
Spleen- Small	6	6
Adrenal Gland(s)- Enlarged	5	1
Liver- Pale	4	4
Hemorrhagic Iris	2	2
Kidney(s)- Small	2	2
Testis- Small	2	2
Retrocaval Ureter(s)	2	1
Adrenal Gland(s)- Accessory	1	1
Adrenal Gland(s)- Pale	1	1
Diaphragm- Thin	1	1
Heart- Small	1	1
Liver- Swollen	1	1
SKELETAL		
Cervical Centrum #1 Ossified	11969	3004
14th Rudimentary Rib(s)	4154	1710

Summary Incidence Malformations and Variations

(Total Number Fetuses/Litters Affected)

Ranked Uppermost to Nethermost

NO. OF DATASETS	165	
Total No. of Fetuses/Litters Examined Externally	59744	3942
Total No. of Fetuses/Litters Examined Viscerally	59550	3942
Total No. of Fetuses/Litters Examined Skeletally	59537	3941

VARIATIONS	Number	
	Fetuses	Litters
SKELETAL		
Sternebra(e) #5 and/or #6 Unossified	3908	1415
Hyoid Unossified	767	492
7th Cervical Rib(s)	492	372
Reduced Ossification of the 13th Rib(s)	366	249
Sternebra(e)- Malaligned (Slight or Moderate)	229	204
Sternebra(e) #1, #2, #3 and/or #4 Unossified	114	106
Bent Rib(s)	99	77
27 Presacral Vertebrae	89	71
Reduced Ossification of the Vertebral Arches	67	62
25 Presacral Vertebrae	62	37
Reduced Ossification of the Skull	52	45
Pubis Unossified	42	36
7th Sternebra	24	10
Reduced Ossification of the Rib(s)	20	17
Entire Sternum Unossified	9	9
Skull Bone(s)- Accessory	8	8
Unco-Ossified Vertebral Centra	6	6
Vertebral Centra Unossified	5	5
Ischium Unossified	4	3
Extra Site of Ossification Anterior to Sternebra #1	3	3
Sternebrae with Thread-Like Attachment	3	2
Reduced Ossification of the Limb Bone(s)	2	2
Extra Site of Ossification Anterior to Cervical Centrum #2	1	1

FINAL REPORT



Contents: Volume 2 of 2
Appendix G

Study Title: A Dermal Prenatal Developmental Toxicity Study of
Distillates (Petroleum), Light Catalytic Cracked in Rats

Laboratory Project ID: WIL-402017

Author: Jeffrey H. Charlap, MS

Test Guidelines: OPPTS 870.3700
OECD Guideline 414

Study Completion Date: 12 July 2012

Performing Laboratory: WIL Research Laboratories, LLC
1407 George Road
Ashland, OH 44805-8946

Sponsor: American Petroleum Institute
1220 L Street, NW
Washington, DC 20005

Total Number of Pages: 402

APPENDIX G

Individual Animal Data

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 1

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
NO SIGNIFICANT CLINICAL OBSERVATIONS	26639	1	P																				
	26636	1	P			P	P		P														
	26575	1	P																				
	26630	1	P													P	P	P		P		P	P
	26599	1																P					
	26668	1	P																				
	26606	1	P																				
	26595	1	P												P						P	P	P
	26674	1	P																P				
	26584	1	P							P		P	P	P		P		P					
	26661	1	P	P		P	P				P	P	P	P			P						P
	26666	1	P																				
	26577	1	P																				
	26718	1	P															P	P				
	26677	1	P			P	P		P			P											
	26590	1	P																				
	26638	1	P											P									
	26687	1	P																				
	26680	1	P																				
	26646	1	P																			P	
	26634	1			P	P	P			P													
	26587	1	P																				
	26642	1	P																				
	26713	1	P			P															P		P
	26625	1	P																				
	26623	2							P														
	26582	2	P									P											

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 2

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
NO SIGNIFICANT CLINICAL OBSERVATIONS	26565	2	P																				
	26659	2						P													P	P	
	26650	2	P							P	P	P	P	P	P	P	P				P	P	
	26589	2	P					P															
	26604	2	P																			P	
	26672	2	P																				
	26603	2	P					P	P						P								
	26613	2	P																				
	26609	2	P													P							
	26681	2	P																				
	26573	2	P										P							P	P	P	
	26593	2	P																				
	26665	2	P							P							P						
	26621	2	P																				
	26692	2	P																		P	P	P
	26576	2	P																				
	26676	2	P						P		P												P
	26663	2	P																				P
	26602	2	P						P		P												P
	26709	2	P														P				P		P
	26580	2	P																		P		
	26694	2	P										P		P					P	P		P
	26616	3	P											P		P							P
	26566	3	P																				
	26648	3	P						P		P	P	P	P		P		P	P				
	26578	3	P										P	P	P	P				P	P	P	P
	26647	3	P																				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																		
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2
NO SIGNIFICANT CLINICAL OBSERVATIONS	26574	3	P																		
	26624	3	P				P														
	26653	3	P																		
	26612	3	P																		
	26670	3	P																		P
	26667	3	P																		
	26657	3	P			P	P														
	26586	3	P							P											
	26714	3	P																		
	26645	3	P																		
	26610	3	P																		
	26607	3	P																		
	26598	3	P	P						P	P	P	P	P		P				P	
	26627	3	P							P											
	26705	3	P																		
	26644	3	P													P				P	
	26704	3	P													P			P	P	
	26641	3	P														P	P			
	26699	3	P																		
	26664	4																			P
	26656	4	P							P								P			
	26629	4	P																		
	26637	4	P																		
	26567	4	P									P									
	26617	4	P										P					P	P		
	26675	4	P																	P	P
	26654	4	P														P	P			

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

[illegible]

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 6

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
SCHEDULED EUTHANASIA; GESTATION DAY 20	26674	1																					P
	26584	1																					P
	26661	1																					P
	26666	1																					P
	26577	1																					P
	26718	1																					P
	26677	1																					P
	26590	1																					P
	26638	1																					P
	26687	1																					P
	26680	1																					P
	26646	1																					P
	26634	1																					P
	26587	1																					P
	26642	1																					P
	26713	1																					P
	26625	1																					P
	26623	2																					P
	26582	2																					P
	26565	2																					P
	26659	2																					P
	26650	2																					P
	26589	2																					P
	26604	2																					P
	26672	2																					P
	26603	2																					P
	26613	2																					P

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 7

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																		
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2
SCHEDULED EUTHANASIA; GESTATION DAY 20	26570	2																			P
	26609	2																			P
	26681	2																			P
	26573	2																			P
	26593	2																			P
	26665	2																			P
	26621	2																			P
	26692	2																			P
	26576	2																			P
	26676	2																			P
	26663	2																			P
	26602	2																			P
	26709	2																			P
	26580	2																			P
	26694	2																			P
	26616	3																			P
	26566	3																			P
	26648	3																			P
	26578	3																			P
	26647	3																			P
	26574	3																			P
	26624	3																			P
	26653	3																			P
	26612	3																			P
	26670	3																			P
	26667	3																			P
	26657	3																			P

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 8

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																		
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2
SCHEDULED EUTHANASIA; GESTATION DAY 20	26586	3																			P
	26714	3																			P
	26645	3																			P
	26610	3																			P
	26607	3																			P
	26598	3																			P
	26627	3																			P
	26705	3																			P
	26644	3																			P
	26704	3																			P
	26641	3																			P
	26585	3																			P
	26699	3																			P
	26664	4																			P
	26656	4																			P
	26629	4																			P
	26637	4																			P
	26567	4																			P
	26617	4																			P
	26675	4																			P
	26654	4																			P
	26579	4																			P
	26572	4																			P
	26671	4																			P
	26611	4																			P
	26678	4																			P
	26635	4																			P

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 9

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY											1	1	1	1	1	1	1	1	2	
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
SCHEDULED EUTHANASIA; GESTATION DAY 20	26652	4																					P
	26717	4																					P
	26700	4																					P
	26655	4																					P
	26669	4																					P
	26628	4																					P
	26688	4																					P
	26622	4																					P
	26618	4																					P
	26591	4																					P
	26631	4																					P
	26568	5																					P
	26651	5																					P
	26649	5																					P
	26581	5																					P
	26592	5																					P
	26597	5																					P
	26658	5																					P
	26620	5																					P
	26632	5																					P
	26600	5																					P
	26569	5																					P
	26605	5																					P
	26712	5																					P
	26594	5																					P
	26588	5																					P
	26626	5																					P

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 10

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	
SCHEDULED EUTHANASIA; GESTATION DAY 20	26608	5																						P
	26673	5																						P
	26706	5																						P
	26601	5																						P
	26614	5																						P
	26662	5																						P
	26643	5																						P
HAIR LOSS RIGHT FORELIMB	26599	1	1																					
	26623	2	1					1			1	1		1	1	1	1	1	1				1	
	26659	2	1		1	1		1	2		1	1	1		1		1	1						
	26589	2																					1	
	26570	2	1		2	2		1		1	1	1	1		1								1	
	26609	2			1	1	1	1	1	1	1	1												
	26681	2																					1	
	26593	2															1							
	26665	2			1		1	1		1		1	1	1	1		1				1	1		
	26621	2																					1	
	26576	2				1																	1	
	26580	2		1	1		1	1	2	1	1	1	1	1	1	1								
	26694	2																			1		1	
	26647	3										1	1	1	1	1		1					1	
	26624	3													1			1						
	26653	3											1				1							
	26612	3						1	1								1							
	26667	3								1														
	26586	3																					1	

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 11

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY															1	1	1	1	1	1	1	1	2
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0			
HAIR LOSS RIGHT FORELIMB	26645	3										1	1			1				1	1	1				
	26627	3																				1				
	26644	3				1			1			1														
	26704	3																			1					
	26641	3																		1	1	1				
	26585	3	1	1	1																					
	26699	3										1										1				
	26664	4	1				1			1	1	1	1	1	1	1	1	1		1						
	26656	4						1		1			1		1		1					1				
	26629	4											1													
	26637	4											1													
	26611	4									1															
	26678	4									1	1		1	1	1	1				1	1				
	26635	4											1	1	1											
	26700	4									1			1								1				
	26688	4							1												1	1	1			
	26631	4																				1	1			
	26651	5					1	1		1	1	1	1	1												
	26581	5								1					1	1	1						1			
	26597	5													1	1										
	26658	5													1	1		1								
	26620	5									1															
	26600	5	1				1	1					1													
	26569	5											1													
	26588	5												1												
	26626	5																			1		1			
	26608	5												1	1						1	1	1			

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 12

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	
HAIR LOSS RIGHT FORELIMB	26673	5												1										
	26615	5								1	1	1												
	26706	5							1				1	1	1	1				1	1	1		
	26643	5											1											
HAIR LOSS LEFT FORELIMB	26599	1	1																					
	26623	2	1					1		1	1		1	1	1	1	1	1				1		
	26659	2	1		1	1		1	2		1	1	1		1		1	1						
	26589	2																				1		
	26570	2	1		2	2		1		1	1													
	26609	2			1	1		1	1	1	1	1												
	26593	2															1				1	1		
	26665	2				1		1	1		1		1	1	1	1		1				1	1	
	26621	2																				1	1	
	26576	2																					1	
	26580	2		1	1		1	1	2	1	1	1	1	1	1	1								
	26694	2																			1			
	26647	3										1		1	1	1			1					
	26624	3										1		1		1			1					
	26653	3												1	1	1		1						
	26612	3						1	1									1						
	26667	3								1														
	26657	3																					1	
	26645	3											1		1			1			1	1	1	
	26610	3																				1		
	26627	3																					1	
	26705	3																				1		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 13

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
HAIR LOSS LEFT FORELIMB	26644	3				1			1			1											
	26704	3																				1	
	26641	3																			1	1	1
	26585	3	1	1	1																		
	26699	3									1												
	26664	4	1			1			1	1	1	1	1	1	1	1	1		1				
	26656	4						1		1			1		1								1
	26579	4													1								
	26671	4																					1
	26611	4								1													
	26678	4							1	1		1	1	1	1						1	1	
	26635	4										1											
	26700	4								1			1										1
	26688	4						1													1	1	1
	26631	4																			1	1	1
	26651	5							1	1	1	1	1	1									
	26649	5														1							
	26581	5							1					1	1	1							
	26597	5												1	1	1							
	26658	5													1	1		1					
	26620	5							1														
	26600	5											1										
	26569	5								1	1											1	
	26588	5												1	1								
	26626	5																			1		1
	26608	5											1	1							1	1	1
	26673	5												1									

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 14

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY											1	1	1	1	1	1	1	1	2
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
HAIR LOSS LEFT FORELIMB	26615	5										1	1	1								
	26706	5								1			1		1	1	1	1		1	1	1
	26643	5											1									
SWOLLEN VENTRAL NECK	26636	1		P																		
	26687	1					P															
WET YELLOW MATERIAL UROGENITAL AREA	26681	2		1																		
	26648	3				1																
	26645	3		2																		
	26607	3		1																		
	26699	3		2	1																	
	26664	4			1	2	1	1														
	26629	4		1																		
	26637	4			2																	
	26617	4			1	1																
	26579	4		1																		
	26572	4			1																	
	26611	4		1																		
	26652	4			1																	
	26717	4			1	1																
	26700	4		2																		
	26655	4		1																		
	26631	4		1																		
	26568	5			1	1	1	2														
	26651	5			1	1	1															
	26581	5												P								

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

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			
WET YELLOW MATERIAL UROGENITAL AREA	26592	5	1																							
	26600	5	1																							
	26569	5	1																							
	26594	5	1																							
	26588	5	1																							
	26626	5	2	2	2																					
	26608	5	1																							
WET RED MATERIAL UROGENITAL AREA	26632	5	2																							
	26673	5																				1				
WET CLEAR RED MATERIAL DORSAL ABDOMINAL AREA	26568	5	1																							
BODY COOL	26579	4											P													
	26572	4																	P							
	26717	4										P														
	26591	4													P											
	26581	5																	P							
	26658	5																	P							
	26632	5																					P			
	26605	5																	P							
	26626	5													P											
	26608	5														P										
	26614	5										P	P										P			
	26715	5														P										
	HAIR LOSS RIGHT LATERAL ABDOMINAL AREA	26594	5												1	2	2									
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																										
1- 0 MG/KG/DAY SHAM 2- 0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																										

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 16

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2			
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	
SCABBING RIGHT FORELIMB	26608	5																						P
	26706	5											P			P								
SCABBING LEFT FORELIMB	26700	4																						P
	26608	5																						P
	26706	5											P			P								
DRIED RED MATERIAL UROGENITAL AREA	26611	4														1								1
	26581	5																	1					1
	26632	5																				1	2	
	26569	5																				1		
	26605	5																				1		
	26594	5																1		1				
	26626	5																	1	1			1	
	26608	5																2	1				2	
	26673	5																			1	1	1	
	26706	5																		1				
	26614	5																1	1	1	3		2	
	26662	5																1						
	26643	5																					1	
	BODY PALE	26658	5																	P				
		26632	5																				P	P
26605		5																	P					
26608		5																	P					
26614		5																				P	P	
26715		5																		P				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 17

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	1	2	
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND NOSE	26639	1	1	1	1	2	2	3	3	3	2	2	2	2	2	2	2	1	1		1	1	
	26636	1	2	2		1		1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	
	26575	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	
	26630	1	1	2	2	1	1	1	1	1		1	1	1				1		1			
	26599	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1	1		1	1	1	1	
	26668	1	1	2	2	2	2	2	3	2	2	1	1	2	1	1	1	1	1	1	1	1	
	26606	1	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1				
	26595	1	2	2	2	3	2	1	1	1	1	1		1	1	1	1		1	1	1	1	
	26674	1	1	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26584	1	1	2	2	2	1	1			1				1		1		1	2	1	1	
	26661	1	2			1	1	1						1	1	1			1	1	1		
	26666	1	1	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	2
	26577	1	1	2	2	3	2	3	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1
	26718	1	2	3	3	1	2	2	2	2	1	1	1	1	1	1			1	1	1	1	1
	26677	1	2			3			1		1	1	1	1	1	1	1	1	1	1		1	
	26590	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26638	1	1	1	2	2	2	1	1	1	1			1	1	1	1	1	1	1	1	1	1
	26687	1	1	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
	26680	1	1	1	1									1	1	1	1		1	1	1	1	1
	26646	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
	26634	1				2	2		1	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	26587	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26642	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1		1		
	26713	1	2		3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
	26625	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
	26623	2	1	2	1	1	1		1				1	1		1	1				1	1	1
	26582	2	1	1					1	1		1		1	1		1	1	1	1	1	1	1

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 18

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND NOSE	26565	2	2	1	1	1		1	2	1	1	1		1	1	1			1	1	1	1	
	26659	2	1	1	1	1			2	1	1	1	1	1	1	1	1		1	1	1		
	26650	2	1	2	1	1	1	1											1				
	26589	2	2	2	1	2		1	2	1	2	2	1	1	1	2	2	1	1	2	1	1	
	26604	2	2	2	3	3	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	
	26672	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26603	2	1	2	1	1			1	1	1	1	1		1	1	1	1	1	1	1	1	1
	26613	2	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
	26570	2	1	2	2	2	2	2	2	1	1	1			1	1	1	1	1	1	1	1	1
	26609	2	1	1	1	1	2	2	1	1	1	1	1	1	1		1	1	1	1	1	1	1
	26681	2	1	3	2	2	2	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
	26573	2	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1		1			
	26593	2	2	2	2	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1		1
	26665	2	1	1	1	1	1	1		1	1	1	1	1	1	1			1	1	1	1	1
	26621	2	1	2	2	2	1	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1
	26692	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1		1	1			
	26576	2	1	1		1	1	1	1	1	1		1	1	1	1	1		1	1	1	1	1
	26676	2	2	1	1		1			1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26663	2	2	2	3	3	3	2	3	3	1	2	1	1	1	1	1	1	1	1	1	1	1
	26602	2	1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26709	2	1	1	1	1	1	1	1	1	1	1	1	1	1					1		1	
	26580	2	2	1	2	2	2	2	2	3	2	2	1	2	1		1	1		1	1	1	1
	26694	2	1	1	1		1	1	1		1		1	1	1	1	1						
26616	3	1	1	1	2	1	2	1	1			1		1	1	1	1	1	1	1	1	1	
26566	3	1	1	1	1	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	
26648	3	1								1		1	1	1		1			1	1	1	1	
26578	3	1	2	1	1	1	1							1	1	1	1						

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 19

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND NOSE	26647	3	2	2	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2
	26574	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26624	3	2	2	3	2		2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1
	26653	3	1	1	2	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26612	3	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	
	26670	3	1	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26667	3	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26657	3	2	2			1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	
	26586	3	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	
	26714	3	1	2	2	2	2	2	2	2	1		1	1	1	1	1	1	1	1	1	1	
	26645	3	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1	1	1	
	26610	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	
	26607	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
	26598	3	1	1	1	1											1	1	1	1		1	
	26627	3	1	1	1	2	2		2		1	2	1	1	1	1	1	1	1	1	1	1	
	26705	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
	26644	3	2	2	2	3	3	3	2	2	2	2	1	1	1		1	1	1		1	1	
	26704	3	2	1	1		1	1	1	1	1	1	1		1		1	1				1	
	26641	3	1	1	1	1	1	1	1	1	1	1	1	1	1		1						
	26585	3	2	1	1	1	2	2	2	2	2	2	2	2	2	1	2	1	2	1	1	1	
	26699	3	1	1	3	2	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	
	26664	4	1	2	2	2	2	1	1	1	1		1	2		1	1	1	1	1			
	26656	4	1	1	1	2	1	1		1	1	1	1	1	1	1	1		1	1	1		
	26629	4	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	
	26637	4	2	2	2	2	3	3	2	3	2	2	1	2	2	2	1	2	2	1	2	1	
26567	4	2	2	2	1	1	1		1	1		2	2	2	2	2	1	2	2	2	2		
26617	4	1	2	1	1	2	1	2	1	1	2		1	1	1			1	1				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 20

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	1	2	
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND NOSE	26675	4	2	2	3	3	2	2	3	2	2	2	2	2	2	2	1	2	2	1	1	2	
	26654	4	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26579	4	2	2	2	1	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	
	26572	4	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
	26671	4	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	
	26611	4	2	2	2	3	3	3	3	2	3	2	2	2	2	1	2	2	3	2	2	2	
	26678	4	2	2	2	1	1	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	
	26635	4	2	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
	26652	4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26717	4	2	3	3	3	3	3	2	3	2	2	1	1	1	1	1	1	1	1	1	1	
	26700	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26655	4	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	
	26669	4	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	26628	4	1	2	2	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	
	26688	4	1	1	2	2	3	3	3	2	2	2	2	1	1	2	2	2	1	1	1	1	
	26622	4	1	1	2	1	2	2	3	2	2	2	2	2	2	1	1	1	1	1	1	1	
	26618	4				1		1	1	1	1	1	1	1			1						
	26591	4	1	1	2	1	2	2	3	2	2	2	2	2	2	1	2	3	3	1	2	2	2
	26631	4	2	2	2	2	2	1					1		1								
	26568	5	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1		1	1	1	
	26651	5	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1		1	1	1	
	26649	5	1	2	2	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	
	26581	5	2	2	2	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	
	26592	5	2	1	1	1	2	2	2	2	1	2	1	1	1	1			1	1	1	1	
	26597	5	2	2	2	2	2	1	2	1	1	1		1	1				1	1	1		
	26658	5	1	2	2	2	2	2	2	1	2	2	1	2	2	1	1	1	1	1	1	1	
	26620	5		2	2	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 21

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND NOSE	26632	5	2	2	1	2	1				1	2	1	1	1	2	1	1		1	1	1	1
	26600	5	2	2	2	1	2	2	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1
	26569	5	2	2			2	2	2	2	2	2	2	1	1	1					1	1	
	26605	5	1	1					2	1	1	1	1	1	1		1	1	1	1	1	1	1
	26712	5	2	2	2	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
	26594	5	2	2	2	2	2	3	2	2	1	2	1	2	1	1	1	1	1	1	1	1	1
	26588	5	2	1	1	2	1		2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
	26626	5	2	2	2	2	1	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1
	26608	5	2	2	2	2	2	2	2	2	2	1	1	1	1	1		1	1	1	1	1	1
	26673	5	1	1	1	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	1	1	1
	26615	5			1	2	2	2	2	2	2	2	1			1	1	1	1				
	26706	5	1		1	1				1	1									1	1		
	26601	5	1	2	2	2	1	1					1	1	1	1	1	1	1	1	1		
	26614	5	1	1	2	1	2	2	2	2	2	2		2	1	1	2	1	1	2	2	1	
	26662	5	2	2	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1		1	1
	26643	5	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1		1	
	26715	5		2	2	2	2	2	2	2	2	1	1		1	1							
DRIED RED MATERIAL AROUND RIGHT EYE	26639	1			1	1				1	1					1	1	1		1	1		1
	26636	1		2	2					1	1	1	1										1
	26575	1			1	1	1	2	1	1	1	1	1	2	2	1	1					1	
	26599	1		2	2	2	2	1	1											1		1	
	26668	1		1	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
	26606	1					1																
	26595	1		1	1	1	1	1	1	1	1	1	1										
	26674	1																				1	
	26584	1		1	1																		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 22

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																	1	1	1	1	1	1	1	1	1	2
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0						
DRIED RED MATERIAL AROUND RIGHT EYE	26661	1		1			1	1	1					1	1			1	1	1	1								
	26666	1																			1								
	26577	1		1				1						1															
	26718	1		1							1	1	1					1											
	26677	1		1			1			1		1	1	1	1	1	1	1	1	1	1	1							
	26590	1		1	1	1	1	1	1		1						1				1								
	26638	1		1			1	1						1	1	1	1				1								
	26687	1		1	2	3	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1							
	26680	1		1	1	1	1	1													1								
	26646	1		1	1	1	1	1	1		1																		
	26634	1					1	1												1									
	26587	1									1		1	1				1	1	1									
	26642	1					1	1	1																				
	26713	1				1	1	1	1	1	1	1	1	1	1	1	1		1	1									
	26623	2		1	2	1	1	1					1			1	1	1	1		1	1							
	26582	2		1	2	1	1	1	1			1		1	1	1	1		1			1							
	26565	2		2	2	2	2	1	1		1	1	1	1	1	1					1								
	26659	2		1							1	1		1															
	26650	2		1																									
	26589	2		1							1	1	1	1	1	1	1	1	1	1	1	1							
	26604	2		1								1		1		1		1			1								
	26672	2		1	1	1	1	1	1												1								
	26603	2		1	1																1	1							
	26613	2		1					1		1					1		1			1								
	26570	2													1						1								
	26609	2			1										1		1				1								
	26681	2		1							1		1	1		1	1	1	1	1	1	1							

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 23

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2	
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
DRIED RED MATERIAL AROUND RIGHT EYE	26573	2	1																			1
	26593	2	2	2	1	1	1	1	1	1									1			1
	26665	2																				1
	26621	2													1							1
	26576	2				1	1	1	1	1		1		1								1
	26676	2	1									1										1
	26663	2	3	3	2	2	2	1	1	1	1		1	1			1		1			
	26602	2																				1
	26709	2	1	1	1	1	1	1	1	1	1		1	1								1
	26580	2	1	1	1	1	1			1	1							1				
	26694	2				1	1															
	26616	3		1	1	1	1	1	1	1					1			1				1
	26566	3				1															1	1
	26648	3																		1		1
	26578	3	2	2	1		1	1	1													
	26647	3		1							1										1	1
	26574	3	1								1			1							1	1
	26624	3	1	1	1	1		1								1			1		1	
	26653	3	1	1	1	1	1	1		1	1				1	1	1		1		1	1
	26612	3	1	1			1				1											
	26670	3		1			1	1						1								1
	26667	3	1	1	1					1	1	1	1	1						1	1	1
	26657	3	2	2			2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
	26586	3		1	1	1	1	1	1		1	1	1	1								1
	26714	3						1			1	1										1
	26645	3					1	1		1	1											1
	26610	3	1	1	1	1	1	1	1	1					1			1	1	1	1	1

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 24

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND RIGHT EYE	26607	3	1			1	1	2	1	1	1		1	1	1	1					1		
	26598	3		1		1	1	1			1				1					1	1		
	26627	3	1			1	1			1	1	1	1	1	1	1		1	1	1	1	1	
	26705	3	1			1	1	2	1	1	1	1							1	1		1	
	26644	3	2		1								1	1									
	26704	3			1	1	1	1	1	1	1	1	1										
	26641	3	1	2	1	1	2	1	1	1	1	1	1	1	1								
	26585	3								1	1	1		1	1	1	1	1	1	1			
	26699	3							1	1		1	1	1	1	1	1	1	1	1	1		
	26664	4		1											1								1
	26656	4	1	2	2	2	2	1		1	1	1	1		1								1
	26629	4		1									1	1	1		1						1
	26637	4	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1		1	1	2	1
	26567	4		1			1	1		1	1		1	1	1	1	1	1	1		1	1	1
	26617	4	1	1	1	1	1	1															
	26675	4	1	1	1		1	1			1	1	1	1	1	1	1	1	1	1	1	1	1
	26654	4		1			1	1		1	1	1	1										1
	26579	4	1	2	1	1	1	1		1	1	1	1			1							1
	26572	4		1																			
	26671	4		1				1	1														
	26611	4	2	1										1	1	1	1		1				1
	26678	4											1	1									1
	26635	4				1		1															1
	26652	4	1	1			1	1			1				1			1	1	1			1
	26717	4	1				1	1	1					1	1	1			1	1			
	26700	4	1	1	1	1	1	1		1		1	1	1	1	1		1		1	1	1	1
	26655	4					1																1

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 25

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
DRIED RED MATERIAL AROUND RIGHT EYE	26669	4					1	1	1	1	1		1	1	1	1	1			1	1	1	
	26628	4	1					1					1	1	1						1		1
	26688	4		1	1	1	1	1	1						1	1	1			1	1		
	26622	4		1	1				1	1	1										1		
	26618	4			1						1	1		1		1				1			
	26591	4						1	1	1	1	1		1	1	1			1	1	1		
	26631	4							1														
	26568	5		1	1			1	1	1	1	1	1		1		1	1	1	1	1	1	1
	26651	5	2	2	2	1		1	1	1	1	1	1			1							1
	26649	5		1				1	1	1	1	1	1	1	1	1	1	1	1		1	1	
	26581	5		1	1	1			1	1		1	1	1	1	1	1	1	1	1	1	1	1
	26592	5		1	1	1			1	1	1	1					1				1	1	1
	26597	5		1	1	1	1	1	1	1							1						
	26658	5		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1	
	26620	5		1	1	1	1	1	1	1	1	1	1			1	1					1	
	26632	5	2	2	2	3	1	1			1	1	1				1	1			1	1	1
	26600	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26569	5	2	2			1	1		1							1					1	
	26605	5	1	2	1	2	3	2	3	1	1	1		1	2	1	1	1	1		1	1	1
	26712	5		1	1	1	1	1	1	1	1	1	1	1	1	1	1				1		
	26594	5		1	1	1	1	1	2	1	1		1	1	1	1	1	1	1	1	1	1	1
	26588	5		1						1	1	1	1	1	1	1	1	1		1	1	1	1
	26626	5								1				1							1	1	1
	26608	5										1				1					1	1	1
	26673	5		1	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	26615	5					1	1	1	1	1	1	1										
	26706	5		1	1	1	1	1		1	1											1	

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 26

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
DRIED RED MATERIAL AROUND RIGHT EYE	26601	5	1	1	1	1																	
	26614	5				1		1	1	1	1		1	1	1	1	1	1	1	1	1	1	
	26662	5							1	1		1				1					1		
	26643	5		1																1			
	26715	5					1	1	1	1	1	1											
DRIED RED MATERIAL AROUND LEFT EYE	26639	1		1	1				1	1		1			1	1	1	1	1	1	1	1	1
	26636	1	2	2					1	1	1	1											1
	26575	1		1	1	1	2	1	1		1		1	1			1					1	
	26630	1										1											
	26599	1																				1	
	26668	1		1	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
	26606	1							1		1												
	26595	1		1	1				1														
	26674	1																				1	
	26584	1		1	1																		
	26661	1			1						1												1
	26666	1																					1
	26577	1		1						1													
	26718	1		1																			
	26677	1		1			1				1						1					1	
	26590	1		1			1	1		1							1					1	
	26638	1		1			1	1	1	1					1								1
	26687	1		1	1	2	1	1	1	1	1	1	1	1			1						1
	26680	1		2	2	2	2	3	3	2	3	3	2	2	2	1	1						1
	26646	1		1	1	1	1	1	1		1									1			1
	26634	1																			1		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 27

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2		
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
DRIED RED MATERIAL AROUND LEFT EYE	26587	1																1	1	1			
	26642	1				1	1	1															
	26713	1							1		1					1	1	1	1				
	26623	2		1	2	1	1	1		1		1			1		1					1	1
	26582	2		2	2	1	1	1	1		1	1	1	1	1	1		1	1	1	1		
	26565	2		2	2	2	2	1	2	1	1	1	1	1	1	1	1					1	
	26659	2			1						1	1		1					1	1			
	26650	2			1																		
	26589	2			1						1		1	1	1	1		1	1	1	1	1	1
	26604	2			1																	1	
	26672	2		1	1			1	1		1	1	1									1	
	26603	2		1	1															1	1	1	1
	26613	2			1			1			1					1		1	1			1	
	26570	2																				1	
	26609	2													1		1					1	
	26681	2		1							1	1	1	1		1	1		1	1	1	1	1
	26573	2		1																		1	
	26593	2		2	1	1	1	1	1		1	1	1									1	
	26665	2					1															1	
	26621	2													1							1	
	26576	2		1			1	1		1	1	1	1	1	1			2			1		
	26676	2		1							1	1										1	
	26663	2		2	3	2	2	2	2	1	1	1	1	1	1	1					1		
	26602	2																				1	
	26709	2		1	1	1	1	1	1	1	1	1	1		1	1			1		1		
	26580	2		1		1	1	1		1									1				
	26616	3		1	1	1	1	1	1	1	1	1					1		1		1		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																1	1	1	1	1	1	1	1	1	2
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0					
DRIED RED MATERIAL AROUND LEFT EYE	26566	3				1																1						
	26648	3										1										1						
	26578	3	2	2	1		1	1	1																			
	26647	3		1						1		1						1	1	1	1							
	26574	3								1												1						
	26624	3	1	1	1	1												1				1						
	26653	3	1	1	1	1	1	1	1	1	1			1	1	1		1		1								
	26612	3	1	1																								
	26670	3	1	1			1	1					1									1						
	26667	3	1	1	1					1	1	1	1				1		1	1	1							
	26657	3	2	2			2		1	1	1	1	1	1	2	1	1	1	1	1	2	1						
	26586	3		1	1	1	1		1			1	1	1							1	1						
	26714	3						1		1	1											1						
	26645	3				1	1		1	1												1						
	26610	3	1	1	1	1	1	1	1	1					1			1	1	1	1	1						
	26607	3	1	1		1	1	1	1	1	1		1	1							1							
	26598	3				1	1				1							1		1								
	26627	3	1			1	1			1	1	1	1	1	1	1		1	1	1	1	1						
	26705	3	1	1		1	1	2	1	1	1	1				1			1	1		1						
	26644	3				1	1		1				1	1														
	26704	3			1	1	1	1	1																			
	26641	3	2	2	1	1	2	1	1	1	1	1	1		1													
	26585	3															1	1	1	1								
	26699	3							1	1			1	1	1			1	1	1	1							
	26664	4		1																		1						
26656	4	1	2	1	1	1	1		1	1	1	1									1							
26629	4		1									1									1							

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 29

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																1	1	1	1	1	1	1	1	1	2
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0					
DRIED RED MATERIAL AROUND LEFT EYE	26637	4	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1						
	26567	4	1				1	1		1	1		1		1	1	1			1	1	1						
	26617	4	1	2	1	1	1	1	2	1	1	1																
	26675	4	1	1	1		1	1				1	1	1	1	1	1	1	1	1	1	1						
	26654	4	1				1	1		1	1	1	1	1							1	1						
	26579	4	1	2	1	1	1	1		1	1	1	1			1	1				1							
	26671	4		1				1	1																			
	26611	4	2	1											1	1	1		1		1							
	26678	4	1									1	1								1							
	26635	4				1		1													1							
	26652	4	1				1	1			1			1	1	1		1	1	1		1						
	26717	4	1				1		1					1	1	1			1	1								
	26700	4	1	1	1	1	1	1		1		1	1			1			1	1	1	1						
	26655	4					1														1							
	26669	4					1	1	1	1	1		1	1	1	1	1				1	1						
	26628	4	1	1			1			1	1	1								1	1	1						
	26688	4	1	1	1	1	1	1	1										1	1	1							
	26622	4						1		1										1								
	26618	4				1					1																	
	26591	4						1	1	1	1	1			1				1	1								
	26631	4					1	1	1																			
	26568	5		1	1		1	1	1	1		1		1	1	1	1	1	1	1	1	1						
	26651	5	1	2	2	1	1	1	1	1	1											1						
	26649	5	1				1	1	1	1	1	1	1	1	1	1	1	1			1							
	26581	5	1	1			1	1		1	1	1	1		1	1	1		1	1	1	1						
	26592	5	1	1	1		1	1	1	1				1		1			1	1	1							
	26597	5	1	1	1	1	1	1	1																			

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 30

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
DRIED RED MATERIAL AROUND LEFT EYE	26658	5		1			1	1		1	1	1	1	1	1	1							1
	26620	5		1	1	1	1	1	1	1	1		1		1								1
	26632	5	2	2	2	2	1			1	1	1				1	1			1	1	1	1
	26600	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	
	26569	5	1	2			1	1		1						1							1
	26605	5											2										1
	26712	5	1	1	1	1	1	1	1	1	1	1		1								1	
	26594	5	1	1	1	1	1	2	1	1		1	1	1	1	1	1	1	1	1	1	1	1
	26588	5	1						1	1	1	1	1	1	1	1					1	1	1
	26626	5							1			1				1				1	1		
	26608	5	1								1					1				1	1	1	
	26673	5	1	1	1	2	2	2	1	1	1	1		1	1	1	1	1		1	1		1
	26615	5					1	1	1			1	1										
	26706	5	1	1	1	1	1			1	1											1	
	26601	5	1	1	1																		
	26614	5				1		1	1	1	1	1		1		1	1	1	1	1	1	1	1
	26662	5							1	1		1	1	1	1	1	1	1				1	
	26643	5	1	1																		1	
	26715	5				1	1	1	1	1	1	1											
	LACRIMATION RIGHT EYE	26575	1											2	3	1	1	1					
26687		1													1					1			
26659		2																			1		
26613		2											1										
26576		2															1						
26663		2																1					
26624		3																			1		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 31

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	
LACRIMATION RIGHT EYE	26670	3																		1	1	1		
	26667	3																		1				
	26586	3										1								1	1			
	26645	3																		1				
	26705	3																		1				
	26704	3							1				1											
	26664	4																				1		
	26656	4																			1	1		
	26629	4																			1	1		
	26567	4																			1			
	26617	4																			1			
	26654	4																			1			
	26611	4										2		1									1	
	26678	4																			1	1		
	26635	4																			1	1		
	26717	4																			1			
	26669	4																			1			
	26688	4																						
	26631	4																			1			
	26651	5																					1	1
	26649	5																				1		
	26658	5																				1	1	
	26620	5																					1	
	26600	5													1									
	26569	5																				1	1	
	26605	5							1													1		
	26626	5																				1		

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 32

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										1	1	1	1	1	1	1	1	2			
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	
LACRIMATION RIGHT EYE	26608	5																						1
LACRIMATION LEFT EYE	26584	1									1													
	26590	1																						1
	26687	1																						1
	26646	1																						1
	26659	2																						1
	26650	2																						1
	26672	2																						1
	26613	2																						1
	26663	2																						1
	26624	3																						1
	26670	3																						1
	26667	3																						1
	26586	3																						1
	26714	3																						1
	26645	3																						1
	26705	3																						1
	26664	4																						1
	26656	4																						1
	26629	4																						1
	26567	4																						1
	26617	4																						1
	26654	4																						1
	26572	4																						1
	26611	4																						1
	26678	4																						1

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

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
LACRIMATION LEFT EYE	26635	4																	1	1			
	26717	4																	1				
	26669	4																	1				
	26688	4																					
	26651	5																			1	1	
	26649	5																			1	1	
	26597	5																					
	26658	5																			1	1	
	26569	5																			1	1	
	26605	5																			1		
	26626	5																			1		
	26608	5																			1		
	26706	5																			1		
	26643	5																			1	1	
HAIR LOSS AROUND LEFT EYE	26575	1																					1
	26668	1																					1
	26680	1											2	2	2	3	3	3	2	1	2	3	3
	26565	2																					
	26576	2																					
	26709	2										1											
	26653	3																					
	26657	3																					
	26714	3										1	1										
	26627	3																					
	26637	4																					
	26568	5																					

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 34

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
HAIR LOSS AROUND LEFT EYE	26594	5										1	1			1							
HAIR LOSS AROUND RIGHT EYE	26575	1														1	1	1	1		1	1	1
	26668	1																			1		
	26687	1																1					
	26576	2																1					
	26709	2										1				1		1					
	26653	3																1					
	26657	3														1		1					
	26714	3										2	2										
	26627	3																1					
	26704	3													1								
	26637	4												1	1	1		1				1	
26568	5														1								
26605	5																			1			
26594	5											1		1									
HAIR LOSS AROUND NOSE	26692	2																1					
	26580	2															1						
	26717	4																			1	1	
	26568	5																		1			
WET RED VAGINAL DISCHARGE	26637	4																	P				
	26675	4																	P				
	26579	4																	P				
	26572	4																	P				
	26611	4																	P				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 35

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	
WET RED VAGINAL DISCHARGE	26717	4																P	P					
	26700	4																	P					
	26655	4																	P					
	26669	4																	P					
	26622	4																						
	26631	4													P	P								
	26568	5													P		P			P				
	26651	5													P									
	26649	5																P	P					
	26581	5												P	P			P	P					
	26592	5													P	P	P	P						
	26597	5																	P					
	26658	5																	P					
	26620	5																	P					
	26632	5																	P	P	P			
	26600	5																	P					
	26569	5												P					P			P	P	
	26605	5																	P					
	26712	5											P				P	P	P					
	26594	5																P						
	26588	5											P					P						
	26626	5																P						
	26608	5																P		P	P	P	P	
	26673	5													P			P						
	26615	5																P						
	26706	5																P						
	26601	5																P						

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 36

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																							
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	2				
WET RED VAGINAL DISCHARGE	26614	5																			P					
	26662	5																			P					
	26643	5																			P					
	26715	5													P	P										
WET BROWN VAGINAL DISCHARGE	26650	2																			P					
	26706	5																					P			
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																										
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																										

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL CLINICAL OBSERVATIONS

PAGE 37

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	
ANIMAL FOUND WITHOUT COLLAR	26636	1				P																		
	26661	1		P																				
	26577	1							P	P														
	26677	1						P	P															
	26638	1		P																				
	26687	1		P																				
	26634	1				P			P															
	26623	2										P												
	26589	2							P															
	26570	2		P																				
	26676	2						P		P														
	26648	3								P														
	26624	3							P															
	26586	3		P																				
	26598	3		P																				
	26567	4									P													
	26671	4		P																				
	26678	4							P	P														
	26635	4		P																				
	26652	4							P															
	26669	4		P																				
	26658	5		P																				
	26620	5		P	P																			
	26632	5										P												
	26615	5		P																				
	26715	5		P																				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY

PCOV3.13
11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A2 (AT TIME OF DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 1

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

OBSERVATION: TIME OF DOSE	ANIMAL	GD GP	GD																						
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9			
NORMAL NO SIGNIFICANT CLINICAL OBSERVATIONS	26639	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26636	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26575	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26630	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26599	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26668	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26606	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26595	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26674	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26584	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26661	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26666	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26577	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26718	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26677	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26590	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26638	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26687	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26680	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26646	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26634	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26587	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26642	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26713	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26625	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26623	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26582	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26565	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26659	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26650	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
1-0 MG/KG/DAY SHAM			2-0 MG/KG/DAY VEH.			3- 100 MG/KG/DAY			4- 450 MG/KG/DAY			5- 750 MG/KG/DAY													
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																									

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A2 (AT TIME OF DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 2

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

OBSERVATION: TIME OF DOSE	ANIMAL	GD GP																
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
NO SIGNIFICANT CLINICAL OBSERVATIONS	26589	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26604	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26672	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26603	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26613	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26570	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26609	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26681	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26573	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26593	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26665	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26621	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26692	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26576	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26676	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26663	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26602	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26709	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26580	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26694	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26616	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26566	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26648	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26578	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26647	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26574	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26624	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26653	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26612	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26670	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26667	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26657	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																		

TABLE A2 (AT TIME OF DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

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

OBSERVATION: TIME OF DOSE	ANIMAL	GD GP																				
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
NO SIGNIFICANT CLINICAL OBSERVATIONS	26586	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26714	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26645	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26610	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26607	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26598	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26627	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26705	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26644	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26704	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26641	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26585	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26699	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26664	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26656	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26629	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26637	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26567	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26617	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26675	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26654	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26579	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26572	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26671	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26611	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26678	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26635	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26652	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26717	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26700	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26655	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26669	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																						
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																						

TABLE A2 (AT TIME OF DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

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

OBSERVATION: TIME OF DOSE	ANIMAL	GD GP																
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
NO SIGNIFICANT CLINICAL OBSERVATIONS	26628	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26688	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26622	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26618	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26591	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26631	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26568	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26651	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26649	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26581	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26592	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26597	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26658	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26620	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26632	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26600	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26569	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26605	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26712	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26594	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26588	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26626	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26608	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26673	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26615	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26706	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26601	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26614	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26662	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26643	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26715	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																		

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 1

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

OBSERVATION: 1-2 HOURS POST-DOSING		ANIMAL	GD GP	0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	1		
NORMAL																									
NO SIGNIFICANT CLINICAL OBSERVATIONS		26639	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26636	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26575	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26630	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26599	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26668	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26606	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26595	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26674	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26584	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26661	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26666	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26577	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26718	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26677	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26590	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26638	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26687	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26680	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
		26646	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	1	1	1	1	1	1	1	
		26634	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
		26587	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
		26642	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
		26713	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
		26625	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
				26623	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
				26582	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
				26565	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
				26659	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
		26650	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
1-0 MG/KG/DAY SHAM		2-0 MG/KG/DAY VEH.		3- 100 MG/KG/DAY		4- 450 MG/KG/DAY		5- 750 MG/KG/DAY																	
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																									

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 2

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

OBSERVATION: 1-2 HOURS POST-DOSING	ANIMAL	GD GP																
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1
NO SIGNIFICANT CLINICAL OBSERVATIONS	26589	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26604	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26672	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26603	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26613	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26570	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26609	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26681	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26573	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26593	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26665	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26621	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26692	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26576	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26676	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26663	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26602	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26709	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26580	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26694	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26616	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26566	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26648	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26578	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26647	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26574	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26624	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26653	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26612	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26670	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26667	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26657	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																		

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

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

OBSERVATION: 1-2 HOURS POST-DOSING	ANIMAL	GD GP																			
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	
NO SIGNIFICANT CLINICAL OBSERVATIONS	26586	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P
	26714	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26645	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26610	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26607	3	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	
	26598	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26627	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26705	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26644	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26704	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26641	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26585	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26699	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26664	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26656	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26629	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	
	26637	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26567	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	
	26617	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26675	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26654	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26579	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	
	26572	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26671	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26611	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	
	26678	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26635	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26652	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26717	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26700	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26655	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26669	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																					
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																					

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

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

OBSERVATION: 1-2 HOURS POST-DOSING	ANIMAL	GD GP																	
			0	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1
NO SIGNIFICANT CLINICAL OBSERVATIONS	26628	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26688	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26622	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26618	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26591	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26631	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26568	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26651	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26649	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26581	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26592	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26597	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26658	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26620	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26632	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26600	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26569	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26605	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26712	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26594	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26588	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26626	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26608	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26673	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26615	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26706	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26601	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26614	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26662	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26643	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26715	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
1-0 MG/KG/DAY SHAM			2-0 MG/KG/DAY VEH.			3- 100 MG/KG/DAY			4- 450 MG/KG/DAY			5- 750 MG/KG/DAY							
GRADE CODE: P = PRESENT			1 = SLIGHT			2 = MODERATE			3 = SEVERE										

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 5

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

OBSERVATION: 1-2 HOURS POST-DOSING		ANIMAL	GD	GP	0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1
BODY/INTEGUMENT																							
WET RED MATERIAL UROGENITAL AREA		26608	5																			2	
		26643	5																		1		
DRIED RED MATERIAL UROGENITAL AREA		26611	4																	2			
		26620	5																	1			
		26569	5																	1			
		26594	5																	1			
		26608	5																	2			
EXCRETA																							
WET RED VAGINAL DISCHARGE		26687	1																	2			
		26659	2																	P			
		26692	2																	P			
		26602	2																P				
		26612	3																P				
		26586	3																	P			
		26607	3																	P			
		26644	3																P				
		26585	3																P				
		26629	4																	P			
		26567	4																P	P			
		26579	4																P	P			
		26611	4																	P	P		
		26669	4																	P			
		26651	5																P	P	P		
		26592	5																P				
		26620	5																	P			
1-0 MG/KG/DAY SHAM		2-0 MG/KG/DAY VEH.	3- 100 MG/KG/DAY	4- 450 MG/KG/DAY	5- 750 MG/KG/DAY																		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																							

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A3 (1-2 HOURS POST-DOSING)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL POST-DOSE OBSERVATIONS

PAGE 6

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

OBSERVATION: 1-2 HOURS POST-DOSING	ANIMAL	GD GP																
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
WET RED VAGINAL DISCHARGE	26632	5															P	
	26569	5																P
	26712	5															P	P
	26594	5															P	P
	26588	5															P	P
	26608	5															P	P
	26673	5															P	
	26706	5															P	
	26601	5																
	26614	5																P
	26643	5																P
	26715	5															P	
WET BROWN VAGINAL DISCHARGE	26585	3																P
	26717	4																P
	26669	4																P
	26628	4																P
	26622	4																P
	26618	4																P
	26591	4															P	P
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 100 MG/KG/DAY 4- 450 MG/KG/DAY 5- 750 MG/KG/DAY																		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																		

PCOPDv1.04
12/02/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 1

GROUP : 0 MG/KG/DAY SHAM										
ANIMAL NO. / SEX										
26639/F	26636/F	26575/F	26630/F	26599/F	26668/F	26606/F	26595/F	26674/F	26584/F	
ERYTHEMA+/EDEMA+/OTHER FINDINGS										
GESTATION DAY										
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 2

GROUP : 0 MG/KG/DAY SHAM				ANIMAL NO. / SEX						
	26661/F	26666/F	26577/F	26718/F	26677/F	26590/F	26638/F	26687/F	26680/F	26646/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
8	0/0/d	SNR	0/0/d	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
9	0/0/d	0/0/d	0/0/d	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
13	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 3

GROUP : 0 MG/KG/DAY SHAM						ANIMAL NO. / SEX					
26634/F						26587/F					
26642/F						26713/F					
26625/F											
GESTATION DAY						ERYTHEMA+/EDEMA+/OTHER FINDINGS					
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	0/0/d	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
5	SNR	0/0/d	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
6	SNR	0/0/d	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
7	SNR	0/0/d	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
8	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
11	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
12	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
13	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
14	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
19	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d
20	SNR	SNR	SNR	SNR	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d	0/0/d

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 4

GROUP : 0 MG/KG/DAY VEH.		ANIMAL NO. / SEX									
		26623/F	26582/F	26565/F	26659/F	26650/F	26589/F	26604/F	26672/F	26603/F	26613/F
GESTATION DAY		ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	1/0/d	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	1/1/d	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	1/1/d	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 5

GROUP : 0 MG/KG/DAY VEH.		ANIMAL NO. / SEX									
		26570/F	26609/F	26681/F	26573/F	26593/F	26665/F	26621/F	26692/F	26576/F	26676/F
GESTATION DAY		ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 6

GROUP : 0 MG/KG/DAY VEH.						ANIMAL NO. / SEX					
26663/F						26602/F					
26709/F						26580/F					
26694/F											
GESTATION DAY						ERYTHEMA+/EDEMA+/OTHER FINDINGS					
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 7

GROUP : 100 MG/KG/DAY		ANIMAL NO. / SEX									
		26616/F	26566/F	26648/F	26578/F	26647/F	26574/F	26624/F	26653/F	26612/F	26670/F
GESTATION DAY		ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 8

GROUP : 100 MG/KG/DAY		ANIMAL NO. / SEX									
		26667/F	26657/F	26586/F	26714/F	26645/F	26610/F	26607/F	26598/F	26627/F	26705/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS										
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 9

GROUP : 100 MG/KG/DAY						ANIMAL NO. / SEX					
26644/F						26704/F					
26641/F						26585/F					
26699/F											
GESTATION DAY						ERYTHEMA+/EDEMA+/OTHER FINDINGS					
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
5	0/0/d	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
6	0/0/d	0/0/d	0/0/d	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	0/0/d	0/0/d	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 10

GROUP : 450 MG/KG/DAY		ANIMAL NO. / SEX									
		26664/F	26656/F	26629/F	26637/F	26567/F	26617/F	26675/F	26654/F	26579/F	26572/F
GESTATION DAY		ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 11

GROUP : 450 MG/KG/DAY		ANIMAL NO. / SEX									
		26671/F	26611/F	26678/F	26635/F	26652/F	26717/F	26700/F	26655/F	26669/F	26628/F
GESTATION DAY		ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 12

GROUP : 450 MG/KG/DAY						ANIMAL NO. / SEX					
26688/F						26622/F					
26618/F						26591/F					
26631/F											
GESTATION DAY						ERYTHEMA+/EDEMA+/OTHER FINDINGS					
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 13

GROUP : 750 MG/KG/DAY										
ANIMAL NO. / SEX										
	26568/F	26651/F	26649/F	26581/F	26592/F	26597/F	26658/F	26620/F	26632/F	26600/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR	1/0	SNR	SNR	SNR	SNR
4	2/1/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	1/0
5	2/1/d	1/1	SNR	SNR	1/1/d	SNR	SNR	SNR	SNR	1/0
6	2/1/d	1/1	SNR	SNR	1/0	2/1/d	1/0	1/0	SNR	2/1/d
7	2/1/d	1/1/d	SNR	SNR	1/0/d	2/1/d	SNR	SNR	SNR	2/1/d
8	2/1/d	1/1/d	0/0/d	SNR	1/0/d	2/1/d	SNR	1/0	SNR	2/1/d
9	2/1/d	1/1/d	1/0/d	SNR	1/1/d	2/1/d	SNR	SNR	SNR	2/1/d
10	2/1/d	1/1/d	1/0/d	SNR	1/1/d	1/1/d	SNR	SNR	SNR	2/1/d
11	2/1/d	1/1/d	1/0/d	SNR	1/1/d	1/1/d	SNR	0/0/d	SNR	2/1/d
12	2/1/d	1/1/d	0/0/d	SNR	1/1	1/1/d	SNR	SNR	SNR	1/1/d
13	2/1/d	SNR	0/0/d	SNR	1/1/d	1/1/d	SNR	SNR	0/0/d	1/1/d
14	2/1/d	1/0/d	0/0/d	SNR	0/0/d	1/1/d	SNR	SNR	SNR	1/1/d
15	2/1/d	0/0/d	SNR	SNR	0/0/d	1/1	SNR	SNR	SNR	1/1/d
16	2/1/d	SNR	SNR	SNR	0/0/d	0/0/d	SNR	1/1/d	SNR	1/1/d
17	2/1/d	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	0/0/d
18	2/1/d	SNR	SNR	SNR	1/0/d	SNR	SNR	SNR	SNR	SNR
19	2/1/d	SNR	SNR	SNR	1/0/d	SNR	SNR	SNR	SNR	SNR
20	2/1/d	SNR	SNR	SNR	0/0/d	SNR	SNR	0/0/d	SNR	0/0/d

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 14

GROUP : 750 MG/KG/DAY										
ANIMAL NO. / SEX										
	26569/F	26605/F	26712/F	26594/F	26588/F	26626/F	26608/F	26673/F	26615/F	26706/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS									
0	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	1/1/d	1/0	1/1/d	SNR	SNR	1/0	SNR	SNR
3	SNR	1/1/d	1/0	SNR	1/1/d	SNR	SNR	SNR	SNR	SNR
4	SNR	0/0/d	1/0	SNR	1/0/d	SNR	SNR	SNR	SNR	SNR
5	SNR	0/0/d	2/1/d	1/0	1/1/d	1/1/d	2/1/d	1/0/d	SNR	0/0/d
6	1/0	2/1/d	2/1/d	1/0	1/0/d	1/1/d	2/1/d	1/0/d	SNR	0/0/d
7	1/0	1/0/d	2/1/d	2/1/d	0/0/d	1/0/d	2/1/d	1/0	1/1	1/0/d
8	1/1/d	1/0/d	2/1/d	1/1/d	0/0/d	1/0/d	2/1/d	SNR	1/0	1/1/d
9	1/1/d	0/0/d	1/1/d	1/1/d	SNR	1/0/d	2/1/d	SNR	0/0/d	1/0/d
10	1/0/d	0/0/d	1/1/d	1/1/d	SNR	0/0/d	2/1/d	SNR	0/0/d	1/0/d
11	0/0/d	0/0/d	2/1/d	1/1/d	SNR	0/0/d	2/1/d	SNR	SNR	1/1
12	SNR	SNR	1/1/d	1/1/d	SNR	0/0/d	2/1/d	SNR	1/1	SNR
13	1/1/d	0/0/d	1/1/d	1/1/d	SNR	0/0/d	2/1/d	SNR	1/1/d	SNR
14	0/0/d	0/0/d	1/0/d	0/0/d	0/0/d	SNR	1/1/d	SNR	0/0/d	SNR
15	SNR	SNR	SNR	0/0/d	SNR	SNR	1/1/d	SNR	1/1/d	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	/	SNR
17	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	DEAD	SNR
18	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR		SNR
19	SNR	SNR	0/0/d	SNR	SNR	SNR	0/0/d	SNR		SNR
20	SNR	SNR	0/0/d	SNR	SNR	SNR	0/0/d	SNR		SNR

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA

SEX CODE: M = MALE F = FEMALE

d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 15

GROUP : 750 MG/KG/DAY			ANIMAL NO. / SEX		
26601/F		26614/F	26662/F	26643/F	26715/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS				
0	SNR	SNR	SNR	SNR	SNR
1	1/0	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR
3	SNR	1/1	SNR	SNR	SNR
4	SNR	1/0	1/1/d	1/1/d	2/2
5	SNR	1/1/d	2/1/d	1/1/d	2/1/d
6	SNR	2/1/d	1/1/d	1/1/d	2/1/d
7	SNR	2/1/d	2/1/d	0/0/d	2/1/d
8	SNR	2/1/d	1/1/d	0/0/d	2/1/d
9	SNR	3/1/d	1/1/d	0/0/d	1/1/d
10	SNR	2/1/d	1/1/d	SNR	2/1/d
11	SNR	2/1/d	1/1/d	SNR	2/1/d
12	SNR	2/1/d	1/1/d	SNR	2/1/d
13	SNR	2/1/d	0/0/d	SNR	2/1/d
14	SNR	2/1/d	0/0/d	SNR	DEAD
15	SNR	2/1/d	SNR	SNR	
16	SNR	1/1/d	SNR	SNR	
17	SNR	1/0/d	SNR	SNR	
18	0/0/d	1/1/d	SNR	SNR	
19	0/0/d	0/1/d	SNR	SNR	
20	SNR	0/0/d	SNR	SNR	

+ = REFER TO DRAIZE SCALE FOR DERMAL SCORING CRITERIA
SEX CODE: M = MALE F = FEMALE
d = DESQUAMATION, SNR = SCORED, NOT REMARKABLE

PIDERRv4.02
11/15/2011

TABLE A5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHTS DURING GESTATION [G]

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20			
DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM												
26575	G	275.	286.	299.	293.	317.	333.	362.	409.	SCHEDULED	NECROPSY	DAY 20
26577	G	223.	253.	261.	281.	294.	313.	341.	369.	SCHEDULED	NECROPSY	DAY 20
26584	G	248.	258.	268.	280.	303.	318.	337.	364.	SCHEDULED	NECROPSY	DAY 20
26587	G	259.	264.	256.	292.	306.	332.	371.	415.	SCHEDULED	NECROPSY	DAY 20
26590	G	257.	249.	287.	300.	319.	325.	373.	402.	SCHEDULED	NECROPSY	DAY 20
26595	G	253.	261.	261.	270.	292.	305.	336.	370.	SCHEDULED	NECROPSY	DAY 20
26599	G	263.	273.	242.	295.	310.	332.	382.	425.	SCHEDULED	NECROPSY	DAY 20
26606	G	254.	264.	235.	278.	296.	325.	373.	403.	SCHEDULED	NECROPSY	DAY 20
26625	G	242.	245.	251.	270.	281.	298.	326.	371.	SCHEDULED	NECROPSY	DAY 20
26630	G	267.	270.	302.	306.	329.	350.	396.	429.	SCHEDULED	NECROPSY	DAY 20
26634	G	264.	290.	288.	308.	319.	342.	376.	407.	SCHEDULED	NECROPSY	DAY 20
26636	G	287.	291.	315.	328.	349.	379.	435.	460.	SCHEDULED	NECROPSY	DAY 20
26638	G	262.	252.	254.	265.	287.	308.	350.	367.	SCHEDULED	NECROPSY	DAY 20
26639	G	231.	240.	250.	260.	268.	272.	270.	271.	SCHEDULED	NECROPSY	DAY 20
26642	G	259.	249.	276.	292.	305.	328.	370.	409.	SCHEDULED	NECROPSY	DAY 20
26646	G	289.	287.	297.	321.	337.	358.	407.	426.	SCHEDULED	NECROPSY	DAY 20
26661	G	245.	269.	280.	291.	309.	328.	368.	398.	SCHEDULED	NECROPSY	DAY 20
26666	G	229.	243.	227.	247.	257.	271.	300.	327.	SCHEDULED	NECROPSY	DAY 20
26668	G	259.	250.	263.	265.	279.	294.	329.	389.	SCHEDULED	NECROPSY	DAY 20
26674	G	252.	260.	268.	287.	314.	330.	371.	396.	SCHEDULED	NECROPSY	DAY 20
26677	G	253.	267.	285.	292.	316.	330.	379.	404.	SCHEDULED	NECROPSY	DAY 20
26680	G	275.	285.	275.	296.	323.	350.	388.	439.	SCHEDULED	NECROPSY	DAY 20
26687	G	262.	270.	271.	284.	304.	326.	377.	428.	SCHEDULED	NECROPSY	DAY 20
26713	G	242.	251.	256.	274.	288.	310.	346.	376.	SCHEDULED	NECROPSY	DAY 20
26718	G	246.	257.	255.	266.	294.	295.	323.	356.	SCHEDULED	NECROPSY	DAY 20
MEAN		256.	263.	269.	286.	304.	322.	359.	392.			
S.D.		16.2	15.3	21.7	19.0	21.1	25.0	34.8	39.1			
S.E.		3.2	3.1	4.3	3.8	4.2	5.0	7.0	7.8			
N		25	25	25	25	25	25	25	25			

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

TABLE A5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHTS DURING GESTATION [G]

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20			
DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.												
26565	G	268.	273.	284.	292.	312.	334.	376.	402.	SCHEDULED	NECROPSY	DAY 20
26570	G	242.	214.	241.	261.	278.	292.	336.	368.	SCHEDULED	NECROPSY	DAY 20
26573	G	248.	256.	259.	276.	282.	302.	340.	362.	SCHEDULED	NECROPSY	DAY 20
26576	G	273.	280.	288.	302.	312.	334.	371.	394.	SCHEDULED	NECROPSY	DAY 20
26580	G	259.	264.	279.	298.	306.	334.	364.	405.	SCHEDULED	NECROPSY	DAY 20
26582	G	287.	292.	295.	303.	331.	360.	395.	420.	SCHEDULED	NECROPSY	DAY 20
26589	G	258.	258.	283.	282.	318.	323.	360.	369.	SCHEDULED	NECROPSY	DAY 20
26593	G	251.	259.	258.	278.	307.	323.	361.	378.	SCHEDULED	NECROPSY	DAY 20
26602	G	268.	274.	278.	294.	315.	330.	368.	391.	SCHEDULED	NECROPSY	DAY 20
26603	G	250.	255.	280.	298.	316.	336.	374.	395.	SCHEDULED	NECROPSY	DAY 20
26604	G	255.	228.	232.	242.	270.	278.	309.	327.	SCHEDULED	NECROPSY	DAY 20
26609	G	236.	227.	241.	272.	286.	294.	329.	358.	SCHEDULED	NECROPSY	DAY 20
26613	G	247.	266.	257.	283.	303.	326.	366.	403.	SCHEDULED	NECROPSY	DAY 20
26621	G	257.	274.	270.	289.	307.	328.	361.	392.	SCHEDULED	NECROPSY	DAY 20
26623	G	250.	241.	258.	276.	287.	300.	333.	357.	SCHEDULED	NECROPSY	DAY 20
26650	G	260.	250.	246.	280.	290.	298.	334.	369.	SCHEDULED	NECROPSY	DAY 20
26659	G	266.	273.	283.	298.	318.	343.	375.	410.	SCHEDULED	NECROPSY	DAY 20
26663	G	281.	279.	279.	308.	336.	357.	398.	449.	SCHEDULED	NECROPSY	DAY 20
26665	G	255.	258.	268.	279.	311.	331.	371.	399.	SCHEDULED	NECROPSY	DAY 20
26672	G	254.	252.	261.	273.	286.	309.	352.	385.	SCHEDULED	NECROPSY	DAY 20
26676	G	276.	292.	297.	309.	332.	351.	407.	432.	SCHEDULED	NECROPSY	DAY 20
26681	G	222.	246.	244.	253.	265.	273.	306.	320.	SCHEDULED	NECROPSY	DAY 20
26692	G	262.	268.	265.	283.	307.	319.	359.	391.	SCHEDULED	NECROPSY	DAY 20
26694	G	243.	242.	248.	269.	282.	303.	352.	384.	SCHEDULED	NECROPSY	DAY 20
26709	G	261.	279.	275.	271.	309.	331.	390.	422.	SCHEDULED	NECROPSY	DAY 20
MEAN		257.	260.	267.	283.	303.	320.	359.	387.			
S.D.		14.3	19.7	18.1	16.8	19.2	23.1	25.7	29.9			
S.E.		2.9	3.9	3.6	3.4	3.8	4.6	5.1	6.0			
N		25	25	25	25	25	25	25	25			

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

TABLE A5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHTS DURING GESTATION [G]

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20			
DAMS FROM GROUP 3: 100 MG/KG/DAY												
26566	G	272.	260.	269.	279.	297.	314.	349.	378.	SCHEDULED	NECROPSY	DAY 20
26574	G	258.	273.	290.	298.	315.	334.	373.	407.	SCHEDULED	NECROPSY	DAY 20
26578	G	265.	279.	291.	312.	339.	344.	399.	434.	SCHEDULED	NECROPSY	DAY 20
26585	G	248.	257.	262.	272.	287.	298.	324.	355.	SCHEDULED	NECROPSY	DAY 20
26586	G	221.	253.	249.	260.	270.	293.	318.	337.	SCHEDULED	NECROPSY	DAY 20
26598	G	266.	276.	279.	296.	317.	340.	384.	412.	SCHEDULED	NECROPSY	DAY 20
26607	G	262.	268.	259.	278.	290.	312.	329.	352.	SCHEDULED	NECROPSY	DAY 20
26610	G	255.	263.	265.	281.	296.	307.	347.	353.	SCHEDULED	NECROPSY	DAY 20
26612	G	251.	255.	267.	279.	298.	318.	356.	379.	SCHEDULED	NECROPSY	DAY 20
26616	G	239.	244.	264.	280.	296.	308.	348.	372.	SCHEDULED	NECROPSY	DAY 20
26624	G	254.	264.	276.	294.	320.	336.	378.	419.	SCHEDULED	NECROPSY	DAY 20
26627	G	271.	283.	281.	294.	315.	334.	365.	372.	SCHEDULED	NECROPSY	DAY 20
26641	G	257.	258.	265.	278.	292.	310.	349.	379.	SCHEDULED	NECROPSY	DAY 20
26644	G	264.	259.	275.	297.	306.	319.	365.	390.	SCHEDULED	NECROPSY	DAY 20
26645	G	248.	269.	265.	276.	284.	299.	330.	361.	SCHEDULED	NECROPSY	DAY 20
26647	G	260.	262.	274.	279.	296.	307.	355.	383.	SCHEDULED	NECROPSY	DAY 20
26648	G	278.	278.	283.	284.	309.	331.	374.	402.	SCHEDULED	NECROPSY	DAY 20
26653	G	253.	262.	268.	288.	295.	314.	349.	384.	SCHEDULED	NECROPSY	DAY 20
26657	G	236.	245.	241.	251.	271.	276.	324.	345.	SCHEDULED	NECROPSY	DAY 20
26667	G	243.	243.	250.	266.	280.	304.	335.	366.	SCHEDULED	NECROPSY	DAY 20
26670	G	248.	240.	268.	283.	292.	301.	315.	326.	SCHEDULED	NECROPSY	DAY 20
26699	G	239.	238.	254.	261.	280.	288.	319.	321.	SCHEDULED	NECROPSY	DAY 20
26704	G	260.	260.	278.	291.	310.	323.	346.	365.	SCHEDULED	NECROPSY	DAY 20
26705	G	279.	261.	272.	285.	307.	316.	364.	382.	SCHEDULED	NECROPSY	DAY 20
26714	G	235.	245.	250.	259.	278.	286.	317.	327.	SCHEDULED	NECROPSY	DAY 20
MEAN		254.	260.	268.	281.	298.	312.	348.	372.			
S.D.		14.1	12.6	12.7	14.2	16.5	17.6	23.1	29.3			
S.E.		2.8	2.5	2.5	2.8	3.3	3.5	4.6	5.9			
N		25	25	25	25	25	25	25	25			

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

TABLE A5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHTS DURING GESTATION [G]

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20			
DAMS FROM GROUP 4: 450 MG/KG/DAY												
26567	G	260.	262.	259.	258.	279.	310.	352.	371.	SCHEDULED	NECROPSY	DAY 20
26572	G	249.	248.	249.	249.	273.	279.	297.	307.	SCHEDULED	NECROPSY	DAY 20
26579	G	249.	245.	265.	270.	281.	294.	321.	353.	SCHEDULED	NECROPSY	DAY 20
26591	G	256.	252.	251.	262.	270.	290.	322.	353.	SCHEDULED	NECROPSY	DAY 20
26611	G	235.	239.	238.	243.	258.	274.	299.	302.	SCHEDULED	NECROPSY	DAY 20
26617	G	258.	268.	261.	284.	293.	318.	352.	442.	SCHEDULED	NECROPSY	DAY 20
26618	G	262.	254.	283.	277.	303.	326.	369.	383.	SCHEDULED	NECROPSY	DAY 20
26622	G	266.	270.	255.	253.	291.	288.	326.	342.	SCHEDULED	NECROPSY	DAY 20
26628	G	287.	271.	280.	291.	309.	320.	359.	364.	SCHEDULED	NECROPSY	DAY 20
26629	G	275.	294.	283.	296.	322.	333.	384.	408.	SCHEDULED	NECROPSY	DAY 20
26631	G	253.	251.	243.	273.	277.	295.	310.	327.	SCHEDULED	NECROPSY	DAY 20
26635	G	239.	255.	239.	250.	267.	272.	306.	318.	SCHEDULED	NECROPSY	DAY 20
26637	G	266.	251.	241.	258.	267.	263.	281.	297.	SCHEDULED	NECROPSY	DAY 20
26652	G	249.	244.	250.	243.	269.	285.	326.	355.	SCHEDULED	NECROPSY	DAY 20
26654	G	253.	249.	241.	258.	278.	297.	334.	351.	SCHEDULED	NECROPSY	DAY 20
26655	G	263.	246.	265.	274.	286.	289.	337.	350.	SCHEDULED	NECROPSY	DAY 20
26656	G	317.	313.	304.	313.	335.	350.	382.	413.	SCHEDULED	NECROPSY	DAY 20
26664	G	245.	228.	249.	266.	284.	301.	345.	358.	SCHEDULED	NECROPSY	DAY 20
26669	G	271.	258.	274.	294.	309.	319.	336.	327.	SCHEDULED	NECROPSY	DAY 20
26671	G	243.	247.	248.	254.	265.	280.	315.	327.	SCHEDULED	NECROPSY	DAY 20
26675	G	255.	252.	254.	280.	299.	314.	353.	360.	SCHEDULED	NECROPSY	DAY 20
26678	G	231.	242.	239.	257.	270.	286.	316.	332.	SCHEDULED	NECROPSY	DAY 20
26688	G	270.	257.	257.	283.	301.	314.	337.	353.	SCHEDULED	NECROPSY	DAY 20
26700	G	260.	271.	260.	276.	278.	295.	330.	333.	SCHEDULED	NECROPSY	DAY 20
26717	G	256.	231.	237.	249.	267.	269.	288.	290.	SCHEDULED	NECROPSY	DAY 20
MEAN		259.	256.	257.	268.	285.	298.	331.	349.			
S.D.		17.6	18.3	17.0	18.3	19.4	21.7	27.1	36.3			
S.E.		3.5	3.7	3.4	3.7	3.9	4.3	5.4	7.3			
N		25	25	25	25	25	25	25	25			

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

TABLE A5
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHTS DURING GESTATION [G]

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20			
DAMS FROM GROUP 5: 750 MG/KG/DAY												
26568	G	251.	250.	267.	281.	293.	304.	325.	339.	SCHEDULED	NECROPSY DAY 20	
26569	G	244.	253.	261.	268.	280.	285.	308.	294.	SCHEDULED	NECROPSY DAY 20	
26581	G	264.	226.	244.	250.	261.	270.	287.	286.	SCHEDULED	NECROPSY DAY 20	
26588	G	251.	265.	270.	278.	295.	292.	258.	259.	SCHEDULED	NECROPSY DAY 20	
26592	G	263.	251.	246.	253.	273.	282.	299.	301.	SCHEDULED	NECROPSY DAY 20	
26594	G	242.	239.	219.	242.	243.	245.	237.	232.	SCHEDULED	NECROPSY DAY 20	
26597	G	257.	258.	260.	272.	282.	286.	299.	295.	SCHEDULED	NECROPSY DAY 20	
26600	G	248.	251.	255.	262.	276.	286.	294.	285.	SCHEDULED	NECROPSY DAY 20	
26601	G	282.	265.	275.	281.	289.	295.	307.	317.	SCHEDULED	NECROPSY DAY 20	
26605	G	236.	235.	245.	254.	266.	264.	283.	274.	SCHEDULED	NECROPSY DAY 20	
26608	G	258.	254.	242.	256.	263.	254.	245.	230.	SCHEDULED	NECROPSY DAY 20	
26614	G	263.	259.	263.	258.	276.	281.	274.	264.	SCHEDULED	NECROPSY DAY 20	
26615	G	274.	278.	275.	276.	278.	285.	NA	NA	GRAVID, DIED DAY 16		
26620	G	252.	256.	253.	271.	281.	293.	306.	311.	SCHEDULED	NECROPSY DAY 20	
26626	G	254.	253.	259.	261.	284.	296.	300.	290.	SCHEDULED	NECROPSY DAY 20	
26632	G	251.	250.	256.	256.	278.	273.	264.	254.	SCHEDULED	NECROPSY DAY 20	
26643	G	254.	242.	251.	263.	264.	286.	303.	302.	SCHEDULED	NECROPSY DAY 20	
26649	G	274.	257.	276.	281.	294.	302.	333.	338.	SCHEDULED	NECROPSY DAY 20	
26651	G	258.	235.	257.	269.	278.	275.	278.	266.	SCHEDULED	NECROPSY DAY 20	
26658	G	257.	248.	243.	249.	263.	277.	287.	278.	SCHEDULED	NECROPSY DAY 20	
26662	G	263.	267.	263.	284.	296.	310.	325.	355.	SCHEDULED	NECROPSY DAY 20	
26673	G	265.	266.	257.	264.	282.	307.	274.	278.	SCHEDULED	NECROPSY DAY 20	
26706	G	276.	274.	266.	277.	283.	290.	313.	305.	SCHEDULED	NECROPSY DAY 20	
26712	G	231.	242.	239.	244.	262.	268.	287.	289.	SCHEDULED	NECROPSY DAY 20	
26715	G	249.	252.	243.	250.	254.	NA	NA	NA	GRAVID, EUTHANIZED DAY 13		
MEAN		257.	253.	255.	264.	276.	284.	291.	289.			
S.D.		12.2	12.4	13.3	12.6	13.5	16.0	24.7	31.4			
S.E.		2.4	2.5	2.7	2.5	2.7	3.3	5.1	6.5			
N		25	25	25	25	25	24	23	23			

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHT CHANGES DURING GESTATION [G]

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20			
DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM													
26575	G		11.	13.	-6.	24.	16.	29.	47.	134.	SCHEDULED	NECROPSY	DAY 20
26577	G		30.	8.	20.	13.	19.	28.	28.	146.	SCHEDULED	NECROPSY	DAY 20
26584	G		10.	10.	12.	23.	15.	19.	27.	116.	SCHEDULED	NECROPSY	DAY 20
26587	G		5.	-8.	36.	14.	26.	39.	44.	156.	SCHEDULED	NECROPSY	DAY 20
26590	G		-8.	38.	13.	19.	6.	48.	29.	145.	SCHEDULED	NECROPSY	DAY 20
26595	G		8.	0.	9.	22.	13.	31.	34.	117.	SCHEDULED	NECROPSY	DAY 20
26599	G		10.	-31.	53.	15.	22.	50.	43.	162.	SCHEDULED	NECROPSY	DAY 20
26606	G		10.	-29.	43.	18.	29.	48.	30.	149.	SCHEDULED	NECROPSY	DAY 20
26625	G		3.	6.	19.	11.	17.	28.	45.	129.	SCHEDULED	NECROPSY	DAY 20
26630	G		3.	32.	4.	23.	21.	46.	33.	162.	SCHEDULED	NECROPSY	DAY 20
26634	G		26.	-2.	20.	11.	23.	34.	31.	143.	SCHEDULED	NECROPSY	DAY 20
26636	G		4.	24.	13.	21.	30.	56.	25.	173.	SCHEDULED	NECROPSY	DAY 20
26638	G		-10.	2.	11.	22.	21.	42.	17.	105.	SCHEDULED	NECROPSY	DAY 20
26639	G		9.	10.	10.	8.	4.	-2.	1.	40.	SCHEDULED	NECROPSY	DAY 20
26642	G		-10.	27.	16.	13.	23.	42.	39.	150.	SCHEDULED	NECROPSY	DAY 20
26646	G		-2.	10.	24.	16.	21.	49.	19.	137.	SCHEDULED	NECROPSY	DAY 20
26661	G		24.	11.	11.	18.	19.	40.	30.	153.	SCHEDULED	NECROPSY	DAY 20
26666	G		14.	-16.	20.	10.	14.	29.	27.	98.	SCHEDULED	NECROPSY	DAY 20
26668	G		-9.	13.	2.	14.	15.	35.	60.	130.	SCHEDULED	NECROPSY	DAY 20
26674	G		8.	8.	19.	27.	16.	41.	25.	144.	SCHEDULED	NECROPSY	DAY 20
26677	G		14.	18.	7.	24.	14.	49.	25.	151.	SCHEDULED	NECROPSY	DAY 20
26680	G		10.	-10.	21.	27.	27.	38.	51.	164.	SCHEDULED	NECROPSY	DAY 20
26687	G		8.	1.	13.	20.	22.	51.	51.	166.	SCHEDULED	NECROPSY	DAY 20
26713	G		9.	5.	18.	14.	22.	36.	30.	134.	SCHEDULED	NECROPSY	DAY 20
26718	G		11.	-2.	11.	28.	1.	28.	33.	110.	SCHEDULED	NECROPSY	DAY 20
MEAN			8.	6.	17.	18.	18.	37.	33.	137.			
S.D.			10.3	16.5	12.5	5.8	7.2	12.4	12.6	28.2			
S.E.			2.1	3.3	2.5	1.2	1.4	2.5	2.5	5.6			
N			25	25	25	25	25	25	25	25			

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHT CHANGES DURING GESTATION [G]

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20			
DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.													
26565	G		5.	11.	8.	20.	22.	42.	26.	134.	SCHEDULED	NECROPSY	DAY 20
26570	G		-28.	27.	20.	17.	14.	44.	32.	126.	SCHEDULED	NECROPSY	DAY 20
26573	G		8.	3.	17.	6.	20.	38.	22.	114.	SCHEDULED	NECROPSY	DAY 20
26576	G		7.	8.	14.	10.	22.	37.	23.	121.	SCHEDULED	NECROPSY	DAY 20
26580	G		5.	15.	19.	8.	28.	30.	41.	146.	SCHEDULED	NECROPSY	DAY 20
26582	G		5.	3.	8.	28.	29.	35.	25.	133.	SCHEDULED	NECROPSY	DAY 20
26589	G		0.	25.	-1.	36.	5.	37.	9.	111.	SCHEDULED	NECROPSY	DAY 20
26593	G		8.	-1.	20.	29.	16.	38.	17.	127.	SCHEDULED	NECROPSY	DAY 20
26602	G		6.	4.	16.	21.	15.	38.	23.	123.	SCHEDULED	NECROPSY	DAY 20
26603	G		5.	25.	18.	18.	20.	38.	21.	145.	SCHEDULED	NECROPSY	DAY 20
26604	G		-27.	4.	10.	28.	8.	31.	18.	72.	SCHEDULED	NECROPSY	DAY 20
26609	G		-9.	14.	31.	14.	8.	35.	29.	122.	SCHEDULED	NECROPSY	DAY 20
26613	G		19.	-9.	26.	20.	23.	40.	37.	156.	SCHEDULED	NECROPSY	DAY 20
26621	G		17.	-4.	19.	18.	21.	33.	31.	135.	SCHEDULED	NECROPSY	DAY 20
26623	G		-9.	17.	18.	11.	13.	33.	24.	107.	SCHEDULED	NECROPSY	DAY 20
26650	G		-10.	-4.	34.	10.	8.	36.	35.	109.	SCHEDULED	NECROPSY	DAY 20
26659	G		7.	10.	15.	20.	25.	32.	35.	144.	SCHEDULED	NECROPSY	DAY 20
26663	G		-2.	0.	29.	28.	21.	41.	51.	168.	SCHEDULED	NECROPSY	DAY 20
26665	G		3.	10.	11.	32.	20.	40.	28.	144.	SCHEDULED	NECROPSY	DAY 20
26672	G		-2.	9.	12.	13.	23.	43.	33.	131.	SCHEDULED	NECROPSY	DAY 20
26676	G		16.	5.	12.	23.	19.	56.	25.	156.	SCHEDULED	NECROPSY	DAY 20
26681	G		24.	-2.	9.	12.	8.	33.	14.	98.	SCHEDULED	NECROPSY	DAY 20
26692	G		6.	-3.	18.	24.	12.	40.	32.	129.	SCHEDULED	NECROPSY	DAY 20
26694	G		-1.	6.	21.	13.	21.	49.	32.	141.	SCHEDULED	NECROPSY	DAY 20
26709	G		18.	-4.	-4.	38.	22.	59.	32.	161.	SCHEDULED	NECROPSY	DAY 20
MEAN			3.	7.	16.	20.	18.	39.	28.	130.			
S.D.			12.6	9.7	8.8	8.8	6.7	7.1	9.0	21.4			
S.E.			2.5	1.9	1.8	1.8	1.3	1.4	1.8	4.3			
N			25	25	25	25	25	25	25	25			

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHT CHANGES DURING GESTATION [G]

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20			
DAMS FROM GROUP 3: 100 MG/KG/DAY													
26566	G		-12.	9.	10.	18.	17.	35.	29.	106.	SCHEDULED	NECROPSY	DAY 20
26574	G		15.	17.	8.	17.	19.	39.	34.	149.	SCHEDULED	NECROPSY	DAY 20
26578	G		14.	12.	21.	27.	5.	55.	35.	169.	SCHEDULED	NECROPSY	DAY 20
26585	G		9.	5.	10.	15.	11.	26.	31.	107.	SCHEDULED	NECROPSY	DAY 20
26586	G		32.	-4.	11.	10.	23.	25.	19.	116.	SCHEDULED	NECROPSY	DAY 20
26598	G		10.	3.	17.	21.	23.	44.	28.	146.	SCHEDULED	NECROPSY	DAY 20
26607	G		6.	-9.	19.	12.	22.	17.	23.	90.	SCHEDULED	NECROPSY	DAY 20
26610	G		8.	2.	16.	15.	11.	40.	6.	98.	SCHEDULED	NECROPSY	DAY 20
26612	G		4.	12.	12.	19.	20.	38.	23.	128.	SCHEDULED	NECROPSY	DAY 20
26616	G		5.	20.	16.	16.	12.	40.	24.	133.	SCHEDULED	NECROPSY	DAY 20
26624	G		10.	12.	18.	26.	16.	42.	41.	165.	SCHEDULED	NECROPSY	DAY 20
26627	G		12.	-2.	13.	21.	19.	31.	7.	101.	SCHEDULED	NECROPSY	DAY 20
26641	G		1.	7.	13.	14.	18.	39.	30.	122.	SCHEDULED	NECROPSY	DAY 20
26644	G		-5.	16.	22.	9.	13.	46.	25.	126.	SCHEDULED	NECROPSY	DAY 20
26645	G		21.	-4.	11.	8.	15.	31.	31.	113.	SCHEDULED	NECROPSY	DAY 20
26647	G		2.	12.	5.	17.	11.	48.	28.	123.	SCHEDULED	NECROPSY	DAY 20
26648	G		0.	5.	1.	25.	22.	43.	28.	124.	SCHEDULED	NECROPSY	DAY 20
26653	G		9.	6.	20.	7.	19.	35.	35.	131.	SCHEDULED	NECROPSY	DAY 20
26657	G		9.	-4.	10.	20.	5.	48.	21.	109.	SCHEDULED	NECROPSY	DAY 20
26667	G		0.	7.	16.	14.	24.	31.	31.	123.	SCHEDULED	NECROPSY	DAY 20
26670	G		-8.	28.	15.	9.	9.	14.	11.	78.	SCHEDULED	NECROPSY	DAY 20
26699	G		-1.	16.	7.	19.	8.	31.	2.	82.	SCHEDULED	NECROPSY	DAY 20
26704	G		0.	18.	13.	19.	13.	23.	19.	105.	SCHEDULED	NECROPSY	DAY 20
26705	G		-18.	11.	13.	22.	9.	48.	18.	103.	SCHEDULED	NECROPSY	DAY 20
26714	G		10.	5.	9.	19.	8.	31.	10.	92.	SCHEDULED	NECROPSY	DAY 20
MEAN			5.	8.	13.	17.	15.	36.	24.	118.			
S.D.			10.3	8.8	5.1	5.5	5.9	10.1	10.1	23.3			
S.E.			2.1	1.8	1.0	1.1	1.2	2.0	2.0	4.7			
N			25	25	25	25	25	25	25	25			

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHT CHANGES DURING GESTATION [G]

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20		
DAMS FROM GROUP 4: 450 MG/KG/DAY												
26567	G		2.	-3.	-1.	21.	31.	42.	19.	111.	SCHEDULED	NECROPSY DAY 20
26572	G		-1.	1.	0.	24.	6.	18.	10.	58.	SCHEDULED	NECROPSY DAY 20
26579	G		-4.	20.	5.	11.	13.	27.	32.	104.	SCHEDULED	NECROPSY DAY 20
26591	G		-4.	-1.	11.	8.	20.	32.	31.	97.	SCHEDULED	NECROPSY DAY 20
26611	G		4.	-1.	5.	15.	16.	25.	3.	67.	SCHEDULED	NECROPSY DAY 20
26617	G		10.	-7.	23.	9.	25.	34.	90.	184.	SCHEDULED	NECROPSY DAY 20
26618	G		-8.	29.	-6.	26.	23.	43.	14.	121.	SCHEDULED	NECROPSY DAY 20
26622	G		4.	-15.	-2.	38.	-3.	38.	16.	76.	SCHEDULED	NECROPSY DAY 20
26628	G		-16.	9.	11.	18.	11.	39.	5.	77.	SCHEDULED	NECROPSY DAY 20
26629	G		19.	-11.	13.	26.	11.	51.	24.	133.	SCHEDULED	NECROPSY DAY 20
26631	G		-2.	-8.	30.	4.	18.	15.	17.	74.	SCHEDULED	NECROPSY DAY 20
26635	G		16.	-16.	11.	17.	5.	34.	12.	79.	SCHEDULED	NECROPSY DAY 20
26637	G		-15.	-10.	17.	9.	-4.	18.	16.	31.	SCHEDULED	NECROPSY DAY 20
26652	G		-5.	6.	-7.	26.	16.	41.	29.	106.	SCHEDULED	NECROPSY DAY 20
26654	G		-4.	-8.	17.	20.	19.	37.	17.	98.	SCHEDULED	NECROPSY DAY 20
26655	G		-17.	19.	9.	12.	3.	48.	13.	87.	SCHEDULED	NECROPSY DAY 20
26656	G		-4.	-9.	9.	22.	15.	32.	31.	96.	SCHEDULED	NECROPSY DAY 20
26664	G		-17.	21.	17.	18.	17.	44.	13.	113.	SCHEDULED	NECROPSY DAY 20
26669	G		-13.	16.	20.	15.	10.	17.	-9.	56.	SCHEDULED	NECROPSY DAY 20
26671	G		4.	1.	6.	11.	15.	35.	12.	84.	SCHEDULED	NECROPSY DAY 20
26675	G		-3.	2.	26.	19.	15.	39.	7.	105.	SCHEDULED	NECROPSY DAY 20
26678	G		11.	-3.	18.	13.	16.	30.	16.	101.	SCHEDULED	NECROPSY DAY 20
26688	G		-13.	0.	26.	18.	13.	23.	16.	83.	SCHEDULED	NECROPSY DAY 20
26700	G		11.	-11.	16.	2.	17.	35.	3.	73.	SCHEDULED	NECROPSY DAY 20
26717	G		-25.	6.	12.	18.	2.	19.	2.	34.	SCHEDULED	NECROPSY DAY 20
MEAN			-3.	1.	11.	17.	13.	33.	18.	90.		
S.D.			11.2	12.1	9.9	7.9	8.3	10.1	18.0	31.6		
S.E.			2.2	2.4	2.0	1.6	1.7	2.0	3.6	6.3		
N			25	25	25	25	25	25	25	25		

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL BODY WEIGHT CHANGES DURING GESTATION [G]

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20		
DAMS FROM GROUP 5: 750 MG/KG/DAY												
26568	G		-1.	17.	14.	12.	11.	21.	14.	88.	SCHEDULED NECROPSY DAY 20	
26569	G		9.	8.	7.	12.	5.	23.	-14.	50.	SCHEDULED NECROPSY DAY 20	
26581	G		-38.	18.	6.	11.	9.	17.	-1.	22.	SCHEDULED NECROPSY DAY 20	
26588	G		14.	5.	8.	17.	-3.	-34.	1.	8.	SCHEDULED NECROPSY DAY 20	
26592	G		-12.	-5.	7.	20.	9.	17.	2.	38.	SCHEDULED NECROPSY DAY 20	
26594	G		-3.	-20.	23.	1.	2.	-8.	-5.	-10.	SCHEDULED NECROPSY DAY 20	
26597	G		1.	2.	12.	10.	4.	13.	-4.	38.	SCHEDULED NECROPSY DAY 20	
26600	G		3.	4.	7.	14.	10.	8.	-9.	37.	SCHEDULED NECROPSY DAY 20	
26601	G		-17.	10.	6.	8.	6.	12.	10.	35.	SCHEDULED NECROPSY DAY 20	
26605	G		-1.	10.	9.	12.	-2.	19.	-9.	38.	SCHEDULED NECROPSY DAY 20	
26608	G		-4.	-12.	14.	7.	-9.	-9.	-15.	-28.	SCHEDULED NECROPSY DAY 20	
26614	G		-4.	4.	-5.	18.	5.	-7.	-10.	1.	SCHEDULED NECROPSY DAY 20	
26615	G		4.	-3.	1.	2.	7.	NA	NA	NA	GRAVID, DIED DAY 16	
26620	G		4.	-3.	18.	10.	12.	13.	5.	59.	SCHEDULED NECROPSY DAY 20	
26626	G		-1.	6.	2.	23.	12.	4.	-10.	36.	SCHEDULED NECROPSY DAY 20	
26632	G		-1.	6.	0.	22.	-5.	-9.	-10.	3.	SCHEDULED NECROPSY DAY 20	
26643	G		-12.	9.	12.	1.	22.	17.	-1.	48.	SCHEDULED NECROPSY DAY 20	
26649	G		-17.	19.	5.	13.	8.	31.	5.	64.	SCHEDULED NECROPSY DAY 20	
26651	G		-23.	22.	12.	9.	-3.	3.	-12.	8.	SCHEDULED NECROPSY DAY 20	
26658	G		-9.	-5.	6.	14.	14.	10.	-9.	21.	SCHEDULED NECROPSY DAY 20	
26662	G		4.	-4.	21.	12.	14.	15.	30.	92.	SCHEDULED NECROPSY DAY 20	
26673	G		1.	-9.	7.	18.	25.	-33.	4.	13.	SCHEDULED NECROPSY DAY 20	
26706	G		-2.	-8.	11.	6.	7.	23.	-8.	29.	SCHEDULED NECROPSY DAY 20	
26712	G		11.	-3.	5.	18.	6.	19.	2.	58.	SCHEDULED NECROPSY DAY 20	
26715	G		3.	-9.	7.	4.	NA	NA	NA	NA	GRAVID, EUTHANIZED DAY 13	
MEAN			-4.	2.	9.	12.	7.	7.	-2.	33.		
S.D.			11.4	10.5	6.4	6.2	8.0	16.9	10.4	29.2		
S.E.			2.3	2.1	1.3	1.2	1.6	3.5	2.2	6.1		
N			25	25	25	25	24	23	23	23		

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

TABLE A7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	1: 0 MG/KG/DAY SHAM				
26575	G	275.	409.	88.3	320.7	45.7
26577	G	223.	369.	69.0	300.0	77.0
26584	G	248.	364.	71.1	292.9	44.9
26587	G	259.	415.	90.6	324.4	65.4
26590	G	257.	402.	91.2	310.8	53.8
26595	G	253.	370.	79.4	290.6	37.6
26599	G	263.	425.	102.1	322.9	59.9
26606	G	254.	403.	101.0	302.0	48.0
26625	G	242.	371.	86.5	284.5	42.5
26630	G	267.	429.	113.5	315.5	48.5
26634	G	264.	407.	80.2	326.8	62.8
26636	G	287.	460.	112.3	347.7	60.7
26638	G	262.	367.	80.4	286.6	24.6
26639	G	231.	271.	1.2	269.8	38.8
26642	G	259.	409.	86.5	322.5	63.5
26646	G	289.	426.	105.2	320.8	31.8
26661	G	245.	398.	85.7	312.3	67.3
26666	G	229.	327.	74.1	252.9	23.9
26668	G	259.	389.	66.8	322.2	63.2
26674	G	252.	396.	69.6	326.4	74.4
26677	G	253.	404.	69.1	334.9	81.9
26680	G	275.	439.	104.2	334.8	59.8
26687	G	262.	428.	99.0	329.0	67.0
26713	G	242.	376.	75.8	300.2	58.2
26718	G	246.	356.	72.7	283.3	37.3
MEAN		256.	392.	83.0	309.4	53.5
S.D.		16.2	39.1	22.16	22.57	15.77
S.E.		3.2	7.8	4.43	4.51	3.15
N		25	25	25	25	25

G = GRAVID

TABLE A7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	2: 0 MG/KG/DAY VEH.				
26565	G	268.	402.	88.5	313.5	45.5
26570	G	242.	368.	78.8	289.2	47.2
26573	G	248.	362.	86.7	275.3	27.3
26576	G	273.	394.	60.1	333.9	60.9
26580	G	259.	405.	89.0	316.0	57.0
26582	G	287.	420.	81.2	338.8	51.8
26589	G	258.	369.	75.5	293.5	35.5
26593	G	251.	378.	86.7	291.3	40.3
26602	G	268.	391.	80.1	310.9	42.9
26603	G	250.	395.	84.0	311.0	61.0
26604	G	255.	327.	59.6	267.4	12.4
26609	G	236.	358.	65.7	292.3	56.3
26613	G	247.	403.	89.0	314.0	67.0
26621	G	257.	392.	82.9	309.1	52.1
26623	G	250.	357.	79.3	277.7	27.7
26650	G	260.	369.	79.4	289.6	29.6
26659	G	266.	410.	87.5	322.5	56.5
26663	G	281.	449.	106.6	342.4	61.4
26665	G	255.	399.	89.5	309.5	54.5
26672	G	254.	385.	86.4	298.6	44.6
26676	G	276.	432.	95.2	336.8	60.8
26681	G	222.	320.	64.1	255.9	33.9
26692	G	262.	391.	82.5	308.5	46.5
26694	G	243.	384.	93.8	290.2	47.2
26709	G	261.	422.	103.6	318.4	57.4
MEAN		257.	387.	83.0	304.3	47.1
S.D.		14.3	29.9	11.71	22.30	13.40
S.E.		2.9	6.0	2.34	4.46	2.68
N		25	25	25	25	25

G = GRAVID

TABLE A7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PREGNANCY STATUS		INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	3: 100 MG/KG/DAY				
26566	G	272.	378.	62.9	315.1	43.1
26574	G	258.	407.	84.3	322.7	64.7
26578	G	265.	434.	84.3	349.7	84.7
26585	G	248.	355.	72.9	282.1	34.1
26586	G	221.	337.	39.9	297.1	76.1
26598	G	266.	412.	93.1	318.9	52.9
26607	G	262.	352.	57.7	294.3	32.3
26610	G	255.	353.	84.0	269.0	14.0
26612	G	251.	379.	76.9	302.1	51.1
26616	G	239.	372.	74.2	297.8	58.8
26624	G	254.	419.	90.2	328.8	74.8
26627	G	271.	372.	66.5	305.5	34.5
26641	G	257.	379.	84.7	294.3	37.3
26644	G	264.	390.	90.0	300.0	36.0
26645	G	248.	361.	78.1	282.9	34.9
26647	G	260.	383.	83.3	299.7	39.7
26648	G	278.	402.	90.3	311.7	33.7
26653	G	253.	384.	83.7	300.3	47.3
26657	G	236.	345.	75.7	269.3	33.3
26667	G	243.	366.	84.2	281.8	38.8
26670	G	248.	326.	15.3	310.7	62.7
26699	G	239.	321.	36.2	284.8	45.8
26704	G	260.	365.	66.8	298.2	38.2
26705	G	279.	382.	84.4	297.6	18.6
26714	G	235.	327.	69.8	257.2	22.2
MEAN		254.	372.	73.2	298.9	44.4
S.D.		14.1	29.3	18.86	20.05	17.81
S.E.		2.8	5.9	3.77	4.01	3.56
N		25	25	25	25	25

G = GRAVID

TABLE A7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	4: 450 MG/KG/DAY				
26567	G	260.	371.	72.3	298.7	38.7
26572	G	249.	307.	35.8	271.2	22.2
26579	G	249.	353.	55.3	297.7	48.7
26591	G	256.	353.	76.8	276.2	20.2
26611	G	235.	302.	32.8	269.2	34.2
26617	G	258.	442.	75.4	366.6	108.6
26618	G	262.	383.	75.2	307.8	45.8
26622	G	266.	342.	55.9	286.1	20.1
26628	G	287.	364.	81.5	282.5	-4.5
26629	G	275.	408.	77.7	330.3	55.3
26631	G	253.	327.	52.5	274.5	21.5
26635	G	239.	318.	57.0	261.0	22.0
26637	G	266.	297.	9.5	287.5	21.5
26652	G	249.	355.	75.3	279.7	30.7
26654	G	253.	351.	61.5	289.5	36.5
26655	G	263.	350.	72.4	277.6	14.6
26656	G	317.	413.	92.4	320.6	3.6
26664	G	245.	358.	76.4	281.6	36.6
26669	G	271.	327.	37.0	290.0	19.0
26671	G	243.	327.	63.4	263.6	20.6
26675	G	255.	360.	72.7	287.3	32.3
26678	G	231.	332.	68.7	263.3	32.3
26688	G	270.	353.	65.7	287.3	17.3
26700	G	260.	333.	68.3	264.7	4.7
26717	G	256.	290.	38.1	251.9	-4.1
MEAN		259.	349.	62.0	286.7	27.9
S.D.		17.6	36.3	18.96	24.65	22.60
S.E.		3.5	7.3	3.79	4.93	4.52
N		25	25	25	25	25

G = GRAVID

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A7
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PAGE 5

	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	5: 750 MG/KG/DAY				
26568	G	251.	339.	41.8	297.2	46.2
26569	G	244.	294.	14.0	280.0	36.0
26581	G	264.	286.	14.5	271.5	7.5
26588	G	251.	259.	2.5	256.5	5.5
26592	G	263.	301.	23.5	277.5	14.5
26594	G	242.	232.	4.0	228.0	-14.0
26597	G	257.	295.	15.0	280.0	23.0
26600	G	248.	285.	15.7	269.3	21.3
26601	G	282.	317.	21.3	295.7	13.7
26605	G	236.	274.	9.5	264.5	28.5
26608	G	258.	230.	2.2	227.8	-30.2
26614	G	263.	264.	9.9	254.1	-8.9
26620	G	252.	311.	30.6	280.4	28.4
26626	G	254.	290.	15.7	274.3	20.3
26632	G	251.	254.	8.0	246.0	-5.0
26643	G	254.	302.	25.7	276.3	22.3
26649	G	274.	338.	44.9	293.1	19.1
26651	G	258.	266.	1.0	265.0	7.0
26658	G	257.	278.	18.5	259.5	2.5
26662	G	263.	355.	60.0	295.0	32.0
26673	G	265.	278.	14.3	263.7	-1.3
26706	G	276.	305.	34.2	270.8	-5.2
26712	G	231.	289.	30.3	258.7	27.7
MEAN		256.	289.	19.9	268.9	12.6
S.D.		12.1	31.4	14.96	18.89	18.09
S.E.		2.5	6.5	3.12	3.94	3.77
N		23	23	23	23	23

G = GRAVID

PUTv4.06
11/15/2011

TABLE A8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM												
26575	G		21.	23.	22.	25.	26.	24.	32.	24.	SCHEDULED	NECROPSY DAY 20
26577	G		20.	24.	27.	29.	31.	31.	32.	27.	SCHEDULED	NECROPSY DAY 20
26584	G		20.	24.	27.	28.	31.	25.	29.	26.	SCHEDULED	NECROPSY DAY 20
26587	G		21.	21.	29.	28.	28.	27.	34.	27.	SCHEDULED	NECROPSY DAY 20
26590	G		22.	26.	27.	27.	27.	31.	31.	27.	SCHEDULED	NECROPSY DAY 20
26595	G		21.	20.	23.	22.	25.	25.	30.	24.	SCHEDULED	NECROPSY DAY 20
26599	G		22.	20.	36.	28.	34.	31.	36.	29.	SCHEDULED	NECROPSY DAY 20
26606	G		24.	18.	33.	29.	29.	21.	34.	27.	SCHEDULED	NECROPSY DAY 20
26625	G		18.	22.	25.	26.	26.	25.	30.	24.	SCHEDULED	NECROPSY DAY 20
26630	G		23.	26.	26.	28.	31.	32.	32.	28.	SCHEDULED	NECROPSY DAY 20
26634	G		26.	23.	30.	29.	26.	28.	27.	27.	SCHEDULED	NECROPSY DAY 20
26636	G		24.	25.	28.	30.	35.	37.	27.	29.	SCHEDULED	NECROPSY DAY 20
26638	G		15.	20.	23.	25.	27.	28.	30.	24.	SCHEDULED	NECROPSY DAY 20
26639	G		19.	19.	22.	24.	26.	24.	22.	22.	SCHEDULED	NECROPSY DAY 20
26642	G		21.	22.	25.	28.	32.	30.	28.	27.	SCHEDULED	NECROPSY DAY 20
26646	G		17.	24.	29.	31.	30.	33.	32.	28.	SCHEDULED	NECROPSY DAY 20
26661	G		22.	24.	27.	27.	27.	26.	31.	26.	SCHEDULED	NECROPSY DAY 20
26666	G		20.	21.	25.	22.	25.	22.	27.	23.	SCHEDULED	NECROPSY DAY 20
26668	G		16.	20.	22.	23.	27.	26.	26.	23.	SCHEDULED	NECROPSY DAY 20
26674	G		21.	20.	30.	32.	34.	30.	33.	29.	SCHEDULED	NECROPSY DAY 20
26677	G		20.	22.	26.	29.	29.	31.	31.	26.	SCHEDULED	NECROPSY DAY 20
26680	G		19.	22.	25.	30.	32.	33.	33.	27.	SCHEDULED	NECROPSY DAY 20
26687	G		21.	24.	26.	28.	28.	28.	26.	26.	SCHEDULED	NECROPSY DAY 20
26713	G		19.	20.	25.	28.	28.	26.	29.	25.	SCHEDULED	NECROPSY DAY 20
26718	G		17.	19.	23.	24.	25.	25.	24.	23.	SCHEDULED	NECROPSY DAY 20
MEAN			20.	22.	26.	27.	29.	28.	30.	26.		
S.D.			2.6	2.3	3.4	2.7	3.0	3.9	3.4	2.1		
S.E.			0.5	0.5	0.7	0.5	0.6	0.8	0.7	0.4		
N			25	25	25	25	25	25	25	25		

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

TABLE A8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.												
26565	G		21.	25.	28.	29.	32.	35.	35.	29.	SCHEDULED	NECROPSY DAY 20
26570	G		9.	23.	26.	26.	28.	27.	32.	24.	SCHEDULED	NECROPSY DAY 20
26573	G		16.	21.	23.	27.	27.	32.	27.	24.	SCHEDULED	NECROPSY DAY 20
26576	G		22.	26.	26.	27.	31.	33.	31.	28.	SCHEDULED	NECROPSY DAY 20
26580	G		20.	24.	27.	27.	32.	30.	28.	27.	SCHEDULED	NECROPSY DAY 20
26582	G		21.	24.	30.	29.	31.	34.	34.	29.	SCHEDULED	NECROPSY DAY 20
26589	G		30.	16.	26.	27.	27.	28.	28.	26.	SCHEDULED	NECROPSY DAY 20
26593	G		16.	21.	26.	29.	29.	31.	29.	26.	SCHEDULED	NECROPSY DAY 20
26602	G		22.	22.	28.	21.	32.	33.	29.	27.	SCHEDULED	NECROPSY DAY 20
26603	G		24.	22.	29.	29.	34.	31.	35.	29.	SCHEDULED	NECROPSY DAY 20
26604	G		21.	13.	24.	24.	26.	26.	29.	23.	SCHEDULED	NECROPSY DAY 20
26609	G		20.	21.	24.	25.	29.	30.	33.	26.	SCHEDULED	NECROPSY DAY 20
26613	G		24.	20.	29.	28.	32.	31.	34.	28.	SCHEDULED	NECROPSY DAY 20
26621	G		21.	22.	24.	26.	30.	33.	31.	27.	SCHEDULED	NECROPSY DAY 20
26623	G		20.	23.	26.	27.	22.	29.	29.	25.	SCHEDULED	NECROPSY DAY 20
26650	G		31.	13.	29.	28.	31.	29.	36.	28.	SCHEDULED	NECROPSY DAY 20
26659	G		20.	25.	29.	32.	33.	35.	36.	30.	SCHEDULED	NECROPSY DAY 20
26663	G		17.	23.	27.	30.	36.	34.	28.	28.	SCHEDULED	NECROPSY DAY 20
26665	G		17.	22.	25.	28.	28.	31.	30.	26.	SCHEDULED	NECROPSY DAY 20
26672	G		25.	18.	28.	27.	29.	32.	33.	27.	SCHEDULED	NECROPSY DAY 20
26676	G		22.	25.	NA	31.	34.	33.	34.	30.	SCHEDULED	NECROPSY DAY 20
26681	G		21.	22.	23.	25.	25.	30.	23.	24.	SCHEDULED	NECROPSY DAY 20
26692	G		18.	20.	26.	27.	28.	31.	28.	25.	SCHEDULED	NECROPSY DAY 20
26694	G		19.	23.	28.	30.	30.	31.	35.	28.	SCHEDULED	NECROPSY DAY 20
26709	G		20.	22.	25.	22.	31.	31.	35.	26.	SCHEDULED	NECROPSY DAY 20
MEAN			21.	21.	27.	27.	30.	31.	31.	27.		
S.D.			4.4	3.4	2.0	2.6	3.1	2.3	3.4	1.9		
S.E.			0.9	0.7	0.4	0.5	0.6	0.5	0.7	0.4		
N			25	25	24	25	25	25	25	25		

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

TABLE A8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 3: 100 MG/KG/DAY												
26566	G		19.	17.	23.	28.	24.	29.	25.	23.	SCHEDULED	NECROPSY DAY 20
26574	G		21.	25.	25.	26.	28.	27.	33.	26.	SCHEDULED	NECROPSY DAY 20
26578	G		22.	25.	29.	30.	32.	30.	39.	29.	SCHEDULED	NECROPSY DAY 20
26585	G		20.	23.	27.	26.	31.	29.	29.	26.	SCHEDULED	NECROPSY DAY 20
26586	G		20.	21.	28.	28.	29.	28.	29.	26.	SCHEDULED	NECROPSY DAY 20
26598	G		21.	24.	30.	30.	31.	36.	33.	29.	SCHEDULED	NECROPSY DAY 20
26607	G		22.	23.	32.	30.	30.	30.	28.	28.	SCHEDULED	NECROPSY DAY 20
26610	G		20.	22.	27.	30.	28.	31.	26.	26.	SCHEDULED	NECROPSY DAY 20
26612	G		19.	24.	27.	27.	29.	31.	35.	27.	SCHEDULED	NECROPSY DAY 20
26616	G		21.	22.	25.	30.	24.	34.	27.	26.	SCHEDULED	NECROPSY DAY 20
26624	G		21.	23.	29.	29.	32.	30.	36.	28.	SCHEDULED	NECROPSY DAY 20
26627	G		20.	22.	22.	28.	29.	30.	26.	25.	SCHEDULED	NECROPSY DAY 20
26641	G		22.	22.	23.	32.	31.	32.	33.	28.	SCHEDULED	NECROPSY DAY 20
26644	G		17.	23.	29.	29.	32.	32.	33.	28.	SCHEDULED	NECROPSY DAY 20
26645	G		23.	23.	23.	25.	26.	27.	27.	25.	SCHEDULED	NECROPSY DAY 20
26647	G		21.	23.	25.	25.	28.	29.	34.	26.	SCHEDULED	NECROPSY DAY 20
26648	G		19.	21.	23.	26.	30.	31.	37.	26.	SCHEDULED	NECROPSY DAY 20
26653	G		20.	22.	27.	24.	27.	28.	30.	25.	SCHEDULED	NECROPSY DAY 20
26657	G		17.	20.	21.	22.	26.	27.	29.	23.	SCHEDULED	NECROPSY DAY 20
26667	G		19.	24.	30.	26.	31.	31.	36.	28.	SCHEDULED	NECROPSY DAY 20
26670	G		19.	22.	27.	31.	29.	29.	32.	27.	SCHEDULED	NECROPSY DAY 20
26699	G		15.	22.	22.	26.	34.	26.	28.	25.	SCHEDULED	NECROPSY DAY 20
26704	G		18.	26.	27.	27.	32.	31.	34.	28.	SCHEDULED	NECROPSY DAY 20
26705	G		13.	23.	24.	30.	30.	33.	26.	25.	SCHEDULED	NECROPSY DAY 20
26714	G		16.	21.	23.	26.	26.	26.	23.	23.	SCHEDULED	NECROPSY DAY 20
MEAN			19.	23.	26.	28.	29.	30.	31.	26.		
S.D.			2.4	1.8	3.0	2.4	2.6	2.5	4.3	1.8		
S.E.			0.5	0.4	0.6	0.5	0.5	0.5	0.9	0.4		
N			25	25	25	25	25	25	25	25		

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

TABLE A8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
DAMS FROM GROUP 4: 450 MG/KG/DAY												
26567	G		20.	22.	25.	23.	32.	30.	34.	26.	SCHEDULED	NECROPSY DAY 20
26572	G		16.	16.	24.	22.	25.	25.	26.	22.	SCHEDULED	NECROPSY DAY 20
26579	G		19.	24.	27.	28.	30.	19.	30.	25.	SCHEDULED	NECROPSY DAY 20
26591	G		17.	20.	22.	26.	26.	28.	27.	24.	SCHEDULED	NECROPSY DAY 20
26611	G		18.	19.	21.	22.	24.	25.	26.	22.	SCHEDULED	NECROPSY DAY 20
26617	G		21.	21.	26.	28.	29.	32.	32.	27.	SCHEDULED	NECROPSY DAY 20
26618	G		15.	24.	27.	28.	28.	32.	27.	26.	SCHEDULED	NECROPSY DAY 20
26622	G		19.	22.	20.	26.	25.	25.	28.	23.	SCHEDULED	NECROPSY DAY 20
26628	G		15.	18.	25.	29.	27.	35.	23.	25.	SCHEDULED	NECROPSY DAY 20
26629	G		24.	18.	30.	30.	33.	30.	34.	28.	SCHEDULED	NECROPSY DAY 20
26631	G		21.	20.	27.	29.	34.	27.	25.	26.	SCHEDULED	NECROPSY DAY 20
26635	G		18.	19.	21.	24.	24.	27.	24.	22.	SCHEDULED	NECROPSY DAY 20
26637	G		17.	17.	21.	20.	22.	22.	29.	20.	SCHEDULED	NECROPSY DAY 20
26652	G		24.	22.	21.	29.	27.	28.	27.	25.	SCHEDULED	NECROPSY DAY 20
26654	G		17.	16.	24.	25.	29.	29.	31.	24.	SCHEDULED	NECROPSY DAY 20
26655	G		17.	19.	23.	25.	25.	30.	26.	23.	SCHEDULED	NECROPSY DAY 20
26656	G		19.	17.	28.	29.	32.	32.	39.	28.	SCHEDULED	NECROPSY DAY 20
26664	G		15.	23.	25.	26.	30.	33.	32.	26.	SCHEDULED	NECROPSY DAY 20
26669	G		22.	20.	26.	28.	29.	29.	25.	26.	SCHEDULED	NECROPSY DAY 20
26671	G		19.	20.	20.	28.	29.	27.	32.	25.	SCHEDULED	NECROPSY DAY 20
26675	G		15.	20.	26.	25.	27.	29.	26.	24.	SCHEDULED	NECROPSY DAY 20
26678	G		17.	20.	25.	25.	29.	34.	26.	25.	SCHEDULED	NECROPSY DAY 20
26688	G		14.	21.	26.	26.	27.	27.	35.	25.	SCHEDULED	NECROPSY DAY 20
26700	G		18.	20.	NA	24.	29.	31.	25.	24.	SCHEDULED	NECROPSY DAY 20
26717	G		16.	16.	24.	26.	26.	26.	23.	22.	SCHEDULED	NECROPSY DAY 20
MEAN			18.	20.	24.	26.	28.	28.	28.	25.		
S.D.			2.7	2.3	2.7	2.6	3.0	3.7	4.2	2.0		
S.E.			0.5	0.5	0.6	0.5	0.6	0.7	0.8	0.4		
N			25	25	24	25	25	25	25	25		

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

TABLE A8
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 5: 750 MG/KG/DAY												
26568	G		14.	23.	24.	27.	32.	33.	32.	26.	SCHEDULED	NECROPSY DAY 20
26569	G		18.	21.	21.	24.	25.	32.	26.	24.	SCHEDULED	NECROPSY DAY 20
26581	G		14.	16.	21.	22.	25.	26.	28.	21.	SCHEDULED	NECROPSY DAY 20
26588	G		20.	20.	25.	25.	25.	14.	20.	21.	SCHEDULED	NECROPSY DAY 20
26592	G		17.	18.	24.	25.	24.	27.	29.	23.	SCHEDULED	NECROPSY DAY 20
26594	G		14.	10.	19.	21.	21.	17.	22.	18.	SCHEDULED	NECROPSY DAY 20
26597	G		17.	20.	23.	23.	26.	26.	28.	23.	SCHEDULED	NECROPSY DAY 20
26600	G		18.	20.	23.	25.	25.	24.	26.	23.	SCHEDULED	NECROPSY DAY 20
26601	G		15.	19.	22.	24.	24.	27.	27.	22.	SCHEDULED	NECROPSY DAY 20
26605	G		17.	21.	27.	26.	27.	26.	30.	25.	SCHEDULED	NECROPSY DAY 20
26608	G		16.	16.	25.	26.	22.	23.	22.	21.	SCHEDULED	NECROPSY DAY 20
26614	G		16.	17.	22.	26.	25.	21.	15.	21.	SCHEDULED	NECROPSY DAY 20
26615	G		21.	20.	18.	23.	20.	NA	NA	NA	GRAVID, DIED DAY 16	
26620	G		19.	20.	21.	24.	27.	26.	26.	23.	SCHEDULED	NECROPSY DAY 20
26626	G		17.	20.	22.	27.	30.	34.	26.	25.	SCHEDULED	NECROPSY DAY 20
26632	G		17.	19.	24.	23.	27.	19.	17.	21.	SCHEDULED	NECROPSY DAY 20
26643	G		13.	18.	22.	24.	26.	26.	18.	21.	SCHEDULED	NECROPSY DAY 20
26649	G		17.	20.	23.	24.	27.	27.	31.	24.	SCHEDULED	NECROPSY DAY 20
26651	G		18.	22.	24.	26.	25.	26.	23.	24.	SCHEDULED	NECROPSY DAY 20
26658	G		17.	18.	24.	22.	29.	29.	44.	25.	SCHEDULED	NECROPSY DAY 20
26662	G		19.	18.	24.	29.	30.	27.	26.	25.	SCHEDULED	NECROPSY DAY 20
26673	G		19.	18.	19.	25.	27.	22.	26.	22.	SCHEDULED	NECROPSY DAY 20
26706	G		20.	18.	22.	24.	27.	30.	26.	24.	SCHEDULED	NECROPSY DAY 20
26712	G		19.	18.	21.	24.	24.	27.	27.	23.	SCHEDULED	NECROPSY DAY 20
26715	G		15.	16.	22.	24.	NA	NA	NA	NA	GRAVID, EUTHANIZED DAY 13	
MEAN			17.	19.	22.	25.	26.	26.	26.	23.		
S.D.			2.1	2.5	2.1	1.8	2.8	4.8	5.9	1.9		
S.E.			0.4	0.5	0.4	0.4	0.6	1.0	1.2	0.4		
N			25	25	25	25	24	23	23	23		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM												
26575	G		75.	78.	74.	82.	80.	69.	83.	75.	SCHEDULED	NECROPSY DAY 20
26577	G		84.	93.	100.	101.	102.	95.	90.	92.	SCHEDULED	NECROPSY DAY 20
26584	G		79.	91.	99.	96.	100.	76.	83.	88.	SCHEDULED	NECROPSY DAY 20
26587	G		80.	81.	106.	94.	88.	77.	87.	87.	SCHEDULED	NECROPSY DAY 20
26590	G		87.	97.	92.	87.	84.	89.	80.	86.	SCHEDULED	NECROPSY DAY 20
26595	G		82.	77.	86.	78.	84.	78.	85.	82.	SCHEDULED	NECROPSY DAY 20
26599	G		82.	78.	134.	92.	106.	87.	89.	92.	SCHEDULED	NECROPSY DAY 20
26606	G		93.	72.	128.	101.	93.	60.	88.	89.	SCHEDULED	NECROPSY DAY 20
26625	G		74.	89.	96.	94.	90.	80.	86.	84.	SCHEDULED	NECROPSY DAY 20
26630	G		86.	91.	86.	88.	91.	86.	77.	85.	SCHEDULED	NECROPSY DAY 20
26634	G		94.	80.	101.	92.	79.	78.	69.	83.	SCHEDULED	NECROPSY DAY 20
26636	G		83.	83.	87.	88.	96.	91.	60.	81.	SCHEDULED	NECROPSY DAY 20
26638	G		58.	79.	88.	91.	91.	85.	84.	82.	SCHEDULED	NECROPSY DAY 20
26639	G		81.	78.	86.	91.	96.	89.	81.	85.	SCHEDULED	NECROPSY DAY 20
26642	G		83.	84.	88.	94.	101.	86.	72.	87.	SCHEDULED	NECROPSY DAY 20
26646	G		59.	82.	94.	94.	86.	86.	77.	82.	SCHEDULED	NECROPSY DAY 20
26661	G		86.	87.	94.	90.	85.	75.	81.	84.	SCHEDULED	NECROPSY DAY 20
26666	G		85.	89.	105.	87.	95.	77.	86.	87.	SCHEDULED	NECROPSY DAY 20
26668	G		63.	78.	83.	85.	94.	83.	72.	79.	SCHEDULED	NECROPSY DAY 20
26674	G		82.	76.	108.	106.	106.	85.	86.	94.	SCHEDULED	NECROPSY DAY 20
26677	G		77.	80.	90.	95.	90.	87.	79.	82.	SCHEDULED	NECROPSY DAY 20
26680	G		68.	79.	87.	97.	95.	89.	80.	82.	SCHEDULED	NECROPSY DAY 20
26687	G		79.	89.	94.	95.	89.	80.	65.	83.	SCHEDULED	NECROPSY DAY 20
26713	G		77.	79.	94.	100.	94.	79.	80.	85.	SCHEDULED	NECROPSY DAY 20
26718	G		67.	74.	88.	86.	85.	81.	71.	80.	SCHEDULED	NECROPSY DAY 20
MEAN			79.	83.	96.	92.	92.	82.	80.	85.		
S.D.			9.4	6.5	13.2	6.3	7.4	7.5	7.7	4.3		
S.E.			1.9	1.3	2.6	1.3	1.5	1.5	1.5	0.9		
N			25	25	25	25	25	25	25	25		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.												
26565	G		77.	90.	97.	96.	99.	99.	90.	91.	SCHEDULED	NECROPSY DAY 20
26570	G		39.	101.	104.	96.	98.	86.	91.	86.	SCHEDULED	NECROPSY DAY 20
26573	G		63.	81.	86.	97.	92.	100.	77.	82.	SCHEDULED	NECROPSY DAY 20
26576	G		79.	92.	88.	88.	96.	93.	81.	88.	SCHEDULED	NECROPSY DAY 20
26580	G		76.	88.	93.	89.	100.	86.	73.	86.	SCHEDULED	NECROPSY DAY 20
26582	G		72.	82.	100.	91.	90.	90.	83.	87.	SCHEDULED	NECROPSY DAY 20
26589	G		116.	59.	92.	90.	84.	82.	77.	85.	SCHEDULED	NECROPSY DAY 20
26593	G		63.	81.	97.	99.	92.	91.	78.	86.	SCHEDULED	NECROPSY DAY 20
26602	G		81.	80.	98.	69.	99.	95.	76.	86.	SCHEDULED	NECROPSY DAY 20
26603	G		95.	82.	100.	94.	104.	87.	91.	93.	SCHEDULED	NECROPSY DAY 20
26604	G		87.	57.	101.	94.	95.	88.	91.	86.	SCHEDULED	NECROPSY DAY 20
26609	G		86.	90.	93.	90.	100.	96.	96.	93.	SCHEDULED	NECROPSY DAY 20
26613	G		93.	76.	107.	96.	102.	90.	88.	92.	SCHEDULED	NECROPSY DAY 20
26621	G		79.	81.	86.	87.	94.	96.	82.	87.	SCHEDULED	NECROPSY DAY 20
26623	G		81.	92.	97.	96.	75.	91.	84.	87.	SCHEDULED	NECROPSY DAY 20
26650	G		122.	52.	110.	98.	105.	92.	102.	96.	SCHEDULED	NECROPSY DAY 20
26659	G		74.	90.	100.	104.	100.	97.	92.	93.	SCHEDULED	NECROPSY DAY 20
26663	G		61.	82.	92.	93.	104.	90.	66.	83.	SCHEDULED	NECROPSY DAY 20
26665	G		66.	84.	91.	95.	87.	88.	78.	84.	SCHEDULED	NECROPSY DAY 20
26672	G		99.	70.	105.	96.	97.	97.	89.	91.	SCHEDULED	NECROPSY DAY 20
26676	G		77.	85.	NA	97.	99.	87.	81.	89.	SCHEDULED	NECROPSY DAY 20
26681	G		90.	90.	92.	97.	93.	103.	73.	90.	SCHEDULED	NECROPSY DAY 20
26692	G		68.	75.	95.	92.	89.	91.	75.	81.	SCHEDULED	NECROPSY DAY 20
26694	G		78.	94.	108.	109.	102.	95.	95.	97.	SCHEDULED	NECROPSY DAY 20
26709	G		74.	79.	92.	76.	97.	86.	86.	82.	SCHEDULED	NECROPSY DAY 20
MEAN			80.	81.	97.	93.	96.	92.	84.	88.		
S.D.			17.2	11.7	6.7	7.9	6.9	5.2	8.6	4.3		
S.E.			3.4	2.3	1.4	1.6	1.4	1.0	1.7	0.9		
N			25	25	24	25	25	25	25	25		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 3: 100 MG/KG/DAY												
26566	G		71.	64.	84.	97.	78.	87.	69.	76.	SCHEDULED	NECROPSY DAY 20
26574	G		79.	89.	85.	85.	86.	76.	85.	82.	SCHEDULED	NECROPSY DAY 20
26578	G		81.	88.	96.	92.	94.	81.	94.	87.	SCHEDULED	NECROPSY DAY 20
26585	G		79.	88.	101.	93.	106.	93.	85.	90.	SCHEDULED	NECROPSY DAY 20
26586	G		84.	84.	110.	106.	103.	92.	88.	95.	SCHEDULED	NECROPSY DAY 20
26598	G		77.	86.	104.	98.	94.	99.	83.	90.	SCHEDULED	NECROPSY DAY 20
26607	G		83.	87.	119.	106.	100.	93.	82.	95.	SCHEDULED	NECROPSY DAY 20
26610	G		77.	83.	99.	104.	93.	95.	74.	88.	SCHEDULED	NECROPSY DAY 20
26612	G		75.	92.	99.	93.	94.	92.	95.	90.	SCHEDULED	NECROPSY DAY 20
26616	G		87.	87.	92.	104.	79.	104.	75.	88.	SCHEDULED	NECROPSY DAY 20
26624	G		81.	85.	102.	94.	98.	84.	90.	88.	SCHEDULED	NECROPSY DAY 20
26627	G		72.	78.	76.	92.	89.	86.	70.	80.	SCHEDULED	NECROPSY DAY 20
26641	G		85.	84.	85.	112.	103.	97.	91.	94.	SCHEDULED	NECROPSY DAY 20
26644	G		65.	86.	101.	96.	102.	94.	87.	91.	SCHEDULED	NECROPSY DAY 20
26645	G		89.	86.	85.	89.	89.	86.	78.	86.	SCHEDULED	NECROPSY DAY 20
26647	G		80.	86.	90.	87.	93.	88.	92.	86.	SCHEDULED	NECROPSY DAY 20
26648	G		68.	75.	81.	88.	94.	88.	95.	82.	SCHEDULED	NECROPSY DAY 20
26653	G		78.	83.	97.	82.	89.	84.	82.	83.	SCHEDULED	NECROPSY DAY 20
26657	G		71.	82.	85.	84.	95.	90.	87.	84.	SCHEDULED	NECROPSY DAY 20
26667	G		78.	97.	116.	95.	106.	97.	103.	98.	SCHEDULED	NECROPSY DAY 20
26670	G		78.	87.	98.	108.	98.	94.	100.	95.	SCHEDULED	NECROPSY DAY 20
26699	G		63.	89.	85.	96.	120.	86.	88.	91.	SCHEDULED	NECROPSY DAY 20
26704	G		69.	97.	95.	90.	101.	93.	96.	92.	SCHEDULED	NECROPSY DAY 20
26705	G		48.	86.	86.	101.	96.	97.	70.	81.	SCHEDULED	NECROPSY DAY 20
26714	G		67.	85.	90.	97.	92.	86.	71.	84.	SCHEDULED	NECROPSY DAY 20
MEAN			75.	85.	94.	96.	96.	90.	85.	88.		
S.D.			8.9	6.5	10.8	7.9	8.8	6.3	9.7	5.5		
S.E.			1.8	1.3	2.2	1.6	1.8	1.3	1.9	1.1		
N			25	25	25	25	25	25	25	25		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 4: 450 MG/KG/DAY												
26567	G		77.	84.	97.	86.	108.	91.	94.	88.	SCHEDULED	NECROPSY DAY 20
26572	G		64.	64.	96.	84.	91.	87.	86.	82.	SCHEDULED	NECROPSY DAY 20
26579	G		77.	94.	101.	101.	104.	62.	89.	88.	SCHEDULED	NECROPSY DAY 20
26591	G		67.	79.	86.	98.	93.	92.	80.	85.	SCHEDULED	NECROPSY DAY 20
26611	G		76.	79.	87.	88.	90.	87.	86.	84.	SCHEDULED	NECROPSY DAY 20
26617	G		80.	79.	95.	97.	95.	96.	81.	87.	SCHEDULED	NECROPSY DAY 20
26618	G		58.	89.	96.	97.	89.	92.	72.	85.	SCHEDULED	NECROPSY DAY 20
26622	G		71.	84.	79.	96.	86.	81.	84.	80.	SCHEDULED	NECROPSY DAY 20
26628	G		54.	65.	87.	97.	86.	103.	64.	81.	SCHEDULED	NECROPSY DAY 20
26629	G		84.	62.	103.	97.	101.	84.	86.	86.	SCHEDULED	NECROPSY DAY 20
26631	G		83.	81.	105.	105.	119.	89.	78.	93.	SCHEDULED	NECROPSY DAY 20
26635	G		73.	77.	86.	93.	89.	93.	77.	82.	SCHEDULED	NECROPSY DAY 20
26637	G		66.	69.	84.	76.	83.	81.	100.	75.	SCHEDULED	NECROPSY DAY 20
26652	G		97.	89.	85.	113.	97.	92.	79.	90.	SCHEDULED	NECROPSY DAY 20
26654	G		68.	65.	96.	93.	101.	92.	90.	85.	SCHEDULED	NECROPSY DAY 20
26655	G		67.	74.	85.	89.	87.	96.	76.	80.	SCHEDULED	NECROPSY DAY 20
26656	G		60.	55.	91.	90.	93.	87.	98.	82.	SCHEDULED	NECROPSY DAY 20
26664	G		63.	96.	97.	95.	102.	102.	91.	91.	SCHEDULED	NECROPSY DAY 20
26669	G		83.	75.	92.	93.	92.	88.	75.	87.	SCHEDULED	NECROPSY DAY 20
26671	G		78.	81.	80.	108.	106.	91.	100.	92.	SCHEDULED	NECROPSY DAY 20
26675	G		59.	79.	97.	86.	88.	87.	73.	81.	SCHEDULED	NECROPSY DAY 20
26678	G		72.	83.	101.	95.	104.	113.	80.	92.	SCHEDULED	NECROPSY DAY 20
26688	G		53.	82.	96.	89.	88.	83.	101.	84.	SCHEDULED	NECROPSY DAY 20
26700	G		68.	75.	NA	87.	101.	99.	75.	83.	SCHEDULED	NECROPSY DAY 20
26717	G		66.	68.	99.	101.	97.	93.	80.	84.	SCHEDULED	NECROPSY DAY 20
MEAN			71.	77.	93.	94.	96.	90.	84.	85.		
S.D.			10.4	10.2	7.3	8.0	8.6	9.4	9.7	4.4		
S.E.			2.1	2.0	1.5	1.6	1.7	1.9	1.9	0.9		
N			25	25	24	25	25	25	25	25		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
STATUS												
DAMS FROM GROUP 5: 750 MG/KG/DAY												
26568	G		56.	89.	88.	94.	107.	105.	96.	90.	SCHEDULED	NECROPSY DAY 20
26569	G		72.	82.	79.	88.	88.	108.	86.	88.	SCHEDULED	NECROPSY DAY 20
26581	G		57.	68.	85.	86.	94.	93.	98.	80.	SCHEDULED	NECROPSY DAY 20
26588	G		78.	75.	91.	87.	85.	51.	77.	77.	SCHEDULED	NECROPSY DAY 20
26592	G		66.	72.	96.	95.	86.	93.	97.	85.	SCHEDULED	NECROPSY DAY 20
26594	G		58.	44.	82.	86.	86.	71.	94.	76.	SCHEDULED	NECROPSY DAY 20
26597	G		66.	77.	86.	83.	92.	89.	94.	83.	SCHEDULED	NECROPSY DAY 20
26600	G		72.	79.	89.	93.	89.	83.	90.	85.	SCHEDULED	NECROPSY DAY 20
26601	G		55.	70.	79.	84.	82.	90.	87.	76.	SCHEDULED	NECROPSY DAY 20
26605	G		72.	88.	108.	100.	102.	95.	108.	97.	SCHEDULED	NECROPSY DAY 20
26608	G		63.	65.	100.	100.	85.	92.	92.	84.	SCHEDULED	NECROPSY DAY 20
26614	G		61.	65.	84.	97.	90.	76.	56.	79.	SCHEDULED	NECROPSY DAY 20
26615	G		76.	72.	65.	83.	71.	NA	NA	NA	GRAVID, DIED DAY 16	
26620	G		75.	78.	80.	87.	94.	87.	84.	83.	SCHEDULED	NECROPSY DAY 20
26626	G		67.	78.	85.	99.	103.	114.	88.	91.	SCHEDULED	NECROPSY DAY 20
26632	G		68.	75.	94.	86.	98.	71.	66.	81.	SCHEDULED	NECROPSY DAY 20
26643	G		52.	73.	86.	91.	95.	88.	59.	77.	SCHEDULED	NECROPSY DAY 20
26649	G		64.	75.	82.	83.	91.	85.	92.	82.	SCHEDULED	NECROPSY DAY 20
26651	G		73.	89.	91.	95.	90.	94.	85.	91.	SCHEDULED	NECROPSY DAY 20
26658	G		67.	73.	98.	86.	107.	103.	155.	95.	SCHEDULED	NECROPSY DAY 20
26662	G		72.	68.	88.	100.	99.	85.	76.	85.	SCHEDULED	NECROPSY DAY 20
26673	G		71.	69.	73.	92.	92.	76.	94.	80.	SCHEDULED	NECROPSY DAY 20
26706	G		73.	67.	81.	86.	94.	99.	84.	84.	SCHEDULED	NECROPSY DAY 20
26712	G		80.	75.	87.	95.	91.	97.	94.	89.	SCHEDULED	NECROPSY DAY 20
26715	G		60.	65.	89.	95.	NA	NA	NA	NA	GRAVID, EUTHANIZED DAY 13	
MEAN			67.	73.	87.	91.	92.	89.	89.	84.		
S.D.			7.7	9.3	8.8	5.9	8.1	13.8	19.0	5.9		
S.E.			1.5	1.9	1.8	1.2	1.7	2.9	4.0	1.2		
N			25	25	25	25	24	23	23	23		

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

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 1

DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM	MATERNAL GROSS OBSERVATION
26575	NO SIGNIFICANT CHANGES OBSERVED
26577	NO SIGNIFICANT CHANGES OBSERVED
26584	NO SIGNIFICANT CHANGES OBSERVED
26587	NO SIGNIFICANT CHANGES OBSERVED
26590	NO SIGNIFICANT CHANGES OBSERVED
26595	NO SIGNIFICANT CHANGES OBSERVED
26599	NO SIGNIFICANT CHANGES OBSERVED
26606	NO SIGNIFICANT CHANGES OBSERVED
26625	NO SIGNIFICANT CHANGES OBSERVED
26630	NO SIGNIFICANT CHANGES OBSERVED
26634	NO SIGNIFICANT CHANGES OBSERVED
26636	NO SIGNIFICANT CHANGES OBSERVED
26638	NO SIGNIFICANT CHANGES OBSERVED
26639	NO SIGNIFICANT CHANGES OBSERVED
26642	NO SIGNIFICANT CHANGES OBSERVED
26646	NO SIGNIFICANT CHANGES OBSERVED
26661	NO SIGNIFICANT CHANGES OBSERVED
26666	NO SIGNIFICANT CHANGES OBSERVED
26668	NO SIGNIFICANT CHANGES OBSERVED
26674	NO SIGNIFICANT CHANGES OBSERVED
26677	NO SIGNIFICANT CHANGES OBSERVED
26680	NO SIGNIFICANT CHANGES OBSERVED
26687	NO SIGNIFICANT CHANGES OBSERVED
26713	NO SIGNIFICANT CHANGES OBSERVED
26718	NO SIGNIFICANT CHANGES OBSERVED

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 2

DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.	MATERNAL GROSS OBSERVATION
26565	NO SIGNIFICANT CHANGES OBSERVED
26570	NO SIGNIFICANT CHANGES OBSERVED
26573	NO SIGNIFICANT CHANGES OBSERVED
26576	NO SIGNIFICANT CHANGES OBSERVED
26580	PINEAL BODY: DISCOLORATION, YELLOW PINEAL BODY: FIRM
26582	NO SIGNIFICANT CHANGES OBSERVED
26589	NO SIGNIFICANT CHANGES OBSERVED
26593	LIVER: AREA(S), WHITE ONE, IRREGULARLY SHAPED, LEFT LOBE
26602	NO SIGNIFICANT CHANGES OBSERVED
26603	NO SIGNIFICANT CHANGES OBSERVED
26604	NO SIGNIFICANT CHANGES OBSERVED
26609	NO SIGNIFICANT CHANGES OBSERVED
26613	NO SIGNIFICANT CHANGES OBSERVED
26621	NO SIGNIFICANT CHANGES OBSERVED
26623	NO SIGNIFICANT CHANGES OBSERVED
26650	NO SIGNIFICANT CHANGES OBSERVED
26659	NO SIGNIFICANT CHANGES OBSERVED
26663	NO SIGNIFICANT CHANGES OBSERVED
26665	NO SIGNIFICANT CHANGES OBSERVED
26672	NO SIGNIFICANT CHANGES OBSERVED
26676	NO SIGNIFICANT CHANGES OBSERVED
26681	APPLICATION SITE: AREA(S), DEPRESSED ONE, 10 X 5 MM
26692	NO SIGNIFICANT CHANGES OBSERVED
26694	NO SIGNIFICANT CHANGES OBSERVED
26709	NO SIGNIFICANT CHANGES OBSERVED

DAMS FROM GROUP 3: 100 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26566	NO SIGNIFICANT CHANGES OBSERVED
26574	NO SIGNIFICANT CHANGES OBSERVED
26578	NO SIGNIFICANT CHANGES OBSERVED
26585	NO SIGNIFICANT CHANGES OBSERVED
26586	NO SIGNIFICANT CHANGES OBSERVED
26598	NO SIGNIFICANT CHANGES OBSERVED
26607	NO SIGNIFICANT CHANGES OBSERVED
26610	NO SIGNIFICANT CHANGES OBSERVED
26612	NO SIGNIFICANT CHANGES OBSERVED
26616	NO SIGNIFICANT CHANGES OBSERVED
26624	NO SIGNIFICANT CHANGES OBSERVED
26627	NO SIGNIFICANT CHANGES OBSERVED
26641	ORGAN DAMAGED AT NECROPSY
	BRAIN
26644	NO SIGNIFICANT CHANGES OBSERVED
26645	NO SIGNIFICANT CHANGES OBSERVED
26647	THYMUS: SMALL
26648	NO SIGNIFICANT CHANGES OBSERVED
26653	NO SIGNIFICANT CHANGES OBSERVED
26657	NO SIGNIFICANT CHANGES OBSERVED
26667	NO SIGNIFICANT CHANGES OBSERVED
26670	NO SIGNIFICANT CHANGES OBSERVED
26699	NO SIGNIFICANT CHANGES OBSERVED
26704	NO SIGNIFICANT CHANGES OBSERVED
26705	AXILLARY LYMPH NODES: ENLARGED
	BILATERAL
26714	NO SIGNIFICANT CHANGES OBSERVED

TABLE A10
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

DAMS FROM GROUP 4: 450 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26567	NO SIGNIFICANT CHANGES OBSERVED
26572	NO SIGNIFICANT CHANGES OBSERVED
26579	NO SIGNIFICANT CHANGES OBSERVED
26591	NO SIGNIFICANT CHANGES OBSERVED
26611	NO SIGNIFICANT CHANGES OBSERVED
26617	NO SIGNIFICANT CHANGES OBSERVED
26618	NO SIGNIFICANT CHANGES OBSERVED
26622	NO SIGNIFICANT CHANGES OBSERVED
26628	NO SIGNIFICANT CHANGES OBSERVED
26629	NO SIGNIFICANT CHANGES OBSERVED
26631	NO SIGNIFICANT CHANGES OBSERVED
26635	NO SIGNIFICANT CHANGES OBSERVED
26637	SKIN: HAIR LOSS
	OCULAR, BILATERAL
26652	NO SIGNIFICANT CHANGES OBSERVED
26654	NO SIGNIFICANT CHANGES OBSERVED
26655	NO SIGNIFICANT CHANGES OBSERVED
26656	SKIN: HAIR LOSS
	FORELIMB, BILATERAL; ENTIRE VENTRAL SURFACE
26664	NO SIGNIFICANT CHANGES OBSERVED
26669	NO SIGNIFICANT CHANGES OBSERVED
26671	NO SIGNIFICANT CHANGES OBSERVED
26675	NO SIGNIFICANT CHANGES OBSERVED
26678	NO SIGNIFICANT CHANGES OBSERVED
26688	NO SIGNIFICANT CHANGES OBSERVED
26700	NO SIGNIFICANT CHANGES OBSERVED
26717	NO SIGNIFICANT CHANGES OBSERVED

DAMS FROM GROUP 5: 750 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26568	APPLICATION SITE: SCABBING
26569	NO SIGNIFICANT CHANGES OBSERVED
26581	THYMUS: SMALL
	VAGINA: CONTENTS, DARK RED
26588	THYMUS: SMALL
26592	NO SIGNIFICANT CHANGES OBSERVED
26594	THYMUS: SMALL
26597	THYMUS: SMALL
26600	NO SIGNIFICANT CHANGES OBSERVED
26601	NO SIGNIFICANT CHANGES OBSERVED
26605	NO SIGNIFICANT CHANGES OBSERVED
26608	ORGAN DAMAGED AT NECROPSY
	BRAIN
26614	NO SIGNIFICANT CHANGES OBSERVED
26615	SKIN: MATTING, RED
	UROGENITAL
	DIED GESTATION DAY 16
	UTERUS: LEFT- 11 EARLY RESORPTIONS; RIGHT- 6 EARLY
	RESORPTIONS
	OVARIES: CORPORA LUTEA- 11, LEFT; 6, RIGHT
26620	ORGAN LOST AT NECROPSY
	THYMUS
26626	NO SIGNIFICANT CHANGES OBSERVED
26632	SKIN: MATTING, RED
	UROGENITAL; ANOGENITAL
	THYMUS: SMALL
26643	NO SIGNIFICANT CHANGES OBSERVED
26649	NO SIGNIFICANT CHANGES OBSERVED
26651	NO SIGNIFICANT CHANGES OBSERVED
26658	NO SIGNIFICANT CHANGES OBSERVED
26662	NO SIGNIFICANT CHANGES OBSERVED
26673	NO SIGNIFICANT CHANGES OBSERVED
26706	NO SIGNIFICANT CHANGES OBSERVED

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 6

DAMS FROM GROUP 5: 750 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26712	NO SIGNIFICANT CHANGES OBSERVED
26715	EUTHANIZED GESTATION DAY 13 UTERUS: LEFT- 7 NORMALLY DEVELOPING IMPLANTATIONS, 1 EARLY RESORPTION; RIGHT- 8 NORMALLY DEVELOPING IMPLANTATIONS OVARIES: CORPORA LUTEA- 8, LEFT; 8, RIGHT SKIN: MATTING, RED UROGENITAL

PMFGRDv4.16
05/16/2012

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (UNSCHEDULED DEATH)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 1

FEMALE GROUP: 750 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26615	G	NA	NA	NA
26715	G	1.51	10.61	0.0815
MEAN		1.51	10.61	0.0815
S.D.		0.000	0.000	0.00000
S.E.		0.000	0.000	0.00000
N		1	1	1

NA = NOT APPLICABLE

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBWv4.29
12/01/2011
R:12/01/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A12 (UNSCHEDULED DEATH)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 1

FEMALE GROUP: 750 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26615	G	NA	NA	NA
26715	G	1.51	702.649	5.430
MEAN		1.51	702.649	5.430
S.D.		0.000	0.0000	0.0000
S.E.		0.000	0.0000	0.0000
N		1	1	1

NA = NOT APPLICABLE

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBWv4.29
12/01/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A13 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 1

FEMALE GROUP:0 MG/KG/DAY SHAM

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26639	G	1.86	9.81	0.2552
26636	G	1.92	17.62	0.3128
26575	G	1.86	16.38	0.2757
26630	G	1.83	18.23	0.1881
26599	G	1.92	16.37	0.3127
26668	G	1.99	13.60	0.1417
26606	G	1.99	18.17	0.1530
26595	G	1.87	14.42	0.1795
26674	G	1.83	17.57	0.1860
26584	G	1.98	13.94	0.1364
26661	G	1.81	16.30	0.3356
26666	G	1.96	11.77	0.1356
26577	G	1.88	13.76	0.1415
26718	G	1.74	13.47	0.1722
26677	G	1.95	17.89	0.4368
26590	G	2.03	15.87	0.2464
26638	G	2.10	15.77	0.2132
26687	G	1.89	15.58	0.1795
26680	G	1.95	18.20	0.1671
26646	G	1.88	17.50	0.4461
26634	G	1.89	17.43	0.1659
26587	G	1.88	17.06	0.1743
26642	G	1.95	17.12	0.1759
26713	G	1.86	14.16	0.1448
26625	G	1.87	14.46	0.1463
MEAN		1.91	15.70	0.2169
S.D.		0.077	2.180	0.08968
S.E.		0.015	0.436	0.01794
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A13 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 2

FEMALE GROUP:0 MG/KG/DAY VEH.

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26623	G	1.78	15.70	0.1294
26582	G	2.00	18.32	0.2232
26565	G	1.99	19.35	0.1950
26659	G	1.89	16.58	0.2039
26650	G	1.99	15.52	0.1925
26589	G	2.02	14.52	0.2638
26604	G	1.88	12.73	0.1262
26672	G	1.96	15.08	0.1487
26603	G	1.88	16.28	0.1786
26613	G	1.80	16.85	0.2125
26570	G	1.86	16.38	0.0940
26609	G	1.86	15.04	0.1954
26681	G	1.79	12.99	0.0844
26573	G	1.80	16.20	0.1354
26593	G	1.81	16.37	0.1930
26665	G	1.87	17.13	0.2527
26621	G	1.97	16.16	0.1516
26692	G	1.83	16.24	0.1844
26576	G	1.98	16.86	0.2709
26676	G	1.94	18.04	0.2197
26663	G	1.95	20.79	0.1346
26602	G	1.90	16.33	0.1942
26709	G	1.93	18.45	0.1823
26580	G	2.09	17.32	0.1853
26694	G	1.91	17.56	0.1626
MEAN		1.91	16.51	0.1806
S.D.		0.082	1.768	0.04779
S.E.		0.016	0.354	0.00956
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A13 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 3

FEMALE GROUP: 100 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26616	G	1.89	16.55	0.1811
26566	G	1.93	15.95	0.2224
26648	G	1.95	17.50	0.2432
26578	G	1.95	20.59	0.2183
26647	G	1.90	15.78	0.0719
26574	G	2.04	18.70	0.1824
26624	G	1.97	17.54	0.3196
26653	G	1.88	17.14	0.1358
26612	G	2.00	16.27	0.2023
26670	G	2.01	15.43	0.1834
26667	G	1.93	16.98	0.1050
26657	G	1.83	15.57	0.1132
26586	G	1.94	15.65	0.1745
26714	G	1.91	14.88	0.1309
26645	G	1.91	15.95	0.0756
26610	G	1.96	14.00	0.1545
26607	G	1.97	14.38	0.1127
26598	G	1.87	18.08	0.1967
26627	G	1.99	17.24	0.2691
26705	G	1.94	15.86	0.2268
26644	G	1.79	15.86	0.2087
26704	G	2.01	16.64	0.1317
26641	G	1.86	17.22	0.1494
26585	G	1.86	15.70	0.1874
26699	G	1.99	14.59	0.2261
MEAN		1.93	16.40	0.1769
S.D.		0.062	1.444	0.05984
S.E.		0.012	0.289	0.01197
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A13 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 4

FEMALE GROUP: 450 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26664	G	1.87	16.62	0.2175
26656	G	1.98	19.31	0.1949
26629	G	2.01	18.37	0.1951
26637	G	1.81	15.22	0.1381
26567	G	1.93	14.77	0.1107
26617	G	1.86	18.49	0.1439
26675	G	2.03	15.97	0.1981
26654	G	1.89	17.78	0.1265
26579	G	1.96	15.93	0.0856
26572	G	2.00	15.30	0.0719
26671	G	1.92	15.61	0.1035
26611	G	1.80	14.86	0.1267
26678	G	1.77	15.23	0.0745
26635	G	1.80	14.02	0.1394
26652	G	1.86	16.04	0.1734
26717	G	1.84	13.57	0.1050
26700	G	1.89	15.54	0.1875
26655	G	1.82	15.54	0.1820
26669	G	1.93	18.17	0.2449
26628	G	1.90	18.61	0.2164
26688	G	1.82	16.74	0.1746
26622	G	1.86	16.05	0.1246
26618	G	2.02	18.79	0.1710
26591	G	1.91	14.99	0.1286
26631	G	1.91	16.31	0.1284
MEAN		1.90	16.31	0.1505
S.D.		0.074	1.578	0.04699
S.E.		0.015	0.316	0.00940
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A13 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 5

FEMALE GROUP: 750 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26568	G	1.77	19.02	0.1561
26651	G	1.95	16.96	0.1267
26649	G	1.99	18.24	0.1094
26581	G	1.79	15.31	0.0684
26592	G	1.75	17.30	0.1117
26597	G	1.92	17.10	0.0626
26658	G	1.83	16.28	0.0486
26620	G	1.86	15.37	NA
26632	G	1.89	13.89	0.0309
26600	G	1.85	17.57	0.0818
26569	G	1.93	19.36	0.1704
26605	G	1.90	16.33	0.0618
26712	G	1.88	17.22	0.0700
26594	G	1.81	12.13	0.0479
26588	G	1.95	16.36	0.0564
26626	G	1.87	18.59	0.1028
26608	G	1.86	13.70	0.0901
26673	G	1.83	17.78	0.0703
26706	G	1.86	17.38	0.1107
26601	G	1.88	19.18	0.0875
26614	G	1.91	12.18	0.0359
26662	G	1.81	20.49	0.0838
26643	G	1.86	18.45	0.0551
MEAN		1.87	16.79	0.0836
S.D.		0.060	2.209	0.03644
S.E.		0.012	0.461	0.00777
N		23	23	22

NA = NOT APPLICABLE

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBWv4.29
11/15/2011
R:11/15/2011

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A14 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 1

FEMALE GROUP:0 MG/KG/DAY SHAM

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26639	G	1.86	527.419	13.710
26636	G	1.92	917.708	16.302
26575	G	1.86	880.645	14.839
26630	G	1.83	996.175	10.273
26599	G	1.92	852.604	16.302
26668	G	1.99	683.417	7.136
26606	G	1.99	913.065	7.688
26595	G	1.87	771.123	9.626
26674	G	1.83	960.109	10.164
26584	G	1.98	704.040	6.869
26661	G	1.81	900.552	18.564
26666	G	1.96	600.510	6.939
26577	G	1.88	731.915	7.553
26718	G	1.74	774.138	9.885
26677	G	1.95	917.436	22.410
26590	G	2.03	781.773	12.118
26638	G	2.10	750.952	10.143
26687	G	1.89	824.339	9.524
26680	G	1.95	933.333	8.564
26646	G	1.88	930.851	23.723
26634	G	1.89	922.222	8.783
26587	G	1.88	907.447	9.255
26642	G	1.95	877.949	9.026
26713	G	1.86	761.290	7.796
26625	G	1.87	773.262	7.807
MEAN		1.91	823.771	11.400
S.D.		0.077	116.5193	4.7509
S.E.		0.015	23.3039	0.9502
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A14 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 2

FEMALE GROUP:0 MG/KG/DAY VEH.

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26623	G	1.78	882.022	7.247
26582	G	2.00	916.000	11.150
26565	G	1.99	972.362	9.799
26659	G	1.89	877.249	10.794
26650	G	1.99	779.900	9.698
26589	G	2.02	718.812	13.069
26604	G	1.88	677.128	6.702
26672	G	1.96	769.388	7.602
26603	G	1.88	865.958	9.521
26613	G	1.80	936.111	11.833
26570	G	1.86	880.645	5.054
26609	G	1.86	808.602	10.484
26681	G	1.79	725.698	4.693
26573	G	1.80	900.000	7.500
26593	G	1.81	904.420	10.663
26665	G	1.87	916.043	13.529
26621	G	1.97	820.305	7.716
26692	G	1.83	887.432	10.055
26576	G	1.98	851.515	13.687
26676	G	1.94	929.897	11.340
26663	G	1.95	1066.154	6.923
26602	G	1.90	859.474	10.211
26709	G	1.93	955.959	9.430
26580	G	2.09	828.708	8.852
26694	G	1.91	919.372	8.534
MEAN		1.91	865.966	9.443
S.D.		0.082	86.7952	2.3933
S.E.		0.016	17.3590	0.4787
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A14 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 3

FEMALE GROUP: 100 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26616	G	1.89	875.661	9.577
26566	G	1.93	826.425	11.503
26648	G	1.95	897.436	12.462
26578	G	1.95	1055.897	11.179
26647	G	1.90	830.526	3.789
26574	G	2.04	916.667	8.922
26624	G	1.97	890.355	16.244
26653	G	1.88	911.702	7.234
26612	G	2.00	813.500	10.100
26670	G	2.01	767.662	9.104
26667	G	1.93	879.793	5.440
26657	G	1.83	850.820	6.175
26586	G	1.94	806.701	9.021
26714	G	1.91	779.058	6.859
26645	G	1.91	835.079	3.979
26610	G	1.96	714.286	7.908
26607	G	1.97	729.949	5.736
26598	G	1.87	966.845	10.535
26627	G	1.99	866.332	13.518
26705	G	1.94	817.526	11.701
26644	G	1.79	886.034	11.676
26704	G	2.01	827.861	6.567
26641	G	1.86	925.806	8.011
26585	G	1.86	844.086	10.054
26699	G	1.99	733.166	11.357
MEAN		1.93	849.967	9.146
S.D.		0.062	76.7227	3.0267
S.E.		0.012	15.3445	0.6053
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A14 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 4

FEMALE GROUP: 450 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26664	G	1.87	888.770	11.658
26656	G	1.98	975.253	9.848
26629	G	2.01	913.930	9.701
26637	G	1.81	840.884	7.624
26567	G	1.93	765.285	5.751
26617	G	1.86	994.086	7.742
26675	G	2.03	786.700	9.754
26654	G	1.89	940.741	6.720
26579	G	1.96	812.755	4.388
26572	G	2.00	765.000	3.600
26671	G	1.92	813.021	5.417
26611	G	1.80	825.556	7.056
26678	G	1.77	860.452	4.237
26635	G	1.80	778.889	7.722
26652	G	1.86	862.366	9.301
26717	G	1.84	737.500	5.707
26700	G	1.89	822.222	9.947
26655	G	1.82	853.846	10.000
26669	G	1.93	941.451	12.694
26628	G	1.90	979.474	11.368
26688	G	1.82	919.780	9.615
26622	G	1.86	862.903	6.720
26618	G	2.02	930.198	8.465
26591	G	1.91	784.817	6.754
26631	G	1.91	853.927	6.702
MEAN		1.90	860.392	7.940
S.D.		0.074	73.3249	2.4118
S.E.		0.015	14.6650	0.4824
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A14 (SCHEDULED NECROPSY)
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 5

FEMALE GROUP: 750 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26568	G	1.77	1074.576	8.814
26651	G	1.95	869.744	6.513
26649	G	1.99	916.583	5.477
26581	G	1.79	855.307	3.799
26592	G	1.75	988.571	6.400
26597	G	1.92	890.625	3.281
26658	G	1.83	889.617	2.678
26620	G	1.86	826.344	NA
26632	G	1.89	734.921	1.640
26600	G	1.85	949.730	4.432
26569	G	1.93	1003.109	8.808
26605	G	1.90	859.474	3.263
26712	G	1.88	915.957	3.723
26594	G	1.81	670.166	2.652
26588	G	1.95	838.974	2.872
26626	G	1.87	994.118	5.508
26608	G	1.86	736.559	4.839
26673	G	1.83	971.585	3.825
26706	G	1.86	934.409	5.968
26601	G	1.88	1020.213	4.681
26614	G	1.91	637.696	1.885
26662	G	1.81	1132.044	4.641
26643	G	1.86	991.936	2.957
MEAN		1.87	900.098	4.484
S.D.		0.060	123.0966	1.9576
S.E.		0.012	25.6674	0.4174
N		23	23	22

NA = NOT APPLICABLE

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBWv4.29
11/15/2011

TABLE A15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM

DAM#	SEX		VIABLE FETUSES			DEAD FETUSES			EARLY RESORPTIONS			LATE RESORPTIONS			IMPLANTATION SITES			CORPORA LUTEA		
	M	F	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT OVARY	RIGHT OVARY	TOTAL
26575	8	7	6	9	15	0	0	0	0	0	0	0	0	0	6	9	15	6	11	17
26577	7	5	9	3	12	0	0	0	2	1	3	0	0	0	11	4	15	11	8	19
26584	7	6	2	11	13	0	0	0	0	0	0	0	0	0	2	11	13	4	12	16
26587	8	9	10	7	17	0	0	0	0	0	0	0	0	0	10	7	17	12	7	19
26590	6	9	5	10	15	0	0	0	1	1	2	0	0	0	6	11	17	6	11	17
26595	3	11	7	7	14	0	0	0	1	1	2	0	0	0	8	8	16	8	8	16
26599	10	7	8	9	17	0	0	0	1	0	1	0	0	0	9	9	18	10	9	19
26606	8	10	6	12	18	0	0	0	0	0	0	0	0	0	6	12	18	6	13	19
26625	6	9	4	11	15	0	0	0	1	0	1	0	0	0	5	11	16	5	11	16
26630	6	14	11	9	20	0	0	0	0	0	0	0	0	0	11	9	20	11	9	20
26634	10	5	5	10	15	0	0	0	1	1	2	0	0	0	6	11	17	7	12	19
26636	5	14	6	13	19	0	0	0	0	0	0	0	0	0	6	13	19	6	13	19
26638	5	10	9	6	15	0	0	0	0	0	0	0	0	0	9	6	15	9	7	16
26639	0	0	0	0	0	0	0	0	3	4	7	0	0	0	3	4	7	5	5	10
26642	7	9	7	9	16	0	0	0	0	0	0	0	0	0	7	9	16	7	9	16
26646	12	6	9	9	18	0	0	0	0	0	0	0	0	0	9	9	18	10	10	20
26661	7	7	9	5	14	0	0	0	0	1	1	0	0	0	9	6	15	9	6	15
26666	5	9	7	7	14	0	0	0	0	0	0	0	0	0	7	7	14	7	7	14
26668	6	7	5	8	13	0	0	0	0	2	2	0	0	0	5	10	15	5	10	15
26674	4	8	5	7	12	0	0	0	1	1	2	0	0	0	6	8	14	6	8	14
26677	7	5	4	8	12	0	0	0	0	1	1	0	0	0	4	9	13	5	9	14
26680	6	12	6	12	18	0	0	0	0	0	0	0	0	0	6	12	18	6	13	19
26687	13	4	12	5	17	0	0	0	0	0	0	0	0	0	12	5	17	12	5	17
26713	4	9	9	4	13	0	0	0	1	0	1	0	0	0	10	4	14	10	6	16
26718	5	8	6	7	13	0	0	0	1	1	2	0	0	0	7	8	15	7	8	15
TOTAL	165	200	167	198	365	0	0	0	13	14	27	0	0	0	180	212	392	190	227	417
MEAN	6.6	8.0	6.7	7.9	14.6	0.0	0.0	0.0	0.5	0.6	1.1	0.0	0.0	0.0	7.2	8.5	15.7	7.6	9.1	16.7
S.D.	2.75	3.10	2.75	3.03	3.81	0.00	0.00	0.00	0.77	0.92	1.55	0.00	0.00	0.00	2.55	2.62	2.58	2.42	2.47	2.39
S.E.	0.55	0.62	0.55	0.61	0.76	0.00	0.00	0.00	0.15	0.18	0.31	0.00	0.00	0.00	0.51	0.52	0.52	0.48	0.49	0.48
N =	25																			

TABLE A15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.

DAM#	SEX		VIABLE FETUSES			DEAD FETUSES			EARLY RESORPTIONS			LATE RESORPTIONS			IMPLANTATION SITES			CORPORA LUTEA		
	M	F	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT OVARY	RIGHT OVARY	TOTAL
26565	3	12	6	9	15	0	0	0	1	1	2	0	0	0	7	10	17	7	10	17
26570	6	6	6	6	12	0	0	0	3	0	3	0	0	0	9	6	15	9	6	15
26573	7	9	10	6	16	0	0	0	0	0	0	0	0	0	10	6	16	10	6	16
26576	5	4	5	4	9	0	0	0	0	0	0	0	0	0	5	4	9	5	11	16
26580	8	8	8	8	16	0	0	0	2	0	2	0	0	0	10	8	18	12	10	22
26582	8	6	5	9	14	0	0	0	2	0	2	0	0	0	7	9	16	7	10	17
26589	7	6	1	12	13	0	0	0	0	0	0	0	0	0	1	12	13	2	14	16
26593	10	5	7	8	15	0	0	0	0	1	1	0	0	0	7	9	16	7	9	16
26602	5	9	6	8	14	0	0	0	3	0	3	0	0	0	9	8	17	9	8	17
26603	9	6	7	8	15	0	0	0	3	0	3	0	0	0	10	8	18	10	8	18
26604	6	5	7	4	11	0	0	0	1	2	3	0	0	0	8	6	14	9	6	15
26609	5	7	5	7	12	0	0	0	0	1	1	0	0	0	5	8	13	5	8	13
26613	12	3	3	12	15	0	0	0	2	0	2	0	0	0	5	12	17	6	13	19
26621	7	9	9	7	16	0	0	0	1	1	2	0	0	0	10	8	18	10	8	18
26623	8	7	7	8	15	0	0	0	0	0	0	0	0	0	7	8	15	7	8	15
26650	8	5	7	6	13	0	0	0	0	0	0	0	0	0	7	6	13	7	6	13
26659	8	6	4	10	14	0	0	0	1	0	1	0	0	0	5	10	15	5	10	15
26663	11	8	6	13	19	0	0	0	0	0	0	0	0	0	6	13	19	6	13	19
26665	9	6	6	9	15	0	0	0	0	1	1	0	1	1	6	11	17	6	11	17
26672	10	5	7	8	15	0	0	0	0	0	0	0	0	0	7	8	15	8	10	18
26676	9	9	8	10	18	0	0	0	0	0	0	0	0	0	8	10	18	8	10	18
26681	5	6	5	6	11	0	0	0	0	0	0	0	0	0	5	6	11	5	6	11
26692	10	4	9	5	14	0	0	0	1	1	2	0	0	0	10	6	16	10	6	16
26694	13	3	6	10	16	0	0	0	0	0	0	0	0	0	6	10	16	7	11	18
26709	7	11	10	8	18	0	0	0	0	0	0	0	0	0	10	8	18	10	8	18
TOTAL	196	165	160	201	361	0	0	0	20	8	28	0	1	1	180	210	390	187	226	413
MEAN	7.8	6.6	6.4	8.0	14.4	0.0	0.0	0.0	0.8	0.3	1.1	0.0	0.0	0.0	7.2	8.4	15.6	7.5	9.0	16.5
S.D.	2.39	2.31	2.06	2.34	2.31	0.00	0.00	0.00	1.08	0.56	1.17	0.00	0.20	0.20	2.25	2.24	2.40	2.26	2.37	2.26
S.E.	0.48	0.46	0.41	0.47	0.46	0.00	0.00	0.00	0.22	0.11	0.23	0.00	0.04	0.04	0.45	0.45	0.48	0.45	0.47	0.45
N =	25																			

TABLE A15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 3: 100 MG/KG/DAY

DAM#	SEX		VIABLE FETUSES			DEAD FETUSES			EARLY RESORPTIONS			LATE RESORPTIONS			IMPLANTATION SITES			CORPORA LUTEA		
			LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT OVARY	RIGHT OVARY	TOTAL
	M	F																		
26566	3	9	5	7	12	0	0	0	2	3	5	0	0	0	7	10	17	7	11	18
26574	8	7	5	10	15	0	0	0	1	0	1	0	0	0	6	10	16	7	11	18
26578	7	8	6	9	15	0	0	0	0	2	2	0	0	0	6	11	17	8	11	19
26585	6	7	6	7	13	0	0	0	1	0	1	0	0	0	7	7	14	7	7	14
26586	5	2	0	7	7	0	0	0	1	0	1	0	0	0	1	7	8	6	7	13
26598	13	4	9	8	17	0	0	0	1	0	1	0	0	0	10	8	18	10	8	18
26607	5	7	8	4	12	0	0	0	1	0	1	0	0	0	9	4	13	9	5	14
26610	7	10	9	8	17	0	0	0	0	0	0	0	0	0	9	8	17	13	12	25
26612	6	8	4	10	14	0	0	0	0	2	2	0	0	0	4	12	16	5	12	17
26616	8	5	5	8	13	0	0	0	0	0	0	0	0	0	5	8	13	5	9	14
26624	9	6	4	11	15	0	0	0	0	0	0	0	0	0	4	11	15	4	11	15
26627	6	7	5	8	13	0	0	0	0	0	0	0	0	0	5	8	13	5	9	14
26641	10	7	10	7	17	0	0	0	0	1	1	0	0	0	10	8	18	10	9	19
26644	11	5	9	7	16	0	0	0	0	0	0	0	0	0	9	7	16	9	7	16
26645	8	7	4	11	15	0	0	0	1	0	1	0	0	0	5	11	16	5	11	16
26647	5	10	8	7	15	0	0	0	0	0	0	0	0	0	8	7	15	9	7	16
26648	9	8	7	10	17	0	0	0	0	0	0	0	0	0	7	10	17	7	10	17
26653	7	9	3	13	16	0	0	0	1	1	2	0	0	0	4	14	18	4	14	18
26657	5	9	6	8	14	0	0	0	0	0	0	0	0	0	6	8	14	7	8	15
26667	8	8	10	6	16	0	0	0	0	1	1	0	0	0	10	7	17	10	8	18
26670	1	1	0	2	2	0	0	0	1	1	2	0	0	0	1	3	4	9	7	16
26699	4	2	5	1	6	0	0	0	0	0	0	0	0	0	5	1	6	5	6	11
26704	4	8	8	4	12	0	0	0	3	0	3	0	0	0	11	4	15	11	4	15
26705	10	6	7	9	16	0	0	0	0	1	1	0	0	0	7	10	17	7	10	17
26714	8	6	4	10	14	0	0	0	0	0	0	0	0	0	4	10	14	4	10	14
TOTAL	173	166	147	192	339	0	0	0	13	12	25	0	0	0	160	204	364	183	224	407
MEAN	6.9	6.6	5.9	7.7	13.6	0.0	0.0	0.0	0.5	0.5	1.0	0.0	0.0	0.0	6.4	8.2	14.6	7.3	9.0	16.3
S.D.	2.68	2.40	2.70	2.78	3.68	0.00	0.00	0.00	0.77	0.82	1.19	0.00	0.00	0.00	2.69	2.95	3.63	2.43	2.41	2.72
S.E.	0.54	0.48	0.54	0.56	0.74	0.00	0.00	0.00	0.15	0.16	0.24	0.00	0.00	0.00	0.54	0.59	0.73	0.49	0.48	0.54
N =	25																			

TABLE A15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 4: 450 MG/KG/DAY

DAM#	SEX		VIABLE FETUSES			DEAD FETUSES			EARLY RESORPTIONS			LATE RESORPTIONS			IMPLANTATION SITES			CORPORA LUTEA		
	M	F	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT OVARY	RIGHT OVARY	TOTAL
26567	8	7	7	8	15	0	0	0	2	2	4	0	0	0	9	10	19	12	14	26
26572	3	4	3	4	7	0	0	0	2	3	5	0	0	0	5	7	12	6	7	13
26579	4	8	3	9	12	0	0	0	2	1	3	0	0	0	5	10	15	6	10	16
26591	10	6	7	9	16	0	0	0	1	0	1	0	0	0	8	9	17	8	9	17
26611	2	4	3	3	6	0	0	0	5	4	9	0	0	0	8	7	15	9	7	16
26617	7	9	7	9	16	0	0	0	1	0	1	0	0	0	8	9	17	8	10	18
26618	6	9	5	10	15	0	0	0	4	2	6	0	0	0	9	12	21	9	12	21
26622	7	5	4	8	12	0	0	0	0	4	4	0	0	0	4	12	16	5	12	17
26628	9	9	7	11	18	0	0	0	2	0	2	0	0	0	9	11	20	9	11	20
26629	4	10	9	5	14	0	0	0	0	1	1	0	0	0	9	6	15	10	8	18
26631	3	8	5	6	11	0	0	0	4	2	6	0	0	0	9	8	17	12	8	20
26635	5	6	5	6	11	0	0	0	1	0	1	0	0	0	6	6	12	6	6	12
26637	1	1	1	1	2	0	0	0	1	0	1	0	0	0	2	1	3	5	10	15
26652	6	9	8	7	15	0	0	0	0	0	0	0	0	0	8	7	15	8	7	15
26654	8	5	7	6	13	0	0	0	2	1	3	0	0	0	9	7	16	9	8	17
26655	6	8	7	7	14	0	0	0	1	1	2	0	0	0	8	8	16	9	8	17
26656	10	8	10	8	18	0	0	0	2	0	2	0	0	0	12	8	20	12	10	22
26664	10	4	8	6	14	0	0	0	0	0	0	0	0	0	8	6	14	8	6	14
26669	4	3	4	3	7	0	0	0	3	6	9	0	0	0	7	9	16	7	11	18
26671	6	6	3	9	12	0	0	0	1	0	1	0	0	0	4	9	13	4	10	14
26675	9	5	5	9	14	0	0	0	1	0	1	1	0	1	7	9	16	12	10	22
26678	7	7	6	8	14	0	0	0	0	0	0	0	0	0	6	8	14	6	8	14
26688	4	10	5	9	14	0	0	0	1	0	1	0	0	0	6	9	15	7	9	16
26700	6	9	8	7	15	0	0	0	2	1	3	0	0	0	10	8	18	10	8	18
26717	3	4	5	2	7	0	0	0	1	4	5	0	0	0	6	6	12	6	6	12
TOTAL	148	164	142	170	312	0	0	0	39	32	71	1	0	1	182	202	384	203	225	428
MEAN	5.9	6.6	5.7	6.8	12.5	0.0	0.0	0.0	1.6	1.3	2.8	0.0	0.0	0.0	7.3	8.1	15.4	8.1	9.0	17.1
S.D.	2.60	2.42	2.19	2.60	3.94	0.00	0.00	0.00	1.33	1.70	2.59	0.20	0.00	0.20	2.21	2.27	3.55	2.35	2.06	3.37
S.E.	0.52	0.48	0.44	0.52	0.79	0.00	0.00	0.00	0.27	0.34	0.52	0.04	0.00	0.04	0.44	0.45	0.71	0.47	0.41	0.67
N =	25																			

TABLE A15
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 5: 750 MG/KG/DAY

DAM#	SEX		VIABLE FETUSES			DEAD FETUSES			EARLY RESORPTIONS			LATE RESORPTIONS			IMPLANTATION SITES			CORPORA LUTEA		
	M	F	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT HORN	RIGHT HORN	TOTAL	LEFT OVARY	RIGHT OVARY	TOTAL
26568	3	5	2	6	8	0	0	0	2	0	2	0	1	1	4	7	11	4	9	13
26569	1	1	1	1	2	0	0	0	5	6	11	0	0	0	6	7	13	6	10	16
26581	1	1	0	2	2	0	0	0	4	8	12	0	0	0	4	10	14	4	10	14
26588	0	0	0	0	0	0	0	0	9	10	19	0	0	0	9	10	19	12	10	22
26592	2	2	1	3	4	0	0	0	6	3	9	0	0	0	7	6	13	10	8	18
26594	0	0	0	0	0	0	0	0	7	8	15	0	0	0	7	8	15	7	9	16
26597	1	0	0	1	1	0	0	0	8	6	14	0	1	1	8	8	16	8	8	16
26600	2	0	0	2	2	0	0	0	7	5	12	0	0	0	7	7	14	7	8	15
26601	2	2	2	2	4	0	0	0	6	5	11	0	1	1	8	8	16	8	10	18
26605	1	0	1	0	1	0	0	0	9	7	16	0	0	0	10	7	17	10	10	20
26608	0	0	0	0	0	0	0	0	1	5	6	0	0	0	1	5	6	4	5	9
26614	1	0	0	1	1	0	0	0	8	9	17	0	0	0	8	10	18	8	10	18
26615	GRAVID, DIED DAY 16																			
26620	3	3	4	2	6	0	0	0	7	7	14	0	0	0	11	9	20	11	9	20
26626	1	1	1	1	2	0	0	0	4	12	16	0	0	0	5	13	18	5	14	19
26632	0	0	0	0	0	0	0	0	9	7	16	0	0	0	9	7	16	9	7	16
26643	2	1	2	1	3	0	0	0	4	5	9	1	3	4	7	9	16	7	9	16
26649	3	7	6	4	10	0	0	0	4	5	9	0	0	0	10	9	19	10	10	20
26651	0	0	0	0	0	0	0	0	5	8	13	0	0	0	5	8	13	5	10	15
26658	1	2	1	2	3	0	0	0	5	10	15	0	0	0	6	12	18	6	12	18
26662	1	11	3	9	12	0	0	0	2	2	4	0	0	0	5	11	16	5	11	16
26673	2	0	1	1	2	0	0	0	6	7	13	0	0	0	7	8	15	10	10	20
26706	4	3	5	2	7	0	0	0	3	6	9	0	0	0	8	8	16	10	9	19
26712	1	4	1	4	5	0	0	0	4	7	11	0	1	1	5	12	17	5	12	17
26715	GRAVID, EUTHANIZED DAY 13																			
TOTAL	32	43	31	44	75	0	0	0	125	148	273	1	7	8	157	199	356	171	220	391
MEAN	1.4	1.9	1.3	1.9	3.3	0.0	0.0	0.0	5.4	6.4	11.9	0.0	0.3	0.3	6.8	8.7	15.5	7.4	9.6	17.0
S.D.	1.12	2.74	1.70	2.17	3.35	0.00	0.00	0.00	2.33	2.66	4.20	0.21	0.70	0.88	2.31	2.01	3.04	2.46	1.80	2.83
S.E.	0.23	0.57	0.35	0.45	0.70	0.00	0.00	0.00	0.49	0.55	0.88	0.04	0.15	0.18	0.48	0.42	0.63	0.51	0.38	0.59
N =	23																			

DAMS FROM GROUP 1:0 MG/KG/DAY SHAM

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES VIABLE	FETUSES DEAD	RESORPTIONS EARLY	RESORPTIONS LATE	RESORPTIONS TOTAL	PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
#	#	%	%	%	%	%	%	%	%	%	%
26575	17.0	15.0	100.0	0.0	0.0	0.0	0.0	11.8	0.0	53.3	46.7
26577	19.0	15.0	80.0	0.0	20.0	0.0	20.0	21.1	20.0	58.3	41.7
26584	16.0	13.0	100.0	0.0	0.0	0.0	0.0	18.8	0.0	53.8	46.2
26587	19.0	17.0	100.0	0.0	0.0	0.0	0.0	10.5	0.0	47.1	52.9
26590	17.0	17.0	88.2	0.0	11.8	0.0	11.8	0.0	11.8	40.0	60.0
26595	16.0	16.0	87.5	0.0	12.5	0.0	12.5	0.0	12.5	21.4	78.6
26599	19.0	18.0	94.4	0.0	5.6	0.0	5.6	5.3	5.6	58.8	41.2
26606	19.0	18.0	100.0	0.0	0.0	0.0	0.0	5.3	0.0	44.4	55.6
26625	16.0	16.0	93.8	0.0	6.3	0.0	6.3	0.0	6.3	40.0	60.0
26630	20.0	20.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	70.0
26634	19.0	17.0	88.2	0.0	11.8	0.0	11.8	10.5	11.8	66.7	33.3
26636	19.0	19.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	73.7
26638	16.0	15.0	100.0	0.0	0.0	0.0	0.0	6.3	0.0	33.3	66.7
26639	10.0	7.0	0.0	0.0	100.0	0.0	100.0	30.0	100.0	0.0	0.0
26642	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	43.8	56.3
26646	20.0	18.0	100.0	0.0	0.0	0.0	0.0	10.0	0.0	66.7	33.3
26661	15.0	15.0	93.3	0.0	6.7	0.0	6.7	0.0	6.7	50.0	50.0
26666	14.0	14.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	35.7	64.3
26668	15.0	15.0	86.7	0.0	13.3	0.0	13.3	0.0	13.3	46.2	53.8
26674	14.0	14.0	85.7	0.0	14.3	0.0	14.3	0.0	14.3	33.3	66.7
26677	14.0	13.0	92.3	0.0	7.7	0.0	7.7	7.1	7.7	58.3	41.7
26680	19.0	18.0	100.0	0.0	0.0	0.0	0.0	5.3	0.0	33.3	66.7
26687	17.0	17.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	76.5	23.5
26713	16.0	14.0	92.9	0.0	7.1	0.0	7.1	12.5	7.1	30.8	69.2
26718	15.0	15.0	86.7	0.0	13.3	0.0	13.3	0.0	13.3	38.5	61.5
MEAN	16.7	15.7	90.8	0.0	9.2	0.0	9.2	6.2	9.2	45.3	54.7
S.D.	2.39	2.58	19.89	0.00	19.89	0.00	19.89	8.00	19.89	14.10	14.10
S.E.	0.48	0.52	3.98	0.00	3.98	0.00	3.98	1.60	3.98	2.88	2.88
N	25	25	25	25	25	25	25	25	25	24	24

TABLE A16
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

DAMS FROM GROUP 2:0 MG/KG/DAY VEH.

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES VIABLE	FETUSES DEAD	RESORPTIONS EARLY	RESORPTIONS LATE	RESORPTIONS TOTAL	PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
#	#	%	%	%	%	%	%	%	%	%	%
26565	17.0	17.0	88.2	0.0	11.8	0.0	11.8	0.0	11.8	20.0	80.0
26570	15.0	15.0	80.0	0.0	20.0	0.0	20.0	0.0	20.0	50.0	50.0
26573	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	43.8	56.3
26576	16.0	9.0	100.0	0.0	0.0	0.0	0.0	43.8	0.0	55.6	44.4
26580	22.0	18.0	88.9	0.0	11.1	0.0	11.1	18.2	11.1	50.0	50.0
26582	17.0	16.0	87.5	0.0	12.5	0.0	12.5	5.9	12.5	57.1	42.9
26589	16.0	13.0	100.0	0.0	0.0	0.0	0.0	18.8	0.0	53.8	46.2
26593	16.0	16.0	93.8	0.0	6.3	0.0	6.3	0.0	6.3	66.7	33.3
26602	17.0	17.0	82.4	0.0	17.6	0.0	17.6	0.0	17.6	35.7	64.3
26603	18.0	18.0	83.3	0.0	16.7	0.0	16.7	0.0	16.7	60.0	40.0
26604	15.0	14.0	78.6	0.0	21.4	0.0	21.4	6.7	21.4	54.5	45.5
26609	13.0	13.0	92.3	0.0	7.7	0.0	7.7	0.0	7.7	41.7	58.3
26613	19.0	17.0	88.2	0.0	11.8	0.0	11.8	10.5	11.8	80.0	20.0
26621	18.0	18.0	88.9	0.0	11.1	0.0	11.1	0.0	11.1	43.8	56.3
26623	15.0	15.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	53.3	46.7
26650	13.0	13.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	61.5	38.5
26659	15.0	15.0	93.3	0.0	6.7	0.0	6.7	0.0	6.7	57.1	42.9
26663	19.0	19.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	57.9	42.1
26665	17.0	17.0	88.2	0.0	5.9	5.9	11.8	0.0	11.8	60.0	40.0
26672	18.0	15.0	100.0	0.0	0.0	0.0	0.0	16.7	0.0	66.7	33.3
26676	18.0	18.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0
26681	11.0	11.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	45.5	54.5
26692	16.0	16.0	87.5	0.0	12.5	0.0	12.5	0.0	12.5	71.4	28.6
26694	18.0	16.0	100.0	0.0	0.0	0.0	0.0	11.1	0.0	81.3	18.8
26709	18.0	18.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	38.9	61.1
MEAN	16.5	15.6	92.8	0.0	6.9	0.2	7.2	5.3	7.2	54.2	45.8
S.D.	2.26	2.40	7.32	0.00	7.26	1.18	7.32	10.21	7.32	13.56	13.56
S.E.	0.45	0.48	1.46	0.00	1.45	0.24	1.46	2.04	1.46	2.71	2.71
N	25	25	25	25	25	25	25	25	25	25	25

DAMS FROM GROUP 3: 100 MG/KG/DAY

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES VIABLE	FETUSES DEAD	RESORPTIONS EARLY	RESORPTIONS LATE	RESORPTIONS TOTAL	PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
#	#	%	%	%	%	%	%	%	%	%	%
26566	18.0	17.0	70.6	0.0	29.4	0.0	29.4	5.6	29.4	25.0	75.0
26574	18.0	16.0	93.8	0.0	6.3	0.0	6.3	11.1	6.3	53.3	46.7
26578	19.0	17.0	88.2	0.0	11.8	0.0	11.8	10.5	11.8	46.7	53.3
26585	14.0	14.0	92.9	0.0	7.1	0.0	7.1	0.0	7.1	46.2	53.8
26586	13.0	8.0	87.5	0.0	12.5	0.0	12.5	38.5	12.5	71.4	28.6
26598	18.0	18.0	94.4	0.0	5.6	0.0	5.6	0.0	5.6	76.5	23.5
26607	14.0	13.0	92.3	0.0	7.7	0.0	7.7	7.1	7.7	41.7	58.3
26610	25.0	17.0	100.0	0.0	0.0	0.0	0.0	32.0	0.0	41.2	58.8
26612	17.0	16.0	87.5	0.0	12.5	0.0	12.5	5.9	12.5	42.9	57.1
26616	14.0	13.0	100.0	0.0	0.0	0.0	0.0	7.1	0.0	61.5	38.5
26624	15.0	15.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0
26627	14.0	13.0	100.0	0.0	0.0	0.0	0.0	7.1	0.0	46.2	53.8
26641	19.0	18.0	94.4	0.0	5.6	0.0	5.6	5.3	5.6	58.8	41.2
26644	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	68.8	31.3
26645	16.0	16.0	93.8	0.0	6.3	0.0	6.3	0.0	6.3	53.3	46.7
26647	16.0	15.0	100.0	0.0	0.0	0.0	0.0	6.3	0.0	33.3	66.7
26648	17.0	17.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	52.9	47.1
26653	18.0	18.0	88.9	0.0	11.1	0.0	11.1	0.0	11.1	43.8	56.3
26657	15.0	14.0	100.0	0.0	0.0	0.0	0.0	6.7	0.0	35.7	64.3
26667	18.0	17.0	94.1	0.0	5.9	0.0	5.9	5.6	5.9	50.0	50.0
26670	16.0	4.0	50.0	0.0	50.0	0.0	50.0	75.0	50.0	50.0	50.0
26699	11.0	6.0	100.0	0.0	0.0	0.0	0.0	45.5	0.0	66.7	33.3
26704	15.0	15.0	80.0	0.0	20.0	0.0	20.0	0.0	20.0	33.3	66.7
26705	17.0	17.0	94.1	0.0	5.9	0.0	5.9	0.0	5.9	62.5	37.5
26714	14.0	14.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	57.1	42.9
MEAN	16.3	14.6	92.1	0.0	7.9	0.0	7.9	10.8	7.9	51.1	48.9
S.D.	2.72	3.63	11.36	0.00	11.36	0.00	11.36	18.14	11.36	12.86	12.86
S.E.	0.54	0.73	2.27	0.00	2.27	0.00	2.27	3.63	2.27	2.57	2.57
N	25	25	25	25	25	25	25	25	25	25	25

TABLE A16
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

DAMS FROM GROUP 4: 450 MG/KG/DAY

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES VIABLE	FETUSES DEAD	RESORPTIONS EARLY	RESORPTIONS LATE	RESORPTIONS TOTAL	PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
#	#	%	%	%	%	%	%	%	%	%	%
26567	26.0	19.0	78.9	0.0	21.1	0.0	21.1	26.9	21.1	53.3	46.7
26572	13.0	12.0	58.3	0.0	41.7	0.0	41.7	7.7	41.7	42.9	57.1
26579	16.0	15.0	80.0	0.0	20.0	0.0	20.0	6.3	20.0	33.3	66.7
26591	17.0	17.0	94.1	0.0	5.9	0.0	5.9	0.0	5.9	62.5	37.5
26611	16.0	15.0	40.0	0.0	60.0	0.0	60.0	6.3	60.0	33.3	66.7
26617	18.0	17.0	94.1	0.0	5.9	0.0	5.9	5.6	5.9	43.8	56.3
26618	21.0	21.0	71.4	0.0	28.6	0.0	28.6	0.0	28.6	40.0	60.0
26622	17.0	16.0	75.0	0.0	25.0	0.0	25.0	5.9	25.0	58.3	41.7
26628	20.0	20.0	90.0	0.0	10.0	0.0	10.0	0.0	10.0	50.0	50.0
26629	18.0	15.0	93.3	0.0	6.7	0.0	6.7	16.7	6.7	28.6	71.4
26631	20.0	17.0	64.7	0.0	35.3	0.0	35.3	15.0	35.3	27.3	72.7
26635	12.0	12.0	91.7	0.0	8.3	0.0	8.3	0.0	8.3	45.5	54.5
26637	15.0	3.0	66.7	0.0	33.3	0.0	33.3	80.0	33.3	50.0	50.0
26652	15.0	15.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	60.0
26654	17.0	16.0	81.3	0.0	18.8	0.0	18.8	5.9	18.8	61.5	38.5
26655	17.0	16.0	87.5	0.0	12.5	0.0	12.5	5.9	12.5	42.9	57.1
26656	22.0	20.0	90.0	0.0	10.0	0.0	10.0	9.1	10.0	55.6	44.4
26664	14.0	14.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	71.4	28.6
26669	18.0	16.0	43.8	0.0	56.3	0.0	56.3	11.1	56.3	57.1	42.9
26671	14.0	13.0	92.3	0.0	7.7	0.0	7.7	7.1	7.7	50.0	50.0
26675	22.0	16.0	87.5	0.0	6.3	6.3	12.5	27.3	12.5	64.3	35.7
26678	14.0	14.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0
26688	16.0	15.0	93.3	0.0	6.7	0.0	6.7	6.3	6.7	28.6	71.4
26700	18.0	18.0	83.3	0.0	16.7	0.0	16.7	0.0	16.7	40.0	60.0
26717	12.0	12.0	58.3	0.0	41.7	0.0	41.7	0.0	41.7	42.9	57.1
MEAN	17.1	15.4	80.6	0.0	19.1	0.3	19.4	9.7	19.4	46.9	53.1
S.D.	3.37	3.55	16.98	0.00	17.14	1.26	16.99	16.56	16.99	11.87	11.87
S.E.	0.67	0.71	3.40	0.00	3.43	0.25	3.40	3.31	3.40	2.37	2.37
N	25	25	25	25	25	25	25	25	25	25	25

TABLE A16
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

DAMS FROM GROUP 5: 750 MG/KG/DAY

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES VIABLE	FETUSES DEAD	RESORPTIONS EARLY	RESORPTIONS LATE	RESORPTIONS TOTAL	PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
#	#	%	%	%	%	%	%	%	%	%	%
26568	13.0	11.0	72.7	0.0	18.2	9.1	27.3	15.4	27.3	37.5	62.5
26569	16.0	13.0	15.4	0.0	84.6	0.0	84.6	18.8	84.6	50.0	50.0
26581	14.0	14.0	14.3	0.0	85.7	0.0	85.7	0.0	85.7	50.0	50.0
26588	22.0	19.0	0.0	0.0	100.0	0.0	100.0	13.6	100.0	0.0	0.0
26592	18.0	13.0	30.8	0.0	69.2	0.0	69.2	27.8	69.2	50.0	50.0
26594	16.0	15.0	0.0	0.0	100.0	0.0	100.0	6.3	100.0	0.0	0.0
26597	16.0	16.0	6.3	0.0	87.5	6.3	93.8	0.0	93.8	100.0	0.0
26600	15.0	14.0	14.3	0.0	85.7	0.0	85.7	6.7	85.7	100.0	0.0
26601	18.0	16.0	25.0	0.0	68.8	6.3	75.0	11.1	75.0	50.0	50.0
26605	20.0	17.0	5.9	0.0	94.1	0.0	94.1	15.0	94.1	100.0	0.0
26608	9.0	6.0	0.0	0.0	100.0	0.0	100.0	33.3	100.0	0.0	0.0
26614	18.0	18.0	5.6	0.0	94.4	0.0	94.4	0.0	94.4	100.0	0.0
26620	20.0	20.0	30.0	0.0	70.0	0.0	70.0	0.0	70.0	50.0	50.0
26626	19.0	18.0	11.1	0.0	88.9	0.0	88.9	5.3	88.9	50.0	50.0
26632	16.0	16.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0
26643	16.0	16.0	18.8	0.0	56.3	25.0	81.3	0.0	81.3	66.7	33.3
26649	20.0	19.0	52.6	0.0	47.4	0.0	47.4	5.0	47.4	30.0	70.0
26651	15.0	13.0	0.0	0.0	100.0	0.0	100.0	13.3	100.0	0.0	0.0
26658	18.0	18.0	16.7	0.0	83.3	0.0	83.3	0.0	83.3	33.3	66.7
26662	16.0	16.0	75.0	0.0	25.0	0.0	25.0	0.0	25.0	8.3	91.7
26673	20.0	15.0	13.3	0.0	86.7	0.0	86.7	25.0	86.7	100.0	0.0
26706	19.0	16.0	43.8	0.0	56.3	0.0	56.3	15.8	56.3	57.1	42.9
26712	17.0	17.0	29.4	0.0	64.7	5.9	70.6	0.0	70.6	20.0	80.0
MEAN	17.0	15.5	20.9	0.0	76.8	2.3	79.1	9.2	79.1	58.5	41.5
S.D.	2.83	3.04	21.91	0.00	23.41	5.65	21.91	10.08	21.91	29.70	29.70
S.E.	0.59	0.63	4.57	0.00	4.88	1.18	4.57	2.10	4.57	7.00	7.00
N	23	23	23	23	23	23	23	23	23	18	18

TABLE A17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

FETUS #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DAM # MEAN	GROUP	1:	0	MG/KG/DAY	SHAM																		
26575	3.9	3.4	3.7	4.2	4.0	3.6	4.2/	3.9	4.1	4.3	4.2	3.8	4.3	3.7	3.9	3.6							
26577	3.7	4.0	E	E	4.0	3.4	4.1	3.2	3.3	3.7	4.0	3.8/	E	3.5	3.9	3.6							
26584	3.7	4.0	4.0/	3.7	3.8	3.7	3.6	3.7	3.9	3.6	3.7	3.6	3.8	3.2									
26587	3.4	3.3	3.5	3.3	3.7	3.6	3.4	3.8	3.3	2.9	3.6/	3.3	3.6	3.7	3.5	3.3	3.3	3.1					
26590	4.0	3.8	4.1	4.3	4.3	E	3.4/	4.6	4.3	4.5	E	4.4	4.2	3.8	4.0	4.0	3.4	3.5					
26595	3.7	3.9	3.8	3.9	E	3.9	3.7	3.6	4.0/	3.4	3.6	3.8	3.7	3.6	3.7	3.2	E						
26599	4.0	2.8	3.6	3.8	3.9	4.1	3.6	3.9	4.2	E /	4.5	4.5	4.2	4.4	4.4	4.1	3.8	3.8	3.7				
26606	3.6	3.6	4.0	3.7	3.5	3.9	4.1/	4.2	3.9	4.1	3.9	3.7	3.4	3.9	2.6	3.8	3.0	3.3	2.2				
26625	3.7	3.7	3.6	3.8	4.3	E /	3.8	4.1	3.7	3.7	3.8	3.6	3.4	4.0	3.5	3.4	2.7						
26630	3.8	4.1	2.8	3.4	2.7	3.9	4.1	4.0	3.9	3.9	4.0	3.8/	4.2	3.8	4.0	3.9	3.9	3.9	3.9	3.6	3.6		
26634	3.4	3.3	3.2	E	3.4	3.3	3.7/	3.7	3.7	3.3	3.2	3.7	3.2	3.2	3.2	3.3	3.1	E					
26636	3.9	3.9	4.0	4.2	4.1	3.9	4.2/	4.2	3.7	3.9	4.0	4.1	4.1	4.0	3.8	3.5	3.6	3.6	3.5	3.1			
26638	3.5	3.4	2.7	3.1	3.1	3.5	3.8	3.9	3.5	3.8/	3.5	3.7	4.0	3.8	3.2	3.1							
26639	0.0	E	E	E /	E	E	E	E															
26642	3.6	3.0	3.5	3.6	3.8	3.4	3.3	3.7/	3.7	3.6	3.8	3.8	4.1	3.7	3.7	3.5	3.2						
26646	3.9	4.0	3.6	4.0	3.9	4.1	4.2	4.3	3.9	4.4/	3.8	3.9	3.9	4.1	3.6	3.9	3.7	3.6	3.8				
26661	4.1	4.3	4.2	4.0	4.0	3.6	4.1	4.1	4.0	4.4/	4.3	4.2	E	4.4	4.2	3.8							
26666	3.5	3.2	3.7	3.5	3.5	3.6	3.6	3.8/	3.9	3.3	3.6	3.4	3.5	3.2	3.1								
26668	3.4	2.7	3.0	3.4	3.5	3.7/	3.5	E	3.9	3.1	3.7	3.4	3.2	3.4	3.1	E							
26674	3.6	3.2	E	3.7	3.8	4.0	3.0/	4.3	E	4.1	3.1	3.7	3.6	3.5	3.5								
26677	3.8	3.7	4.0	4.2	4.2/	3.9	E	3.7	3.9	4.1	3.6	3.8	3.4	3.4									
26680	3.9	3.8	3.8	4.1	4.1	4.4	4.3/	4.0	4.2	3.9	4.3	4.1	4.1	3.9	3.7	3.5	3.9	3.4	3.4				
26687	3.8	3.4	3.9	3.3	3.6	3.8	4.1	4.1	4.0	4.1	4.1	3.6	4.0/	3.9	3.8	3.7	4.1	3.4					
26713	3.7	4.1	3.5	E	3.7	4.1	3.9	4.0	3.8	3.7	3.9/	3.8	3.8	3.0	3.4								
26718	3.7	3.5	3.8	E	4.0	3.8	3.5	4.1/	3.6	3.7	3.7	4.0	3.5	E	3.2	3.3							

MEAN 3.7
S.D. 0.20
S.E. 0.04
N 24

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

TABLE A17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

FETUS #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DAM # MEAN	GROUP	2:	0 MG/KG/DAY VEH.																				
26565	3.8	3.6	3.8	3.8	3.7	4.0	4.1	E /	3.9	3.9	3.7	3.6	4.0	3.4	E	3.8	3.9	3.6					
26570	4.2	4.2	E	4.0	4.6	E	E	4.3	4.6	4.1/	4.1	4.4	4.0	4.3	4.4	3.7							
26573	3.5	3.0	3.4	2.4	3.6	3.1	3.5	3.8	3.8	3.8	3.5/	3.6	3.7	3.4	3.5	3.3	3.8						
26576	4.3	3.7	4.4	4.3	4.2	4.6/	4.4	4.6	4.5	4.4													
26580	3.6	E	3.6	3.4	3.9	3.7	E	4.0	3.5	3.5	3.2/	3.6	3.9	3.5	3.7	3.4	3.8	3.8	3.1				
26582	3.8	3.3	E	E	3.6	4.0	4.1	3.9/	4.2	3.6	3.7	4.2	3.8	3.6	3.8	3.5	3.5						
26589	3.7	3.9/	4.0	3.5	3.7	3.8	3.5	3.9	3.7	4.2	3.7	3.0	3.8	3.5									
26593	3.8	3.8	3.6	3.7	3.6	4.2	4.1	4.1/	4.2	4.0	E	3.9	4.1	3.9	3.6	3.8	3.0						
26602	3.7	E	3.6	E	3.5	4.0	4.0	3.5	4.0	E /	3.7	3.5	3.9	3.7	3.8	3.5	3.3	3.3					
26603	3.4	2.8	E	E	3.6	3.3	3.2	3.6	E	3.3	3.9/	3.7	3.3	4.1	3.4	3.1	3.7	3.4	2.6				
26604	3.5	3.3	3.9	3.8	3.5	E	3.5	3.5	3.9/	3.3	E	3.4	E	3.3	3.1								
26609	3.4	2.9	3.7	3.5	3.6	3.5/	3.4	3.3	3.5	3.4	3.7	3.0	3.0	E									
26613	4.0	E	3.8	E	4.0	4.6/	4.2	4.2	3.8	3.8	3.7	4.0	4.1	3.9	4.0	3.8	4.1	3.9					
26621	3.4	3.6	3.5	3.3	3.0	3.1	E	3.3	3.7	3.5	3.7/	4.1	4.0	3.6	3.6	3.2	3.0	E	2.8				
26623	3.5	3.4	3.5	3.8	3.8	3.7	3.8	3.7/	3.9	3.1	3.2	3.5	3.2	3.7	3.2	3.0							
26650	3.8	3.5	3.8	3.6	3.6	3.5	4.0	4.1/	4.0	4.1	4.3	3.9	3.9	3.3									
26659	4.2	3.9	4.1	4.3	4.3	E /	4.5	4.3	4.2	4.2	4.5	4.3	3.9	3.9	3.8								
26663	3.6	3.2	4.0	3.5	4.1	3.6	4.2/	4.1	3.1	3.4	3.6	3.3	4.1	3.9	3.7	3.7	3.5	3.2	3.4	3.0			
26665	3.8	4.0	3.9	3.7	4.0	4.0	4.0/	L	4.0	3.8	4.1	3.6	E	4.0	3.7	3.7	3.4	3.7					
26672	3.7	3.5	3.6	3.6	3.6	3.9	3.6	3.9/	3.9	4.0	3.9	4.0	3.5	3.9	3.3	3.6							
26676	3.4	3.4	3.2	3.5	3.6	3.7	2.3	4.0	3.9/	3.8	3.7	3.3	3.6	3.3	3.3	3.2	3.3	2.9	2.7				
26681	3.6	3.3	3.5	3.5	3.7	3.7/	3.0	3.7	4.0	4.2	3.5	3.2											
26692	3.8	3.6	3.8	E	3.4	3.5	3.6	3.9	3.9	3.8	3.8/	3.7	4.3	E	4.2	3.8	3.4						
26694	3.7	3.6	3.5	3.8	4.0	3.8	3.7/	3.5	3.8	3.4	3.8	3.8	4.0	3.8	2.9	3.5	3.8						
26709	3.8	3.3	3.8	3.4	3.8	3.7	2.7	4.0	3.5	4.3	4.1/	4.3	4.0	3.8	3.9	4.1	4.0	4.2	3.9				
MEAN	3.7																						
S.D.	0.25																						
S.E.	0.05																						
N	25																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

TABLE A17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

FETUS #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DAM # MEAN	GROUP	3:	100	MG/KG/DAY																			
26566	3.1	3.2	3.4	3.5	3.6	3.3	E	E /	3.3	E	3.1	3.1	3.0	2.8	2.5	2.7	E	E					
26574	3.7	3.7	4.2	4.3	E	4.1	3.8/	3.4	2.8	3.3	3.5	4.2	3.7	4.0	3.7	3.3	3.1						
26578	3.6	3.8	3.5	3.4	4.1	3.4	3.6/	3.5	3.5	3.4	4.0	3.5	3.6	3.9	3.5	E	E	3.2					
26585	3.7	3.9	3.8	3.9	3.8	3.7	3.6	E /	3.6	3.7	3.9	3.9	2.7	3.4	3.6								
26586	3.7	E /	3.6	3.7	3.8	3.8	3.8	3.8	3.6														
26598	3.5	3.1	E	3.5	3.2	3.5	3.9	4.0	3.5	3.9	3.3/	4.1	3.3	3.7	3.6	3.5	3.4	3.6	3.1				
26607	3.1	2.8	3.2	3.0	2.7	E	3.2	3.2	3.4	3.2/	3.4	3.4	3.1	2.8									
26610	3.3	3.3	3.1	3.5	3.6	3.0	3.2	3.2	3.2	3.6/	3.5	3.3	3.3	3.4	3.3	3.4	3.0	3.2					
26612	3.6	3.9	3.6	3.9	4.2/	3.7	E	3.5	3.6	3.3	E	4.0	3.7	3.3	3.6	3.3	2.8						
26616	3.9	3.5	3.7	3.9	3.9	4.3/	3.8	3.8	4.2	4.0	3.8	4.0	3.8	3.9									
26624	3.8	3.9	4.0	4.1	4.0/	3.6	3.8	3.9	3.6	3.7	4.1	3.7	4.0	3.7	3.9	3.4							
26627	3.2	3.1	3.2	3.4	3.2	3.6/	3.4	2.4	3.3	3.5	3.3	3.3	3.4	3.0									
26641	3.3	3.0	3.1	2.9	3.1	3.0	3.4	3.3	3.5	3.0	3.5/	3.8	3.4	E	3.5	3.8	3.4	3.2	3.0				
26644	3.9	3.4	4.0	3.6	4.1	3.9	4.2	3.7	4.0	3.9/	4.1	4.0	3.9	4.1	4.2	3.8	3.6						
26645	3.4	3.0	E	3.6	3.4	3.8/	3.5	3.1	3.3	3.6	3.5	3.6	3.3	3.6	3.4	3.4	2.9						
26647	3.7	3.6	3.8	4.0	4.0	3.8	3.7	3.9	4.1/	4.1	3.9	3.6	3.3	3.6	3.2	3.3							
26648	3.6	3.6	4.0	3.5	3.9	3.8	3.7	3.8/	3.7	3.3	3.8	3.9	3.8	3.7	3.5	3.2	3.3	3.3					
26653	3.5	3.4	E	4.0	4.2/	3.8	3.2	3.7	3.8	E	3.8	3.7	3.7	3.0	3.3	3.1	3.4	3.1	2.8				
26657	3.7	3.7	3.8	3.6	3.4	3.7	3.9/	4.0	3.7	3.4	3.6	3.6	3.9	3.7	3.4								
26667	3.5	3.4	3.5	3.6	3.6	3.8	3.9	3.6	3.5	3.3	3.9/	3.5	3.3	3.6	E	3.5	3.5	3.2					
26670	4.7	E /	4.1	5.3	E																		
26699	3.7	3.8	4.0	3.8	3.8	3.5/	3.5																
26704	3.5	2.7	E	E	3.6	3.2	3.9	3.6	E	3.1	3.6	3.5/	3.7	3.9	3.9	3.4							
26705	3.6	3.4	3.4	3.5	3.6	3.5	3.6	3.6/	E	4.0	3.7	4.1	3.7	3.6	3.9	3.6	3.6	3.5					
26714	3.4	3.2	3.0	3.7	3.3/	3.6	3.8	3.1	3.7	3.5	3.8	3.2	3.5	3.4	3.1								
MEAN	3.6																						
S.D.	0.32																						
S.E.	0.06																						
N	25																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

TABLE A17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

FETUS #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DAM # MEAN	GROUP	4:	450	MG/KG/DAY																			
26567	3.1	E	3.0	2.8	2.8	2.8	3.1	3.1	3.5	E /	E	3.2	3.3	2.9	3.0	3.3	3.1	2.8	3.1	E			
26572	2.9	2.8	E	E	3.0	3.0/	E	2.9	2.9	3.0	2.9	E	E										
26579	2.9	3.1	E	E	3.1	2.9/	3.2	2.5	E	2.9	3.1	2.9	3.0	3.0	2.9	2.6							
26591	3.0	2.6	3.1	3.5	3.2	3.1	3.0	E	3.3/	3.1	3.1	3.0	1.9	3.0	3.1	2.8	3.1	2.7					
26611	3.2	E	E	E	2.9	E	E	3.5	3.4/	E	3.1	E	3.4	E	3.1	E							
26617	3.1	E	3.2	3.3	3.1	3.0	3.2	3.5	3.1/	3.0	3.2	3.2	2.8	3.3	3.3	3.0	3.0	2.6					
26618	3.1	E	E	2.3	E	3.0	3.5	E	3.0	3.2/	2.9	3.5	3.6	3.1	3.3	2.9	2.8	3.0	3.1	3.3	E	E	
26622	2.9	2.9	2.9	3.5	2.6/	E	2.3	3.2	3.4	3.3	3.5	E	2.5	3.0	E	E	1.8						
26628	2.9	2.5	2.8	3.0	2.9	E	2.4	E	3.2	3.6/	2.8	3.0	2.9	2.6	3.1	3.3	3.3	3.0	3.0	2.5	2.6		
26629	3.6	3.7	3.5	3.7	3.9	3.9	3.6	3.5	3.3	3.5/	3.7	3.8	E	3.6	3.7	3.4							
26631	2.8	E	2.8	2.6	E	2.9	3.1	E	E	3.0/	3.0	2.8	3.0	E	2.9	2.6	2.6	E					
26635	3.3	E	3.1	3.6	3.3	3.4	3.4/	3.4	3.5	3.1	3.3	3.1	2.9										
26637	2.3	2.5	E /	2.0																			
26652	3.3	3.4	3.5	3.6	3.3	3.4	3.4	3.1	3.0/	3.5	3.0	3.3	3.7	3.2	3.3	3.1							
26654	2.9	2.5	2.8	2.7	3.3	2.4	3.2	E	E	2.8/	2.8	E	3.1	3.1	2.7	3.0	2.7						
26655	3.5	3.4	3.3	E	3.6	3.7	3.3	3.5	3.5/	3.5	3.4	3.4	3.7	3.5	3.7	E	3.4						
26656	3.4	E	2.6	3.2	3.5	3.9	3.5	3.5	3.5	3.8	3.4	E	3.5/	3.9	3.5	3.5	3.1	3.5	3.5	3.2	3.2		
26664	3.8	3.5	3.8	3.9	3.9	4.0	3.7	3.9	4.0/	3.4	4.1	3.9	3.8	3.1	3.5								
26669	2.8	E	E	2.9	2.0	E	2.9	2.6/	E	E	E	2.7	E	2.9	E	3.5	E						
26671	3.1	E	3.0	3.3	3.2/	3.0	2.9	3.0	3.1	3.4	3.5	2.8	3.3	2.9									
26675	3.0	2.6	L	3.1	2.3	3.2	3.3	E /	3.1	3.4	3.2	3.4	3.6	2.4	3.1	3.0	2.5						
26678	3.2	3.6	3.3	3.5	3.0	3.2	2.7/	2.8	2.8	3.4	3.7	3.6	3.1	3.3	2.7								
26688	3.0	2.9	E	3.1	2.8	3.0	3.1/	3.4	2.9	3.0	2.7	2.9	2.9	2.9	2.8								
26700	3.0	2.7	2.9	3.2	2.9	3.0	E	3.0	3.3	2.9	E /	2.8	3.1	3.2	3.4	E	3.1	2.9	2.6				
26717	3.2	3.4	3.4	E	3.2	3.1	3.3/	E	3.2	E	E	E	2.7										
MEAN	3.1																						
S.D.	0.30																						
S.E.	0.06																						
N	25																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

TABLE A17
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

FETUS #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DAM # MEAN	GROUP	5:	750	MG/KG/DAY																			
26568	2.8	E	2.6	E	2.8/	3.0	3.1	2.8	2.9	L	2.8	2.6											
26569	2.5	2.6	E	E	E	E	E /	E	E	2.4	E	E	E	E									
26581	2.7	E	E	E	E /	E	2.9	E	E	E	E	2.5	E	E	E								
26588	0.0	E	E	E	E	E	E	E	E	E /	E	E	E	E	E	E	E	E	E				
26592	3.1	E	E	E	3.2	E	E	E /	3.6	E	3.2	2.4	E	E									
26594	0.0	E	E	E	E	E	E	E /	E	E	E	E	E	E	E								
26597	3.6	E	E	E	E	E	E	E	E /	E	E	E	3.6	E	E	E	L						
26600	2.9	E	E	E	E	E	E	E /	E	E	3.2	E	E	E	2.6								
26601	1.7	1.6	E	E	E	E	E	1.9	E /	E	L	1.9	E	E	E	E	1.4						
26605	2.3	E	E	E	E	E	E	E	E	2.3	E /	E	E	E	E	E	E						
26608	0.0	E /	E	E	E	E	E	E	E														
26614	3.3	E	E	E	E	E	E	E	E /	E	3.3	E	E	E	E	E	E	E	E				
26620	3.2	E	E	E	2.9	E	E	3.4	3.4	3.7	E	E /	E	E	E	E	2.8	E	3.1	E	E		
26626	2.7	E	E	E	2.7	E /	E	E	E	E	E	E	E	2.7	E	E	E	E					
26632	0.0	E	E	E	E	E	E	E	E	E /	E	E	E	E	E	E	E	E					
26643	1.7	E	1.5	E	1.8	E	L	E /	E	E	L	E	L	1.9	L	E	E						
26649	2.6	E	E	2.0	E	2.4	2.3	2.2	3.0	E	3.2/	E	2.8	E	2.5	E	3.0	2.8	E	E			
26651	0.0	E	E	E	E	E /	E	E	E	E	E	E	E	E									
26658	2.6	E	E	2.4	E	E	E /	E	E	E	E	2.6	E	2.7	E	E	E	E					
26662	2.8	3.0	E	E	2.8	3.3/	2.5	3.1	2.8	2.9	E	2.9	2.8	2.7	E	2.5	2.6						
26673	3.2	E	E	E	E	E	E	3.3/	3.1	E	E	E	E	E	E	E							
26706	2.7	1.8	E	E	2.8	2.4	3.1	3.0	E /	E	3.2	2.8	E	E	E	E	E						
26712	2.7	E	E	E	E	2.9/	E	3.0	E	2.6	2.8	E	E	2.4	L	E	E	E					
MEAN	2.7																						
S.D.	0.49																						
S.E.	0.12																						
N	18																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 1

DAMS FROM GROUP 1:0 MG/KG/DAY SHAM FETUS # GRADE

26575

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	A	A	A	A	A	A/	A	A	A	A	A	A	A	A	A
SEX:	F	F	M	F	F	F	M	M	M	M	M	M	F	F	M
CEPHALIC:	2, 4, 6, 8, 10, 12, 14														

SKELETAL	2	V	CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	4	V	CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	7	V	CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	10	V	7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
NO REMARKABLE OBSERVATIONS				
EXTERNAL	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15			
VISCERAL	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15			
SKELETAL	1, 3, 5, 6, 8, 9, 11, 12, 13, 14, 15			

26577

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	A	E	E	A	A	A	A	A	A	A	A/	E	A	A	A
SEX:	M	-	-	M	M	M	F	F	M	M	F	-	F	M	F
CEPHALIC:	4, 6, 8, 10, 13, 15														

SKELETAL	1	V	14TH RUDIMENTARY RIB(S) BILATERAL	P
EXTERNAL	2		EARLY RESORPTION	
EXTERNAL	3		EARLY RESORPTION	
SKELETAL	5	V	14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	7	V	STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	8	V	14TH RUDIMENTARY RIB(S)	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 2

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26577	(CONTINUED)			
			LEFT	
SKELETAL		9	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		10	V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
SKELETAL		11	V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL		12	EARLY RESORPTION	
SKELETAL		13	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
SKELETAL		15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			1,4,5,6,7,8,9,10,11,13,14,15	
VISCERAL			1,4,5,6,7,8,9,10,11,13,14,15	
SKELETAL			4,6,14	
26584				
		1 2 3 4 5 6 7 8 9 10 11 12 13		
		A A/ A A A A A A A A A A A		
	SEX:	M M F M F M F M F F F M M		
	CEPHALIC:	1,3,5,7,9,11,13		
SKELETAL		4	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		5	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		7	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
SKELETAL		12	V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 3

DAMS FROM GROUP		1:0 MG/KG/DAY SHAM	FETUS #																	GRADE
26584	(CONTINUED)																			
			NO REMARKABLE OBSERVATIONS																	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13																	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13																	
	SKELETAL		1,2,3,6,8,10,11,13																	
26587			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
			A	A	A	A	A	A	A	A	A	A/	A	A	A	A	A	A	A	
		SEX:	F	M	M	M	M	F	F	F	F	F	F	M	M	M	F	M	F	
		CEPHALIC:	2,4,6,8,10,12,14																	
	SKELETAL		4	V CERVICAL CENTRUM #1 OSSIFIED																P
	SKELETAL		6	V CERVICAL CENTRUM #1 OSSIFIED																P
				V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																P
				#5																
	SKELETAL		8	V CERVICAL CENTRUM #1 OSSIFIED																P
	SKELETAL		9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																P
				#5																
	SKELETAL		10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																P
				#5																
	SKELETAL		11	V CERVICAL CENTRUM #1 OSSIFIED																P
	SKELETAL		12	V CERVICAL CENTRUM #1 OSSIFIED																P
				V 14TH RUDIMENTARY RIB(S)																P
				BILATERAL																
	SKELETAL		13	V CERVICAL CENTRUM #1 OSSIFIED																P
	SKELETAL		14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																P
				#5																
	SKELETAL		15	V CERVICAL CENTRUM #1 OSSIFIED																P
	SKELETAL		17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																P
				#5																

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 4

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26587	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	SKELETAL	1,2,3,5,7,16	
26590		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
	SEX:	A A A A E A/ A A A E A A A A A A A	
	CEPHALIC:	M F F F - F M F M - F F M M F F M	
	EXTERNAL	5 EARLY RESORPTION	
	EXTERNAL	10 EARLY RESORPTION	
	SKELETAL	14 V 7TH STERNEBRA	P
		LOCATED BETWEEN #5 AND #6	
	SKELETAL	16 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,6,7,8,9,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,6,7,8,9,11,12,13,14,15,16,17	
	SKELETAL	1,2,3,4,6,7,8,9,11,12,13,15,17	
26595		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
	SEX:	A A A E A A A A/ A A A A A A A E	
	CEPHALIC:	M F F - M F F F F F F F F M F -	
		2,5,7,9,11,13,15	
	SKELETAL	1 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	4 EARLY RESORPTION	
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 5

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26595	(CONTINUED)		
		#5	
SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	16	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,5,6,7,8,9,10,11,12,13,14,15	
VISCERAL		1,2,3,5,6,7,8,9,10,11,12,13,14,15	
SKELETAL		2,3,7,8,9,12,14	
26599		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		A A A A A A A A E/ A A A A A A A A A	
	SEX:	M F F M F F F F - M M M M M M M F M	
	CEPHALIC:	2,4,6,8,11,13,15,17	
EXTERNAL	1	M EXENCEPHALY WITH OR WITHOUT OPEN EYELID WITHOUT OPEN EYELID, BILATERAL M MICROPHTHALMIA AND/OR ANOPHTHALMIA MICROPHTHALMIA, RIGHT	
VISCERAL		CONFIRMATION OF EXENCEPHALY	P
		CONFIRMATION OF MICROPHTHALMIA	P
SKELETAL		V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 6

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26599	(CONTINUED)		
	SKELETAL	1 CONFIRMATION OF EXENCEPHALY FRONTAL, BILATERAL, PARIETAL, BILATERAL ABSENT	P
	SKELETAL	3 MICROPTHALMIA- NO APPARENT SKELETAL ORIGIN V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	P 1
	SKELETAL	4 #2 V 14TH RUDIMENTARY RIB(S)	P
	SKELETAL	7 LEFT V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	9 EARLY RESORPTION	
	SKELETAL	12 V BENT RIB(S) #5 THROUGH #12, RIGHT; #11, LEFT	1
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18	
	SKELETAL	2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18 2,5,6,8,10,11,13,14,15,16,17,18	
26606		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 A A A A A A/ A A A A A A A A A A SEX: F M F F M F M M M F F F F M F M F CEPHALIC: 1,3,5,7,9,11,13,15,17	
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	6 #5 V 14TH RUDIMENTARY RIB(S)	P
	SKELETAL	8 LEFT V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	11 #5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	14 #5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 7

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26606	(CONTINUED)		
		#5	
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	18	V PUBIS UNOSSIFIED	P
		BILATERAL	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
SKELETAL		1,2,3,5,7,9,10,12,13,16	
26625		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A E/ A A A A A A A A A A A	
	SEX:	F F F M - F M M M M F F M F F F	
	CEPHALIC:	2,4,7,9,11,13,15	
SKELETAL	1	V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	5	EARLY RESORPTION	
SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 8

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26625	(CONTINUED)		
		#5	
SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	16	V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
VISCERAL		1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
SKELETAL		3, 4, 7, 9, 11, 13	
26630		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	
	SEX:	A A A A A A A A A A A A A A A A A A A A	
	CEPHALIC:	M F F F M M F F M F F M F M F F F F F F F	
		1, 3, 5, 7, 9, 11, 13, 15, 17, 19	
SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	19	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 9

DAMS FROM GROUP 1:0 MG/KG/DAY SHAM FETUS # GRADE

26630 (CONTINUED)

#5
NO REMARKABLE OBSERVATIONS
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
1, 2, 3, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 18, 20

26634

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
A A E A A A/ A A A A A A A A A E
SEX: M M - F F M M M M F M F F M M M -
CEPHALIC: 1, 4, 6, 8, 10, 12, 14, 16

EXTERNAL 3 EARLY RESORPTION
SKELETAL 12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED

P

SKELETAL 13 V 14TH RUDIMENTARY RIB(S)
BILATERAL

P

EXTERNAL 17 EARLY RESORPTION

NO REMARKABLE OBSERVATIONS
1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16

26636

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
A A A A A A/ A A A A A A A A A A A
SEX: M F M F F F M F F M F F F F F F M F
CEPHALIC: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

SKELETAL 1 V CERVICAL CENTRUM #1 OSSIFIED
SKELETAL 2 V 14TH RUDIMENTARY RIB(S)
LEFT

P

P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 10

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26636	(CONTINUED)		
	SKELETAL	3 V 14TH RUDIMENTARY RIB(S) RIGHT	P
	SKELETAL	5 V 14TH RUDIMENTARY RIB(S) RIGHT	P
	SKELETAL	7 V 14TH RUDIMENTARY RIB(S) RIGHT	P
	SKELETAL	10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	18 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	19 V CERVICAL CENTRUM #1 OSSIFIED V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19 4,6,8,9,11,12,13,14,15,16,17	
26638		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 A A A A A A A A A/ A A A A A A SEX: F M M F M M F F F F F M F F F CEPHALIC: 1,3,5,7,9,11,13,15	
	SKELETAL	2 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	7 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 11

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26638	(CONTINUED)		
		#5	
SKELETAL		V REDUCED OSSIFICATION OF THE 13TH RIB(S) BILATERAL	1
SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	15	V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
		#2	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
SKELETAL		1,4,5,9,10,12	
26639		1 2 3 4 5 6 7	
		E E E/ E E E E	
SEX:		- - - - - - -	
EXTERNAL		1 EARLY RESORPTION	
EXTERNAL		2 EARLY RESORPTION	
EXTERNAL		3 EARLY RESORPTION	
EXTERNAL		4 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 12

DAMS FROM GROUP 1:0 MG/KG/DAY SHAM FETUS # GRADE

26639 (CONTINUED)

EXTERNAL 5 EARLY RESORPTION
EXTERNAL 6 EARLY RESORPTION
EXTERNAL 7 EARLY RESORPTION

26642

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A A A A A A A/ A A A A A A A A
SEX: F F F F F F F F F M M M F M M M M
CEPHALIC: 1,3,5,7,9,11,13,15

SKELETAL 1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED P
#5
SKELETAL 5 V 14TH RUDIMENTARY RIB(S) P
BILATERAL
SKELETAL 8 V CERVICAL CENTRUM #1 OSSIFIED P
SKELETAL 9 V 14TH RUDIMENTARY RIB(S) P
RIGHT
SKELETAL 10 V CERVICAL CENTRUM #1 OSSIFIED P
SKELETAL 12 V CERVICAL CENTRUM #1 OSSIFIED P
V 14TH RUDIMENTARY RIB(S) P
BILATERAL
SKELETAL 13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED P
#5
SKELETAL 14 V CERVICAL CENTRUM #1 OSSIFIED P
NO REMARKABLE OBSERVATIONS
EXTERNAL 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
VISCERAL 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
SKELETAL 2,3,4,6,7,11,15,16

26646

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
A A A A A A A A/ A A A A A A A A A
SEX: M F M M M M M M M F M F M F M M F F
CEPHALIC: 1,3,5,7,9,11,13,15,17

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 13

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26646	(CONTINUED)		
	SKELETAL	1 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	5 V 14TH RUDIMENTARY RIB(S) RIGHT	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V 7TH CERVICAL RIB(S) PINPOINT, LEFT	P
	SKELETAL	10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	18 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18 2,3,4,6,7,11,13,15,16	
26661		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 A A A A A A A A A/ A A E A A A	
	SEX:	M M F F F M F F M M F - M M F	
	CEPHALIC:	2,4,6,8,10,13,15	
	SKELETAL	1 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 14

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26661	(CONTINUED)			
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V 14TH RUDIMENTARY RIB(S)	P
	SKELETAL	7	BILATERAL	
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	EXTERNAL	12	EARLY RESORPTION	
	SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
	SKELETAL	15	V CERVICAL CENTRUM #1 OSSIFIED	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,13,14,15	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,13,14,15	
	SKELETAL		2,3,5,6,8,9	
26666		1 2 3 4 5 6 7 8 9 10 11 12 13 14		
		A A A A A A A/ A A A A A A A		
	SEX:	F M F F F F F M M F M F M M F		
	CEPHALIC:	1,3,5,7,9,11,13		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 15

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26666	(CONTINUED)		
		#5	
SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
SKELETAL		2,4,5,7,8,9,11,12	
26668		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A/ A E A A A A A A A E	
SEX:		F F M M F F - M F M F F M M -	
CEPHALIC:		1,3,5,8,10,12,14	
		7	EARLY RESORPTION
EXTERNAL		9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
SKELETAL		#5	
		12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
SKELETAL		#5	
		15	EARLY RESORPTION
EXTERNAL		NO REMARKABLE OBSERVATIONS	
		1,2,3,4,5,6,8,9,10,11,12,13,14	
EXTERNAL		1,2,3,4,5,6,8,9,10,11,12,13,14	
VISCERAL		1,2,3,4,5,6,8,10,11,13,14	
SKELETAL		1,2,3,4,5,6,8,10,11,13,14	
26674		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		A E A A A A/ A E A A A A A A	
SEX:		M - F M M F F - F F F M F F	
CEPHALIC:		1,4,6,9,11,13	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 16

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26674	(CONTINUED)		
EXTERNAL	2	EARLY RESORPTION	
SKELETAL	3	V 14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	4	V 14TH RUDIMENTARY RIB(S) RIGHT	P
VISCERAL	6	V SPLEEN- PALE	P
		V SPLEEN- SMALL	P
SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
EXTERNAL	8	EARLY RESORPTION	
SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	11	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
SKELETAL	13	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
SKELETAL	14	V 14TH RUDIMENTARY RIB(S) RIGHT	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14	
VISCERAL		1, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14	
SKELETAL		1, 5, 7, 10, 12	
26677		1 2 3 4 5 6 7 8 9 10 11 12 13	
		A A A A/ A E A A A A A A A	
SEX:	M M M M M	- M F M F F F F	
CEPHALIC:	2, 4, 7, 9, 11, 13		
EXTERNAL	6	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 17

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26677	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,7,8,9,10,11,12,13	
	VISCERAL	1,2,3,4,5,7,8,9,10,11,12,13	
	SKELETAL	1,2,3,4,5,7,8,9,10,11,12,13	
26680		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
	SEX:	A A A A A A/ A A A A A A A A A A A A	
	CEPHALIC:	M F M M F F M M F F F F F F F M F F	
		1,3,5,7,9,11,13,15,17	
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) BILATERAL	P P P
	SKELETAL	11 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	18 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #6	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	SKELETAL	1,4,7,9,12,13,14,15,16,17	
26687		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
	SEX:	A A A A A A A A A A A A/ A A A A A A	
	CEPHALIC:	F M M M M M M M F M M M M M F M F	
		2,4,6,8,10,12,14,16	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 18

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26687	(CONTINUED)		
	SKELETAL	2 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	10 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	11 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	14 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	17 V 14TH RUDIMENTARY RIB(S) LEFT	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	SKELETAL	1,3,4,5,6,7,8,9,12,16	
26713		1 2 3 4 5 6 7 8 9 10 11 12 13 14 A A E A A A A A A A/ A A A A SEX: M F - F M M M F F F F F F CEPHALIC: 2,5,7,9,11,13	
	EXTERNAL	3 EARLY RESORPTION	
	SKELETAL	4 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 19

DAMS FROM GROUP		1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26713	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,4,5,6,7,8,9,10,11,12,13,14	
	VISCERAL		1,2,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		1,2,5,6,7,8,9,10,11,13,14	
26718			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
			A A E A A A A/ A A A A A E A A	
	SEX:		F F - M F F M F M F M F - F M	
	CEPHALIC:		1,4,6,8,10,12,15	
	SKELETAL		1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL		3 EARLY RESORPTION	
	EXTERNAL		13 EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,4,5,6,7,8,9,10,11,12,14,15	
	VISCERAL		1,2,4,5,6,7,8,9,10,11,12,14,15	
	SKELETAL		2,4,5,6,7,8,9,10,11,12,14,15	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 20

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26565		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 A A A A A A E/ A A A A A A E A A A SEX: F F F F F M - F F F F F F - M M F CEPHALIC: 2,4,6,10,12,13,16	
EXTERNAL		7 EARLY RESORPTION	
SKELETAL		9 V BENT RIB(S)	1
		#4 THROUGH #10, RIGHT; #5 THROUGH #10 AND #12, LEFT	
SKELETAL		10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL		12 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL		14 EARLY RESORPTION	
SKELETAL		17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,8,9,10,11,12,13,15,16,17	
VISCERAL		1,2,3,4,5,6,8,9,10,11,12,13,15,16,17	
SKELETAL		1,2,3,4,5,6,8,11,15,16	
26570		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 A E A A E E A A A/ A A A A A A SEX: F - F M - - F M M F F M M M F CEPHALIC: 1,4,8,10,12,14	
EXTERNAL		2 EARLY RESORPTION	
EXTERNAL		5 EARLY RESORPTION	
EXTERNAL		6 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 21

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26570	(CONTINUED)		
	SKELETAL	11 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,3,4,7,8,9,10,11,12,13,14,15	
	VISCERAL	1,3,4,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,3,4,7,8,9,10,12,13,14,15	
26573		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A A A A A A A/ A A A A A A	
	SEX:	F M F M F F M M M F F M F F F M	
	CEPHALIC:	2,4,6,8,10,12,14,16	
	EXTERNAL	3 M FACIAL CLEFT	
		UPPER ROSTRAL REGION, BILATERAL	
	VISCERAL	CONFIRMATION OF FACIAL CLEFT	P
	SKELETAL	CONFIRMATION OF FACIAL CLEFT	P
		NASAL REDUCED IN OSSIFICATION, MODERATE, BILATERAL AND FUSED	
		ALONG INTERNASAL SUTURE; PREMAXILLA REDUCED IN OSSIFICATION,	
		MODERATE, BILATERAL; MAXILLA REDUCED IN OSSIFICATION,	
		MODERATE, BILATERAL	
	SKELETAL	7 V 14TH RUDDIMENTARY RIB(S)	P
		BILATERAL	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,4,5,6,7,8,9,10,11,12,13,14,15,16	
	VISCERAL	1,2,4,5,6,7,8,9,10,11,12,13,14,15,16	
	SKELETAL	1,2,4,5,6,8,9,10,11,12,13,14,15,16	
26576		1 2 3 4 5 6 7 8 9	
		A A A A A/ A A A A	
	SEX:	F M F F M F M M M	
	CEPHALIC:	1,3,5,7,9	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 22

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26576	(CONTINUED)		
	SKELETAL	2 V BENT RIB(S) #5 THROUGH #8, #10 AND #11, RIGHT	1
	SKELETAL	3 V BENT RIB(S) #6 AND #7, RIGHT	1
	SKELETAL	4 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7 V BENT RIB(S) #5 THROUGH #9, LEFT; #4 THROUGH # 12, RIGHT	1
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9	
	SKELETAL	1,2,3,4,5,6,7,8,9 1,8,9	
26580		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 E A A A A E A A A A/ A A A A A A A SEX: - M F F M - M F M M M M F F F F M F CEPHALIC: 2,4,7,9,11,13,15,17	
	EXTERNAL	1 EARLY RESORPTION	
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	6 EARLY RESORPTION	
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	18 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 23

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26580	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
EXTERNAL		2,3,4,5,7,8,9,10,11,12,13,14,15,16,17,18	
VISCERAL		2,3,4,5,7,8,9,10,11,12,13,14,15,16,17,18	
SKELETAL		2,4,5,7,9,10,11,12,13,14,15,16,17	
26582		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A E E A A A A/ A A A A A A A A A	
	SEX:	F - - M M M F M M F M F F M M F	
	CEPHALIC:	1,5,7,9,11,13,15	
EXTERNAL		2 EARLY RESORPTION	
EXTERNAL		3 EARLY RESORPTION	
VISCERAL		8 V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	1
		URETER, BILATERAL	
SKELETAL		9 V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
VISCERAL		14 LIVER- AREA(S), WHITE	P
		MULTIPLE, PINPOINT, RIGHT AND MEDIAN LOBES	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,4,5,6,7,8,9,10,11,12,13,14,15,16	
VISCERAL		1,4,5,6,7,9,10,11,12,13,15,16	
SKELETAL		1,4,5,6,7,8,10,11,12,13,14,15,16	
26589		1 2 3 4 5 6 7 8 9 10 11 12 13	
		A/ A A A A A A A A A A A A	
	SEX:	F M F M F M M F M F F M M	
	CEPHALIC:	2,4,6,8,10,12	
SKELETAL		9 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 24

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26589	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	SKELETAL	1,2,3,4,5,6,7,8,10,11,12,13	
26593		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A A A A/ A A E A A A A A A	
	SEX:	M F F M M F M M M - F M M M M F	
	CEPHALIC:	2,4,6,8,11,13,15	
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	10 EARLY RESORPTION	
	SKELETAL	16 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,11,12,13,14,15,16	
	VISCERAL	1,2,3,4,5,6,7,8,9,11,12,13,14,15,16	
	SKELETAL	1,2,3,4,5,6,8,11,12,13,14,15	
26602		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		E A E A A A A A E/ A A A A A A A A	
	SEX:	- F - F M M F M - F F M F F M F F	
	CEPHALIC:	2,5,7,10,12,14,16	
	EXTERNAL	1 EARLY RESORPTION	
	EXTERNAL	3 EARLY RESORPTION	
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	9 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017 TABLE A18
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 25

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26602	(CONTINUED)		
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	2,4,5,6,7,8,10,11,12,13,14,15,16,17	
	SKELETAL	2,4,5,6,7,8,10,11,12,13,14,15,16,17	
26603		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
	SEX:	A E E A A A A E A A/ A A A A A A A	
	CEPHALIC:	F - - M M M M - M M M M M F F F F F	
	EXTERNAL	2 EARLY RESORPTION	
	EXTERNAL	3 EARLY RESORPTION	
	EXTERNAL	8 EARLY RESORPTION	
	SKELETAL	18 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,4,5,6,7,9,10,11,12,13,14,15,16,17,18	
	SKELETAL	1,4,5,6,7,9,10,11,12,13,14,15,16,17,18	
26604		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
	SEX:	A A A A E A A A/ A E A E A A	
	CEPHALIC:	F M M M - F F M F - M - F M	
	EXTERNAL	5 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 26

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26604	(CONTINUED)		
	EXTERNAL	10 EARLY RESORPTION	
	EXTERNAL	12 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,6,7,8,9,11,13,14	
	VISCERAL	1,2,3,4,6,7,8,9,11,13,14	
	SKELETAL	1,2,3,4,6,7,8,9,11,13,14	
26609		1 2 3 4 5 6 7 8 9 10 11 12 13	
		A A A A A/ A A A A A A A E	
	SEX:	F M M F F F M M F M F F -	
	CEPHALIC:	2,4,6,8,10,12	
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	13 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12	
	SKELETAL	1,2,3,4,6,7,8,9,10,11,12	
26613		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		E A E A A/ A A A A A A A A A A A A	
	SEX:	- M - M M M M F F F M M M M M M M	
	CEPHALIC:	4,6,8,10,12,14,16	
	EXTERNAL	1 EARLY RESORPTION	
	EXTERNAL	3 EARLY RESORPTION	
	SKELETAL	7 V 7TH CERVICAL RIB(S)	P
		PINPOINT, LEFT	
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 27

DAMS FROM GROUP 2:0 MG/KG/DAY VEH. FETUS # GRADE

26613 (CONTINUED)

#5
NO REMARKABLE OBSERVATIONS
2,4,5,6,7,8,9,10,11,12,13,14,15,16,17
2,4,5,6,7,8,9,10,11,12,13,14,15,16,17
2,4,5,6,8,9,10,12,13,14,15,16,17

26621

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
A A A A A E A A A A/ A A A A A E A
SEX: M F M F F - F M F F M M M M F F - F
CEPHALIC: 2,4,7,9,11,13,15,18

SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	3	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	4	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	5	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
EXTERNAL	6	EARLY RESORPTION	
SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	8	V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
SKELETAL	9	V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
		V 27 PRESACRAL VERTEBRAE	P
SKELETAL	10	V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
SKELETAL	11	V 14TH RUDIMENTARY RIB(S)	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 28

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26621	(CONTINUED)		
		BILATERAL	
SKELETAL	12	V 14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	13	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
SKELETAL	14	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
SKELETAL	16	V 14TH RUDIMENTARY RIB(S) RIGHT	P
EXTERNAL	17	EARLY RESORPTION	
SKELETAL	18	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #6	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18	
VISCERAL		1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18	
SKELETAL		2, 15	
26623		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A A A/ A A A A A A A A	
	SEX:	F F F F F M M M F M M F M M M	
	CEPHALIC:	2, 4, 6, 8, 10, 12, 14	
SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017 TABLE A18
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 29

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26623	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,13,15	
26650		1 2 3 4 5 6 7 8 9 10 11 12 13	
	SEX:	A A A A A A A/ A A A A A A	
	CEPHALIC:	F M M M F M F F M M M M F	
		1,3,5,7,9,11,13	
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	VISCERAL	8 V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	P
		KIDNEY, LEFT (WOO AND HOAR GRADE 0); URETER, SLIGHT, LEFT	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	VISCERAL	1,2,3,4,5,6,7,9,10,11,12,13	
	SKELETAL	1,2,3,4,6,7,8,9,10,11,12,13	
26659		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
	SEX:	A A A A E/ A A A A A A A A A	
	CEPHALIC:	F M M F - M M F F M M F F M M	
		2,4,7,9,11,13,15	
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	5 EARLY RESORPTION	
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 30

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26659	(CONTINUED)		
	SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,6,7,8,9,10,11,12,13,14,15	
	VISCERAL	1,2,3,4,6,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,2,3,6,7,8,9,10,11,12	
26663		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	
		A A A A A A A A A A A A A A A A A A	
	SEX:	M M F M M M M F F F M M M M F M F F F	
	CEPHALIC:	2,4,6,8,10,12,14,16,18	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	4 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	19 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 31

DAMS FROM GROUP 2:0 MG/KG/DAY VEH. FETUS # GRADE

26663 (CONTINUED)

NO REMARKABLE OBSERVATIONS

EXTERNAL 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19
VISCERAL 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19
SKELETAL 5,6,9,12,13,14,16,18

26665

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
A A A A A A/ L A A A A E A A A A A
SEX: M M F M M F - F M M F - M F M F M
CEPHALIC: 2,4,6,9,11,14,16

SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
VISCERAL	5	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S) URETER, BILATERAL RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1) BILATERAL	2 P
SKELETAL		V CERVICAL CENTRUM #1 OSSIFIED V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P P
VISCERAL	6	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S) URETER, LEFT	1
SKELETAL		V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL	7	LATE RESORPTION CROWN-RUMP LENGTH: 2.7 CM, MUMMIFIED	
SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL	12	EARLY RESORPTION	
SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	15	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 32

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26665	(CONTINUED)		
		#5	
SKELETAL	17	V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL		NO REMARKABLE OBSERVATIONS	
VISCERAL		1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17	
SKELETAL		1, 2, 3, 4, 8, 9, 10, 11, 13, 14, 15, 16, 17	
		1, 2, 4, 9, 10, 11	
26672		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A A A/ A A A A A A A	
	SEX:	M M M F M F F M M M M F M F M	
	CEPHALIC:	1, 3, 5, 7, 9, 11, 13, 15	
SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	4	#5 V 14TH RUDIMENTARY RIB(S) LEFT	P
VISCERAL	5	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S) URETER, BILATERAL	1
SKELETAL		V 14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	6	V 14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	7	V 14TH RUDIMENTARY RIB(S) LEFT	P
VISCERAL	8	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S) URETER, LEFT	1
SKELETAL	9	V 14TH RUDIMENTARY RIB(S) RIGHT	P
SKELETAL	10	V 14TH RUDIMENTARY RIB(S) RIGHT	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 33

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26672	(CONTINUED)			
	VISCERAL	12	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	1
			URETER, RIGHT	
	SKELETAL	14	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	EXTERNAL		NO REMARKABLE OBSERVATIONS	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	SKELETAL		1,2,3,4,6,7,9,10,11,13,14,15	
			2,3,8,11,12,13,15	
26676		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		
		A A A A A A A A/ A A A A A A A A A		
	SEX:	M F F F F F M M M M M M M F F M F F		
	CEPHALIC:	1,3,5,7,9,11,13,15,17		
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	6	M MICROPHTHALMIA AND/OR ANOPHTHALMIA	
			MICROPHTHALMIA, RIGHT	
	VISCERAL		CONFIRMATION OF MICROPHTHALMIA	P
	SKELETAL		CONFIRMATION OF MICROPHTHALMIA	P
			ORBIT APPEARS SMALLER THAN NORMAL, RIGHT	
			V 7TH CERVICAL RIB(S)	P
			INTERMEDIATE, RIGHT	
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
			M RIB ANOMALY	P
			RIGHT RIBS #2 AND #3 FUSED, ENTIRE LENGTH; RIGHT COSTAL	
			CARTILAGES #2 AND #3 FUSED AND BIFURCATE PRIOR TO JOINING	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 34

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26676	(CONTINUED)		
SKELETAL		STERNUM IN NORMAL #2 AND #3 POSITIONS, RESPECTIVELY M COSTAL CARTILAGE ANOMALY COSTAL CARTILAGE ARISING FROM RIGHT 7TH CERVICAL RIB AND RIGHT COSTAL CARTILAGE #1 FUSED AND BIFURCATE PRIOR TO JOINING STERNUM IN NORMAL #1 POSITION	P
SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL		NO REMARKABLE OBSERVATIONS	
VISCERAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15,16,17,18	
SKELETAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15,16,17,18 1,3,5,8,10,11,12,13,15,17,18	
26681		1 2 3 4 5 6 7 8 9 10 11 A A A A A/ A A A A A A SEX: F M M F F F F M M F M CEPHALIC: 2,4,6,8,10	
SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL		NO REMARKABLE OBSERVATIONS	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11	
SKELETAL		1,2,3,4,5,6,7,8,9,10,11 1,3,4,5,6,7,8,9,10	
26692		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 A A E A A A A A A/ A A E A A A SEX: M M - M F F M M F M F M - M M M CEPHALIC: 1,4,6,8,10,12,15	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 35

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26692	(CONTINUED)		
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	3 EARLY RESORPTION	
	SKELETAL	12 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	13 EARLY RESORPTION	
	SKELETAL	15 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,4,5,6,7,8,9,10,11,12,14,15,16	
	VISCERAL	1,2,4,5,6,7,8,9,10,11,12,14,15,16	
	SKELETAL	2,4,5,6,7,8,9,10,11,14,16	
26694		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
	SEX:	M M M M M M F M F M M M M F M M	
	CEPHALIC:	1,3,5,7,9,11,13,15	
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	SKELETAL	1,2,3,4,7,8,9,10,11,12,13,16	
26709		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
	SEX:	M M F F M F F F M F M F F F M F M F	
	CEPHALIC:	2,4,6,8,10,12,14,16,18	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 36

DAMS FROM GROUP 2:0 MG/KG/DAY VEH.		FETUS #		GRADE
26709	(CONTINUED)			
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	6	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2	
			V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	2
			#3	
	SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	SKELETAL		1,2,4,5,7,9,10,11,12,14,15,16,17,18	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 37

DAMS FROM GROUP 3: 100 MG/KG/DAY		FETUS #	GRADE
26566		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 A A A A A E E/ A E A A A A A E E SEX: M M M F F - - F - F F F F F F - - CEPHALIC: 1,3,5,10,12,14	
	SKELETAL	3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL	6 EARLY RESORPTION	
	EXTERNAL	7 EARLY RESORPTION	
	EXTERNAL	9 EARLY RESORPTION	
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6 V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED #4	P
	EXTERNAL	16 EARLY RESORPTION	
	EXTERNAL	17 EARLY RESORPTION	
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,8,10,11,12,13,14,15	
	SKELETAL	1,2,3,4,5,8,10,11,12,13,14,15 1,2,5,8,10,11,15	
26574		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 A A A E A A/ A A A A A A A A A SEX: M M M - F F F F F F F M F M M M CEPHALIC: 1,3,6,8,10,12,14,16	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 38

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26574	(CONTINUED)		
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	4 EARLY RESORPTION	
	SKELETAL	6 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
		V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
		RIGHT	
	SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,5,6,7,8,9,10,11,12,13,14,15,16	
	VISCERAL	1,2,3,5,6,7,8,9,10,11,12,13,14,15,16	
	SKELETAL	1,2,5,8,11,12,13,15,16	
26578		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A/ A A A A A A A E E A	
	SEX:	M F F M F F F M F M M M M F - - F	
	CEPHALIC:	1,3,5,7,9,11,13,17	
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	3 V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
		LEFT	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	6 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	12 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 39

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26578	(CONTINUED)		
		#5	
EXTERNAL		15 EARLY RESORPTION	
EXTERNAL		16 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,17	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,17	
SKELETAL		1,4,5,7,8,10,11,13,17	
26585		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		A A A A A A E/ A A A A A A A	
	SEX:	M M F F F M - F F M M F F M	
	CEPHALIC:	2,4,6,9,11,13	
SKELETAL		1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL		3 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL		6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		V BENT RIB(S)	1
		#5 THROUGH #7 AND #11, LEFT; #11 AND #12, RIGHT	
EXTERNAL		7 EARLY RESORPTION	
SKELETAL		8 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		11 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL		13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL		14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 40

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26585	(CONTINUED)		
		#5	
SKELETAL		V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14	
VISCERAL		1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14	
SKELETAL		2, 4, 5, 9, 10	
26586		1 2 3 4 5 6 7 8	
		E/ A A A A A A A A	
	SEX:	- F M F M M M M	
	CEPHALIC:	2, 4, 6, 8	
EXTERNAL		1 EARLY RESORPTION	
SKELETAL		2 V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
SKELETAL		3 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		6 V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
		V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		2, 3, 4, 5, 6, 7, 8	
VISCERAL		2, 3, 4, 5, 6, 7, 8	
SKELETAL		4, 5, 7, 8	
26598		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		A E A A A A A A A/ A A A A A A A A	
	SEX:	M - M M M M M F M F M F M M M M F	
	CEPHALIC:	1, 4, 6, 8, 10, 12, 14, 16, 18	
SKELETAL		1 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 41

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26598	(CONTINUED)		
	EXTERNAL	2	EARLY RESORPTION
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	5	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)
		#4	
		V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED
		V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED
		V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	16	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	17	V CERVICAL CENTRUM #1 OSSIFIED
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	VISCERAL	1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	
	SKELETAL	13,15,18	
26607		1 2 3 4 5 6 7 8 9 10 11 12 13	
		A A A A E A A A A/ A A A A	
	SEX:	F M F F - M M M F M F F F	
	CEPHALIC:	2,4,7,9,11,13	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 42

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26607	(CONTINUED)		
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	5 EARLY RESORPTION	
	SKELETAL	7 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,6,7,8,9,10,11,12,13	
	SKELETAL	1,2,3,4,6,7,8,9,10,11,12,13	
26610		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A A A A/ A A A A A A A A	
	SEX:	M F F M F F M F M M F F M F F F M	
	CEPHALIC:	1,3,5,7,9,11,13,15,17	
	SKELETAL	3 V 7TH CERVICAL RIB(S)	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 43

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #		GRADE
26610	(CONTINUED)			
		4	INTERMEDIATE, BILATERAL V 14TH RUDIMENTARY RIB(S) LEFT	P
		5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		14	V 7TH CERVICAL RIB(S) INTERMEDIATE, LEFT V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		16	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT	P
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
VISCERAL			1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
SKELETAL			1,2,6,7,8,9,11,12,13,15,17	
26612		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		
		A A A A/ A E A A A E A A A A A A		
	SEX:	M F F M F - F M F - M M F F M F		
	CEPHALIC:	1,3,5,8,11,13,15		
		1	V CERVICAL CENTRUM #1 OSSIFIED	P
		2	V CERVICAL CENTRUM #1 OSSIFIED	P
		3	V CERVICAL CENTRUM #1 OSSIFIED	P
		5	RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1) RIGHT	P
EXTERNAL		6	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 44

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26612	(CONTINUED)		
	SKELETAL	7 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#6	
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	10 EARLY RESORPTION	
	SKELETAL	13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,7,8,9,11,12,13,14,15,16	
	VISCERAL	1,2,3,4,7,8,9,11,12,13,14,15,16	
	SKELETAL	4,5,11,12,14,15,16	
26616		1 2 3 4 5 6 7 8 9 10 11 12 13	
		A A A A A/ A A A A A A A A	
	SEX:	F M M M M F F M M F M F M	
	CEPHALIC:	1,3,5,7,9,11,13	
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	SKELETAL	1,2,3,4,7,8,12	
26624		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A/ A A A A A A A A A A	
	SEX:	M M F M F M M F M M F M F M F	
	CEPHALIC:	1,3,5,7,9,11,13,15	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 45

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26624	(CONTINUED)		
	SKELETAL	2 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,3,4,5,6,7,9,10,11,13,14	
26627		1 2 3 4 5 6 7 8 9 10 11 12 13 A A A A A/ A A A A A A A A SEX: M M M F F F M M M F F F F CEPHALIC: 2,4,6,8,10,12	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	VISCERAL	7 M INTERVENTRICULAR SEPTAL DEFECT A 1 MM IN DIAMETER OPENING IN THE ANTERIOR PORTION OF THE SEPTUM	P
	SKELETAL	M STERNOSCHISIS	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 46

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26627	(CONTINUED)		
		STERNAL BANDS NOT JOINED, ENTIRE LENGTH	
SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13	
VISCERAL		1,2,3,4,5,6,8,9,10,11,12,13	
SKELETAL		2,6,8,12	
26641		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		A A A A A A A A A A/ A A E A A A A A	
	SEX:	M F F F F F M M M M F M M - F M F M M	
	CEPHALIC:	2,4,6,8,10,12,15,17	
SKELETAL	1	V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
SKELETAL	2	V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	5	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 47

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26641	(CONTINUED)		
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	13 #5 EARLY RESORPTION	
	SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,14,15,16,17,18	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,14,15,16,17,18	
	SKELETAL	4,6,7,8,10,11,12,15,16,17,18	
26644		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A A A A A A/ A A A A A A A	
	SEX:	F M F M M M M M F M M M F M M F	
	CEPHALIC:	1,3,5,7,9,11,13,15	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
26645		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A E A A A/ A A A A A A A A A A	
	SEX:	F - M F M M F F M F F M M M M F	
	CEPHALIC:	3,5,7,9,11,13,15	
	SKELETAL	1 V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
		RIGHT	
	EXTERNAL	2 EARLY RESORPTION	
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 48

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26645	(CONTINUED)		
		#5	
SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	16	V CERVICAL CENTRUM #1 OSSIFIED	P
		V REDUCED OSSIFICATION OF THE 13TH RIB(S)	2
		BILATERAL	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
VISCERAL		1,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
SKELETAL		3,4,5,6,7,9,10,11,12,13,15	
26647		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A A A/ A A A A A A A	
SEX:	F M F M F F M M F F F F F F M		
CEPHALIC:	2,4,6,8,10,12,14		
SKELETAL	1	V 7TH CERVICAL RIB(S)	P
		PINPOINT, LEFT	
SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	11	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
SKELETAL		2,4,6,8,10,12,13,14,15	
26648		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A A/ A A A A A A A A	
SEX:	M M F M M F F F F M M M M F F F		
CEPHALIC:	1,3,5,7,9,11,13,15,17		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 49

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26648	(CONTINUED)		
	SKELETAL	4 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	5 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	8 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	11 V 14TH RUDIMENTARY RIB(S) LEFT	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	12 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	VISCERAL	17 RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1) LEFT	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16 1,2,3,6,7,9,10,14,16,17	
26653		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 A E A A/ A A A A E A A A A A A A A SEX: M - M M F F M F - M F M F F F F F M CEPHALIC: 3,5,7,10,12,14,16,18	
	EXTERNAL	2 EARLY RESORPTION	
	EXTERNAL	9 EARLY RESORPTION	
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
 SPONSOR:AMERICAN PETROLEUM

TABLE A18
 RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 50

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26653	(CONTINUED)		
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18	
	VISCERAL	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18	
	SKELETAL	1, 3, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16, 17, 18	
26657		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		A A A A A A/ A A A A A A A A	
	SEX:	M M F F F M F M F F F M F F	
	CEPHALIC:	2, 4, 6, 8, 10, 12, 14	
	SKELETAL	1 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
		V 7TH CERVICAL RIB(S)	P
		PINPOINT, RIGHT	
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
	VISCERAL	6 V ACCESSORY SPLEEN(S)	P
		ONE, PINPOINT	
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	
	VISCERAL	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14	
	SKELETAL	4, 6, 8, 10, 11, 12, 13, 14	
26667		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A A A A/ A A A E A A A	
	SEX:	M M F F M F F F F M M F F - M M M	
	CEPHALIC:	2, 4, 6, 8, 10, 12, 15, 17	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 51

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26667	(CONTINUED)		
	SKELETAL	1 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	4 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	14 EARLY RESORPTION	
	SKELETAL	15 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	16 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17	
	SKELETAL	2,6,13	
26670		1 2 3 4	
		E/ A A E	
	SEX:	- F M -	
	CEPHALIC:	2	
	EXTERNAL	1 EARLY RESORPTION	
	EXTERNAL	4 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 52

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26670	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,3	
	VISCERAL	2,3	
	SKELETAL	2,3	
26699		1 2 3 4 5 6	
		A A A A A/ A	
	SEX:	M M M M F F	
	CEPHALIC:	2,4,6	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6	
	VISCERAL	1,2,3,4,5,6	
	SKELETAL	2,4,6	
26704		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A E E A A A A E A A A/ A A A A	
	SEX:	F - - F F M M - F F F F F M M	
	CEPHALIC:	1,5,7,10,12,14	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	2 EARLY RESORPTION	
	EXTERNAL	3 EARLY RESORPTION	
	EXTERNAL	8 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 53

DAMS FROM GROUP	3: 100 MG/KG/DAY	FETUS #	GRADE
26704	(CONTINUED)		
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,4,5,6,7,9,10,11,12,13,14,15	
	VISCERAL	1,4,5,6,7,9,10,11,12,13,14,15	
	SKELETAL	4,5,6,7,10,11,13	
26705		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A A/ E A A A A A A A A A	
	SEX:	M M F M F M F - M F M F M M M M F	
	CEPHALIC:	2,4,6,9,11,13,15,17	
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	8 EARLY RESORPTION	
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	16 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,9,10,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,5,6,7,9,10,11,12,13,14,15,16,17	
	SKELETAL	1,3,4,6,7,9,10,11,13,14,15,17	
26714		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		A A A A/ A A A A A A A A A A	
	SEX:	M F M F M M F M M M F M F F	
	CEPHALIC:	1,3,5,7,9,11,13	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 54

DAMS FROM GROUP 3: 100 MG/KG/DAY		FETUS #		GRADE
26714	(CONTINUED)			
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		1,2,3,5,6,9,10,12,13,14	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 55

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26567		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 E A A A A A A A E/ E A A A A A A A E SEX: - M F M F M M F - - M F F F F M M M - CEPHALIC: 3,5,7,11,13,15,17 EXTERNAL 1 EARLY RESORPTION EXTERNAL 9 EARLY RESORPTION EXTERNAL 10 EARLY RESORPTION SKELETAL 11 V 14TH RUDIMENTARY RIB(S) LEFT P SKELETAL 17 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED P SKELETAL 18 V 14TH RUDIMENTARY RIB(S) RIGHT P EXTERNAL 19 EARLY RESORPTION NO REMARKABLE OBSERVATIONS EXTERNAL 2,3,4,5,6,7,8,11,12,13,14,15,16,17,18 VISCERAL 2,3,4,5,6,7,8,11,12,13,14,15,16,17,18 SKELETAL 2,3,4,5,6,7,8,12,13,14,15,16	
26572		1 2 3 4 5 6 7 8 9 10 11 12 A E E A A/ E A A A E E SEX: M - - F F - M F F M - - CEPHALIC: 1,5,8,10 SKELETAL 1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED P EXTERNAL 2 EARLY RESORPTION EXTERNAL 3 EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 56

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26572	(CONTINUED)			
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	6	EARLY RESORPTION	
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	10	V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	NO REMARKABLE OBSERVATIONS		
	VISCERAL	1,4,5,7,8,9,10		
	SKELETAL	1,4,5,7,8,9,10		
		8,9		
26579		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		A E E A A/ A A E A A A A A A		
	SEX:	M - - M F M F - M F F F F F F		
	CEPHALIC:	4,6,9,11,13,15		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 57

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26579	(CONTINUED)		
		#5	
SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	7	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	8	EARLY RESORPTION	
SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1,4,5,6,7,9,10,11,12,13,14,15	
VISCERAL		1,4,5,6,7,9,10,11,12,13,14,15	
SKELETAL		6	
26591		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		A A A A A A E A/ A A A A A A A A A	
SEX:		F M M M M F - F M M F M M M F F M	
CEPHALIC:		2,4,6,9,11,13,15,17	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 58

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26591	(CONTINUED)		
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	5 V REDUCED OSSIFICATION OF THE 13TH RIB(S) LEFT	1
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	7 EARLY RESORPTION	
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	13 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	15 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	16 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16,17	
	SKELETAL	2,3,4,10,12,17	
26611		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		E E E A E E A A/ E A E A E A E	
	SEX:	- - - F - - M F - F - F - M -	
	CEPHALIC:	8,10,14	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 59

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26611	(CONTINUED)		
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	5	EARLY RESORPTION
	EXTERNAL	6	EARLY RESORPTION
	VISCERAL	8	RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)
			LEFT
	EXTERNAL	9	EARLY RESORPTION
	EXTERNAL	11	EARLY RESORPTION
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	15	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	4,7,8,10,12,14	
	VISCERAL	4,7,10,12,14	
	SKELETAL	4,7,8,10,12,14	
26617		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		E A A A A A A A/ A A A A A A A A	
	SEX:	- M F M F F F M M F F F M M M F F	
	CEPHALIC:	3,5,7,9,11,13,15,17	
	EXTERNAL	1	EARLY RESORPTION
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
			#5
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
			#5
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
			#5
	SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
			#5

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 60

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26617	(CONTINUED)		
	SKELETAL	9 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #3 AND #4	1
	SKELETAL	10 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #5	1
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	V 27 PRESACRAL VERTEBRAE V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	VISCERAL	16 V SPLEEN- PALE	P
	SKELETAL	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
	VISCERAL	17 V SPLEEN- PALE	P
		V LIVER- ACCESSORY LOBULE(S) ONE, 2 X 2 X 1 MM, ATTACHED TO MEDIAN LOBE	P
	SKELETAL	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
	SKELETAL	2,3,4,5,6,7,8,9,10,11,12,13,14,15 2,3,7,15	
26618		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 E E A E A A E A A/ A A A A A A A A E E	
	SEX:	- - F - M M - M F F F M F M F F F M F - -	
	CEPHALIC:	3,6,9,11,13,15,17,19	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 61

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26618	(CONTINUED)			
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL	12	V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
	SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	20	EARLY RESORPTION	
	EXTERNAL	21	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.: WIL-402017
 SPONSOR: AMERICAN PETROLEUM

TABLE A18
 RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 62

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26618	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
EXTERNAL		3, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	
VISCERAL		3, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	
SKELETAL		5, 6, 14, 18, 19	
26622		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A/ E A A A A E A A E E A	
	SEX:	F F M F - F M M M M - M M - - F	
	CEPHALIC:	1, 3, 6, 8, 10, 13	
SKELETAL		1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
VISCERAL		4 V SPLEEN- SMALL	P
SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
EXTERNAL		5 EARLY RESORPTION	
VISCERAL		6 V SPLEEN- SMALL	P
SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL		11 EARLY RESORPTION	
EXTERNAL		14 EARLY RESORPTION	
EXTERNAL		15 EARLY RESORPTION	
EXTERNAL		16 M MICROPHTHALMIA AND/OR ANOPHTHALMIA MICROPHTHALMIA, LEFT	
VISCERAL		CONFIRMATION OF MICROPHTHALMIA	P
SKELETAL		CONFIRMATION OF MICROPHTHALMIA ORBIT SMALLER THAN NORMAL, LEFT	P
		V STERNEBRA(E) #1, #2, #3 AND/OR #4 UNOSSIFIED #2	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 63

DAMS FROM GROUP 4: 450 MG/KG/DAY FETUS # GRADE

26622 (CONTINUED)

#5 AND #6
NO REMARKABLE OBSERVATIONS
1,2,3,4,6,7,8,9,10,12,13
1,2,3,7,8,9,10,12,13
2,3,7,8,9,10,12,13

EXTERNAL
VISCERAL
SKELETAL

26628

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
A A A A E A E A A/ A A A A A A A A A A
SEX: F F F M - M - M F M F M F F M M M F F M
CEPHALIC: 1,3,6,9,11,13,15,17,19

SKELETAL

1 V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED
#2
V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED

P

P

SKELETAL

2 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
#5

P

SKELETAL

3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
#5

P

SKELETAL

4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
#5

P

EXTERNAL
SKELETAL

5 EARLY RESORPTION
6 V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED
#2 AND #4
V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
#5 AND #6

P

P

EXTERNAL
SKELETAL

7 EARLY RESORPTION
10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
#5 AND #6

P

VISCERAL

11 RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)

P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 64

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26628	(CONTINUED)			
			RIGHT	
SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		
EXTERNAL	13	M CLEFT PALATE		
		ENTIRE LENGTH		
VISCERAL		CONFIRMATION OF CLEFT PALATE		P *
SKELETAL		V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED		P
		#2		
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5 AND #6		
SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		
SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		
SKELETAL	18	V REDUCED OSSIFICATION OF THE 13TH RIB(S)		1
		RIGHT		
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		
SKELETAL	19	V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED		P
		#2		
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5 AND #6		
VISCERAL	20	V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)		P
		KIDNEY, RIGHT (WOO AND HOAR GRADE 0)		
SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
		#5		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE
* = CEPHALIC FINDING

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 65

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26628	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20	
VISCERAL		1, 2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 17, 18, 19	
SKELETAL		8, 9, 11, 16	
26629		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A A A A A A/ A A E A A A	
	SEX:	M F F F F F F F F F M M - F M F	
	CEPHALIC:	2, 4, 6, 8, 10, 15	
VISCERAL	1	RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)	P
SKELETAL	2	BILATERAL V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	3	#5 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
VISCERAL	9	RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)	P
VISCERAL	11	RIGHT RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)	P
EXTERNAL	12	LEFT EARLY RESORPTION	
EXTERNAL		NO REMARKABLE OBSERVATIONS	
VISCERAL		1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15	
SKELETAL		2, 3, 4, 5, 6, 7, 8, 10, 13, 14, 15	
		1, 6, 7, 8, 9, 10, 11, 13, 14, 15	
26631		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
		E A A E A A E E A/ A A A E A A A E	
	SEX:	- F M - F M - - F M F F - F F F -	
	CEPHALIC:	3, 6, 10, 12, 15	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 66

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26631	(CONTINUED)			
	EXTERNAL	1	EARLY RESORPTION	
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	11	V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
			RIGHT	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	13	EARLY RESORPTION	
	SKELETAL	14	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	17	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 67

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26631	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,3,5,6,9,10,11,12,14,15,16	
	VISCERAL	2,3,5,6,9,10,11,12,14,15,16	
	SKELETAL		
26635		1 2 3 4 5 6 7 8 9 10 11 12	
		E A A A A A/ A A A A A A	
	SEX:	- M M F M M F M F F F F	
	CEPHALIC:	3,5,7,9,11	
	EXTERNAL	1 EARLY RESORPTION	
	SKELETAL	2 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
		#4	
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	7 V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	8 V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
	SKELETAL	9 V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
		#2	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 68

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26635	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,3,4,5,6,7,8,9,10,11,12	
	VISCERAL	2,3,4,5,6,7,8,9,10,11,12	
	SKELETAL	3,4,5,10	
26637		1 2 3	
		A E/ A	
	SEX:	M - F	
	CEPHALIC:	3	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
	EXTERNAL	2 EARLY RESORPTION	
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,3	
	SKELETAL	1,3	
26652		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A A A A/ A A A A A A A	
	SEX:	F M M F M F F F M F F M F F M	
	CEPHALIC:	1,3,5,7,9,11,13,15	
	SKELETAL	8 V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
26654		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A A A E E A/ A E A A A A A	
	SEX:	M F F M F M - - M M - F M F M M	
	CEPHALIC:	1,3,5,9,14,16	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 69

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26654	(CONTINUED)			
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	2	#5 AND #6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	4	#5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	6	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	10	#5 V 27 PRESACRAL VERTEBRAE	P
	EXTERNAL	11	EARLY RESORPTION	
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	13	#5 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
			#4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	14	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	15	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	16	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
 SPONSOR:AMERICAN PETROLEUM

TABLE A18
 RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 70

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26654	(CONTINUED)	NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 3, 4, 5, 6, 9, 10, 12, 13, 14, 15, 16	
VISCERAL		1, 2, 3, 4, 5, 6, 9, 10, 12, 13, 14, 15, 16	
SKELETAL		3	
26655		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A E A A A A A/ A A A A A A E A	
	SEX:	M F - F F F M M F F F M M M - F	
	CEPHALIC:	2, 5, 7, 9, 11, 13, 16	
SKELETAL		1 V 7TH CERVICAL RIB(S) PINPOINT, LEFT	P
SKELETAL		2 V 7TH CERVICAL RIB(S) INTERMEDIATE, LEFT	P
		V REDUCED OSSIFICATION OF THE 13TH RIB(S) RIGHT	1
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL		3 EARLY RESORPTION	
SKELETAL		6 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		11 V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL		15 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16	
VISCERAL		1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16	
SKELETAL		4, 5, 7, 8, 9, 10, 12, 13, 14, 16	
26656		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	
		E A A A A A A A A E A/ A A A A A A A A	
	SEX:	- M M F M F F F M F - F M F M F M M M M	
	CEPHALIC:	2, 4, 6, 8, 10, 13, 15, 17, 19	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 71

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26656	(CONTINUED)		
	EXTERNAL	1	EARLY RESORPTION
	VISCERAL	2	M KIDNEY AND URETER ABSENT LEFT
	SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
	SKELETAL	7	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL, #3 THROUGH #5, BILATERAL
			V 14TH RUDIMENTARY RIB(S) LEFT
	EXTERNAL	11	EARLY RESORPTION
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
	SKELETAL	15	V REDUCED OSSIFICATION OF THE 13TH RIB(S) RIGHT
	SKELETAL	19	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
	SKELETAL	20	V REDUCED OSSIFICATION OF THE SKULL FRONTAL, BILATERAL
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,3,4,5,6,7,8,9,10,12,13,14,15,16,17,18,19,20	
	VISCERAL	3,4,5,6,7,8,9,10,12,13,14,15,16,17,18,19,20	
	SKELETAL	3,5,6,8,9,10,13,14,16,17,18	
26664		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		A A A A A A A A/ A A A A A A	
	SEX:	F M M F M F M M M M M M F M	
	CEPHALIC:	1,3,5,7,9,11,13	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 72

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26664	(CONTINUED)			
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	8	#5 V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	9	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
	SKELETAL	12	#4 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
			#3 AND #4	
	EXTERNAL		NO REMARKABLE OBSERVATIONS	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
			1,2,3,4,5,7,10,11,13,14	
26669		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		
		E E A A E A A/ E E E A E A E A E		
	SEX:	- - M F - F F - - - M - M - M -		
	CEPHALIC:	4,7,13		
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
	SKELETAL	4	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #5 THROUGH #7, BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 73

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26669	(CONTINUED)		
		#5 AND #6	
EXTERNAL	5	EARLY RESORPTION	
SKELETAL	6	V REDUCED OSSIFICATION OF THE SKULL	1
		NASAL, BILATERAL	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	8	EARLY RESORPTION	
EXTERNAL	9	EARLY RESORPTION	
EXTERNAL	10	EARLY RESORPTION	
SKELETAL	11	V REDUCED OSSIFICATION OF THE SKULL	1
		NASAL, BILATERAL	
EXTERNAL	12	EARLY RESORPTION	
EXTERNAL	14	EARLY RESORPTION	
EXTERNAL	16	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL	3,4,6,7,11,13,15		
VISCERAL	3,4,6,7,11,13,15		
SKELETAL	7,13,15		
26671		1 2 3 4 5 6 7 8 9 10 11 12 13	
		E A A A/ A A A A A A A A A	
	SEX:	- M F F F F M M M M F F M	
	CEPHALIC:	3,5,7,9,11,13	
EXTERNAL	1	EARLY RESORPTION	
SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	13	V 14TH RUDIMENTARY RIB(S)	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 74

DAMS FROM GROUP 4: 450 MG/KG/DAY FETUS # GRADE

26671 (CONTINUED)

LEFT
NO REMARKABLE OBSERVATIONS
2,3,4,5,6,7,8,9,10,11,12,13
2,3,4,5,6,7,8,9,10,11,12,13
2,3,4,6,7,8,9,10,12

26675

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A L A A A A E/ A A A A A A A A A
SEX: M - M M M F - F M F M M M F F M
CEPHALIC: 3,5,10,12,14,16

SKELETAL	1	V PUBIS UNOSSIFIED	P
		BILATERAL	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	2	LATE RESORPTION	
		CROWN-RUMP LENGTH: 3.7 CM, SEVERE AUTOLYSIS, NO REMARKABLE	
		OBSERVATIONS	
SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
EXTERNAL	7	EARLY RESORPTION	
VISCERAL	8	M SITUS INVERSUS	P
		TRACHEA, ESOPHAGUS, HEART, GREAT AND MAJOR VESSELS, LUNGS,	
		LIVER, STOMACH, PANCREAS, SPLEEN, KIDNEYS, ADRENAL GLANDS,	
		AND INTESTINE Laterally TRANSPOSED	
SKELETAL		M STERNOSCHISIS	P
		STERNAL BAND #2 NOT JOINED	
		V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 75

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26675	(CONTINUED)		
SKELETAL	13	#3 AND #4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6 V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
SKELETAL	14	#2 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	16	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
EXTERNAL		NO REMARKABLE OBSERVATIONS	
VISCERAL		1,3,4,5,6,8,9,10,11,12,13,14,15,16	
SKELETAL		1,3,4,5,6,9,10,11,12,13,14,15,16 3,5,9,10,11,12,15	
26678		1 2 3 4 5 6 7 8 9 10 11 12 13 14 A A A A A A/ A A A A A A A A SEX: M F M F F M F M F M M F M F CEPHALIC: 1,3,5,7,9,11,13	
SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	4	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	5	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
SKELETAL	6	#5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
VISCERAL	8	#5 V MAJOR BLOOD VESSEL VARIATION RIGHT CAROTID AND RIGHT SUBCLAVIAN ARISE INDEPENDENTLY FROM THE AORTIC ARCH (NO BRACHIOCEPHALIC TRUNK)	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 76

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #	GRADE
26678	(CONTINUED)		
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL	1,2,3,4,5,6,7,9,10,11,12,13,14	
		1,3,7,8,9,10,11,13	
26688		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A E A A A A/ A A A A A A A A	
	SEX:	M - F F F F M F F M F F F M F	
	CEPHALIC:	1,4,6,8,10,12,14	
	EXTERNAL	2 EARLY RESORPTION	P
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	
	SKELETAL	10 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	12 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,3,4,5,6,7,8,9,10,11,12,13,14,15	
	SKELETAL	1,3,4,5,6,7,8,9,10,11,12,13,14,15	
		1,3,4,6,7,8,9,11,13,14,15	
26700		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		A A A A A E A A A E/ A A A A E A A A	
	SEX:	F M F F F - F M F - M F F M - M M F	
	CEPHALIC:	1,3,5,11,13,16,18	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 77

DAMS FROM GROUP		4: 450 MG/KG/DAY	FETUS #		GRADE
26700	(CONTINUED)				
	SKELETAL		2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		3	V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
				V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL		6	EARLY RESORPTION	
	SKELETAL		7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL		10	EARLY RESORPTION	
	SKELETAL		11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL		15	EARLY RESORPTION	
	SKELETAL		16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL		18	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
				#5	
				NO REMARKABLE OBSERVATIONS	
	EXTERNAL			1,2,3,4,5,7,8,9,11,12,13,14,16,17,18	
	VISCERAL			1,2,3,4,5,7,8,9,11,12,13,14,16,17,18	
	SKELETAL			1,5,9,12,14	
26717			1 2 3 4 5 6 7 8 9 10 11 12		
			A A E A A A/ E A E E E A		
	SEX:		F M - M F F - F - - - M		
	CEPHALIC:		2,5,8		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 78

DAMS FROM GROUP	4: 450 MG/KG/DAY	FETUS #		GRADE
26717	(CONTINUED)			
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	6	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	EXTERNAL	7	EARLY RESORPTION	
	SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	SKELETAL	12	V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,4,5,6,8,12	
	VISCERAL		1,2,4,5,6,8,12	
	SKELETAL		1,2,4	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 79

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26568		1 2 3 4 5 6 7 8 9 10 11 E A E A/ A A A A L A A SEX: - M - F M F F F - M F CEPHALIC: 2, 5, 7, 10	
EXTERNAL		1 EARLY RESORPTION	
SKELETAL		2 V 27 PRESACRAL VERTEBRAE V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P P
EXTERNAL		3 EARLY RESORPTION	
SKELETAL		4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL		5 V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL		7 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL		9 LATE RESORPTION	
		CROWN-RUMP LENGTH: 3.5 CM, SLIGHT AUTOLYSIS, NO APPARENT MALFORMATIONS	
SKELETAL		11 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		2, 4, 5, 6, 7, 8, 10, 11	
VISCERAL		2, 4, 5, 6, 7, 8, 10, 11	
SKELETAL		8, 10	
26569		1 2 3 4 5 6 7 8 9 10 11 12 13 A E E E E E/ E E A E E E E SEX: M - - - - - - F - - - - CEPHALIC: 9	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26569	(CONTINUED)			
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
			V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #3 THROUGH #7, BILATERAL	1
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #5 THROUGH #7, BILATERAL	1
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,9		
	VISCERAL	1,9		
	SKELETAL			
26581		1 2 3 4 5 6 7 8 9 10 11 12 13 14		
		E E E E/ E A E E E E A E E E		
	SEX:	- - - - - M - - - - F - - -		
	CEPHALIC:	11		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 81

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26581	(CONTINUED)		
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	4	EARLY RESORPTION
	EXTERNAL	5	EARLY RESORPTION
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
		#5	
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	8	EARLY RESORPTION
	EXTERNAL	9	EARLY RESORPTION
	EXTERNAL	10	EARLY RESORPTION
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED
		#5	
	EXTERNAL	12	EARLY RESORPTION
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	14	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	6,11	
	VISCERAL	6,11	
	SKELETAL		
26588		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	
	SEX:	E E E E E E E E E/ E E E E E E E E E E	
		- - - - - - - - - - - - - - - - - - -	
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	4	EARLY RESORPTION
	EXTERNAL	5	EARLY RESORPTION

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 82

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26588	(CONTINUED)		
	EXTERNAL	6	EARLY RESORPTION
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	8	EARLY RESORPTION
	EXTERNAL	9	EARLY RESORPTION
	EXTERNAL	10	EARLY RESORPTION
	EXTERNAL	11	EARLY RESORPTION
	EXTERNAL	12	EARLY RESORPTION
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	14	EARLY RESORPTION
	EXTERNAL	15	EARLY RESORPTION
	EXTERNAL	16	EARLY RESORPTION
	EXTERNAL	17	EARLY RESORPTION
	EXTERNAL	18	EARLY RESORPTION
	EXTERNAL	19	EARLY RESORPTION
26592		1 2 3 4 5 6 7 8 9 10 11 12 13	
	SEX:	E E E A E E E/ A E A A E E	
	CEPHALIC:	- - - M - - - M - F F - -	
		10	
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED
	EXTERNAL	5	EARLY RESORPTION
	EXTERNAL	6	EARLY RESORPTION
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	9	EARLY RESORPTION
	SKELETAL	10	V 14TH RUDDIMENTARY RIB(S) BILATERAL

P

P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 83

DAMS FROM GROUP		5: 750 MG/KG/DAY	FETUS #															GRADE
26592	(CONTINUED)																	
	SKELETAL		11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED														P
	EXTERNAL		12	EARLY RESORPTION														
	EXTERNAL		13	EARLY RESORPTION														
				NO REMARKABLE OBSERVATIONS														
	EXTERNAL		4,8,10,11															
	VISCERAL		4,8,10,11															
	SKELETAL		8															
26594			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			E	E	E	E	E	E	E/	E	E	E	E	E	E	E	E	
	SEX:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	EXTERNAL		1	EARLY RESORPTION														
	EXTERNAL		2	EARLY RESORPTION														
	EXTERNAL		3	EARLY RESORPTION														
	EXTERNAL		4	EARLY RESORPTION														
	EXTERNAL		5	EARLY RESORPTION														
	EXTERNAL		6	EARLY RESORPTION														
	EXTERNAL		7	EARLY RESORPTION														
	EXTERNAL		8	EARLY RESORPTION														
	EXTERNAL		9	EARLY RESORPTION														
	EXTERNAL		10	EARLY RESORPTION														
	EXTERNAL		11	EARLY RESORPTION														
	EXTERNAL		12	EARLY RESORPTION														
	EXTERNAL		13	EARLY RESORPTION														
	EXTERNAL		14	EARLY RESORPTION														
	EXTERNAL		15	EARLY RESORPTION														
26597			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			E	E	E	E	E	E	E	E/	E	E	E	A	E	E	E	L
	SEX:		-	-	-	-	-	-	-	-	-	-	-	M	-	-	-	-

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 84

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26597	(CONTINUED)		
EXTERNAL	1	EARLY RESORPTION	
EXTERNAL	2	EARLY RESORPTION	
EXTERNAL	3	EARLY RESORPTION	
EXTERNAL	4	EARLY RESORPTION	
EXTERNAL	5	EARLY RESORPTION	
EXTERNAL	6	EARLY RESORPTION	
EXTERNAL	7	EARLY RESORPTION	
EXTERNAL	8	EARLY RESORPTION	
EXTERNAL	9	EARLY RESORPTION	
EXTERNAL	10	EARLY RESORPTION	
EXTERNAL	11	EARLY RESORPTION	
SKELETAL	12	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL; FRONTAL, BILATERAL	1
EXTERNAL	13	EARLY RESORPTION	
EXTERNAL	14	EARLY RESORPTION	
EXTERNAL	15	EARLY RESORPTION	
EXTERNAL	16	LATE RESORPTION CROWN-RUMP LENGTH: 3.5 CM, SLIGHT AUTOLYSIS, NO APPARENT MALFORMATIONS	
	NO REMARKABLE OBSERVATIONS		
EXTERNAL	12		
VISCERAL	12		
SKELETAL			
26600		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		E E E E E E E/ E E A E E E A	
	SEX:	- - - - - - - - M - - - M	
	CEPHALIC:	10	
EXTERNAL	1	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 85

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26600	(CONTINUED)			
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	10,14		
	VISCERAL	10,14		
	SKELETAL			
26601		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		
		A E E E E E A E/ E L A E E E E A		
	SEX:	M - - - - - M - - - - - F		
	CEPHALIC:	7,16		
	SKELETAL	1	V REDUCED OSSIFICATION OF THE SKULL	2
			NASAL, BILATERAL; INTERPARIETAL, BILATERAL	
			V UNCO-OSSIFIED VERTEBRAL CENTRA	P
			THORACIC #1 THROUGH #3	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 86

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26601	(CONTINUED)			
	SKELETAL	1	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES SACRAL #2 THROUGH CAUDAL #6, BILATERAL	1
			V ENTIRE STERNUM UNOSSIFIED	P
			V METACARPAL(S) AND/OR METATARSAL(S) UNOSSIFIED	P
			METACARPALS, DIGITS #1 AND #4, BILATERAL	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2 AND #4	
			V 27 PRESACRAL VERTEBRAE	P
			V PUBIS UNOSSIFIED	P
			BILATERAL	
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			SACRAL #2 THROUGH CAUDAL #6, BILATERAL	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.0 CM, SEVERE AUTOLYSIS, NO APPARENT MALFORMATIONS	
	SKELETAL	11	V 27 PRESACRAL VERTEBRAE	P
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			SACRAL #3 THROUGH CAUDAL #6, BILATERAL	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 87

DAMS FROM GROUP 5: 750 MG/KG/DAY		FETUS #	GRADE
26601 (CONTINUED)			
SKELETAL		#5 AND #6 V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
EXTERNAL	12	EARLY RESORPTION	
EXTERNAL	13	EARLY RESORPTION	
EXTERNAL	14	EARLY RESORPTION	
EXTERNAL	15	EARLY RESORPTION	
SKELETAL	16	V PUBIS UNOSSIFIED BILATERAL	P
		V ENTIRE STERNUM UNOSSIFIED	P
		V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES SACRAL #2 THROUGH CAUDAL #6	1
		V UNCO-OSSIFIED VERTEBRAL CENTRA THORACIC #1 THROUGH #3, AND #10 THROUGH #12	P
		NO REMARKABLE OBSERVATIONS	
EXTERNAL	1,7,11,16		
VISCERAL	1,7,11,16		
SKELETAL			
26605			
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17		
	E E E E E E E E A E/ E E E E E E E		
SEX:	- - - - - - - M - - - - - - - -		
EXTERNAL	1	EARLY RESORPTION	
EXTERNAL	2	EARLY RESORPTION	
EXTERNAL	3	EARLY RESORPTION	
EXTERNAL	4	EARLY RESORPTION	
EXTERNAL	5	EARLY RESORPTION	
EXTERNAL	6	EARLY RESORPTION	
EXTERNAL	7	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 88

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26605	(CONTINUED)		
	EXTERNAL	8	EARLY RESORPTION
	SKELETAL	9	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES #3 THROUGH #5, BILATERAL V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #6
			1
			P
	EXTERNAL	10	EARLY RESORPTION
	EXTERNAL	11	EARLY RESORPTION
	EXTERNAL	12	EARLY RESORPTION
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	14	EARLY RESORPTION
	EXTERNAL	15	EARLY RESORPTION
	EXTERNAL	16	EARLY RESORPTION
	EXTERNAL	17	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	9	
	VISCERAL	9	
	SKELETAL		
26608		1 2 3 4 5 6	
		E/ E E E E E	
	SEX:	- - - - -	
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	4	EARLY RESORPTION
	EXTERNAL	5	EARLY RESORPTION
	EXTERNAL	6	EARLY RESORPTION
26614		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		E E E E E E E E/ E A E E E E E E E E	
	SEX:	- - - - - - - - - M - - - - - - -	
	CEPHALIC:	10	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 89

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26614	(CONTINUED)		
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	4	EARLY RESORPTION
	EXTERNAL	5	EARLY RESORPTION
	EXTERNAL	6	EARLY RESORPTION
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	8	EARLY RESORPTION
	EXTERNAL	9	EARLY RESORPTION
	EXTERNAL	11	EARLY RESORPTION
	EXTERNAL	12	EARLY RESORPTION
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	14	EARLY RESORPTION
	EXTERNAL	15	EARLY RESORPTION
	EXTERNAL	16	EARLY RESORPTION
	EXTERNAL	17	EARLY RESORPTION
	EXTERNAL	18	EARLY RESORPTION
	NO REMARKABLE OBSERVATIONS		
	EXTERNAL	10	
	VISCERAL	10	
	SKELETAL	10	
26620		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	
		E E E A E E A A A E E/ E E E E A E A E E	
	SEX:	- - - F - - F F M - - - - - M - M - -	
	CEPHALIC:	4,8,16	
	EXTERNAL	1	EARLY RESORPTION
	EXTERNAL	2	EARLY RESORPTION
	EXTERNAL	3	EARLY RESORPTION

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 90

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26620	(CONTINUED)			
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
	EXTERNAL	14	EARLY RESORPTION	
	EXTERNAL	15	EARLY RESORPTION	
	SKELETAL	16	V REDUCED OSSIFICATION OF THE 13TH RIB(S)	2
			RIGHT	
			V UNCO-OSSIFIED VERTEBRAL CENTRA	P
			THORACIC #10 THROUGH #12	
			M VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY	P
			LEFT LUMBAR ARCH #2 ABSENT; THORACIC CENTRUM #13 AND LUMBAR	
			CENTRA #1 AND #2 ABSENT; RIGHT RIBS #13 AND #14 FUSED,	
			PROXIMAL THROUGH DISTAL	
			V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
	EXTERNAL	17	EARLY RESORPTION	
	SKELETAL	18	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	19	EARLY RESORPTION	
	EXTERNAL	20	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 91

DAMS FROM GROUP 5: 750 MG/KG/DAY		FETUS #																		GRADE
26620	(CONTINUED)																			
		NO REMARKABLE OBSERVATIONS																		
	EXTERNAL	4,7,8,9,16,18																		
	VISCERAL	4,7,8,9,16,18																		
	SKELETAL	8,9																		
26626		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
		E	E	E	A	E/	E	E	E	E	E	E	E	A	E	E	E	E	E	
	SEX:	-	-	-	F	-	-	-	-	-	-	-	-	M	-	-	-	-	-	
	CEPHALIC:	4																		
	EXTERNAL			1		EARLY RESORPTION														
	EXTERNAL			2		EARLY RESORPTION														
	EXTERNAL			3		EARLY RESORPTION														
	SKELETAL			4		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED														P
						#5														
	EXTERNAL			5		EARLY RESORPTION														
	EXTERNAL			6		EARLY RESORPTION														
	EXTERNAL			7		EARLY RESORPTION														
	EXTERNAL			8		EARLY RESORPTION														
	EXTERNAL			9		EARLY RESORPTION														
	EXTERNAL			10		EARLY RESORPTION														
	EXTERNAL			11		EARLY RESORPTION														
	EXTERNAL			12		EARLY RESORPTION														
	SKELETAL			13		V REDUCED OSSIFICATION OF THE SKULL														1
						NASAL, BILATERAL														
	EXTERNAL			14		EARLY RESORPTION														
	EXTERNAL			15		EARLY RESORPTION														
	EXTERNAL			16		EARLY RESORPTION														
	EXTERNAL			17		EARLY RESORPTION														
	EXTERNAL			18		EARLY RESORPTION														

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 92

DAMS FROM GROUP 5: 750 MG/KG/DAY FETUS # GRADE

26626 (CONTINUED)

NO REMARKABLE OBSERVATIONS

EXTERNAL
VISCERAL
SKELETAL

4,13
4,13

26632

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
E E E E E E E E E/ E E E E E E E
SEX: - - - - - - - - - - - - - - - -

EXTERNAL 1 EARLY RESORPTION
EXTERNAL 2 EARLY RESORPTION
EXTERNAL 3 EARLY RESORPTION
EXTERNAL 4 EARLY RESORPTION
EXTERNAL 5 EARLY RESORPTION
EXTERNAL 6 EARLY RESORPTION
EXTERNAL 7 EARLY RESORPTION
EXTERNAL 8 EARLY RESORPTION
EXTERNAL 9 EARLY RESORPTION
EXTERNAL 10 EARLY RESORPTION
EXTERNAL 11 EARLY RESORPTION
EXTERNAL 12 EARLY RESORPTION
EXTERNAL 13 EARLY RESORPTION
EXTERNAL 14 EARLY RESORPTION
EXTERNAL 15 EARLY RESORPTION
EXTERNAL 16 EARLY RESORPTION

26643

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
E A E A E L E/ E E L E L A L E E
SEX: - F - M - - - - - - - M - - -
CEPHALIC: 4

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 93

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26643	(CONTINUED)			
	EXTERNAL	1	EARLY RESORPTION	
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V METACARPAL(S) AND/OR METATARSAL(S) UNOSSIFIED	P
			METATARSAL DIGITS #1 THROUGH #5, BILATERAL	
			V UNCO-OSSIFIED VERTEBRAL CENTRA	P
			THORACIC #1 THROUGH #3	
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #2 THROUGH #7, BILATERAL; THORACIC #1 THROUGH #10, BILATERAL	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.3 CM, MUMMIFIED	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.3 CM, MUMMIFIED	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	LATE RESORPTION	
			CROWN-RUMP LENGTH: 1.7 CM, MUMMIFIED	
	SKELETAL	13	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	2
			CERVICAL #2 THROUGH #7, BILATERAL	
	EXTERNAL	14	LATE RESORPTION	
			CROWN-RUMP LENGTH: 3.0 CM, SEVERE AUTOLYSIS, NO APPARENT MALFORMATIONS	
	EXTERNAL	15	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
 SPONSOR:AMERICAN PETROLEUM

TABLE A18
 RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 94

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26643	(CONTINUED)		
	EXTERNAL	16 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,4,13	
	VISCERAL	2,4,13	
	SKELETAL		
26649		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	
	SEX:	E E A E A A A A E A/ E A E A E A A E E	
		- - F - M F F F - F - M - F - M F - -	
	CEPHALIC:	5,7,10,14,17	
	EXTERNAL	1 EARLY RESORPTION	
	EXTERNAL	2 EARLY RESORPTION	
	SKELETAL	3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
	EXTERNAL	4 EARLY RESORPTION	
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
		V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
		CERVICAL #2 THROUGH #6, BILATERAL	
	SKELETAL	7 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
	SKELETAL	8 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	9 EARLY RESORPTION	
	EXTERNAL	11 EARLY RESORPTION	
	EXTERNAL	13 EARLY RESORPTION	
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 95

DAMS FROM GROUP		5: 750 MG/KG/DAY	FETUS #	GRADE
26649	(CONTINUED)			
	EXTERNAL	15	#5 EARLY RESORPTION	
	SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	18	#5 EARLY RESORPTION	
	EXTERNAL	19	EARLY RESORPTION	
	EXTERNAL	NO REMARKABLE OBSERVATIONS		
	VISCERAL	3,5,6,7,8,10,12,14,16,17		
	SKELETAL	3,5,6,7,8,10,12,14,16,17 10,12,16		
26651		1 2 3 4 5 6 7 8 9 10 11 12 13		
		E E E E E/ E E E E E E E E		
	SEX:	- - - - - - - - - - - - - -		
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
26658		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		
		E E A E E E/ E E E E A E A E E E E E		
	SEX:	- - F - - - - - - - F - M - - - - -		
	CEPHALIC:	3,13		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 96

DAMS FROM GROUP 5: 750 MG/KG/DAY		FETUS #														GRADE		
26658	(CONTINUED)																	
	EXTERNAL	1	EARLY RESORPTION															
	EXTERNAL	2	EARLY RESORPTION															
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED															P
			#5															
	EXTERNAL	4	EARLY RESORPTION															
	EXTERNAL	5	EARLY RESORPTION															
	EXTERNAL	6	EARLY RESORPTION															
	EXTERNAL	7	EARLY RESORPTION															
	EXTERNAL	8	EARLY RESORPTION															
	EXTERNAL	9	EARLY RESORPTION															
	EXTERNAL	10	EARLY RESORPTION															
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED															P
			#5 AND #6															
	EXTERNAL	12	EARLY RESORPTION															
	SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED															P
			#5 AND #6															
	EXTERNAL	14	EARLY RESORPTION															
	EXTERNAL	15	EARLY RESORPTION															
	EXTERNAL	16	EARLY RESORPTION															
	EXTERNAL	17	EARLY RESORPTION															
	EXTERNAL	18	EARLY RESORPTION															
		NO REMARKABLE OBSERVATIONS																
	EXTERNAL	3,11,13																
	VISCERAL	3,11,13																
	SKELETAL																	
26662		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
		A	E	E	A	A/	A	A	A	A	E	A	A	A	E	A	A	
	SEX:	F	-	-	F	F	M	F	F	F	-	F	F	F	-	F	F	
	CEPHALIC:	1, 5, 7, 9, 12, 15																

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 97

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26662	(CONTINUED)			
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2	
	SKELETAL	7	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
			#2 THROUGH #4	
	SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	14	EARLY RESORPTION	
	SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,4,5,6,7,8,9,11,12,13,15,16	
	VISCERAL		1,4,5,6,7,8,9,11,12,13,15,16	
	SKELETAL		5,6,9,13	
26673		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		E E E E E E A/ A E E E E E E E		
	SEX:	- - - - - M M - - - - -		
	CEPHALIC:	8		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 98

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #	GRADE
26673	(CONTINUED)		
EXTERNAL	1	EARLY RESORPTION	
EXTERNAL	2	EARLY RESORPTION	
EXTERNAL	3	EARLY RESORPTION	
EXTERNAL	4	EARLY RESORPTION	
EXTERNAL	5	EARLY RESORPTION	
EXTERNAL	6	EARLY RESORPTION	
SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
		#2 THROUGH #4	
EXTERNAL	9	EARLY RESORPTION	
EXTERNAL	10	EARLY RESORPTION	
EXTERNAL	11	EARLY RESORPTION	
EXTERNAL	12	EARLY RESORPTION	
EXTERNAL	13	EARLY RESORPTION	
EXTERNAL	14	EARLY RESORPTION	
EXTERNAL	15	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
EXTERNAL	7,8		
VISCERAL	7,8		
SKELETAL			
26706		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A E E A A A A E/ E A A E E E E	
	SEX:	F - - M F F M - - M M - - - -	
	CEPHALIC:	1,5,7,11	
SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 99

DAMS FROM GROUP	5: 750 MG/KG/DAY	FETUS #		GRADE
26706	(CONTINUED)			
			#5 AND #6	
	SKELETAL		V PUBIS UNOSSIFIED	P
			BILATERAL	
			V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	P
			CERVICAL #1 THROUGH #6, MODERATE, BILATERAL; CERVICAL #7, SLIGHT, BILATERAL	
			V METACARPAL(S) AND/OR METATARSAL(S) UNOSSIFIED	P
			METACARPALS #1 AND #4, BILATERAL; METATARSALS, #1 AND #4, BILATERAL	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL; FRONTAL, BILATERAL	
	SKELETAL	5	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #2 THROUGH #6, BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
	SKELETAL	7	V 27 PRESACRAL VERTEBRAE	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	VISCERAL	10	V HEMORRHAGIC RING AROUND THE IRIS	P
			BILATERAL	
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 100

DAMS FROM GROUP 5: 750 MG/KG/DAY		FETUS #																		GRADE
26706	(CONTINUED)																			
	EXTERNAL	14																		
	EXTERNAL	15																		
	EXTERNAL	16																		
		NO REMARKABLE OBSERVATIONS																		
	EXTERNAL	1,4,5,6,7,10,11																		
	VISCERAL	1,4,5,6,7,11																		
	SKELETAL	10																		
26712		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
		E	E	E	E	A/	E	A	E	A	A	E	E	A	L	E	E	E		
	SEX:	-	-	-	-	F	-	M	-	F	F	-	-	F	-	-	-	-		
	CEPHALIC:	5,9,13																		
	EXTERNAL	1																		
	EXTERNAL	2																		
	EXTERNAL	3																		
	EXTERNAL	4																		
	EXTERNAL	6																		
	EXTERNAL	8																		
	EXTERNAL	8																		
	SKELETAL	9																		P
		V 14TH RUDDIMENTARY RIB(S)																		
		LEFT																		
	SKELETAL	10																		P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																		
		#5																		
	EXTERNAL	11																		
	EXTERNAL	12																		
	SKELETAL	13																		P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED																		
		#5 AND #6																		
	EXTERNAL	14																		
		LATE RESORPTION																		
		CROWN-RUMP LENGTH: 3.0 CM, SEVERE AUTOLYSIS, NO APPARENT																		
		MALFORMATIONS																		

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402017
SPONSOR:AMERICAN PETROLEUM

TABLE A18
RAT DERMAL DEV TOX STUDY OF DISTILLATES, LIGHT CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 101

DAMS FROM GROUP 5: 750 MG/KG/DAY		FETUS #	GRADE
26712 (CONTINUED)			
EXTERNAL		15	EARLY RESORPTION
EXTERNAL		16	EARLY RESORPTION
EXTERNAL		17	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
EXTERNAL		5,7,9,10,13	
VISCERAL		5,7,9,10,13	
SKELETAL		5,7	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PFETv4.14
12/16/2011