

FINAL REPORT



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Study Title: A Dermal Prenatal Developmental Toxicity Study of
Clarified Oils, Catalytic Cracked in Rats

Laboratory Project ID: WIL-402016

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Test Guidelines: OPPTS 870.3700
OECD Guideline 414

Study Completion Date: 12 July 2012

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Total Number of Pages: 394

COMPLIANCE STATEMENT

The following is a detailed description of all differences between the practices used in this study, WIL-402016, 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.



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12 July 2012
Date

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1. SUMMARY

1.1. OBJECTIVE

The objectives of this 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, clarified oils, catalytic cracked (CAS no. 64741-62-4), in the vehicle (acetone) 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 5, 25, and 50 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 test substance exposure. 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 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 was noted at 50 mg/kg/day, as 2 females were found dead on gestation days 18 and 19. Noteworthy clinical findings for these females included red and/or yellow material around the urogenital area, nose, and eyes, decreased defecation, pale body, and/or red vaginal discharge at the daily examinations and/or approximately 1 to 2 hours following dose administration. Macroscopic findings for these females consisted of red matting on the skin, dark red contents in the vagina, and/or pale liver, brain, and pituitary gland. All other females in the sham control, vehicle control, 5, 25, and 50 mg/kg/day groups survived to the scheduled necropsy.

Test substance-related increased incidences of yellow and/or red material in the urogenital area were noted at 5, 25, and 50 mg/kg/day at the daily examinations and/or approximately 1 to 2 hours following dose administration generally throughout the treatment period. Occurrences of red vaginal discharge were noted in the 50 mg/kg/day group and were attributed to the postimplantation loss noted in this group. Additionally, a test substance-related, adverse occurrence of pale body was noted for 2 surviving females in the 50 mg/kg/day group towards the end of the treatment period at the daily examinations. There were no other test substance-related clinical findings noted in any exposure group. Red material around the nose and/or eyes were noted at the daily examinations in all groups, including the sham and vehicle control groups, generally throughout the treatment period. Because these findings were found at similar frequencies across all groups, they were likely a result of the animals' inability to groom and discomfort caused by the collars and therefore not attributed to test substance administration. No remarkable dermal observations were noted in the 5, 25, and 50 mg/kg/day groups.

Test substance-related mean body weight losses were noted in the 25 and 50 mg/kg/day groups at the start of the treatment period (gestation days 0-3), followed by mean body weight gains that were similar to the vehicle control group during gestation days 3-12. Lower mean body weight gains were noted in the 25 and 50 mg/kg/day groups for the remainder of the treatment period (gestation days 12-20); these differences were considered test substance-related. The reductions in mean body weight gain in the 25 and 50 mg/kg/day groups were partially attributed to the decreased mean number of viable fetuses and lower mean fetal weights in these groups, especially during the latter half of gestation. Test substance-related lower mean food consumption was noted generally throughout the treatment period in the 25 and 50 mg/kg/day groups. Lower mean net body weight in the 50 mg/kg/day group and lower mean net body weight changes and gravid uterine weights in the 25 and 50 mg/kg/day groups were noted compared to the vehicle control group; the reduction in mean gravid uterine weights in these groups was attributed to the decreased number of viable fetuses and lower mean fetal weights noted at these exposure levels. Mean net body weights in the 5 and 25 mg/kg/day groups and mean maternal body weights, body weight gains, net body weight gain, gravid uterine weight, and food consumption in the 5 mg/kg/day group were unaffected by test substance administration.

In the 50 mg/kg/day group, 1 female was noted with dark red contents in the uterus; this finding was considered test substance-related. No remarkable macroscopic findings were noted at 5 and 25 mg/kg/day. Test substance-related, lower mean thymus weights (absolute and relative to brain) were noted in the 25 and 50 mg/kg/day groups compared to the vehicle control group. No test substance-related mean organ weight changes were noted at 5 mg/kg/day.

An increased mean litter proportion of postimplantation loss (early and/or late resorptions) and a corresponding lower mean number and mean litter proportion of viable fetuses was noted at 25 and 50 mg/kg/day. Mean male, female, and combined fetal weights in the 25 and 50 mg/kg/day groups were also lower compared to the vehicle

control group. There were no test substance-related effects on intrauterine growth and survival at 5 mg/kg/day.

Increased mean litter proportions of sternebra(e) nos. 5 and/or 6 unossified, reduced ossification of the vertebral arches, reduced ossification of the skull, and pubis unossified were noted in the 50 mg/kg/day group. In addition, a decreased mean litter proportion of cervical centrum no. 1 ossified was noted at 50 mg/kg/day. An increased mean litter proportion of reduced ossification of the skull was also noted in the 25 mg/kg/day group. These findings were considered secondary to the reduced fetal weights noted in the 25 and 50 mg/kg/day groups. There were no test substance-related malformations noted at 5, 25, and 50 mg/kg/day or developmental variations noted at 5 mg/kg/day.

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

1.4. CONCLUSIONS

Maternal toxicity was evidenced by mortality at 50 mg/kg/day and lower mean food consumption with corresponding mean body weight losses and lower mean body weight gains generally throughout the treatment period in the 25 and 50 mg/kg/day groups. Additionally, lower mean thymus weights were noted in the 25 and 50 mg/kg/day groups. No evidence of maternal toxicity was noted at 5 mg/kg/day. Developmental effects were noted in the 25 and 50 mg/kg/day groups as evidenced by increased mean litter proportions of postimplantation loss (early resorptions at 25 mg/kg/day and early and late resorptions at 50 mg/kg/day) with a corresponding decrease in the mean numbers and litter proportions of viable fetuses. In addition, lower mean male, female, and combined fetal weights were noted in the 25 and 50 mg/kg/day groups. Test substance-related fetal developmental variations (sternebra[e] nos. 5 and/or 6 unossified, cervical centrum no. 1 ossified, reduced ossification of the vertebral arches, reduced ossification of the skull, and/or pubis unossified) were noted in the 50 mg/kg/day group and reduced ossification

of the skull was also noted in the 25 mg/kg/day group. These findings were considered secondary to the lower fetal weights noted in these groups. Intrauterine growth and survival and external, visceral, and skeletal fetal morphology were unaffected by test substance administration at an exposure level of 5 mg/kg/day.

Based on these results, an exposure level of 5 mg/kg/day was considered to be the no-observed-adverse-effect level (NOAEL) for maternal toxicity and embryo/fetal development when clarified oils, 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 Clarified Oils, Catalytic Cracked in Rats.” Due to software spacing constraints, the study title is presented as “Rat Dermal Dev Tox Study of Clarified Oils, 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 12.

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-402016	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)
1 September 2011	Experimental starting date (animal receipt)
13 September 2011	Experimental start date (initiation of test substance exposure; first gestation day 0)
13 September - 7 October 2011	Test substance exposure period
8 October 2011	Last laparohysterectomy
8 November 2011	Experimental termination/completion date (last fetal skeletal examination)

2.3. PARTICIPATING SCIENTIST

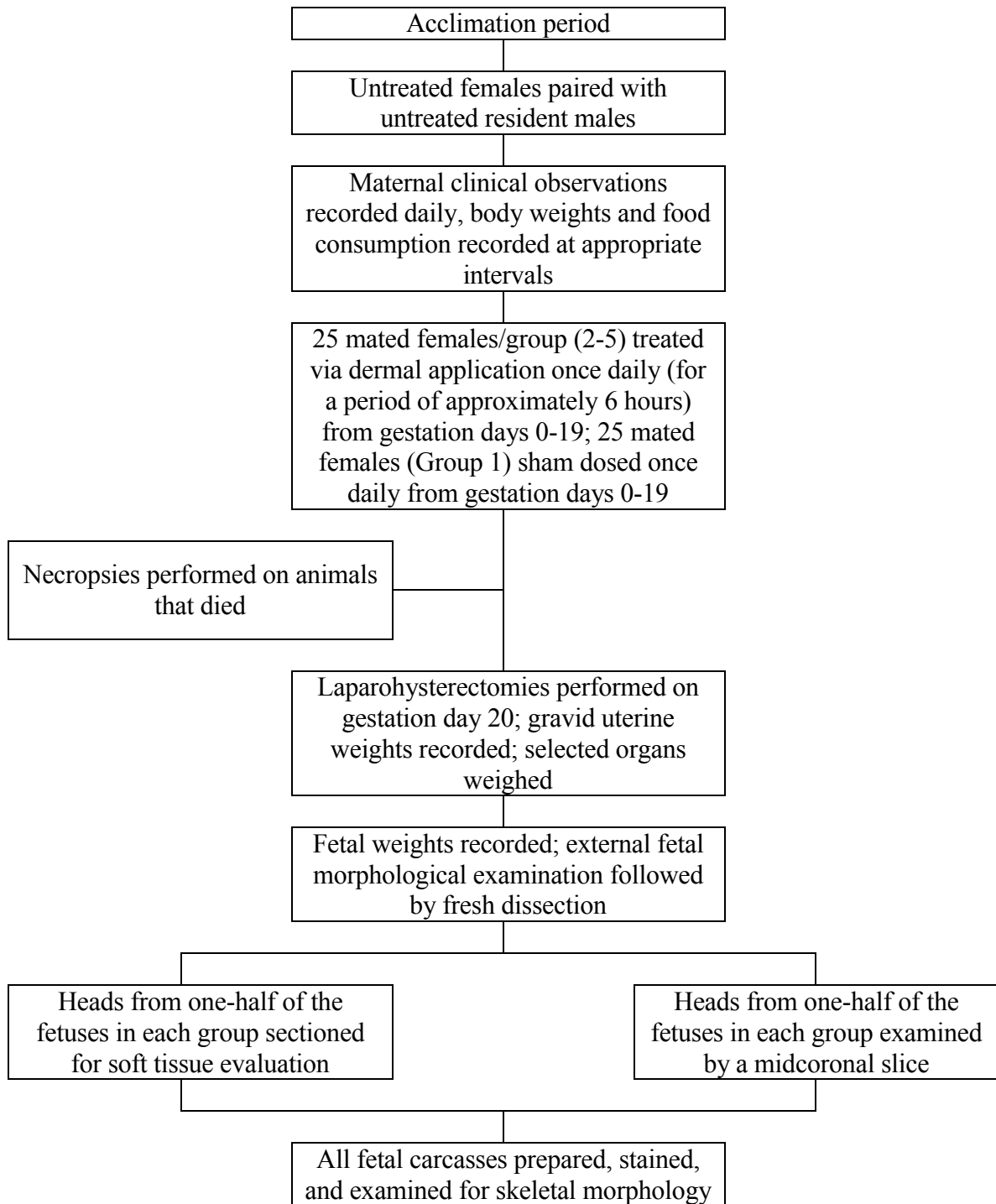
Analytical Chemistry	Amanda M. Stanton, BA WIL Research Laboratories, LLC
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¹ Date ranges represent the first and last dates of evaluation.

2.4. WIL RESEARCH KEY STUDY PERSONNEL

Eric S. Bodle, PhD	Assistant Director, Analytical Chemistry
Heather L. Johnson, BS, RQAP-GLP	Manager, Quality Assurance
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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, & <i>In Vitro</i> 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, clarified oils, catalytic cracked, was received from EPL Archives, Inc., Sterling, VA, on behalf of the Sponsor on 25 August 2011, as follows:

Identification	Physical Description
Clarified oils, catalytic cracked (CAS No. 64741-62-4; Site #12, Sample #2) [WIL ID no. 110132]	Dark brown opaque, viscous 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 acetone, NF (lot nos. ZE0696 and ZX0140, exp. dates: 31 March 2012 and 11 November 2012, respectively, manufactured by Spectrum Chemical Manufacturing Corporation, New Brunswick, NJ).

4.1.3. PREPARATION

A sufficient amount of acetone 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	5	3.3
4	Test substance ^b	25	16.7
5	Test substance ^b	50	33.3

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

^b = The test substance for this study was clarified oils, catalytic cracked (CAS no. 64741-62-4).

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.

The first dosing formulations were visually inspected by the Study Director and were found to be visibly homogeneous and acceptable for administration.

4.1.4. SAMPLING AND ANALYSES

Analyses to demonstrate the homogeneity, stability, and resuspension homogeneity of the test substance formulations at concentrations of 1 and 100 mg/mL following 11 and 18 days of room temperature storage were conducted previously (Haubenstricker, 2011, WIL-402029). Therefore, stability and resuspension homogeneity analyses were not conducted during the current study.

Samples for homogeneity and concentration analysis 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 gas chromatography (GC) with flame ionization detection method. 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 2001.

CrI:CD(SD) rats (155 females) were received in good health from Charles River Laboratories, Inc., Portage, MI, on 1 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 12 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 66.8°F to 70.9°F (19.3°C to 21.6°C) and mean daily relative humidity ranged from 42.3% to 61.5% 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. The 12-hour light/12-hour dark photoperiod was interrupted as necessary to allow for the performance of protocol-specified activities. 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 rats utilized exclusively for breeding. These rats were maintained under similar laboratory conditions as the females. A breeding record containing the male and female

identification numbers and the dates of cohabitation was 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 224 g to 284 g on gestation day 0.

4.7. ORGANIZATION OF TEST GROUPS, EXPOSURE 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; 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. When needed, the test site was gently patted with gauze moistened with acetone 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 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.

	Percent Coverage (%)				
Group	1	2	3	4	5
Exposure Level (mg/kg/day)	NA	0	5	25	50
Study Week 0	10	9.7	11.3	10.8	9.9
Study Week 1	9.1	10.0	9.7	9.9	10.2
Study Week 2	8.9	8.9	8.4	8.6	9.2
Study Week 3	7.4	7.2	7.8	7.8	8.4
Mean Coverage	8.8	8.9	9.3	9.3	9.4
Standard Deviation	1.1	1.2	1.5	1.4	0.8

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 sham removal of residual test substance) as the vehicle control and test substance-treated animals, but were not exposed to the vehicle or test substance.

The following table presents the study group assignment:

Group Number	Treatment	Exposure Level (mg/kg/day)	Dose Volume (mL/kg)	Number of Females
1	Sham Control	NA	NA	25
2	Vehicle Control	0	1.5	25
3	Test Substance ^a	5	1.5	25
4	Test Substance ^a	25	1.5	25
5	Test Substance ^a	50	1.5	25

^a = The test substance for this study was clarified oils, catalytic cracked (CAS no. 64741-62-4).

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, *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 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. 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 for possible future analysis:

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.

Uteri with no macroscopic evidence of implantation were opened and subsequently placed in 10% ammonium sulfide solution for detection of early implantation loss (Salewski, 1964).

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 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. Nonviable fetuses (if the degree of autolysis was minimal or absent) were examined, the crown-rump length measured, weighed, sexed, and tagged individually. 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). Visceral and skeletal findings for the dead fetus are presented in Appendix F.

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)

Program/System	Description
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.
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. Data obtained from nongravid animals were excluded from statistical analyses. 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 AND DISCUSSION

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 and Concentration Analyses

	Group 2 (3.3 mg/mL)	Group 3 (16.7 mg/mL)	Group 4 (33.3 mg/mL)
Homogeneity and Concentration Assessment of the 12 September 2011 Formulations			
Mean Concentration (mg/mL)	3.23	16.5	32.5
RSD (%)	7.3	1.6	1.6
Mean % of Target	97.8	98.9	97.6
Homogeneity and Concentration Assessment of the 30 September 2011 Formulations			
Mean Concentration (mg/mL)	3.35	16.9	33.0
RSD (%)	0.41	1.2	0.94
Mean % of Target	102	101	99.1

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 was noted at 50 mg/kg/day. Female nos. 26452 and 26314 in the 50 mg/kg/day group were found dead on gestation days 18 and 19, respectively. Both females were noted with yellow and/or red material around the urogenital area, nose, and eyes and decreased defecation at the daily examinations intermittently throughout the treatment period until the day of death; single occurrences

of red material in the urogenital area were noted for each female 1 to 2 hours following dose administration. In addition, female no. 26452 was noted with a single occurrence of red vaginal discharge 1 to 2 hours following dose administration on gestation day 16. On the day prior to death, both females were noted with a pale body. All other females in the 50 mg/kg/day group survived to the scheduled necropsy. All females in the sham control, vehicle control, 5, and 25 mg/kg/day groups survived to the scheduled necropsy on gestation day 20.

Clinical findings of red and/or yellow material in the urogenital area were noted in all groups, including the sham and vehicle control groups, generally throughout the treatment period (gestation days 0-20) at the daily examinations and/or 1 to 2 hours following dose administration. Although these findings were noted in all groups, they occurred at a much greater frequency in the test substance-treated groups and were therefore considered test substance-related at exposure levels of 5, 25, and 50 mg/kg/day. Test substance-related occurrences of red vaginal discharge were noted for 2 surviving females in the 50 mg/kg/day group during gestation days 16-19 at 1 to 2 hours following dose administration. In addition, 2 surviving females in the 50 mg/kg/day group were noted with a pale body during gestation days 17-19 at the daily examinations; this finding, which was also noted in both females that were found dead in this group, was considered test substance-related and adverse.

Red material around the nose and/or eyes were noted at the daily examinations in all groups, including the sham and vehicle control groups, generally throughout the treatment period (gestation days 1-20). Because these findings were found at similar frequencies across all groups, they were likely a result of the animals' inability to groom and discomfort caused by the collars; therefore, these findings were not attributed to test substance administration.

No other test substance-related clinical findings were noted at the daily examinations or approximately 1 to 2 hours following dose administration at any exposure level. Other

findings noted in the treated groups, including hair loss on various body surfaces and decreased defecation, 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

No remarkable dermal observations were noted at any exposure level. Observations noted in the treated 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

Test substance-related mean body weight losses were noted in the 50 mg/kg/day group at the start of the treatment period (gestation days 0-3); the difference was significant ($p < 0.01$). Mean body weight gains in the 25 and 50 mg/kg/day groups were similar to the vehicle control group during gestation days 0-3, 3-6, 6-9, and/or 9-12. However, significantly ($p < 0.01$) lower mean body weight gains were noted in the 25 and 50 mg/kg/day groups throughout the remainder of the treatment period (gestation days 12-20). As a result, significantly ($p < 0.01$) lower mean body weight gains were noted at 25 and 50 mg/kg/day when the entire treatment period (gestation days 0-20) was evaluated. Mean body weights in the 25 and 50 mg/kg/day groups were significantly ($p < 0.01$) lower (up to 10.6% and 22.3%, respectively) than the vehicle control group during gestation days 18-20 and 12-20, respectively. At necropsy, a lower mean net body

weight in the 50 mg/kg/day group and lower mean net body weight changes in the 25 and 50 mg/kg/day groups were also noted; the differences were significant ($p < 0.01$). Mean net body weight in the 25 mg/kg/day group was similar to the vehicle control group. Additionally, gravid uterine weights in the 25 and 50 mg/kg/day groups were significantly ($p < 0.01$) lower than the vehicle control group and were attributed to the decreased number of viable fetuses and lower mean fetal weights noted at these exposure levels (see Section 6.6.3.). The decreased number of viable fetuses and lower fetal weights in the 25 and 50 mg/kg/day groups also contributed to the lower body weights and body weight losses/reduced body weight gains in these groups, especially 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 5 mg/kg/day group were unaffected by test substance administration. 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 attributed to biological variability.

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 25 and 50 mg/kg/day groups generally throughout the treatment period and when the entire treatment period (gestation days 0-20) was evaluated; differences from the vehicle control group were generally significant ($p < 0.05$ or $p < 0.01$). The lower mean food consumption in these groups corresponded to the mean body weight losses and lower mean body weight gains noted during the treatment period.

Maternal food consumption in the 5 mg/kg/day group was generally similar to the vehicle control group throughout the treatment period, with the following exception. A significantly ($p < 0.05$) lower mean food consumption value (g/kg/day only) was noted in the 5 mg/kg/day group when the overall treatment period (gestation days 0-20) was evaluated. However, no corresponding effects on g/animal/day food consumption, mean body weights, or mean body weight gains were noted in this group; therefore, the difference in mean food consumption at 5 mg/kg/day was attributed to biological variability and was not considered test substance-related.

Mean food consumption in the vehicle control group was generally similar to the sham control group, with the following exception. A transient, significantly ($p < 0.05$) higher g/kg/day mean food consumption value was noted in the vehicle control group during gestation days 6-9 compared to the sham control group. Because there was no effect on the overall treatment interval or corresponding effect on mean body weight in the vehicle control group, this change was 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 was observed at 50 mg/kg/day. In the 50 mg/kg/day group, female nos. 26452 and 26314 were found dead on gestation days 18 and 19, respectively. Female no. 26452 was noted internally with a pale liver, brain, and pituitary gland and had 4 late resorptions and 10 early resorptions *in utero*. Female no. 26314 was noted internally with dark red contents in the vagina and had 2 late resorptions and 14 early resorptions *in utero*. Both females that were found dead were noted with red matting on the skin on the urogenital and nasal areas; this finding correlated with red material clinical findings around the urogenital area and nose noted for these females. All other females in the 50 mg/kg/day group survived to the scheduled necropsy.

In the 50 mg/kg/day group, 1 female (no. 26356) was noted with dark red contents in the uterus; because similar findings were noted in the females that were found dead in the 50 mg/kg/day group, this finding was considered test substance-related. No test substance-related internal findings were observed at the scheduled necropsy at 5 and 25 mg/kg/day. Macroscopic findings observed in the test substance-treated groups occurred infrequently and/or in a manner that was not dose-related. With the exception of 1 female in the 50 mg/kg/day group, all females in the test substance-treated groups were determined to be gravid.

No macroscopic findings were noted for females in the vehicle control or sham control groups at the scheduled necropsy. One female each in the vehicle control and sham control groups were determined to be nongravid.

6.6.2. ORGAN WEIGHTS

Summary Data: Table S11

Individual Data: Table A11, Table A12

Test substance-related, significantly ($p < 0.05$ or $p < 0.01$) lower mean thymus weights (absolute and relative to brain) were noted in the 25 and 50 mg/kg/day groups compared to the vehicle control group. Mean liver (absolute and relative to brain) weights and absolute brain weights in the 25 and 50 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 at 5 mg/kg/day. None of the differences from the vehicle control group were statistically significant.

Mean organ weights (absolute and relative to brain) 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 S12, Table S13

Individual Data: Table A13, Table A14, Table A15

Historical Control Data: Appendix G

Test substance-related effects on intrauterine growth and survival were noted at 25 and 50 mg/kg/day. The mean litter proportions of postimplantation loss in the 25 and 50 mg/kg/day groups (42.8% and 82.8% per litter, respectively) were significantly ($p < 0.01$) higher than the vehicle control group (6.5% per litter) and exceeded the maximum mean value in the WIL historical control data (9.9% per litter). This increase in postimplantation loss was the result of an increased mean litter proportion of early resorptions at 25 and 50 mg/kg/day. Corresponding significantly ($p < 0.01$) lower mean litter proportions of viable fetuses were noted in the 25 and 50 mg/kg/day groups (57.2% and 17.2% per litter, respectively) when compared to the vehicle control group (93.5% per litter) and the values were below the minimum mean value in the WIL historical control data (90.1% per litter). The mean numbers of viable fetuses at 25 and 50 mg/kg/day (8.5 and 2.7 per litter, respectively) were also significantly ($p < 0.01$) lower than the vehicle control group (13.4 per litter) and below the minimum mean value in the WIL historical control data (12.2 per litter). One and 8 females in the 25 and 50 mg/kg/day groups, respectively, had 100% post-implantation loss (0.0% viable fetuses). Additionally, in the 25 and 50 mg/kg/day groups, significantly ($p < 0.01$) lower mean male (3.4 g and 2.7 g, respectively), female (3.1 g and 2.6 g, respectively), and combined (3.2 g and 2.7 g, respectively) fetal weights were noted compared to the vehicle control group values (3.8 g, 3.6 g, and 3.7 g, respectively). The fetal weight values in the 25 and 50 mg/kg/day groups were also below the minimum mean values in the WIL historical control data (3.5 g, males, 3.4 g, females, and 3.4 g, combined). Intrauterine growth and survival were unaffected by test substance administration at an exposure level of 5 mg/kg/day. The mean number of corpora lutea and implantation sites at 5, 25, and 50 mg/kg/day were similar to the vehicle control group.

Intrauterine growth and survival parameters in the vehicle control group were similar to the sham control group. Differences from the sham control group were slight and not statistically significant.

6.7. FETAL MORPHOLOGICAL DATA

Summary Data: Table S14, Table S15, Table S16, Table S17

Individual Data: Table A16

Historical Control Data: Appendix G

The numbers of fetuses (litters) available for morphological evaluation were 346(24), 322(24), 340(25), 213(24), and 59(14) in the sham control, vehicle control, 5, 25, and 50 mg/kg/day groups, respectively. Malformations were observed in 4(2), 0(0), 3(2), 0(0), and 1(1) fetuses (litters) in these same respective dose groups.

6.7.1. EXTERNAL MALFORMATIONS AND VARIATIONS

There were no test substance-related external malformations noted for fetuses in the test substance-treated groups. Fetus no. 26370-11 in the 5 mg/kg/day group was noted with microphthalmia (right); skeletally, this finding consisted of the orbit being smaller than normal. Because this finding occurred in a single fetus and did not occur in a dose-related manner, it was not considered test substance-related.

No significant differences in external malformations were noted when the vehicle control group was compared to the sham control group. In the sham control group, 1 fetus (no. 26433-06) was noted with localized fetal edema (neck and thorax).

There were no external developmental variations noted for fetuses in this study.

6.7.2. VISCERAL MALFORMATIONS AND VARIATIONS

There were no test substance-related visceral malformations noted for fetuses in the test substance-treated groups. Fetus no. 26354-01 in the 5 mg/kg/day group was noted with situs inversus (trachea, esophagus, heart, great and major vessels, lungs, liver, stomach, pancreas, spleen, kidneys, adrenals, and intestine laterally transposed). Because this

finding occurred in a single animal, did not occur in a dose-related manner, and was also noted for 1 fetus (no. 26407-01) in the sham control group, it was not considered test substance-related.

No test substance-related visceral developmental variations were noted in the 5, 25, and 50 mg/kg/day groups. One fetus (no. 26390-03) in the 25 mg/kg/day group was noted with a major blood vessel variation (right carotid and right subclavian arteries arose independently from the aortic arch [no brachiocephalic trunk]). In the 5 mg/kg/day group, fetus no. 26402-09 was noted with a distended ureter (left). These findings occurred in single animals and did not occur in a dose-related manner; therefore, these findings were not considered test substance-related. Fetus no. 26315-06 in the vehicle control group was noted with a hemorrhagic ring around the iris (right).

No significant differences in visceral malformations or developmental variations were noted when the vehicle control group was compared to the sham control group. Fetus no. 26302-10 in the sham control group was noted with the variation of a distended ureter (left).

One fetus each in the sham control and 5 mg/kg/day groups (nos. 26426-07 and 26402-09, respectively) were noted with renal papilla(e) not fully developed (Woo and Hoar Grade 1). This finding was not classified as either a malformation or developmental variation, was not included on the summary tables, and was not considered to be test substance-related because it occurred infrequently and in a manner that was not dose-related.

6.7.3. SKELETAL MALFORMATIONS AND VARIATIONS

There were no test substance-related skeletal malformations noted for fetuses in the test substance-treated groups. Two (nos. 26354-01 and 26354-02) and 1 (no. 26393-14) fetuses in the 5 and 50 mg/kg/day groups, respectively, were noted with a vertebral anomaly without an associated rib anomaly (absent, fused, smaller or larger than normal,

and/or malpositioned centra and arches). This malformation did not occur in a dose-related manner, and therefore was not considered test substance-related.

In the 50 mg/kg/day group, a decreased mean litter proportion of cervical centrum no. 1 ossified and increased mean litter proportions of sternebra(e) nos. 5 and/or 6 unossified, reduced ossification of the vertebral arches, reduced ossification of the skull, and pubis unossified were noted compared to the vehicle control group; the difference in sternebra(e) nos. 5 and/or 6 unossified was significant ($p < 0.05$). The mean litter proportion of reduced ossification of the skull was also higher in the 25 mg/kg/day group compared to the vehicle control group. While these findings were test substance-related, they were considered secondary to the reduced fetal weights noted at 25 and 50 mg/kg/day. No test substance-related skeletal developmental variations were noted at 5 mg/kg/day. The following text table summarizes the absolute number of fetuses and mean litter proportions of the test substance-related skeletal developmental variations observed in this study.

Text Table 2. Skeletal Developmental Variations

Dose (mg/kg):	0 ^a	5	25	50	WIL HC Mean (Range; % per litter)
Skeletal Developmental Variations:					
Absolute no. (% per litter)					
Sternebra(e) nos. 5 and/or 6 unossified	48 (14.6)	40 (11.8)	35 (14.7)	26 (50.2*)	6.4 (0.0-26.1)
Cervical centrum no. 1 ossified	33 (9.8)	63 (18.5)	15 (11.3)	7 (5.3)	20.4 (6.6-35.8)
Reduced ossification of the vertebral					
arches	2 (0.5)	1 (0.3)	3 (1.1)	10 (26.8)	0.1 (0.0-1.1)
Reduced ossification of the skull	1 (0.2)	2 (0.6)	5 (1.8)	7 (14.3)	0.1 (0.0-1.0)
Pubis unossified	1 (0.3)	0 (0.0)	0 (0.0)	2 (7.1)	0.1 (0.0-2.3)

^a Vehicle control.

WIL HC = WIL developmental historical control data.

* = Significantly different from the vehicle control group at 0.05 using Dunnett's test.

Other skeletal developmental variations observed in the test substance-treated groups consisted of 7th cervical rib(s), 14th rudimentary rib(s), sternebra(e) malaligned (slight or

moderate), sternebra(e) nos. 1, 2, 3, and/or 4 unossified, reduced ossification of the 13th rib(s), 25 presacral vertebrae, and 27 presacral vertebrae. 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 significant differences in skeletal malformations or developmental variations were noted when the vehicle control group was compared to the sham control group. In the sham control group, 2 fetuses from a single litter (nos. 26433-06 and 26433-14) were noted with sternoschisis (sternal bands nos. 1 and 2 or nos. 5 and 6 not joined). In addition, 1 fetus (no. 26407-16) in the sham control group was noted with severely malaligned sternebrae.

6.7.4. SUMMARY OF EXTERNAL, VISCERAL, AND SKELETAL EXAMINATIONS

The numbers of fetuses (litters) available for morphological evaluation were 346(24), 322(24), 340(25), 213(24), and 59(14) in the sham control, vehicle control, 5, 25, and 50 mg/kg/day groups, respectively. Malformations were observed in 4(2), 0(0), 3(2), 0(0), and 1(1) fetuses (litters) in these same respective dose groups.

A significantly ($p < 0.01$) higher incidence of fetal developmental variations was observed in the 50 mg/kg/day group (82.9% per litter) compared to the vehicle control group (33.0% per litter). This was due to the significantly ($p < 0.01$) higher percent per litter of skeletal variations (82.9% per litter versus 32.6% per litter in the vehicle control group). Increased mean litter proportions of sternebra(e) nos. 5 and/or 6 unossified, reduced ossification of the vertebral arches, reduced ossification of the skull, and pubis unossified were noted in the 50 mg/kg/day group. In addition, a decreased mean litter proportion of cervical centrum no. 1 ossified was noted at 50 mg/kg/day. An increased mean litter proportion of reduced ossification of the skull was also noted in the 25 mg/kg/day group. These findings were considered secondary to the reduced fetal weights noted in the

25 and 50 mg/kg/day groups. No test substance-related fetal malformations or developmental variations were noted in the 5 mg/kg/day group.

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

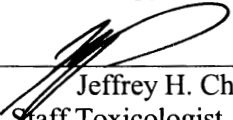
7. CONCLUSIONS

Maternal toxicity was evidenced by mortality at 50 mg/kg/day and lower mean food consumption with corresponding mean body weight losses and lower mean body weight gains generally throughout the treatment period in the 25 and 50 mg/kg/day groups. Additionally, lower mean thymus weights were noted in the 25 and 50 mg/kg/day groups. No evidence of maternal toxicity was noted at 5 mg/kg/day. Developmental effects were noted in the 25 and 50 mg/kg/day groups as evidenced by increased mean litter proportions of postimplantation loss (early resorptions at 25 mg/kg/day and early and late resorptions at 50 mg/kg/day) with a corresponding decrease in the mean numbers and litter proportions of viable fetuses. In addition, lower mean male, female, and combined fetal weights were noted in the 25 and 50 mg/kg/day groups. Test substance-related fetal developmental variations (sternebra[e] nos. 5 and/or 6 unossified, cervical centrum no. 1 ossified, reduced ossification of the vertebral arches, reduced ossification of the skull, and/or pubis unossified) were noted in the 50 mg/kg/day group and reduced ossification of the skull was also noted in the 25 mg/kg/day group. These findings were considered secondary to the lower fetal weights noted in these groups. Intrauterine growth and survival and external, visceral, and skeletal fetal morphology were unaffected by test substance administration at an exposure level of 5 mg/kg/day.

Based on these results, an exposure level of 5 mg/kg/day was considered to be the no-observed-adverse-effect level (NOAEL) for maternal toxicity and embryo/fetal development when clarified oils, catalytic cracked was administered by dermal application to bred CrI:CD(SD) rats.

8. REPORT REVIEW AND APPROVAL

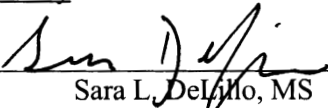
Report Authored and Approved By:



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

12 July 2012
Date

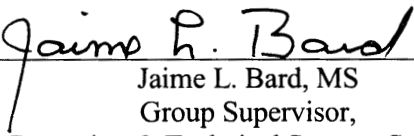
Report Prepared By:



Sara L. DeLillo, MS
Study Analyst

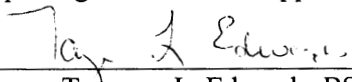
12 Jul 2012
Date

Report Reviewed By:



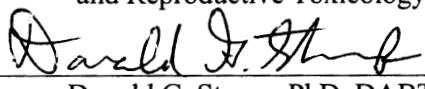
Jaime L. Bard, MS
Group Supervisor,
Reporting & Technical Support Services

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

9. 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>
30-Aug-2011	Protocol Review	30-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
28-Sep-2011, 29-Sep-2011	Dermal Observations	29-Sep-2011	25-Oct-2011
03-Oct-2011	Laparohysterectomy and Fetal Examinations	03-Oct-2011	28-Nov-2011
20-Oct-2011, 21-Oct-2011, 24-Oct-2011, 25-Oct-2011, 06-Dec-2011, 07-Dec-2011, 09-Dec-2011	Study Records (I-1)	09-Dec-2011	16-Jan-2012
26-Oct-2011, 27-Oct-2011, 08-Dec-2011, 09-Dec-2011	Study Records (I-2)	09-Dec-2011	16-Jan-2012
27-Oct-2011	Protocol Amendment 3	27-Oct-2011	28-Nov-2011
28-Oct-2011, 08-Dec-2011, 09-Dec-2011	Study Records (N-1)	09-Dec-2011	16-Jan-2012
03-Nov-2011	Protocol Amendment 4	03-Nov-2011	20-Dec-2011
07-Nov-2011, 08-Nov-2011, 08-Dec-2011, 09-Dec-2011	Study Records (Rx-1)	09-Dec-2011	16-Jan-2012
09-Nov-2011	Protocol Amendment 5	09-Nov-2011	20-Dec-2011

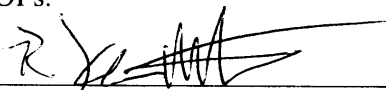
<u>Date(s) of Inspection(s)</u>	<u>Phase Inspected</u>	<u>Date(s) Findings Reported to Study Director</u>	<u>Date(s) Findings Reported to Management</u>
18-Nov-2011, 08-Dec-2011, 09-Dec-2011	Study Records (N-2)	09-Dec-2011	16-Jan-2012
23-Nov-2011, 28-Nov-2011	Study Records (A-1)	28-Nov-2011	20-Dec-2011
01-Dec-2011, 02-Dec-2011, 05-Dec-2011, 06-Dec-2011, 09-Dec-2011	Draft Report (without Analyses of Dosing Formulations Appendix)	09-Dec-2011	16-Jan-2012
05-Dec-2011	Analytical Chemistry Report	05-Dec-2011	16-Jan-2012
15-Dec-2011, 16-Dec-2011	Audited Draft Report	16-Dec-2011	16-Jan-2012
16-Dec-2011	Audited Analytical Chemistry Report	16-Dec-2011	16-Jan-2012
10-Jul-2012	Final Report	10-Jul-2012	10-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.

WIL-402016
American Petroleum Institute

Clarified Oils, Catalytic Cracked

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

10. REFERENCES

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11. 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.

12. 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
dL	-	deciliter
EPA	-	Environmental Protection Agency
exp.	-	expiration
g	-	gram
GC	-	gas chromatography
GLP	-	Good Laboratory Practices
GMP	-	Good Manufacturing Practices
hr	-	hour(s)
kg	-	kilogram
L	-	liter
M	-	molar
mg	-	milligram
mL	-	milliliter
mm	-	millimeter
ms	-	milliseconds
mM	-	millimolar
NA	-	not applicable
NF	-	National Formulary
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
SOP	-	standard operating procedure
TSCA	-	Toxic Substances Control Act
WIL Research	-	WIL Research Laboratories, LLC
WTDMS™	-	WIL Toxicology Data Management System
wt.	-	weight
wt.	-	weights

TABLES S1 - S17

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S1
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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	2	8.0
FEMALES THAT ABORTED 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	2	100.0
FEMALES THAT WERE EUTHANIZED 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	0	0.0
FEMALES EXAMINED AT SCHEDULED NECROPSY	25	100.0	25	100.0	25	100.0	25	100.0	23	92.0
NONGRAVID	1	4.0	1	4.0	0	0.0	0	0.0	1	4.3
GRAVID	24	96.0	24	96.0	25	100.0	25	100.0	22	95.7
WITH RESORPTIONS ONLY	0	0.0	0	0.0	0	0.0	1	4.0	8	36.4
WITH VIABLE FETUSES	24	100.0	24	100.0	25	100.0	24	96.0	14	63.6
TOTAL FEMALES GRAVID	24	96.0	24	96.0	25	100.0	25	100.0	24	96.0

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

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10/27/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

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

TABLE RANGE: GROUP:	1	09-13-11 TO 10-08-11 2	3	4	5
NORMAL					
-NO SIGNIFICANT CLINICAL OBSERVATIONS	106/25	104/25	102/25	68/25	52/25
DISPOSITION					
-SCHEDULED EUTHANASIA; GESTATION DAY 20	25/25	25/25	25/25	25/25	23/23
-FOUND DEAD	0/ 0	0/ 0	0/ 0	0/ 0	2/ 2
BODY/INTEGUMENT					
-WET YELLOW MATERIAL UROGENITAL AREA	0/ 0	17/ 5	17/ 7	27/12	21/ 9
-WET YELLOW MATERIAL VENTRAL ABDOMINAL AREA	0/ 0	0/ 0	4/ 1	1/ 1	0/ 0
-HAIR LOSS LEFT HINDLIMB	0/ 0	0/ 0	5/ 1	0/ 0	0/ 0
-HAIR LOSS RIGHT FORELIMB	3/ 1	0/ 0	4/ 3	3/ 3	2/ 2
-HAIR LOSS LEFT FORELIMB	4/ 1	0/ 0	3/ 1	2/ 1	0/ 0
-DRIED YELLOW MATERIAL UROGENITAL AREA	9/ 4	8/ 3	20/ 6	38/13	35/11
-HAIR LOSS VENTRAL ABDOMINAL AREA	0/ 0	4/ 1	9/ 1	3/ 1	0/ 0
-LACERATION LEFT LATERAL ABDOMINAL AREA	0/ 0	0/ 0	0/ 0	0/ 0	1/ 1
-WET RED MATERIAL UROGENITAL AREA	0/ 0	0/ 0	2/ 2	10/ 9	20/15
-DRIED RED MATERIAL UROGENITAL AREA	3/ 3	2/ 2	15/ 8	38/16	61/22
-HAIR LOSS DORSAL HEAD	1/ 1	1/ 1	2/ 1	1/ 1	0/ 0
-HAIR LOSS FACIAL AREA	0/ 0	2/ 1	1/ 1	0/ 0	0/ 0
-BODY PALE	0/ 0	0/ 0	0/ 0	0/ 0	5/ 4
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY					

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

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

TABLE RANGE: GROUP:	1	09-13-11 TO 10-08-11 2	3	4	5
EYES/EARS/NOSE					
-DRIED RED MATERIAL AROUND NOSE	389/25	383/25	378/25	417/25	432/25
-DRIED RED MATERIAL RIGHT EYE	168/23	172/23	177/23	164/22	208/25
-DRIED RED MATERIAL LEFT EYE	143/21	167/23	163/23	158/23	186/24
-WET RED MATERIAL AROUND NOSE	2/ 2	1/ 1	1/ 1	2/ 2	0/ 0
-WET RED MATERIAL RIGHT EYE	0/ 0	2/ 1	2/ 1	2/ 1	0/ 0
-WET RED MATERIAL LEFT EYE	0/ 0	2/ 1	1/ 1	2/ 1	0/ 0
-HAIR LOSS AROUND RIGHT EYE	2/ 2	4/ 3	2/ 2	4/ 2	0/ 0
-HAIR LOSS AROUND LEFT EYE	0/ 0	4/ 3	1/ 1	4/ 2	0/ 0
EXCRETA					
-DECREASED DEFECATION	88/21	87/22	104/25	99/24	162/25
-WET RED VAGINAL DISCHARGE	0/ 0	0/ 0	1/ 1	0/ 0	0/ 0
ORAL/DENTAL					
-LEFT UPPER INCISOR MISSING	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0
-RIGHT UPPER INCISOR BROKEN	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0
SPECIAL II					
-ANIMAL FOUND WITHOUT COLLAR ON	6/ 6	8/ 5	6/ 4	4/ 4	6/ 6
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY	

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12/16/2011

PROJECT NO.:WIL-402016
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TABLE S3
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
SUMMARY OF POST-DOSE FINDINGS: TOTAL OCCURRENCE/NO. OF ANIMALS

PAGE 1

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

TABLE RANGE: 09-13-11 TO 10-07-11						
GROUP:		1	2	3	4	5
NORMAL						
TIME OF DOSE						
-NO SIGNIFICANT CLINICAL OBSERVATIONS		500/25	500/25	499/25	500/25	497/25
1-2 HOURS POST-DOSING						
-NO SIGNIFICANT CLINICAL OBSERVATIONS		499/25	494/25	484/25	472/25	463/25
BODY/INTEGUMENT						
1-2 HOURS POST-DOSING						
-WET YELLOW MATERIAL UROGENITAL AREA		0/0	5/5	12/8	17/13	13/10
-DRIED YELLOW MATERIAL UROGENITAL AREA		1/1	0/0	1/1	1/1	0/0
-WET RED MATERIAL UROGENITAL AREA		0/0	1/1	0/0	4/4	10/8
-DRIED RED MATERIAL UROGENITAL AREA		0/0	0/0	2/1	6/5	8/7
-WET CLEAR MATERIAL UROGENITAL AREA		0/0	0/0	1/1	0/0	0/0
EXCRETA						
1-2 HOURS POST-DOSING						
-WET RED VAGINAL DISCHARGE		0/0	0/0	0/0	0/0	3/3
1-0 MG/KG/DAY SHAM		2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY	

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12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

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

TABLE RANGE:		09-13-11 TO 10-08-11				
GROUP:	1	2	3	4	5	

DERMAL OBS						
-SCORED, NOT REMARKABLE	519/25	502/25	502/25	511/25	515/25	
-NO ERYTHEMA	6/ 2	23/ 8	23/12	14/ 5	5/ 3	
-NO EDEMA	6/ 2	23/ 8	23/12	14/ 5	5/ 3	
-DESQUAMATION	6/ 2	23/ 8	23/12	14/ 5	5/ 3	

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PCSUv4.07
11/11/2011

PROJECT NO.:WIL-402016
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TABLE S5
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
SUMMARY OF BODY WEIGHTS DURING GESTATION [G]

PAGE 1

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY	
DAY	0	MEAN	253.	251.	251.	253.	252.
		S.D.	11.7	11.3	11.9	12.2	12.3
		S.E.	2.4	2.3	2.4	2.4	2.5
		N	24	24	25	25	24
DAY	3	MEAN	251.	249.	251.	249.	243.
		S.D.	12.6	17.6	13.1	12.6	10.9
		S.E.	2.6	3.6	2.6	2.5	2.2
		N	24	24	25	25	24
DAY	6	MEAN	264.	261.	262.	261.	255.
		S.D.	13.2	15.6	15.6	12.2	14.8
		S.E.	2.7	3.2	3.1	2.4	3.0
		N	24	24	25	25	24
DAY	9	MEAN	278.	274.	273.	271.	264.
		S.D.	14.2	15.7	15.3	13.2	14.8
		S.E.	2.9	3.2	3.1	2.6	3.0
		N	24	24	25	25	24
DAY	12	MEAN	293.	291.	287.	286.	277.d
		S.D.	13.8	16.2	16.1	13.7	18.4
		S.E.	2.8	3.3	3.2	2.7	3.8
		N	24	24	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

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY	
DAY	15	MEAN	310.	308.	305.	296.	282.d
		S.D.	14.3	18.2	18.0	13.6	20.9
		S.E.	2.9	3.7	3.6	2.7	4.3
		N	24	24	25	25	24
DAY	18	MEAN	349.	343.	344.	319.d	285.d
		S.D.	17.1	23.3	19.3	20.2	26.4
		S.E.	3.5	4.8	3.9	4.0	5.5
		N	24	24	25	25	23
DAY	20	MEAN	385.	377.	374.	337.d	293.d
		S.D.	18.1	28.7	21.9	25.8	34.8
		S.E.	3.7	5.9	4.4	5.2	7.4
		N	24	24	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 WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PGBWSUv5.10
11/11/2011

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

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	0-	3					
		MEAN	-2.	-2.	-1.	-5.	-9.d
		S.D.	8.9	10.6	6.1	7.4	6.9
		S.E.	1.8	2.2	1.2	1.5	1.4
		N	24	24	25	25	24
DAY	3-	6					
		MEAN	12.	12.	11.	12.	12.
		S.D.	4.7	6.4	5.6	5.8	8.7
		S.E.	1.0	1.3	1.1	1.2	1.8
		N	24	24	25	25	24
DAY	6-	9					
		MEAN	15.	13.	12.	10.	9.
		S.D.	4.8	6.4	6.5	6.1	5.7
		S.E.	1.0	1.3	1.3	1.2	1.2
		N	24	24	25	25	24
DAY	9-	12					
		MEAN	15.	17.	14.	14.	13.
		S.D.	6.1	6.1	5.4	5.2	7.3
		S.E.	1.2	1.3	1.1	1.0	1.5
		N	24	24	25	25	24
DAY	12-	15					
		MEAN	17.	17.	18.	11.d	5.d
		S.D.	4.7	5.5	6.5	5.9	6.9
		S.E.	1.0	1.1	1.3	1.2	1.4
		N	24	24	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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	15-	18					
		MEAN	39.	36.	39.	23.d	3.d
		S.D.	7.4	7.6	6.2	11.1	14.6
		S.E.	1.5	1.5	1.2	2.2	3.0
		N	24	24	25	25	23
DAY	18-	20					
		MEAN	36.	34.	30.	19.d	7.d
		S.D.	6.3	8.6	5.1	10.6	13.1
		S.E.	1.3	1.8	1.0	2.1	2.8
		N	24	24	25	25	22
DAY	0-	20					
		MEAN	132.	127.	123.	84.d	40.d
		S.D.	12.8	21.6	17.0	24.7	26.8
		S.E.	2.6	4.4	3.4	4.9	5.7
		N	24	24	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

MEAN DIFFERENCES CALCULATED FROM INDIVIDUAL DIFFERENCES

NONGRAVID WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PGBWSUv5.10
11/11/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
INITIAL BODY WT.					
MEAN	253.	251.	251.	253.	253.
S.D.	11.7	11.3	11.9	12.2	12.4
S.E.	2.4	2.3	2.4	2.4	2.6
N	24	24	25	25	22
TERMINAL BODY WT.					
MEAN	385.	377.	374.	337.d	293.d
S.D.	18.1	28.7	21.9	25.8	34.8
S.E.	3.7	5.9	4.4	5.2	7.4
N	24	24	25	25	22
GRAVID UTERINE WT.					
MEAN	84.0	76.8	76.1	46.7d	17.9d
S.D.	9.05	17.26	8.64	22.37	14.47
S.E.	1.85	3.52	1.76	4.47	3.09
N	24	24	24	25	22
NET BODY WT.					
MEAN	300.9	300.6	297.2	290.7	275.3d
S.D.	16.68	16.50	17.67	14.47	25.21
S.E.	3.41	3.37	3.61	2.89	5.38
N	24	24	24	25	22
NET BODY WT. CHANGE					
MEAN	48.2	49.7	46.4	37.3d	22.6d
S.D.	12.86	10.27	14.16	11.11	18.53
S.E.	2.63	2.10	2.89	2.22	3.95
N	24	24	24	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

PUTSUv5.07
11/23/2011

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

GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	0-	3				
		MEAN	19.	19.	19.	17.d
		S.D.	2.4	3.6	2.5	2.2
		S.E.	0.5	0.7	0.5	0.4
		N	24	24	25	24
DAY	3-	6				
		MEAN	21.	21.	20.	20.
		S.D.	1.7	3.1	2.4	1.4
		S.E.	0.3	0.6	0.5	0.3
		N	24	24	25	24
DAY	6-	9				
		MEAN	23.	25.	24.	23.d
		S.D.	1.9	3.2	3.0	2.4
		S.E.	0.4	0.7	0.6	0.5
		N	24	24	25	24
DAY	9-	12				
		MEAN	24.	24.	24.	23.
		S.D.	1.7	2.3	2.1	2.0
		S.E.	0.3	0.5	0.4	0.4
		N	23	24	25	25
DAY	12-	15				
		MEAN	27.	28.	27.	26.
		S.D.	2.0	2.8	2.9	3.8
		S.E.	0.4	0.6	0.6	0.8
		N	24	24	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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	15-	18					
		MEAN	29.	30.	27.	25.d	23.d
		S.D.	2.7	2.2	4.5	4.0	4.6
		S.E.	0.5	0.4	0.9	0.8	1.0
		N	24	24	25	25	21
DAY	18-	20					
		MEAN	30.	30.	29.	28.	26.d
		S.D.	2.7	3.1	3.1	3.2	6.6
		S.E.	0.5	0.6	0.6	0.6	1.4
		N	24	24	25	25	22
DAY	0-	20					
		MEAN	25.	25.	24.	23.d	21.d
		S.D.	1.5	2.0	1.8	1.6	2.1
		S.E.	0.3	0.4	0.4	0.3	0.5
		N	24	24	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 WEIGHT(S) NOT INCLUDED IN CALCULATION OF MEAN

PGFWSUv5.16
11/11/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	0-	3					
		MEAN	74.	76.	75.	66.d	62.d
		S.D.	9.0	12.0	10.5	8.0	6.8
		S.E.	1.8	2.5	2.1	1.6	1.4
		N	24	24	25	25	24
DAY	3-	6					
		MEAN	81.	81.	79.	77.	76.
		S.D.	4.8	9.0	6.9	5.2	5.1
		S.E.	1.0	1.8	1.4	1.0	1.0
		N	24	24	25	25	24
DAY	6-	9					
		MEAN	87.	93.a	89.	84.d	83.d
		S.D.	7.6	10.9	10.4	7.1	8.0
		S.E.	1.5	2.2	2.1	1.4	1.6
		N	24	24	25	25	24
DAY	9-	12					
		MEAN	85.	86.	85.	83.	80.d
		S.D.	5.9	5.5	5.2	7.1	6.1
		S.E.	1.2	1.1	1.0	1.4	1.2
		N	23	24	25	25	24
DAY	12-	15					
		MEAN	89.	94.	90.	89.	87.
		S.D.	6.8	9.2	7.6	11.7	14.0
		S.E.	1.4	1.9	1.5	2.3	2.9
		N	24	24	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.

a = Significantly different from control group 1 at 0.05 using two-sample t-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-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

GROUP:			0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
DAY	15-	18					
		MEAN	89.	91.	83.	83.c	81.c
		S.D.	5.7	5.8	13.9	11.9	14.6
		S.E.	1.2	1.2	2.8	2.4	3.2
		N	24	24	25	25	21
DAY	18-	20					
		MEAN	82.	84.	80.	84.	88.
		S.D.	7.2	7.3	6.5	10.0	19.6
		S.E.	1.5	1.5	1.3	2.0	4.2
		N	24	24	25	25	22
DAY	0-	20					
		MEAN	83.	85.	82.c	80.d	79.d
		S.D.	3.7	3.7	4.0	3.9	5.6
		S.E.	0.8	0.8	0.8	0.8	1.2
		N	24	24	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.

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

PGFWSUv5.16
11/11/2011
R:11/23/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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	24	24	24	24	19
NONGRAVID -- AMMONIUM SULFIDE NEGATIVE	1	1	0	0	1
DIAPHRAGM: HERNIA	0	0	1	0	0
LIVER: AREA(S), WHITE	0	0	0	1	1
BRAIN: PALE	0	0	0	0	2
DIED GESTATION DAY 18	0	0	0	0	1
SKIN: MATTING, RED	0	0	0	0	2
LIVER: PALE	0	0	0	0	1
PITUITARY: PALE	0	0	0	0	2
DIED GESTATION DAY 19	0	0	0	0	1
VAGINA: CONTENTS, DARK RED	0	0	0	0	1
UTERUS: CONTENTS, DARK RED	0	0	0	0	1

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PMGSIv4.04
10/27/2011

		FEMALES				
GROUP:		0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
BRAIN (G)	MEAN	1.98	1.96	1.96	1.97	1.94
	S.D.	0.099	0.090	0.084	0.085	0.096
	S.E.	0.020	0.018	0.017	0.017	0.021
	N	24	24	25	25	22
LIVER (G)	MEAN	16.17	15.68	16.17	16.24	15.32
	S.D.	1.342	1.363	1.642	1.478	2.419
	S.E.	0.274	0.278	0.328	0.296	0.516
	N	24	24	25	25	22
LIVER (G/100 G BRAIN)	MEAN	819.811	798.423	827.062	824.565	788.813
	S.D.	77.9996	65.4161	80.6767	70.2748	114.1607
	S.E.	15.9216	13.3530	16.1353	14.0550	24.3392
	N	24	24	25	25	22
THYMUS (G)	MEAN	0.2309	0.2335	0.2360	0.1837 ^c	0.1314 ^d
	S.D.	0.08160	0.06419	0.07086	0.05480	0.03420
	S.E.	0.01666	0.01310	0.01417	0.01096	0.00729
	N	24	24	25	25	22
THYMUS (G/100 G BRAIN)	MEAN	11.668	11.904	12.083	9.316 ^d	6.776 ^d
	S.D.	3.9927	3.2693	3.6297	2.7569	1.7602
	S.E.	0.8150	0.6673	0.7259	0.5514	0.3753
	N	24	24	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.

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 WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S12
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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 186 160	346	0	28 0	28	374	381	7	NA	24
	MEAN 7.8 6.7	14.4	0.0	1.2 0.0	1.2	15.6	15.9	0.3	3.7	
	S.D. 2.49 2.51	1.47	0.00	1.58 0.00	1.58	1.59	1.54	0.55	0.29	
	S.E. 0.51 0.51	0.30	0.00	0.32 0.00	0.32	0.32	0.31	0.11	0.06	
2	TOTAL 168 154	322	0	24 0	24	346	370	24	NA	24
	MEAN 7.0 6.4	13.4	0.0	1.0 0.0	1.0	14.4	15.4	1.0	3.7	
	S.D. 2.38 2.59	2.96	0.00	1.18 0.00	1.18	3.12	2.89	1.44	0.28	
	S.E. 0.49 0.53	0.60	0.00	0.24 0.00	0.24	0.64	0.59	0.29	0.06	
3	TOTAL 165 175	340	0	29 3	32	372	390	18	NA	25
	MEAN 6.6 7.0	13.6	0.0	1.2 0.1	1.3	14.9	15.6	0.7	3.6	
	S.D. 2.55 2.38	1.41	0.00	1.11 0.33	1.24	1.62	1.83	0.98	0.29	
	S.E. 0.51 0.48	0.28	0.00	0.22 0.07	0.25	0.32	0.37	0.20	0.06	
4	TOTAL 115 98	213	1	155 2	158	371	402	31	NA	25
	MEAN 4.6 3.9	8.5d	0.0	6.2 0.1	6.3	14.8	16.1	1.2	3.2d	
	S.D. 3.03 2.36	4.66	0.20	4.30 0.28	4.20	3.29	2.69	2.11	0.33	
	S.E. 0.61 0.47	0.93	0.04	0.86 0.06	0.84	0.66	0.54	0.42	0.07	
5	TOTAL 30 29	59	0	259 6	265	324	339	15	NA	22
	MEAN 1.4 1.3	2.7d	0.0	11.8 0.3	12.0	14.7	15.4	0.7	2.7d	
	S.D. 2.13 1.36	2.95	0.00	3.95 0.55	3.96	3.74	3.00	1.32	0.55	
	S.E. 0.45 0.29	0.63	0.00	0.84 0.12	0.84	0.80	0.64	0.28	0.15	

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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PLSUv5.12
11/23/2011
R:11/23/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

PAGE 1

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
CORPORA LUTEA					
MEAN	15.9	15.4	15.6	16.1	15.4
S.D.	1.54	2.89	1.83	2.69	3.00
S.E.	0.31	0.59	0.37	0.54	0.64
N	24	24	25	25	22
IMPLANTATION SITES					
MEAN	15.6	14.4	14.9	14.8	14.7
S.D.	1.59	3.12	1.62	3.29	3.74
S.E.	0.32	0.64	0.32	0.66	0.80
N	24	24	25	25	22
VIABLE FETUSES (%)					
MEAN	93.0	93.5	91.8	57.2d	17.2d
S.D.	8.84	7.56	7.68	26.57	18.94
S.E.	1.80	1.54	1.54	5.31	4.04
N	24	24	25	25	22
DEAD FETUSES (%)					
MEAN	0.0	0.0	0.0	0.3	0.0
S.D.	0.00	0.00	0.00	1.54	0.00
S.E.	0.00	0.00	0.00	0.31	0.00
N	24	24	25	25	22
EARLY RESORPTIONS (%)					
MEAN	7.0	6.5	7.6	41.9d	81.1d
S.D.	8.84	7.57	7.01	27.21	19.79
S.E.	1.80	1.55	1.40	5.44	4.22
N	24	24	25	25	22

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

PAGE 2

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
LATE RESORPTIONS (%)					
MEAN	0.0	0.0	0.7	0.5	1.7
S.D.	0.00	0.00	1.96	1.86	3.40
S.E.	0.00	0.00	0.39	0.37	0.72
N	24	24	25	25	22
TOTAL RESORPTIONS (%)					
MEAN	7.0	6.5	8.3	42.5d	82.8d
S.D.	8.84	7.57	7.69	26.56	18.94
S.E.	1.80	1.55	1.54	5.31	4.04
N	24	24	25	25	22
PRE-IMPLANTATION LOSS (%)					
MEAN	1.8	7.7	4.3	8.1	5.9
S.D.	3.44	13.37	5.83	14.98	15.82
S.E.	0.70	2.73	1.17	3.00	3.37
N	24	24	25	25	22
POST-IMPLANTATION LOSS (%)					
MEAN	7.0	6.5	8.3	42.8d	82.8d
S.D.	8.84	7.57	7.69	26.56	18.94
S.E.	1.80	1.55	1.54	5.31	4.04
N	24	24	25	25	22
MALES (%)					
MEAN	53.8	54.0	48.3	53.1	40.7
S.D.	16.46	17.13	17.34	21.34	29.67
S.E.	3.36	3.50	3.47	4.36	7.93
N	24	24	25	24	14

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.

d = Significantly different from control group 2 at 0.01

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
SUMMARY OF FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

PAGE 3

GROUP:	0 MG/KG/DAY SHAM	0 MG/KG/DAY VEH.	5 MG/KG/DAY	25 MG/KG/DAY	50 MG/KG/DAY
FEMALES (%)					
MEAN	46.2	46.0	51.7	46.9	59.3
S.D.	16.46	17.13	17.34	21.34	29.67
S.E.	3.36	3.50	3.47	4.36	7.93
N	24	24	25	24	14
MALE FETAL WEIGHTS (g)					
MEAN	3.8	3.8	3.7	3.4d	2.7d
S.D.	0.32	0.31	0.33	0.33	0.57
S.E.	0.07	0.06	0.07	0.07	0.17
N	24	24	24	23	11
FEMALE FETAL WEIGHTS (g)					
MEAN	3.7	3.6	3.5	3.1d	2.6d
S.D.	0.35	0.32	0.26	0.28	0.53
S.E.	0.07	0.07	0.05	0.06	0.15
N	24	23	24	23	13
COMBINED FETAL WEIGHTS (g)					
MEAN	3.7	3.7	3.6	3.2d	2.7d
S.D.	0.29	0.28	0.29	0.33	0.55
S.E.	0.06	0.06	0.06	0.07	0.15
N	24	24	24	24	14

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.
d = Significantly different from control group 2 at 0.01

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11/23/2011
R:11/23/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S14
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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	346	322	340	213	59	24	24	25	24	14
LOCALIZED FETAL EDEMA	1	0	0	0	0	1	0	0	0	0
MICROPHTHALMIA AND/OR ANOPHTHALMIA	0	0	1	0	0	0	0	1	0	0
NUMBER EXAMINED VISCERALLY	346	322	340	213	59	24	24	25	24	14
SITUS INVERSUS	1	0	1	0	0	1	0	1	0	0
NUMBER EXAMINED SKELETALLY	346	322	340	213	59	24	24	25	24	14
VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY	0	0	2	0	1	0	0	1	0	1
STERNEBRA(E) MALALIGNED (SEVERE)	1	0	0	0	0	1	0	0	0	0
STERNOSCHISIS	2	0	0	0	0	1	0	0	0	0
TOTAL NUMBER WITH MALFORMATIONS										
EXTERNAL :	1	0	1	0	0	1	0	1	0	0
SOFT TISSUE :	1	0	1	0	0	1	0	1	0	0
SKELETAL :	3	0	2	0	1	2	0	1	0	1
COMBINED :	4	0	3	0	1	2	0	2	0	1
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY						

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12/07/2011

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED EXTERNALLY	24	24	25	24	14
LOCALIZED FETAL EDEMA	MEAN 0.4	0.0	0.0	0.0	0.0
	S.D. 1.86	0.00	0.00	0.00	0.00
	S.E. 0.38	0.00	0.00	0.00	0.00
MICROPTHALMIA AND/OR ANOPHTHALMIA	MEAN 0.0	0.0	0.3	0.0	0.0
	S.D. 0.00	0.00	1.67	0.00	0.00
	S.E. 0.00	0.00	0.33	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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	24	25	24	14
SITUS INVERSUS	MEAN 0.3	0.0	0.3	0.0	0.0
	S.D. 1.28	0.00	1.54	0.00	0.00
	S.E. 0.26	0.00	0.31	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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	24	25	24	14
VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY	MEAN	0.0	0.0	0.6	0.0	0.9
	S.D.	0.00	0.00	3.08	0.00	3.34
	S.E.	0.00	0.00	0.62	0.00	0.89
STERNEBRA(E) MALALIGNED (SEVERE)	MEAN	0.3	0.0	0.0	0.0	0.0
	S.D.	1.28	0.00	0.00	0.00	0.00
	S.E.	0.26	0.00	0.00	0.00	0.00
STERNOSCHISIS	MEAN	0.8	0.0	0.0	0.0	0.0
	S.D.	3.71	0.00	0.00	0.00	0.00
	S.E.	0.76	0.00	0.00	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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-402016		TABLE S15				PAGE 4	
SPONSOR:AMERICAN PETROLEUM		RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED					
		SUMMARY OF LITTER PROPORTIONS OF MALFORMATIONS				DAY 20	
		% PER LITTER					
DOSE GROUP:		1	2	3	4	5	
NUMBER OF LITTERS EXAMINED		24	24	25	24	14	
TOTAL MALFORMATIONS							
PERCENT PER LITTER WITH EXTERNAL MALFORMATIONS		MEAN	0.4	0.0	0.3	0.0	0.0
		S.D.	1.86	0.00	1.67	0.00	0.00
		S.E.	0.38	0.00	0.33	0.00	0.00
PERCENT PER LITTER WITH SOFT TISSUE MALFORMATIONS		MEAN	0.3	0.0	0.3	0.0	0.0
		S.D.	1.28	0.00	1.54	0.00	0.00
		S.E.	0.26	0.00	0.31	0.00	0.00
PERCENT PER LITTER WITH SKELETAL MALFORMATIONS		MEAN	1.0	0.0	0.6	0.0	0.9
		S.D.	3.87	0.00	3.08	0.00	3.34
		S.E.	0.79	0.00	0.62	0.00	0.89
TOTAL PERCENT PER LITTER WITH MALFORMATIONS		MEAN	1.3	0.0	0.9	0.0	0.9
		S.D.	4.41	0.00	3.44	0.00	3.34
		S.E.	0.90	0.00	0.69	0.00	0.89

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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

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12/07/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE S16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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	346	322	340	213	59	24	24	25	24	14
NUMBER WITH FINDINGS	0	0	0	0	0	0	0	0	0	0
NUMBER EXAMINED VISCERALLY	346	322	340	213	59	24	24	25	24	14
RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	1	0	1	0	0	1	0	1	0	0
MAJOR BLOOD VESSEL VARIATION	0	0	0	1	0	0	0	0	1	0
HEMORRHAGIC RING AROUND THE IRIS	0	1	0	0	0	0	1	0	0	0
NUMBER EXAMINED SKELETALLY	346	322	340	213	59	24	24	25	24	14
STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	53	48	40	35	26	11	14	9	12	12
7TH CERVICAL RIB(S)	0	2	12	2	0	0	2	5	1	0
14TH RUDIMENTARY RIB(S)	37	27	36	13	3	14	12	16	9	3
CERVICAL CENTRUM #1 OSSIFIED	68	33	63	15	7	19	14	18	8	2
REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	3	2	1	3	10	2	2	1	2	6
HYOID UNOSSIFIED	1	1	0	0	0	1	1	0	0	0
REDUCED OSSIFICATION OF THE SKULL	1	1	2	5	7	1	1	1	4	5
PUBIS UNOSSIFIED	3	1	0	0	2	1	1	0	0	1
STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	4	4	3	6	3	4	2	3	6	3
STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	2	1	1	1	0	2	1	1	1	0
BENT RIB(S)	0	2	0	0	0	0	2	0	0	0
REDUCED OSSIFICATION OF THE 13TH RIB(S)	0	2	6	1	0	0	1	2	1	0
25 PRESACRAL VERTEBRAE	0	0	9	0	0	0	0	2	0	0
27 PRESACRAL VERTEBRAE	0	0	0	1	2	0	0	0	1	2
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY						

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12/07/2011

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED EXTERNALLY	24	24	25	24	14
NUMBER OF LITTERS WITH FINDINGS	0	0	0	0	0

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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-402016	RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED	PAGE 2
SPONSOR:AMERICAN PETROLEUM	SUMMARY OF LITTER PROPORTIONS OF VARIATIONS	
	% PER LITTER	DAY 20

DOSE GROUP:		1	2	3	4	5
NUMBER OF LITTERS EXAMINED VISCERALLY		24	24	25	24	14
RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)	MEAN	0.3	0.0	0.3	0.0	0.0
	S.D.	1.46	0.00	1.43	0.00	0.00
	S.E.	0.30	0.00	0.29	0.00	0.00
MAJOR BLOOD VESSEL VARIATION	MEAN	0.0	0.0	0.0	0.4	0.0
	S.D.	0.00	0.00	0.00	2.04	0.00
	S.E.	0.00	0.00	0.00	0.42	0.00
HEMORRHAGIC RING AROUND THE IRIS	MEAN	0.0	0.3	0.0	0.0	0.0
	S.D.	0.00	1.70	0.00	0.00	0.00
	S.E.	0.00	0.35	0.00	0.00	0.00

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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

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

PROJECT NO.:WIL-402016 RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED PAGE 4
 SPONSOR:AMERICAN PETROLEUM SUMMARY OF LITTER PROPORTIONS OF VARIATIONS
 % PER LITTER DAY 20

DOSE GROUP:	1	2	3	4	5
NUMBER OF LITTERS EXAMINED SKELETALLY	24	24	25	24	14
STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	MEAN 1.1 S.D. 2.61 S.E. 0.53	MEAN 1.2 S.D. 4.58 S.E. 0.94	MEAN 0.9 S.D. 2.57 S.E. 0.51	MEAN 2.3 S.D. 4.07 S.E. 0.83	MEAN 5.0 S.D. 10.00 S.E. 2.67
STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	MEAN 0.6 S.D. 2.17 S.E. 0.44	MEAN 0.3 S.D. 1.28 S.E. 0.26	MEAN 0.3 S.D. 1.67 S.E. 0.33	MEAN 0.4 S.D. 1.86 S.E. 0.38	MEAN 0.0 S.D. 0.00 S.E. 0.00
BENT RIB(S)	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.7 S.D. 2.31 S.E. 0.47	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
REDUCED OSSIFICATION OF THE 13TH RIB(S)	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.6 S.D. 2.92 S.E. 0.60	MEAN 1.8 S.D. 6.38 S.E. 1.28	MEAN 0.3 S.D. 1.57 S.E. 0.32	MEAN 0.0 S.D. 0.00 S.E. 0.00
25 PRESACRAL VERTEBRAE	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 2.6 S.D. 11.47 S.E. 2.29	MEAN 0.0 S.D. 0.00 S.E. 0.00	MEAN 0.0 S.D. 0.00 S.E. 0.00
27 PRESACRAL VERTEBRAE	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 0.3 S.D. 1.70 S.E. 0.35	MEAN 3.6 S.D. 9.08 S.E. 2.43

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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-402016		TABLE S17				PAGE 5	
SPONSOR:AMERICAN PETROLEUM		RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED					
		SUMMARY OF LITTER PROPORTIONS OF VARIATIONS					
		% PER LITTER				DAY 20	
DOSE GROUP:		1	2	3	4	5	
NUMBER OF LITTERS EXAMINED		24	24	25	24	14	
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	0.3	0.3	0.4	0.0
		S.D.	1.46	1.70	1.43	2.04	0.00
		S.E.	0.30	0.35	0.29	0.42	0.00
PERCENT PER LITTER WITH SKELETAL VARIATIONS		MEAN	42.3	32.6	38.1	34.1	82.9d
		S.D.	24.72	25.67	24.24	26.50	22.13
		S.E.	5.05	5.24	4.85	5.41	5.92
TOTAL PERCENT PER LITTER WITH VARIATIONS		MEAN	42.6	33.0	38.4	34.1	82.9d
		S.D.	24.22	25.85	24.07	26.50	22.13
		S.E.	4.94	5.28	4.81	5.41	5.92

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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 Dunn's test

PMALKv5.07
12/07/2011
R:12/13/2011

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.

PLANNED DEVIATIONS

- **Protocol Section 8.5.4** states that all animals would be dosed at approximately the same time each day. Beginning on 19 September 2011, the start of dosing was adjusted gradually to an earlier start time.

Reason for Deviation: The adjustment in the start time of dosing facilitated study activities during normal business hours of the Testing Facility.

UNPLANNED DEVIATIONS

- **Protocol Section 8.1** states that during the quarantine period, each rat would be observed twice daily for changes in general appearance and behavior. On 6 September 2011, there is no documentation of the morning check.

Reason for Deviation: Technician error.

- **Protocol Section 8.2** states that after confirmation of mating, the female would be returned to an individual suspended wire-mesh cage (assigned to a group), and the day would be designated as day 0 of gestation. On 19 September 2011, animals that were not confirmed as having mated were separated from the breeder males and placed into clean caging with a food jar, as a sufficient number of animals needed for study had already shown evidence of mating. The breeder males were then transferred to another room for breeding. During a cage change out for the breeder males, female no. 26450 was found still paired up by animal husbandry. Female no. 26450 was immediately removed from the study room, euthanized in the necropsy holding room, and was discarded.

Reason for Deviation: Technician error.

- **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. On 30 September 2011 (gestation day 12, 13, 14, 15, 16, or 17), there is no documentation of the control clippers being used for shaving the control animals.

Reason for Deviation: Technician error.

- **Protocol Section 8.5.4** states that following the 6-hour exposure period, the test site would be gently patted using a disposable paper towel in an effort to remove the residual test substance. On 21 September 2011 (gestation day 3, 4, 5, 6, 7, or 8), residual test substance was removed from females in the 5 and 50 mg/kg/day groups at 5 hours 59 minutes following exposure.

Reason for Deviation: Technician error.

- **Protocol Section 8.5.4** states that all animals would be dosed at approximately the same time each day. On gestation day 17, confirmation of dose time for female no. 26454 in the 5 mg/kg/day group was not recorded online. The previous animal, female no. 26421, was dosed at 1006. The animal following female no. 26454, which was female no. 26343, was dosed at 1007. Female no. 26454 was entered late into the computer with a time of 1007 to allow for post-dosing observation collection; however, the exact time of dose cannot be determined for this animal.

Reason for Deviation: Technician error.

- **Protocol Section 8.7.1** states that all animals would be observed at the time of dosing during the treatment period. On gestation day 17 (3 October 2011), female no. 26454 in the 5 mg/kg/day group did not have a time of dosing observation recorded.

Reason for Deviation: Technician error.

- **Protocol Section 8.7.4** states that individual food consumption would be recorded on gestation days 0, 3, 6, 9, 12, 15, 18, and 20. On gestation day 18, female nos. 26314 and 26436 in the 50 mg/kg/day group did not have a food left value recorded. Therefore, no food consumption data exists for these 2 animals from gestation days 15-18.

Reason for Deviation: Technician error.

- **Protocol Section 8.8.3.1** states that each viable fetus would be examined in detail, sexed, weighed, euthanized by a subcutaneous injection of sodium pentobarbital in the scapular region and tagged. After the fetuses from dam no. 26328 in the 5 mg/kg/day group had been examined, sexed, weighed, and euthanized, the box was dropped and fetuses nos. 7 and 13 fell from their assigned compartments. Since both fetuses were female, it was unable to determine which fetus belonged to site no. 7 and which belonged to site no. 13. These fetuses were arbitrarily assigned and placed back in the box for subsequent visceral examination and tagging.

Reason for Deviation: Technician error.

GLP DEVIATIONS

- A GLP deviation from sections 792.83 of 40 CFR Part 792 and 4.4 of OECD [C(97) 186/Final] occurred on 6 October 2011 when standards and quality control samples prepared on 30 September 2011 were injected for processed sample stability. The ethyl acetate (ACC#14089) used to wash the column between samples was expired. It is believed at this time that the use of expired ethyl acetate had no effect on the outcome of this study.

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



Study Number: WIL-402016

PROTOCOL AMENDMENT 5

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Clarified Oils, Catalytic Cracked in Rats

Protocol Modifications:

The following revision to Amendment 4 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~~ **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

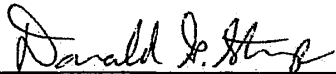
WIL Research Laboratories, LLC



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-402016

PROTOCOL AMENDMENT 4

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Clarified Oils, 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).

Reasons for Protocol Modification:

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

Approval:

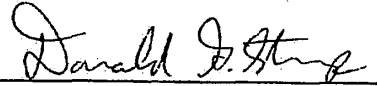
Sponsor's approval was obtained via email on 04 Nov 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

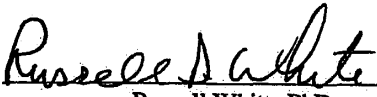
04 Nov 2011
Date



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-402016

PROTOCOL AMENDMENT 3

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Clarified Oils, Catalytic Cracked in Rats

Protocol Modifications:

The following section is added:

1) **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 adds information on the statistics to be performed on the organ weight data.

Approval:

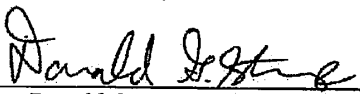
Sponsor's approval was obtained via email on 27 Oct 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

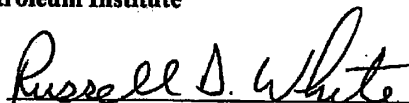
27 Oct 2011
Date



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

27 Oct 2011
Date

American Petroleum Institute



Russell White, PhD
Sponsor Representative

28 Oct. 2011
Date



Study Number: WIL-402016

PROTOCOL AMENDMENT 2

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Clarified Oils, 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 that samples will be collected for each dosing formulation.
- 3) This modification clarifies the procedure for processing the fetal skeletons.

Approval:

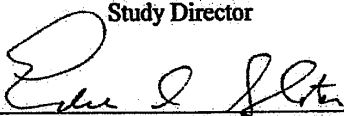
Sponsor's approval was obtained via email on 09 Sep 2011.
Date

WIL Research Laboratories, LLC



Jeffrey H. Charlap, MS
Study Director

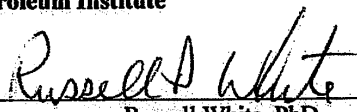
09 Sep 2011
Date



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-402016

PROTOCOL AMENDMENT 1

Sponsor: American Petroleum Institute

Title of Study:

A Dermal Prenatal Developmental Toxicity Study of Clarified Oils, Catalytic Cracked in Rats

Protocol Modifications:

1) 8.5.1 Organization of Test Groups:

The footnote is revised as follows:

a- The test substance used for Groups 3-5 is Clarified oils, catalytic cracked (CAS 64741-62-4), also known as catalytic cracked slurry 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 modification corrects the CAS number of the Test Article
- 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:

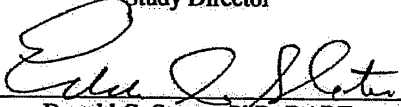
Sponsor's approval was obtained via email on 08 Sep 2011.
Date

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.



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WIL-402016
August 31, 2011

PROTOCOL

A DERMAL PRENATAL DEVELOPMENTAL TOXICITY STUDY OF CLARIFIED OILS, CATALYTIC CRACKED IN RATS

(U.S. EPA OCSPP and OECD Guidelines)

WIL Study Number: WIL-402016

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 1, 2011
Proposed Experimental Start (First Day of Dosing) Date:	September 13, 2011
Proposed Experimental Completion/Termination Date:	October 03, 2011
Proposed Audited Report Date:	December 16, 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-402016; 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:

Clarified oils, catalytic cracked (CAS# 64741-62-4)

Also known as catalytic cracked slurry oil

4.3 Lot Number:

Site #12: Sample #2

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 retained for subsequent studies or returned to the Sponsor's 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:**

Acetone, Min. 99.0% (2-propanone, CAS# 67-64-1, Spectrum Chemical Mfg. Corp., product code AC115).

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.

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	5	3.3	1.5	25
4	Test substance ^a	25	16.7	1.5	25
5	Test substance ^a	50	33.3	1.5	25

a- The test substance used for Groups 3-5 is Clarified oils, catalytic cracked (CAS-4741-62-4), also known as catalytic cracked slurry oil.

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:

Acetone, Min. 99.0% (2-propanone, CAS# 67-64-1, Spectrum Chemical Mfg. Corp., product code AC115).

8.5.4 Treatment Regimen:

The test article 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 18-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-402029, Haubenstricker, 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 on the first and last days of preparation. 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 on 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 skin will be collected and the liver, brain and thymus weighed and collected as described in Section 8.8.2. 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 listed in section 8.8.2.1 will be preserved for future histopathologic examination in 10% neutral-buffered formalin. 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:

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

Sponsor approval received via email on 31 Aug 2011
Date

American Petroleum Institute

Russell White 1 Sept. 2011
Russell White
Sponsor Representative Date

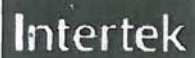
WIL Research Laboratories, LLC

Jeffrey H. Charlap, MS 31 Aug 2011
Jeffrey H. Charlap, MS
Study Director Date

Melissa J. Buck 31 Aug 2011
for: Donald G. Stump, PhD, DABT
Senior Director, Developmental and
Reproductive Toxicology Date

APPENDIX B

Test Substance Characterization (Sponsor-Provided Data)



Report of Analysis

Sample ID: 2009-DRPK-000651-023		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#12 Sx #2 (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	

Simdist-2000

ITS Caleb Brett - Houston

SAMPLE:	09-0651-23 (Site #12 Sx. #2)	Injection Date:	0090120084535-0600
FILE:	C:\CP32 Instruments\Dual Hi-Temp\Data\2009\UAN-09\09-0651-23.0013.CDF	Report Date:	1/21/09 8:47
PROCEDURE:	C:\CP32 Instruments\Dual Hi-Temp\Procedures\1-7-09-FRONT-HT.prc		
EXCEL FILE:	C:\CP32 Instruments\Dual Hi-Temp\Reports\2009\UAN-09\09-0651-23_0013_CDF.xls		

Boiling Point Distribution Report Simulated Distillation

%Off	BP °F	BP °C	%Off	BP °F	BP °C	%Off	BP °F	BP °C
IBP	341.5	171.9	40%	728.4	386.9	80%	857.4	458.6
1%	429.7	221.0	41%	730.6	388.1	81%	862.6	461.5
2%	502.3	261.3	42%	732.5	389.2	82%	868.0	464.4
3%	541.7	283.2	43%	734.6	390.3	83%	874.5	468.1
4%	563.7	295.4	44%	736.9	391.6	84%	881.7	472.1
5%	580.9	304.9	45%	739.6	393.1	85%	889.5	476.4
6%	589.8	309.9	46%	742.4	394.7	86%	898.2	481.2
7%	602.7	317.1	47%	745.4	396.3	87%	906.4	485.8
8%	610.5	321.4	48%	748.3	397.9	88%	915.6	490.9
9%	617.2	325.1	49%	751.1	399.5	89%	926.5	496.9
10%	621.2	327.3	50%	753.9	401.0	90%	941.4	505.2
11%	628.0	331.1	51%	756.8	402.7	91%	958.1	514.5
12%	634.2	334.6	52%	759.8	404.3	92%	978.5	525.8
13%	640.1	337.8	53%	762.5	405.8	93%	1003.6	539.8
14%	645.4	340.8	54%	765.2	407.4	94%	1035.0	557.2
15%	649.7	343.2	55%	768.0	408.9	95%	1065.7	574.3
16%	653.9	345.5	56%	770.7	410.4	96%	1099.3	593.0
17%	659.7	348.7	57%	773.6	412.0	97%	1138.3	614.6
18%	663.9	351.1	58%	776.2	413.4	98%	1188.7	642.6
19%	668.1	353.4	59%	778.9	414.9	99%	1277.3	691.8
20%	671.7	355.4	60%	781.5	416.4	FBP	1359.0	737.2
21%	676.0	357.8	61%	784.2	417.9			
22%	681.3	360.7	62%	786.8	419.3			
23%	687.5	364.1	63%	789.3	420.7			
24%	692.7	367.0	64%	792.0	422.2			
25%	696.4	369.1	65%	795.0	423.9			
26%	698.5	370.3	66%	798.1	425.6			
27%	700.3	371.3	67%	801.2	427.3			
28%	702.1	372.3	68%	804.2	429.0			
29%	703.9	373.3	69%	807.3	430.7			
30%	705.8	374.3	70%	811.3	432.9			
31%	708.0	375.6	71%	815.7	435.4			
32%	710.8	377.1	72%	819.8	437.6			
33%	713.7	378.7	73%	824.2	440.1			
34%	716.1	380.1	74%	828.6	442.5			
35%	718.4	381.3	75%	833.6	445.3			
36%	720.5	382.5	76%	838.6	448.1			
37%	722.5	383.6	77%	843.1	450.6			
38%	724.4	384.7	78%	847.5	453.1			
39%	726.2	385.7	79%	852.3	455.7			

Start Elution Time (mins):	0.05	Sample Wt:	0.1192 g
End Elution Time (mins):	54.424	Solvent Wt:	7.6937 g
		Material Balance:	100.0 wt%
Blank File:	C:\CP32 Instruments\Dual Hi-Temp\Data\2009\UAN-09\BLANK4(1).0017.CDF		
Calib File:	D:\CP32 Instruments\Dual Hi-Temp\DATA\2-20-06\RTMIX1Z-BACK.0014.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

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:

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 = $(R1 - R2) / [(R1 + R2) / 2] \times 100$ 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 Clarified Oils, Catalytic
Cracked in Rats

Analyses of Dosing Formulations

Analytical Chemistry Department

WIL Research Laboratories, LLC



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1. SUMMARY

A gas chromatography method using flame ionization detection for the determination of clarified oils, catalytic cracked (CAS# 64741-62-4) concentration in acetone formulations and test substance ranging in concentration from 1.00 to 100 mg/mL was validated in a previous study (Haubenstricker, 2011, WIL-402029). In the present study, test substance stability was assessed in calibration standards and processed quality control (QC) samples stored at room temperature for 5 days. Also in this study, dosing formulations prepared at target concentrations of 3.3, 16.7, and 33.3 mg CAS# 64741-62-4/mL were analyzed to assess test substance homogeneity and concentration acceptability.

The test substance in calibration standards and processed QC samples stored at room temperature for 5 days met the WIL Research SOP acceptance criteria for stability, *i.e.*, the post-storage concentration was not <90% of the pre-storage value.

The results of the test substance homogeneity and concentration acceptability assessment in formulations prepared at target concentrations of 3.3, 16.7, and 33.3 mg CAS# 64741-62-4/mL met the WIL Research SOP acceptance criteria, *i.e.*, the relative standard deviation (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 of a validated gas chromatography (GC) method using flame ionization detection (FID) for the determination of CAS# 64741-62-4 concentration in acetone formulations and test substance ranging in concentration from 1.00 to 100 mg/mL. The method was validated in a previous study (Haubenstricker, 2011, WIL-402029) where assay specificity/selectivity, ruggedness, calibration reproducibility, precision, accuracy, and test substance stability in calibration standards and processed quality control (QC) samples stored at room temperature for 2 days were established. Also in the previous study, test substance homogeneity and,

following 11 and 18 days of room temperature storage, resuspension homogeneity and stability were assessed and verified in formulations ranging in concentration from 1 to 100 mg CAS# 64741-62-4/mL. In the present study, test substance stability was assessed in calibration standards and QC samples stored at room temperature for 5 days. Also, formulations used for test substance administration were analyzed to verify test substance homogeneity and 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>
12 September 2011	First date of analysis
6 October 2011	Last date of analysis

2.2. WIL RESEARCH KEY STUDY PERSONNEL

Scott D. Freer, BA	Manager/Research Chemist, Analytical Chemistry
Donna K. Murphy	Chemist II, Analytical Chemistry
Amanda M. Stanton, BA	Group Supervisor/Associate Research Chemist, Analytical Chemistry
Gregory A. Hawks, AS	Group Supervisor, Reporting & Technical Support Services
Melissa A. Hull, BS	Group Manager, Reporting & Technical Support Services

3. EXPERIMENTAL PROCEDURES - MATERIALS AND METHODS

3.1. TEST SUBSTANCE IDENTIFICATION

The test substance, clarified oils, catalytically cracked (CAS# 64741-62-4), was received from EPL Archives, Sterling, VA on behalf of American Petroleum Institute on 10 November 2010 as follows:

Identification	Quantity Received	Physical Description
Catalytically Cracked Slurry Oil Lot no. Site 12: Sample 2 WIL log no.8473A	4 Bottles	Dark brown, very viscous liquid

For purposes of dose calculations, the purity of the test substance was considered to be 100%. The test substance was stored at room temperature, protected from light and was considered stable under this condition. Reserve samples of the test substance (approximately 0.834 g) were collected on 15 November 2010 and stored in the WIL Research Archives.

3.2. GAS CHROMATOGRAPHY

Instrument:	Agilent 6890 gas chromatograph equipped with a flame ionization detector, an Agilent 7673 autosampler, and Dionex Chromeleon [®] data system, or equivalent
Column:	Zebtron [™] ZB-1HT Inferno [™] column, 15 m × 0.32 mm ID, 0.25-μm film-thickness
Temperature Program:	120°C, hold for 1 minute Ramp at 40°C/minute to 400°C, hold for 2 minutes
Carrier Gas:	Helium
Carrier Gas Flow Rate:	1.5 mL/minute
Wash Vial:	Ethyl acetate (EtOAc)
Injector Temperature:	300°C
Injection Volume:	1 μL Split (5:1)
Detector:	FID at 400°C
Retention Time:	Approximately 4.5 minutes for CAS# 64741-62-4 peak group
Run Time:	10 minutes

3.3. PREPARATION OF CALIBRATION STOCK SOLUTION

A calibration standard stock solution was prepared at a concentration of 1.00 mg CAS# 64741-62-4/mL as follows. Approximately 25 mg of CAS# 64741-62-4 (WIL log no. 8473A, no correction for purity) was accurately weighed in a tared glass funnel and transferred to a 25-mL volumetric flask with rinses of EtOAc. The contents were mixed as needed to achieve dissolution of the test substance. Additional EtOAc was added to yield the desired concentration, and the solution was stirred to mix.

3.4. PREPARATION OF CALIBRATION STANDARDS

Calibration standards were prepared at 500, 600, 750, 850, and 1000 µg CAS# 64741-62-4/mL by thoroughly mixing the appropriate volumes of calibration stock solution and EtOAc in amber autosampler vials. At least single calibration standards were prepared at each concentration for routine analyses.

3.5. PREPARATION OF THE QUALITY CONTROL STOCK SOLUTION

A QC stock solution was prepared at a concentration of 20.0 mg CAS# 64741-62-4/mL as follows. Approximately 0.2 g of CAS# 64741-62-4 (WIL log no. 8473A, no correction for purity) was accurately weighed in a tared glass funnel and transferred to a 10-mL volumetric flask with rinses of EtOAc. The contents were mixed as needed to achieve dissolution of the test substance. Additional EtOAc was added to yield the desired concentration, and the solution was stirred to mix.

3.6. PREPARATION AND PROCESSING OF QUALITY CONTROL SAMPLES

As detailed in the following table, QC samples were prepared to simulate the processing of formulation samples at concentrations of 1.00, 10.0, and 100 mg CAS# 64741-62-4/mL (nominal QC concentrations) by combining aliquots of the QC stock solution, vehicle (acetone), and EtOAc in polypropylene tubes or amber autosampler vials. The QC samples were capped and mixed with vortex action. The processed samples were further diluted as necessary with EtOAc in amber autosampler

vials. The samples were capped, and thoroughly mixed with vortex action. Triplicate QC samples at each concentration were prepared; a single blank sample was prepared.

QC Level	Nominal QC Concentration (mg/mL)	Vehicle Volume (mL)	QC Stock Volume (mL)	EtOAc Volume (mL)	Secondary Dilution	Theoretical Final Concentration (µg/mL)
Blank	0	0.500	0	0.300	NA	0
QC1	1.00	0.500	0.0250	0.275	NA	625
QC2	10.0	0.500	0.250	7.25	NA	625
QC3	100	0.500	2.50	7.00	6.67-fold	750

NA = Not applicable

3.7. FORMULATION SAMPLE PROCESSING

Quadruplicate formulation samples were collected using a 1-mL Class A volumetric pipette 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 discarded upon the Study Director's acceptance of the analytical results. As detailed in the following table, formulation samples were processed by adding EtOAc and mixing with vortex action.

Group	Theoretical Test Substance Concentration (mg/mL)	Sample Volume (mL)	EtOAc Volume (mL)	Theoretical Final Concentration (µg/mL)
2	0	1.0	4.00	0
3	3.3	1.0	4.00	660
4	16.7	1.0	19.0	835
5	33.3	1.0	39.0	833

3.8. CALIBRATION AND QUANTITATION

Single injections were made of each calibration standard, processed QC, and formulation samples. A calibration curve was constructed for each set of analyses. The CAS# 64741-62-4 peak group area (y) and the theoretical concentrations (x) of the

calibration standards were fit with least-squares regression analysis to the quadratic function:

$$y = ax^2 + b x + c$$

Concentrations were back-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, were calculated and presented in tabular form. The concentrations of the formulation and QC samples were calculated by applying any necessary multiplication factors to correct for dilution and/or unit conversions.

4. RESULTS AND DISCUSSION

Under the described chromatographic conditions, the retention time of the test substance was approximately 4.5 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 control group formulation sample, respectively. The total analysis time required for each run was 10 minutes.

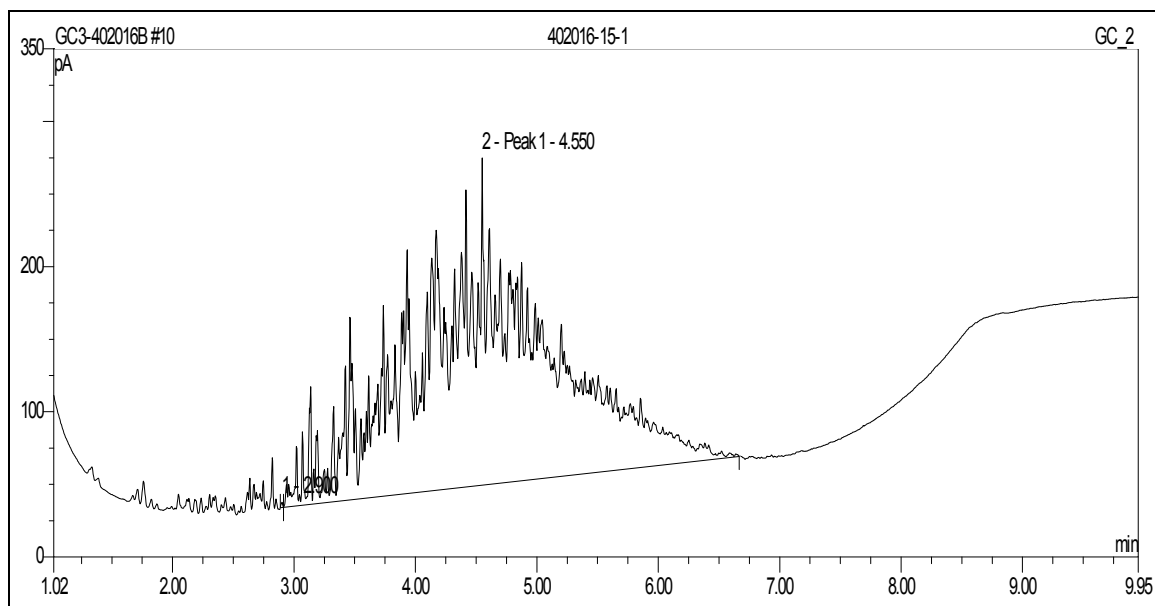


Figure 1: Representative Chromatogram of a 500 µg CAS# 64741-62-4/mL Calibration Standard

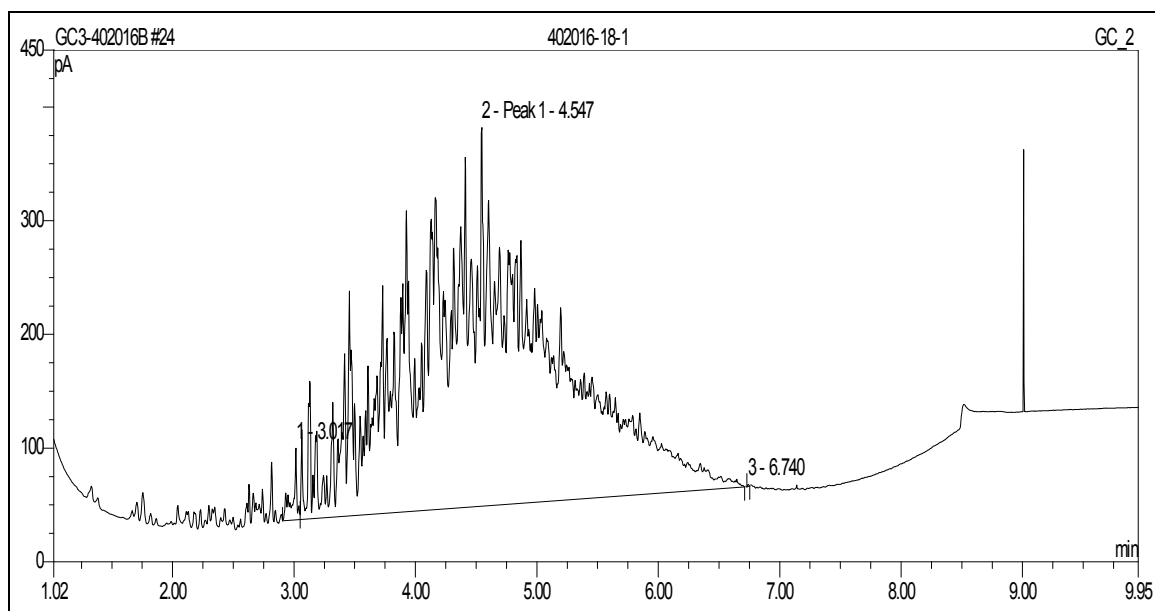


Figure 2: Representative Chromatogram of a Processed 100 mg CAS# 64741-62-4/mL Quality Control Sample

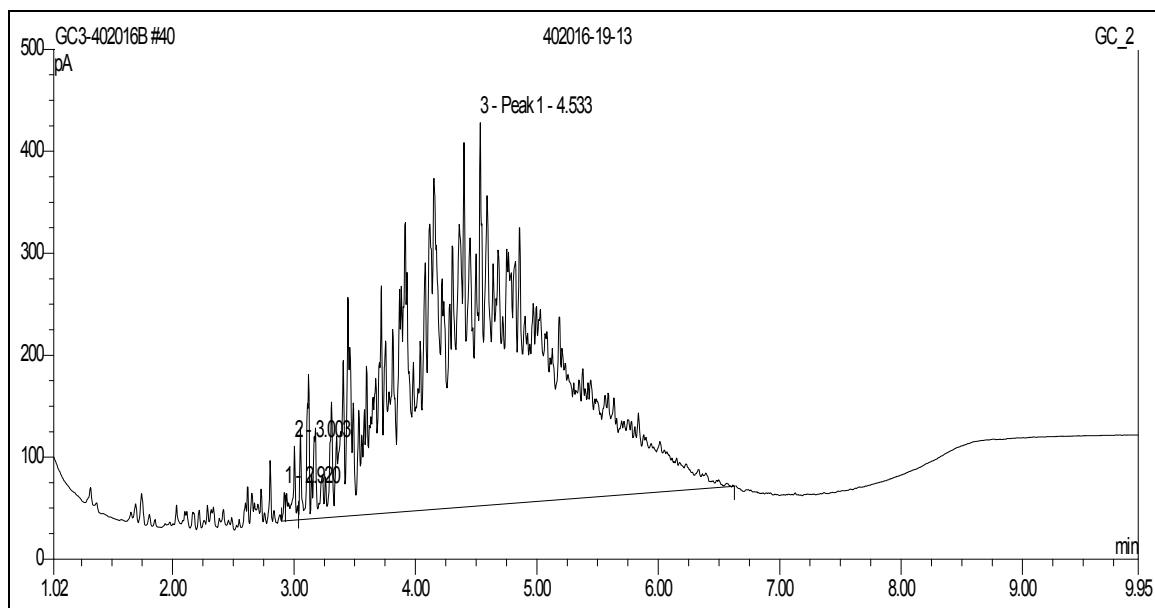


Figure 3: Representative Chromatogram of a Processed 16.7 mg CAS# 64741-62-4/mL Formulation Sample

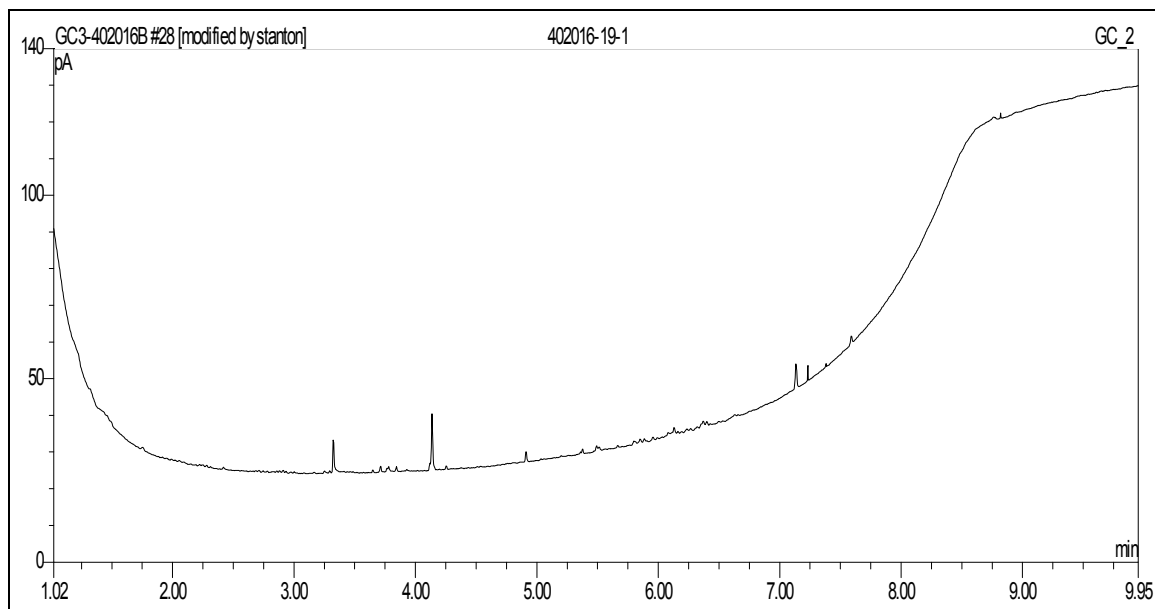


Figure 4: Chromatogram of a Processed Control Group Formulation Sample

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 GC/FID 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 group (approximately 4.5 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 0, 3.3, 16.7, and 33.3 mg CAS# 64741-62-4/mL, and the QC samples were prepared at nominal concentrations of 1.00, 10.0, and 100 mg CAS# 64741-62-4/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 STABILITY IN CALIBRATION STANDARDS

Calibration standards prepared at 500, 600, 750, 850, and 1000 µg/mL and analyzed on 1 October 2011 were stored at room temperature for 5 days before being re-analyzed to assess test substance stability. The mean post-storage concentrations ranged from 96.7% to 100% of the pre-storage values (Table 1), which met the WIL Research SOP requirement for stability, *i.e.*, the mean post-storage concentration was not <90% of the pre-storage value.

4.4. TEST SUBSTANCE STABILITY IN PROCESSED SAMPLES

QC samples prepared at nominal test article concentrations of 1.00, 10.0, and 100 mg/mL were processed and analyzed on 1 October 2011. The processed samples were stored at room temperature for 5 days before being re-analyzed to assess test substance stability.

The mean post-storage concentrations ranged from 97.0% to 100% of the pre-storage values (Table 2), which met the previously stated WIL Research SOP requirement for stability.

4.5. TEST SUBSTANCE HOMOGENEITY AND CONCENTRATION ASSESSMENT OF FORMULATIONS

Duplicate samples from the top, middle, and bottom strata of formulations used for test substance administration and prepared on 12 September 2011 and 30 September 2011 at target concentrations of 0, 3.3, 16.7, and 33.3 mg CAS# 64741-62-4/mL were analyzed to verify test substance homogeneity and concentration acceptability. The results of the homogeneity and concentration acceptability assessments are presented in Table 3 and Table 4, with the mean concentrations and overall statistics summarized in the following tables.

Homogeneity and Concentration Assessment of the 12 September 2011 Formulations				
	Group 1 (0 mg/mL)	Group 2 (3.3 mg/mL)	Group 3 (16.7 mg/mL)	Group 4 (33.3 mg/mL)
Mean Concentration (mg/mL)	ND	3.23	16.5	32.5
SD	NA	0.24	0.26	0.53
RSD (%)	NA	7.3	1.6	1.6
Mean % of Target	NA	97.8	98.9	97.6

ND = No test substance chromatographic peak detected

NA = Not applicable

Homogeneity and Concentration Assessment of the 30 September 2011 Formulations				
	Group 1 (0 mg/mL)	Group 2 (3.3 mg/mL)	Group 3 (16.7 mg/mL)	Group 4 (33.3 mg/mL)
Mean Concentration (mg/mL)	ND	3.35	16.9	33.0
SD	NA	0.014	0.20	0.31
RSD (%)	NA	0.41	1.2	0.94
Mean % of Target	NA	102	101	99.1

ND = No test substance chromatographic peak detected

NA = Not applicable

The analyzed formulations met the WIL Research SOP requirement for homogeneity, *i.e.*, the RSD for the mean concentration was $\leq 10\%$ at a concentration within the acceptable limits (85% to 115% of target concentration) and concentration acceptability for suspension formulations, *i.e.*, the analyzed concentration was 85% to 115% of the target concentration. No test substance was detected in the analyzed vehicle administered to the control group (Group 1).

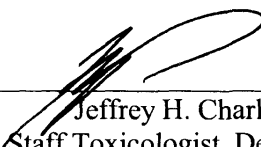
5. CONCLUSIONS

A validated GC/FID method was used for the determination of CAS# 64741-62-4 concentration in acetone formulations. Test substance stability in calibration standards and processed QC samples stored at room temperature for 5 days were assessed and validated, satisfying WIL Research SOP criteria. In addition, analyzed formulations used for test substance administration met the applicable WIL Research SOP acceptance criteria for test substance homogeneity and concentration acceptability. No test substance was detected in the analyzed vehicle administered to the control group.

6. REPORT REVIEW AND APPROVAL

WIL-402016 Analytical Chemistry Report

Report Approved by:



Jeffrey H. Charlap, MS
Staff Toxicologist, Developmental
and Reproductive Toxicology
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12 July 2012
Date

Report Prepared by:



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Analytical Chemistry

12 Jul 2012
Date

Report Reviewed by:



Eric S. Bodle, PhD
Assistant Director, Analytical Chemistry

12 Jul 2012
Date

7. REFERENCES

Haubenstricker, M.E. Analytical Validation and Stability Study of Catalytically Cracked Slurry Oil in Acetone Formulations. (Study No. WIL-402029). 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 - 4

Table 1. 5-Day Room Temperature Stability Analysis of the Calibration Samples

<u>Date Analyzed</u>	<u>Theo. Conc</u> ($\mu\text{g/mL}$)	<u>Ref #</u> (402016 -)	<u>Run #</u>	<u>Conc</u> ($\mu\text{g/mL}$)	<u>Percent of Time Zero</u> (%)	<u>Overall Percent of Time Zero</u> (%)
<i>Calibration Samples</i>						
01Oct2011	500	15 - 1	172	492	N/A	N/A
		15 - 2	215	514	N/A	
		15 - 3	216	504	N/A	
06Oct2011	500	15 - 1	233	508	103	100
		15 - 2	250	515	100	
		15 - 3	251	487	96.7	
01Oct2011	600	15 - 4	173	612	N/A	N/A
		15 - 5	217	616	N/A	
		15 - 6	218	615	N/A	
06Oct2011	600	15 - 4	234	577	94.3	96.7
		15 - 5	252	605	98.1	
		15 - 6	253	600	97.6	
01Oct2011	750	15 - 7	174	766	N/A	N/A
		15 - 8	219	771	N/A	
		15 - 9	220	756	N/A	
06Oct2011	750	15 - 7	235	752	98.2	98.2
		15 - 8	254	754	97.8	
		15 - 9	255	744	98.5	
01Oct2011	850	15 - 10	175	856	N/A	N/A
		15 - 11	221	872	N/A	
		15 - 12	222	871	N/A	
06Oct2011	850	15 - 10	236	841	98.2	98.6
		15 - 11	256	840	96.4	
		15 - 12	257	882	101	
01Oct2011	1000	15 - 13	176	1006	N/A	N/A
		15 - 14	223	996	N/A	
		15 - 15	224	1004	N/A	
06Oct2011	1000	15 - 13	237	1008	100	99.6
		15 - 14	258	1012	102	
		15 - 15	259	974.2	97.0	

N/A = Not applicable

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Table 2. 5-Day Room Temperature Stability Analysis of the Quality Control Samples

<u>Date Analyzed</u>	<u>Theo. Conc</u> (mg/mL)	<u>Ref #</u> (402016 -)	<u>Run #</u>	<u>Conc</u> (mg/mL)	<u>Percent of Time Zero</u> (%)	<u>Overall Percent of Time Zero</u> (%)
<i>QC Samples</i>						
01Oct2011	1.00	17 - 2	180	1.00	N/A	N/A
		17 - 3	181	1.03	N/A	
		17 - 4	182	1.04	N/A	
06Oct2011	1.00	17 - 2	240	1.00	99	97.0
		17 - 3	241	1.00	96.9	
		17 - 4	242	0.981	94.7	
01Oct2011	10.0	17 - 5	183	10.1	N/A	N/A
		17 - 6	184	10.0	N/A	
		17 - 7	185	9.79	N/A	
06Oct2011	10.0	17 - 5	243	9.65	95.2	97.3
		17 - 6	244	9.85	98	
		17 - 7	245	9.65	99	
01Oct2011	100	18 - 1	186	103	N/A	N/A
		18 - 2	187	104	N/A	
		18 - 3	188	101	N/A	
06Oct2011	100	18 - 1	246	97.9	95.4	100
		18 - 2	247	110	106	
		18 - 3	248	100	99	

N/A = Not applicable

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Table 3. Homogeneity/Concentration Assessment of the 12 September 2011 Formulations
(Analyzed 12-16 September 2011)

<u>Group</u>	<u>Strata</u>	<u>Dose Conc</u> (mg/mL)	<u>Ref #</u> (402016-)	<u>Run #</u>	<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	6 - 1	128	-----Not Detected-----		3.23	0.24	7.3	97.8
			6 - 2	129	-----Not Detected-----					
	Mid	0	6 - 3	130	-----Not Detected-----					
			6 - 4	131	-----Not Detected-----					
	Btm	0	6 - 5	132	-----Not Detected-----					
			6 - 6	133	-----Not Detected-----					
3	Top	3.3	6 - 7	134	3.44	104	16.5	0.26	1.6	98.9
			6 - 8	135	3.26	98.9				
	Mid	3.3	6 - 9	136	2.77	83.9				
			6 - 10	137	3.31	100				
	Btm	3.3	6 - 11	138	3.23	98.0				
			6 - 12	139	3.34	101				
4	Top	16.7	6 - 13	140	16.1	96.7	32.5	0.53	1.6	97.6
			6 - 14	141	16.5	98.7				
	Mid	16.7	6 - 15	142	16.5	98.9				
			6 - 16	143	16.8	101				
	Btm	16.7	6 - 17	144	16.3	97.8				
			6 - 18	145	16.8	101				
5	Top	33.3	6 - 19	146	32.2	96.6	31.9			
			6 - 20	147	33.3	100				
	Mid	33.3	6 - 21	148	32.0	96.2				
			6 - 22	149	32.6	97.9				
	Btm	33.3	6 - 23	150	32.9	98.9				
			6 - 24	151	31.9	95.9				

Table 4. Homogeneity/Concentration Assessment of the 30 September 2011 Formulations
(Analyzed 30 September - 1 October 2011)

<u>Group</u>	<u>Strata</u>	<u>Dose Conc</u> (mg/mL)	<u>Ref #</u> (402016-)	<u>Run #</u>	<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	19 - 1	190	-----Not Detected-----					
			19 - 2	191	-----Not Detected-----					
	Mid	0	19 - 3	192	-----Not Detected-----					
			19 - 4	193	-----Not Detected-----					
	Btm	0	19 - 5	194	-----Not Detected-----					
			19 - 6	195	-----Not Detected-----					
3	Top	3.3	19 - 7	196	3.36	102	3.35	0.014	0.41	102
			19 - 8	197	3.35	102				
	Mid	3.3	19 - 9	198	3.37	102				
			19 - 10	199	3.36	102				
	Btm	3.3	19 - 11	200	3.34	101				
			19 - 12	201	3.33	101				
4	Top	16.7	19 - 13	202	16.6	100	16.9	0.20	1.2	101
			19 - 14	203	16.9	101				
	Mid	16.7	19 - 15	204	17.2	103				
			19 - 16	205	16.7	100				
	Btm	16.7	19 - 17	206	17.0	102				
			19 - 18	207	17.0	102				
5	Top	33.3	19 - 19	208	33.1	99.4	33.0	0.31	0.94	99.1
			19 - 20	209	33.2	99.6				
	Mid	33.3	19 - 21	210	33.1	99.3				
			19 - 22	211	33.3	100				
	Btm	33.3	19 - 23	212	32.4	97.4				
			19 - 24	213	32.9	98.7				

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APPENDIX D

Animal Room Environmental Conditions

RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED

PROJECT NO.:WIL- 402016

TEMPERATURE/HUMIDITY - STUDY SUMMARY REPORT

SPONSOR: 402 - AMERICAN PETROLEUM

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STUDY SPECIFICATIONS: 402016

DATE IN 09/01/11 TIME IN 11:00

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

ROOM SPECIFICATIONS: B ROOM 112

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)
09/01/11	70.6	21.4	70.7	21.5	61.5	62.9
09/02/11	70.2	21.2	70.3	21.3	56.8	58.0
09/03/11	70.0	21.1	70.0	21.1	54.2	55.5
09/04/11	70.2	21.2	70.2	21.2	53.8	54.9
09/05/11	70.9	21.6	70.9	21.6	50.0	51.2
09/06/11	70.4	21.3	70.5	21.4	48.2	49.2
09/07/11	70.4	21.3	70.5	21.4	48.3	49.3
09/08/11	70.4	21.3	70.4	21.3	48.3	49.4
09/09/11	70.4	21.3	70.5	21.4	48.0	49.1
09/10/11	70.4	21.3	70.5	21.4	47.8	48.8
09/11/11	70.4	21.3	70.5	21.4	48.4	49.4
09/12/11	70.4	21.3	70.5	21.4	49.4	50.4
09/13/11	70.3	21.3	70.4	21.3	52.9	54.0
09/14/11	70.5	21.4	70.5	21.4	48.8	49.8
09/15/11	70.3	21.3	70.4	21.3	43.8	44.9
09/16/11	70.2	21.2	70.3	21.3	42.3	43.6
09/17/11	70.4	21.3	70.5	21.4	44.5	45.8
09/18/11	70.4	21.3	70.5	21.4	48.9	49.9
09/19/11	70.4	21.3	70.4	21.3	51.3	52.3

RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED

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DATE	PRIMARY TEMP		SECONDARY TEMP		PRIMARY HUM	SECONDARY HUM
	MEAN (°F)	MEAN (°C)	MEAN (°F)	MEAN (°C)	MEAN (%RH)	MEAN (%RH)
09/20/11	70.7	21.5	70.8	21.6	49.9	51.1
09/21/11	70.4	21.3	70.5	21.4	50.9	52.2
09/22/11	70.4	21.3	70.5	21.4	49.5	50.7
09/23/11	70.4	21.3	70.5	21.4	50.1	51.3
09/24/11	70.4	21.3	70.5	21.4	49.3	50.4
09/25/11	70.4	21.3	70.5	21.4	49.5	50.6
09/26/11	70.4	21.3	70.4	21.3	50.4	51.5
09/27/11	70.3	21.3	70.4	21.3	50.0	51.2
09/28/11	70.3	21.3	70.4	21.3	50.0	51.2
09/29/11	70.4	21.3	70.4	21.3	49.7	51.0
09/30/11	69.8	21.0	69.9	21.1	45.8	47.0
10/01/11	68.2	20.1	68.4	20.2	43.7	44.9
10/02/11	68.4	20.2	68.5	20.3	42.8	44.0
10/03/11	68.2	20.1	68.3	20.2	49.8	50.9
10/04/11	67.7	19.8	67.8	19.9	52.4	53.6
10/05/11	66.8	19.3	66.9	19.4	50.4	51.6
10/06/11	68.6	20.3	68.9	20.5	50.0	51.2
10/07/11	70.3	21.3	70.1	21.2	48.4	49.5
10/08/11	70.1	21.2	70.1	21.2	47.4	48.5

RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED

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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:	70.0	66.8	70.9				
PRIMARY TEMP °C:	21.1	19.3	21.6				
SECONDARY TEMP °F:	70.0	66.9	70.9				
SECONDARY TEMP °C:	21.1	19.4	21.6				
PRIMARY HUM %RH:	49.3	42.3	61.5				
SECONDARY HUM %RH:	50.4	43.6	62.9				
N DAYS	38						

RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED

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B ROOM 112 SUMMARY OF HOURLY VALUES

	PRIMARY TEMP				SECONDARY TEMP				PRIMARY HUM		SECONDARY HUM	
MEAN	70.0	°F	21.1	°C	70.0	°F	21.1	°C	49.3	%RH	50.4	%RH
MIN	65.3	°F	18.5	°C	65.4	°F	18.6	°C	38.7	%RH	40.0	%RH
MAX	73.1	°F	22.8	°C	73.3	°F	22.9	°C	69.0	%RH	70.7	%RH
SD	1.19		0.66		1.18		0.66		4.18		4.19	
SE	0.04		0.02		0.04		0.02		0.14		0.14	
N SAMPLES	883				883				883		883	
FIRST DAY	09/01/11											
LAST DAY	10/08/11											
N DAYS	38											

RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED

PROJECT NO.:WIL- 402016

TEMPERATURE/HUMIDITY - STUDY SUMMARY REPORT

SPONSOR: 402 - AMERICAN PETROLEUM

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STUDY 402016 SUMMARY OF HOURLY VALUES

	PRIMARY TEMP				SECONDARY TEMP				PRIMARY HUM		SECONDARY HUM	
MEAN	70.0	°F	21.1	°C	70.0	°F	21.1	°C	49.3	%RH	50.4	%RH
MIN	65.3	°F	18.5	°C	65.4	°F	18.6	°C	38.7	%RH	40.0	%RH
MAX	73.1	°F	22.8	°C	73.3	°F	22.9	°C	69.0	%RH	70.7	%RH
SD	1.19		0.66		1.18		0.66		4.18		4.19	
SE	0.04		0.02		0.04		0.02		0.14		0.14	
N SAMPLES	883				883				883		883	
FIRST DAY	09/01/11											
LAST DAY	10/08/11											
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

Visceral and Skeletal Findings for Dead Fetus

Dam No.	Group	Fetus No.	Fetus Sex	Visceral Findings	Skeletal Findings
26373	4	2	F	N	14th rudimentary ribs (right)
F = Female N = No remarkable observations					

APPENDIX G

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

Developmental Parameters for Crl:CD(SD) Rats (Standard) v. 3.10
Mon Dec 12 2011

		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
Retroesophageal 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

NO. OF DATASETS	Mean of Study Means							
	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								
Twining	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	
	Number		
MALFORMATIONS	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	
Retroesophageal 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
	Number	
MALFORMATIONS	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			
Twinning		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 H

Study Title: A Dermal Prenatal Developmental Toxicity Study of
Clarified Oils, Catalytic Cracked in Rats

Laboratory Project ID: WIL-402016

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: 394

APPENDIX H

Individual Animal Data

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

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	
NO SIGNIFICANT CLINICAL OBSERVATIONS	26433	1	P												P				P		P	P	P
	26383	1	P	P											P				P		P		
	26384	1	P	P									P		P	P		P	P	P		P	
	26349	1	P	P											P								
	26395	1	P																		P	P	
	26405	1	P												P				P	P	P	P	
	26327	1	P												P								
	26426	1	P																	P	P		
	26312	1	P												P								
	26368	1	P																				
	26318	1	P												P				P	P	P	P	
	26407	1	P																	P		P	
	26451	1	P			P														P		P	
	26432	1	P	P																			
	26330	1	P																	P	P	P	P
	26317	1	P											P		P			P	P		P	
	26309	1	P												P	P			P		P	P	
	26434	1	P												P		P				P		
	26447	1	P																				
	26304	1	P																P		P	P	
	26302	1	P																	P		P	
	26369	1	P													P						P	
	26380	1	P													P					P	P	
	26420	1	P			P										P		P		P	P	P	
	26430	1	P																	P		P	
	26386	2	P																				
	26392	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 3

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY																	
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7
NO SIGNIFICANT CLINICAL OBSERVATIONS	26329	3	P																
	26320	3	P																
	26424	3	P																
	26435	3	P																
	26419	3	P																
	26437	3	P																
	26397	3	P																
	26385	3	P																
	26316	3	P																
	26409	3	P																
	26365	3	P																
	26319	3	P																
	26341	3	P																
	26421	3	P																
	26454	3	P																
	26343	3	P																
	26370	3	P																
	26351	3	P																
	26354	3	P																
	26378	3	P																
	26323	3	P																
	26334	4	P	P															
	26324	4	P																
	26398	4	P																
	26373	4	P																
	26313	4	P																
	26345	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY 0 1 2 3 4 5 6 7 8 9	1 1 1 1 1 1 1 1 1 2 0 1 2 3 4 5 6 7 8 9 0
NO SIGNIFICANT CLINICAL OBSERVATIONS	26428	5 P	P
	26339	5 P	P
	26406	5 P	P
	26326	5 P	P
	26377	5 P	P
	26376	5 P	P
	26360	5 P	
	26427	5 P	P
	26443	5 P	P
	26314	5 P	P
	26436	5 P	
	26413	5 P	P
	26356	5 P	P
	26444	5 P	
	26452	5 P	P
	26333	5 P	
	26393	5 P	P
SCHEDULED EUTHANASIA; GESTATION DAY 20	26433	1	P
	26383	1	P
	26384	1	P
	26349	1	P
	26395	1	P
	26405	1	P
	26327	1	P
	26426	1	P
	26312	1	P
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE			
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 6

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	26368	1																						P
	26318	1																						P
	26407	1																						P
	26451	1																						P
	26432	1																						P
	26330	1																						P
	26317	1																						P
	26309	1																						P
	26434	1																						P
	26447	1																						P
	26304	1																						P
	26302	1																						P
	26369	1																						P
	26380	1																						P
	26420	1																						P
	26430	1																						P
	26386	2																						P
	26392	2																						P
	26322	2																						P
	26366	2																						P
	26350	2																						P
	26342	2																						P
	26355	2																						P
	26352	2																						P
	26337	2																						P
26414	2																						P	
26403	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

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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	26305	2																		P
	26315	2																		P
	26336	2																		P
	26331	2																		P
	26344	2																		P
	26453	2																		P
	26418	2																		P
	26371	2																		P
	26439	2																		P
	26442	2																		P
	26303	2																		P
	26346	2																		P
	26438	2																		P
	26423	2																		P
	26328	3																		P
	26402	3																		P
	26358	3																		P
	26388	3																		P
	26329	3																		P
	26320	3																		P
	26424	3																		P
	26435	3																		P
	26419	3																		P
	26437	3																		P
	26397	3																		P
	26385	3																		P
	26316	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

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OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY															
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
SCHEDULED EUTHANASIA; GESTATION DAY 20	26409	3															P
	26365	3															P
	26319	3															P
	26341	3															P
	26421	3															P
	26454	3															P
	26343	3															P
	26370	3															P
	26351	3															P
	26354	3															P
	26378	3															P
	26323	3															P
	26334	4															P
	26324	4															P
	26398	4															P
	26373	4															P
	26313	4															P
	26345	4															P
	26391	4															P
	26379	4															P
	26387	4															P
	26390	4															P
	26400	4															P
	26404	4															P
	26399	4															P
	26301	4															P
	26332	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

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OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY															
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
SCHEDULED EUTHANASIA; GESTATION DAY 20	26357	4															P
	26396	4															P
	26353	4															P
	26372	4															P
	26408	4															P
	26415	4															P
	26325	4															P
	26431	4															P
	26306	4															P
	26425	4															P
	26382	5															P
	26347	5															P
	26394	5															P
	26389	5															P
	26311	5															P
	26416	5															P
	26411	5															P
	26448	5															P
	26428	5															P
	26339	5															P
	26406	5															P
	26326	5															P
	26377	5															P
	26376	5															P
	26360	5															P
	26427	5															P
	26443	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

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OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																		
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2
WET YELLOW MATERIAL UROGENITAL AREA	26400	4			2	2	2	1													
	26399	4		1		1															
	26301	4				1															
	26332	4		1																	
	26357	4			1	1	1	1	2												
	26372	4			1	1	1														
	26431	4			1																
	26382	5			1																
	26311	5		2	2	2	1														
	26326	5				1	1														
	26376	5		1	2	2	1	1	1												
	26443	5			1																
	26444	5			2	1															
	26452	5			1																
	26333	5			1	1															
26393	5		1	1																	
WET YELLOW MATERIAL VENTRAL ABDOMINAL AREA	26358	3				1	1		1	1											
	26357	4								2											
HAIR LOSS LEFT HINDLIMB	26319	3			1				2	2			2			2					
HAIR LOSS RIGHT FORELIMB	26327	1							1	1	1										
	26329	3										1									
	26424	3												2					1		
	26409	3											1								
	26313	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 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	
HAIR LOSS RIGHT FORELIMB	26301	4																			1	
	26325	4																		1		
	26377	5																			1	
	26427	5																			1	
HAIR LOSS LEFT FORELIMB	26327	1						1	1	1	1											
	26424	3							1						2						1	
	26313	4	1									1										
DRIED YELLOW MATERIAL UROGENITAL AREA	26405	1													1							
	26434	1																		1		
	26447	1										1										
	26302	1										1	1	1	1		1		1			
	26392	2														1				1		
	26355	2														2						
	26337	2										2		1	1		1				1	
	26358	3									2	2				1		2	2			
	26424	3							1													
	26435	3													1							
	26316	3													1							
	26354	3						1	1		1											
	26323	3				1	1		1		2	2	1	1	1			2				
	26324	4								1		1	1									
	26391	4										1		1								
	26387	4										1		1								
	26400	4							1		2											
26404	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 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	
DRIED YELLOW MATERIAL UROGENITAL AREA	26301	4						1																
	26357	4								2		2	2		2							1		
	26353	4				1		1																
	26372	4				1		2													1			
	26325	4				1		1	1															
	26431	4				1	1					2												
	26306	4				1	1																	
	26425	4				1	1			2	2	2		2		1								
	26382	5																			1			
	26411	5																				1		
	26448	5						1																
	26406	5												1										
	26376	5						2	1	2	2		2	3	2		2					1		
	26360	5											2	2	2	1								
	26314	5				1						1	1	1										
	26444	5				1	1	2				2	2	2			1		1					
	26452	5				1		2			2													
26333	5				1																			
26393	5				1	2																		
HAIR LOSS VENTRAL ABDOMINAL AREA	26337	2												1	2	1				1				
	26358	3								1		2		3	3	3	3	1	2	2				
	26373	4									1			1	1									
LACERATION LEFT LATERAL ABDOMINAL AREA	26326	5						P																
WET RED MATERIAL UROGENITAL AREA	26319	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 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 RED MATERIAL UROGENITAL AREA	26323	3															1						
	26324	4															1						
	26398	4															1						
	26313	4															1						
	26391	4															1						
	26387	4																1					
	26390	4																1					
	26396	4															1						
	26325	4															2				1		
	26425	4															1						
	26382	5																3					
	26389	5																		1			
	26311	5																		1			
	26448	5																					1
	26428	5																					1
	26339	5																		1			1
	26406	5															2						
	26377	5																		1			
	26360	5																		1			
	26443	5																		2	1		
	26314	5															2		2	2			
	26356	5																	1				
	26452	5															1				3		
26333	5																			1			
26393	5																						

DRIED RED MATERIAL UROGENITAL AREA	26327	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- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY																			

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

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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 UROGENITAL AREA	26317	1															1							
	26434	1																	1					
	26414	2																1						
	26423	2																1						
	26358	3																	1	1				
	26320	3																1	1		1			
	26437	3																	1					
	26385	3																1						
	26316	3																					1	
	26319	3																1	1		1			
	26370	3																1	1					
	26354	3														1								
	26324	4																	1	1				
	26398	4																		1				
	26373	4																		1	1			1
	26313	4																		1	1	1	1	1
	26391	4																		1	1	1		
	26390	4																			1			
	26400	4																		1	1	1		
	26404	4																			1	1	1	
	26301	4																			1			
	26357	4																			1	1		
	26396	4																				1		
	26353	4																					1	
	26408	4																				1		
	26325	4																					1	1
	26431	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

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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 UROGENITAL AREA	26306	4												1	1					1				
	26382	5																					1	2
	26347	5													1		1				1			
	26394	5															1	1						
	26389	5														1	1	1			2		1	
	26311	5																1						
	26416	5																1	1			1		
	26448	5												1	1	1								
	26428	5																1					1	
	26339	5													2	1	1	1			1			
	26406	5														1	1							
	26326	5												2		1		1	1					
	26377	5													1	1		1						
	26376	5													1	1	1		1	1			2	
	26360	5															1							
	26443	5															1	1			2			
	26314	5															1			2	1			
	26436	5													1	1				2				
	26356	5																					1	
	26444	5													1	1		1					2	
26452	5												1				2							
26333	5																				1	1		
26393	5																			1	1			
HAIR LOSS DORSAL HEAD	26420	1															1							
	26403	2																1						
	26343	3											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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

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1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

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

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OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																		
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2
DRIED RED MATERIAL AROUND NOSE	26434	1	1	2	2	2	1		1	1		1									1
	26447	1	1	1	2	2	2	2	1	1	2	1	1	1	1	2	1	1	1	1	1
	26304	1	1	1	2	2	2	2	1	2	1	2	1	1	1	1		1			1
	26302	1	2	2	2	2	2	2	1	1						1			1		1
	26369	1	1	1	2	2	2	1	1	1		1	1	1	1		1	1	1	1	2
	26380	1	1	1	1	1	1	2	2	1		2	1	1		1	1			1	
	26420	1	1	1		1	1	1	2	1	2	1		1			1		1		1
	26430	1	1	2	2	2	2	1	1		1	1	1	1	1	1		2	1	1	2
	26386	2	1	3	3	3	3	2	3	3	3	3	2	1	1	1	1	1	1	1	1
	26392	2	2	2	2	2	2	2	1	2	1	1	1		1			1	1		
	26322	2			1			1		1											1
	26366	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	3	2	2
	26350	2	2	2	2	2	2	2	2	1	1	1	1		1	1	1	1	1		
	26342	2	1	1	2	2	1	1	1	1	1		1		1			1	1	1	
	26355	2	2	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1		2
	26352	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2
	26337	2	2	2	2	2	2	2		1	1		1		1	1	1				
	26414	2	2	2	1	2	1	1	1	1		1				1	1	1			1
	26403	2	2	1	1	1	1	1	1	1		1		1			1	1			1
	26305	2	1	2	2	2	2	2	1	1	1		1	1	1	1	1	1	1	1	1
	26315	2	2	2	1	1	1	1	1		1										
	26336	2	2	2	2	2	1	2	1	1	1		1				1	1		1	1
	26331	2	1	2	1	1	1	1		1	1		1	1		1				1	1
	26344	2	2	2	2	2	2	1		1	1				1	1	1			1	1
	26453	2	2	2	2	2	2	1	1	1		1	1	1	1	1	1	1	1	1	2
	26418	2	1	2	2	2	2	2	1	1		1	1		1	1	1			1	1
	26371	2		2	2	2	2	2		2		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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

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SPONSOR:AMERICAN PETROLEUM

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

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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	26439	2		2	2	2	2	1	1	1		2	1	2	1	1	1	1	1	1	1	1						
	26442	2		1	2	2	2	2	1	1	1		2	1	1	1	1	1		2		1	2					
	26303	2		1	2	2	2	2	1	1	1			1	1		1											
	26346	2		1		1	2	2	2	1	3	2	2	1	1	1	2	1	2	2	1	2	2					
	26438	2		1	2	1	1		1	1		1		1	1	1		1		1		1						
	26423	2		1	1	2	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	1					
	26328	3			2	2	2	2	2	2	2	1	1	1		1			1	1		1						
	26402	3			1	1	1		2	1	2	1	1			1			1		2	2						
	26358	3		2	2	2	2	2	1	1	1											1						
	26388	3		1	1	1	1		1	1				1					1									
	26329	3		2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	1	1						
	26320	3		1	1	1	1	1	1	2		1	1		1	1	1	1	1	1		1						
	26424	3		1	1	1	1	1	1	1		1	1				1	1	1									
	26435	3		1	2	2	2	2	2	2	1	1	1		1	1	1	1	1	1	1	1						
	26419	3		1	1	1	1	2	1	1		1			1	1	1		1		1							
	26437	3		2	2	2	2	2	2	1	1	1	1	1	1	1	1		1	1		1	1					
	26397	3		2	2	2	2	2	1	1		1		1		1	1	1			1	1						
	26385	3		1	1	2	1	1	1	1	1	1		1	1		1											
	26316	3		2	1	2	2	2	2	1	2	2	1		1	1	1	2	1	1	1	1						
	26409	3		2	2	2	2	2	2	1	2	2		1	1	1	1	1			1	1	1					
	26365	3		1	1	2	2	2	2	2	2	2	2	1	1	1	3	1			2	1	1					
	26319	3		2	1	2	2	1	2		1	1		1			1	1			1		1					
	26341	3		1	1	1	1	1	1	1	1		1		1	1			1	1		1	1					
	26421	3		1	2	2	2	2	1	1	1		1							1	1	2	1					
	26454	3		1	2	2	2	2	3	1	1	1	2	1		1	1	1			1	1	1					
	26343	3		1	1	1	1	1		1	1		1				1			1	1	1	1					
	26370	3		1	2	2	2	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 20

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	
DRIED RED MATERIAL AROUND NOSE	26351	3	1	2	2	2	2	1		1		1	1	1	1		1		1		1	1	
	26354	3	1	2	2	2	2	1	1	1	1	1		1	1	1	1	1	1	1	2		
	26378	3	1	2	2	2	1	1	2	1	2	1	1	1	1	1	1	2	1	2	1	2	
	26323	3	2		2	3	3	3	1	3	3	2	1	2	1	1	2	1	2	1	2	1	
	26334	4		1	2	1	1	1	1	1		1	1									1	
	26324	4	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	1	1	1	2	2	
	26398	4	2	2	2	2	2	2	2	2	1	1	1		1	1	1	1				1	
	26373	4	2	3	2	2	1	2	2	2	1	2	1	2	1	1	2	1	1	1	1	2	
	26313	4	1	2	1	2	1	2	1	2	1												
	26345	4	1	2	2	2	2	2	2	2		1	1		1	1		1	1	1	1	1	
	26391	4	1	2	2	2	2	2	2	1	1	2	1	1	1	2	1		1	2	2	1	
	26379	4	2	2	2	2	2	2	2	2	2	1		1	1		1	1	1	1	2	1	
	26387	4	2	2	2	1	2	1	2	1	1	1		1		1	1	1			1	1	
	26390	4	2	2	2	2	2	2	2	1	1	1		1	1	1	1	1	1	1	1	1	
	26400	4	2	2	2	2	1	1	2	1	1			1	1	1	1	1			1	2	1
	26404	4	1	2	2	2	2	2	2	2	3	2	3	1	2	1	1	2	2	2	2	2	
	26399	4	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1		1	1	
	26301	4	1	2	2	2	2	1	1	1	1		1	1	1	1		1				2	
	26332	4	1	2	2	1	1	1		1			1	1	1	1		1	1	1	1	1	
	26357	4	1	2	2	2	2	2	2	1	1		1	1	1	1		1	1	1		2	
	26396	4	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1		1	1	2	1	
	26353	4	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1						
	26372	4	2	2	1	1	1	1				1	1	1		1							
	26408	4	2	2	2	2	2	3	2	2	1	1	1	1	1	1	2	2	2	1	1	2	
	26415	4	2	2	2	2	2	2	1	2	2	2	2	2	2	1	1	1	2	2	2	2	
	26325	4	1	2	2	2	1	1	1	1		2	1	2	1	1	1	1				1	
	26431	4	2	2	2	2	2				1		1	1	1	1	1	3	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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	26306	4		2	2	2	2	1	1		1	1	1		1	1	1					1	1			
	26425	4		2	2	2	2	2	1	1	1	1	1	1		1	1	1	2	2	1	1				
	26382	5		2	2	2	2	2	2	2	2	2	2	1		1	1	1	1	1	1	2				
	26347	5		2	2	2	2	2	2	2	1		1	2	2		3	1	1	2	2	2				
	26394	5		1	2	2		2	2	2	1	1	1			1	1	1	1	1	1	1				
	26389	5		1	1	2	1	2	1	1	1	1	1	1			1	1	1	1	1	1				
	26311	5		2	1	2	2	1	1	1	1	1	1				1	1								
	26416	5		2	2	2	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1				
	26411	5		1	2	2	1	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1				
	26448	5		2	2	2	2	2	3	2	3	2	2	2	1	1		1	1	1	1	1				
	26428	5		1	1	1	1	1	1	1		1	1		1	1	1			1		1				
	26339	5		2	2	2	2		2	2	2	2	1	2	1	1						1	2	1		
	26406	5		2	1	1	1	1	1	1		1	2		1	1	1	1	1	1	1	1				
	26326	5		1	2	1	2	2	2	1	1	2		2	1	1	1	1	1	1	1	1				
	26377	5		1	1	2	1	1	1	1	1	1		1	1			1	1			1	1			
	26376	5		1	2	2	2	2	2	1	1	1		1	1	1						1	1			
	26360	5		1	2	2	2	2	2	3	3	3	3	3	1	1	1	1	1	1	1	2	2			
	26427	5		1	2	2	2	2	2	1	1	1		1	1	1	1	1	1	1	2	1	1			
	26443	5		1	2	2	2	2	2	1	1				1		1	1	1		1	1				
	26314	5		1	1	2	2	2	2	3			1	1	2	1	1	1	1	2	2					
	26436	5		2	2	2	2	3	2	2	1	2	2		2	1	1	1	2	2	2	2				
	26413	5		1	2	2	1	2	1	1	1		2	1	2	1	1	1	1	1	1	1				
	26356	5		1	2	2	2	2	1		1		1	1	1	1	1	1	1	1	2	1				
	26444	5		2	2	2	2	3	3	3	3	3	1	2	2		1	1	2	2	2	3				
	26452	5			2	2		3			1		1	2	1	1	1	2	2							
	26333	5		2	2	2	3	3	2	1	2	1	1	1	1	1	2	2	1	1	1					
	26393	5		1	1	1		1	1		1	2			1			1	2		2	1				

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

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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 RIGHT EYE	26433	1																1		1							
	26383	1				1	1	1	1	1		1	1					1	1	1							
	26349	1						1		1																	
	26395	1				1	1	1	1	1	1																
	26405	1			1	1	2	2	1	1	1																
	26327	1		1	1	1		1										1	1	1	1	1	1	1	1	1	1
	26426	1			1	1	1	1	1	1		1	1					1									
	26312	1		2	2	1	1	2	1	2	2	2	1					2	2	1	1	1	1	1	1	1	1
	26368	1			2													1									
	26318	1						1		1																	
	26407	1				1	2	2	2	2	2	1															
	26451	1		1	1		2	1	1	1	1	1	1	1	1	1											
	26432	1			1	1	1	1	1		1	1	1														
	26330	1			1	1	1	1	1	1	1	1	1														
	26317	1									1	1															
	26309	1		1	1	1	1																				
	26434	1		1	1	1	1	1																			
	26304	1				1	1	1																			
	26302	1					1	1				1	1														
	26369	1		1	1		1	1					1	1													
	26380	1		1	1	1	1	1	1		1		1														
	26420	1		1	1		1																				
	26430	1		1	1	1	2	2	1				1	1													
	26386	2		1			1	1		1	1							1		1	1	1					
	26392	2			1	2	1	1	1	1	2		1														
	26322	2						1		1																	
	26366	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 24

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 RIGHT EYE	26397	3				1	1	1		1		1	1											
	26385	3		1	1	1	1	1	1															
	26316	3		1	1	1	1					1				1	1					1	1	
	26409	3		1	1																	1		
	26365	3			1	1	1	1				1												
	26319	3		1	1	1	1	1	1		1	1				1								
	26341	3		1	1	1	1																	
	26421	3		1	2	2	2	2	2	2	1		1											
	26454	3			1	1	1	1															1	
	26343	3		1	1	1	1	1			1										1	1	1	
	26370	3		1	1	1	1	1	1	1	1		1	1	1						1	1	1	
	26351	3		1	1	2	1	2	1		2		1	1	1	1			1			1	2	2
	26354	3			1	1	1																	
	26378	3		1	1	2	1	1		1			1		1	1						1		1
	26323	3		2		2	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1	2	1	
	26334	4				1	1	1	1	1	1													
	26398	4								1		1			1									
	26373	4		2	2	2	1		1	1	1	1	1	1	1	1								
	26313	4				1	1					1												
	26345	4				1	1	1	1	1	1											1		1
	26391	4		1	1	1	1	1	1	1			1		1	1	1	1					1	1
	26379	4					1	1																
	26387	4		1	1	2	1	1	1	1	1				1									
	26390	4					1	1		1													1	
	26400	4		1	1	1	2																	1
	26399	4		1	1	1	1	1	1	1	1	1		2	2	1	1							
26301	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 27

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
DRIED RED MATERIAL LEFT EYE	26380	1	1	1	1	1				1		1										
	26420	1	1	1																		
	26430	1	1	1	2	1	1					1	1					1				1
	26386	2	1			1	1	1	1	1					1		1	1	1			
	26392	2		1	2	1	1	1	1	2	1	2	1		1							1
	26322	2						1		1												
	26366	2	1	1	1	1	1	1	1	1	1		1		1		1					
	26350	2		1						1					1	1	1					
	26342	2			1	1	1	1		1												
	26355	2		1	1	1	1	1	1	1	1							1				
	26352	2		1		1	1															
	26337	2	1	1	1	1	2	2	1		1	1		1								
	26414	2	1	1	1	1	1	1	1													
	26403	2		1				1	1	1	1	1				1		1				
	26305	2			1																	
	26315	2	2	2	1	1		1							1							
	26336	2	1	2	2	2	1	2		1	1		1									
	26331	2	1	1	2	2	2	1														
	26344	2	1	1	1	2	1	1		1	1		1					1		1		
	26453	2	1	1	1	1	1									1			1	1		1
	26418	2		2	2	2	1		1	1												
	26371	2		1	1	1	1															
	26439	2		1	1	1	1	1	1	1		1	1	1								
	26303	2										1									1	
	26346	2	2		2	2	2	2	2	2	2	2	1		1	1	1	1	1	1	1	1
	26438	2	1	1																		
	26328	3		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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 29

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 LEFT EYE	26391	4	1	1	1	1	1	1	1			1		1	1	1							1
	26379	4					1	1															
	26387	4	1	1	1	1	1								1	1							
	26390	4					1	1		1						1	1						
	26400	4	1	1	1	2																	1
	26399	4	1	1	1	1	1	2	1	1	1		2	2	1	1							
	26301	4	1	1	1	1		1															
	26332	4		2	1	1																	
	26357	4	1	1	1	1	1	1			1		1	1									
	26396	4	1	1	1	1	1								1								
	26353	4	1	1	1	1	1						1			1	1	1					1
	26372	4	2	1	2	1	1	2	2	1	1	2		1		1							
	26408	4		1	1	1	1																
	26415	4			1		1				1										1	1	1
	26325	4	1	2	2	2	2		1	1													
	26431	4	1			1	1	1	1	1	1		2	1	1	1			1	1		2	2
	26306	4		1	2	2	2	2	1		1												2
	26425	4																1					
	26382	5		1	1	1	1	1	1	1	1												
	26347	5						1	1	1	1												
	26394	5	2	2	2			2	1	2	2												
	26389	5	1	2	1	1	1	1	1	1				1									
	26311	5	1	1	1	1		1															
	26416	5	1	1	1	1	1	1	1	1			1			1							
	26411	5	1	1	1	1	1	1	2	1	2	1			2	2	2		1	1	1	1	1
	26448	5		1	1	1	1	1	1														
	26428	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY										DAY									
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	2
DRIED RED MATERIAL LEFT EYE	26339	5							1	1												
	26406	5	1		1	1	1	1	1		1	1		1	1		1					
	26326	5	1	2	2	2	2	1										1		1		
	26377	5		1	2			1														
	26376	5	1	1	2	1	2	1					1		1							
	26360	5		1	1	1	1	1								1				1	1	
	26427	5	1	1	1	1	1	1	1	1	1	1		1	1	2	1			1		
	26443	5	1	2	2	2	2	1	1	1	1									1		
	26314	5				1	1						1									
	26413	5		1	1	1																
	26356	5	1	1	1	1	1	1					1							1		
	26444	5	1	1	1	1	1															
	26452	5		1	2	2		2		1	1	1		1								
	26333	5	1	1	1	1	1	1	1		1	1	1		1	1	1			1		
	26393	5	1	2	1		1	1		1	2	2	1	1	1	1	1	1	1	2	1	
WET RED MATERIAL AROUND NOSE	26395	1						1														
	26327	1								1												
	26346	2				1																
	26385	3				1																
	26373	4						1														
	26372	4			1																	
WET RED MATERIAL RIGHT EYE	26346	2				1	1															
	26316	3					1	1														
	26372	4				1	1															
WET RED MATERIAL LEFT EYE	26346	2				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- 5 MG/KG/DAY	4- 25 MG/KG/DAY	5- 50 MG/KG/DAY
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OBSERVATION	ANIMAL	GROUP	GESTATIONAL DAY																			
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	2	
WET RED MATERIAL LEFT EYE	26316	3																				
	26372	4				1	1															
HAIR LOSS AROUND RIGHT EYE	26312	1																	1			
	26304	1																1				
	26315	2																	1			
	26344	2																	1			
	26346	2											2		2							
	26358	3																		1		
	26343	3																1				
	26379	4																1				
26372	4													1		1	1					
HAIR LOSS AROUND LEFT EYE	26315	2																1				
	26418	2																1				
	26346	2												1		1						
	26358	3																		1		
	26379	4															1					
	26372	4														1		1	1			
DECREASED DEFECACTION	26384	1																P			P	
	26349	1																P	P	P	P	
	26395	1																P				
	26405	1																P	P			
	26327	1				P		P				P					P	P				
	26426	1				P											P					
	26312	1				P					P	P	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																						

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 36

OBSERVATION	ANIMAL GROUP	GESTATIONAL DAY																		
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8
DECREASED DEFECATION	26333	5	P	P	P			P	P		P	P	P							
	26393	5	P	P	P	P	P	P			P	P								
WET RED VAGINAL DISCHARGE	26385	3																P		
LEFT UPPER INCISOR MISSING	26430	1																P		
RIGHT UPPER INCISOR BROKEN	26430	1																P		
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																				
1-0 MG/KG/DAY SHAM 2-0 MG/KG/DAY VEH. 3- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																				

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A1 (DAILY EXAMINATIONS)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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
ANIMAL FOUND WITHOUT COLLAR ON	26433	1	P														
	26407	1		P													
	26451	1			P												
	26432	1	P														
	26369	1															P
	26420	1			P												
	26322	2	P	P		P											
	26315	2														P	
	26371	2		P													
	26439	2		P													
	26346	2		P										P			
	26328	3	P														
	26402	3				P											
	26351	3								P					P		
	26354	3		P													
	26373	4				P											
	26379	4													P		
	26372	4								P							
	26306	4		P													
	26394	5				P											
	26389	5													P		
	26339	5						P									
	26314	5								P							
	26452	5		P													
	26393	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY

PCOV3.13
12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

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

OBSERVATION	ANIMAL	GD GP																							
			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			26433	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26383	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26384	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26349	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26395	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26405	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26327	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26426	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26312	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26368	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26318	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26407	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26451	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26432	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26330	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26317	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26309	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26434	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26447	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26304	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26302	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26369	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26380	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26420	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26430	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26386	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26392	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26322	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26366	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
			26350	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																									
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																									

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

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

OBSERVATION	ANIMAL	GD GP	GD																							
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9				
NO SIGNIFICANT CLINICAL OBSERVATIONS	26342	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26355	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26352	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26337	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26414	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26403	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26305	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26315	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26336	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26331	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26344	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26453	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26418	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26371	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26439	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26442	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26303	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26346	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26438	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26423	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26328	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26402	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26358	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26388	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26329	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26320	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26424	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26435	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26419	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26437	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26397	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	26385	3	P	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 MG/KG/DAY														
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																										

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 3

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

OBSERVATION	ANIMAL	GD GP																		1	1	1	1	1	1	1	1	1
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9						
NO SIGNIFICANT CLINICAL OBSERVATIONS	26316	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26409	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26365	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26319	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26341	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26421	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26454	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26343	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26370	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26351	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26354	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26378	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26323	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26334	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26324	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26398	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26373	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26313	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26345	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26391	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26379	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26387	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26390	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26400	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26404	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26399	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26301	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26332	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26357	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26396	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26353	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P						
	26372	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 MG/KG/DAY																
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																												

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

PAGE 4

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

OBSERVATION	ANIMAL	GD GP																		1	1	1	1	1	1	1	1	1
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9						
NO SIGNIFICANT CLINICAL OBSERVATIONS	26408	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26415	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26325	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26431	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26306	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26425	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26382	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26347	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26394	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26389	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26311	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26416	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26411	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26448	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26428	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26339	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26406	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26326	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26377	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26376	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26360	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26427	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26443	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26314	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26436	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26413	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26356	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26444	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26452	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26333	5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	26393	5	P	P	P	P	P	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																												
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																												

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SPONSOR:AMERICAN PETROLEUM

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

PAGE 1

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

OBSERVATION	ANIMAL	GD GP	GD																			
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	
NORMAL																						
NO SIGNIFICANT CLINICAL OBSERVATIONS																						
	26433	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26383	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26384	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26349	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26395	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26405	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26327	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26426	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26312	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26368	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26318	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26407	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26451	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26432	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26330	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26317	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26309	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26434	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26447	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26304	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26302	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26369	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26380	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26420	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26430	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26386	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26392	2	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26322	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26366	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	26350	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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																						
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																						

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 2

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

OBSERVATION	ANIMAL	GD GP	GD																							
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1					
NO SIGNIFICANT CLINICAL OBSERVATIONS	26342	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26355	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26352	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26337	2	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26414	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26403	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26305	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26315	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26336	2	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26331	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26344	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26453	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26418	2	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26371	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26439	2	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26442	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26303	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26346	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26438	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26423	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	P				
	26328	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26402	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26358	3	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26388	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26329	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26320	3	P	P	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26424	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26435	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26419	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26437	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26397	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26385	3	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 MG/KG/DAY														
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																										

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 3

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

OBSERVATION	ANIMAL	GD GP																			1	1	1	1	1	1	1	1	1
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9							
NO SIGNIFICANT CLINICAL OBSERVATIONS	26316	3	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26409	3	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26365	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26319	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26341	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26421	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26454	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26343	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26370	3	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26351	3	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26354	3	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26378	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26323	3	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P		P									
	26334	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26324	4	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26398	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26373	4	P	P	P	P		P	P	P	P	P	P	P	P	P		P	P	P	P	P							
	26313	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26345	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26391	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26379	4	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26387	4	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26390	4	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26400	4	P	P	P			P	P	P	P	P	P	P	P	P		P	P	P	P	P							
	26404	4	P	P	P		P	P	P	P	P	P	P	P	P		P	P	P	P	P	P							
	26399	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26301	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26332	4	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26357	4	P	P			P	P	P	P	P	P	P	P	P	P	P	P		P		P							
	26396	4	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P							
	26353	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P		P							
	26372	4	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- 5 MG/KG/DAY			4- 25 MG/KG/DAY			5- 50 MG/KG/DAY																	
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																													

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 4

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

OBSERVATION	ANIMAL	GD GP																	1	1	1	1	1	1	1	1
			0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9				
NO SIGNIFICANT CLINICAL OBSERVATIONS	26408	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26415	4	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26325	4	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26431	4	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26306	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26425	4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26382	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P		P	P				
	26347	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P		P	P	P				
	26394	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26389	5	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26311	5	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26416	5	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26411	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26448	5	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26428	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26339	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26406	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P		P	P				
	26326	5	P	P	P		P	P	P	P	P	P	P	P		P	P	P	P	P	P	P				
	26377	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26376	5	P	P			P	P	P	P	P	P	P	P	P	P	P	P	P	P		P				
	26360	5	P	P	P	P	P		P	P	P	P	P	P	P		P	P	P	P	P	P				
	26427	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26443	5	P	P	P	P	P		P	P	P	P	P	P	P		P		P	P	P	P				
	26314	5	P	P	P	P	P		P	P	P	P	P	P	P		P	P	P	P	P	P				
	26436	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P		P					
	26413	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26356	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26444	5	P			P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
	26452	5	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P								
	26333	5		P	P	P	P		P	P	P	P	P	P	P	P	P	P		P		P				
	26393	5			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- 5 MG/KG/DAY 4- 25 MG/KG/DAY 5- 50 MG/KG/DAY																										
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																										

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

[illegible]

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

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

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SPONSOR:AMERICAN PETROLEUM

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

PAGE 7

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

OBSERVATION	ANIMAL	GD GP																				
			0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	
DRIED RED MATERIAL UROGENITAL AREA	26357	4																			1	
	26353	4																		1	1	
	26325	4																			1	
	26306	4																1				
	26339	5																			1	
	26376	5																		1		
	26360	5																		1		
	26436	5																	1		1	
	26444	5																			1	
	26333	5																		1		
26393	5																	1				
WET CLEAR MATERIAL UROGENITAL AREA	26323	3																			1	
EXCRETA																						
WET RED VAGINAL DISCHARGE	26428	5																			P	
	26452	5																	P			
	26333	5																	P			
1-0 MG/KG/DAY SHAM	2-0 MG/KG/DAY VEH.	3- 5 MG/KG/DAY	4-	25 MG/KG/DAY	5-	50 MG/KG/DAY																
GRADE CODE: P = PRESENT 1 = SLIGHT 2 = MODERATE 3 = SEVERE																						

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

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SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 1

GROUP : 0 MG/KG/DAY SHAM										
ANIMAL NO. / SEX										
	26433/F	26383/F	26384/F	26349/F	26395/F	26405/F	26327/F	26426/F	26312/F	26368/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	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	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	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	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

SNR = SCORED, NOT REMARKABLE

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 2

GROUP : 0 MG/KG/DAY SHAM										
ANIMAL NO. / SEX										
	26318/F	26407/F	26451/F	26432/F	26330/F	26317/F	26309/F	26434/F	26447/F	26304/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	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
10	SNR	0/0/d	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	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	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

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TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 3

GROUP : 0 MG/KG/DAY SHAM			ANIMAL NO. / SEX		
	26302/F	26369/F	26380/F	26420/F	26430/F
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS				
0	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	0/0/d	SNR	SNR
8	SNR	SNR	0/0/d	SNR	SNR
9	SNR	SNR	0/0/d	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR

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INDIVIDUAL DERMAL OBSERVATIONS

PAGE 4

GROUP : 0 MG/KG/DAY VEH.										
ANIMAL NO. / SEX										
	26386/F	26392/F	26322/F	26366/F	26350/F	26342/F	26355/F	26352/F	26337/F	26414/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	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
8	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	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	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR	SNR	SNR	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

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INDIVIDUAL DERMAL OBSERVATIONS

PAGE 5

GROUP : 0 MG/KG/DAY VEH.										ANIMAL NO. / SEX	
	26403/F	26305/F	26315/F	26336/F	26331/F	26344/F	26453/F	26418/F	26371/F	26439/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	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	0/0/d	SNR	0/0/d	SNR	0/0/d	SNR	0/0/d	SNR	SNR	SNR	SNR
5	0/0/d	SNR	0/0/d	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
6	0/0/d	SNR	0/0/d	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
7	0/0/d	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d	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

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INDIVIDUAL DERMAL OBSERVATIONS

PAGE 6

GROUP : 0 MG/KG/DAY VEH.						ANIMAL NO. / SEX					
26442/F						26303/F					
26346/F						26438/F					
26423/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	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	0/0/d	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

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INDIVIDUAL DERMAL OBSERVATIONS

PAGE 7

GROUP : 5 MG/KG/DAY		ANIMAL NO. / SEX									
		26328/F	26402/F	26358/F	26388/F	26329/F	26320/F	26424/F	26435/F	26419/F	26437/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	SNR	SNR	SNR	SNR	SNR	0/0/d	SNR
7	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	0/0/d	0/0/d	SNR
8	SNR	SNR	0/0/d	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

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PAGE 8

GROUP : 5 MG/KG/DAY		ANIMAL NO. / SEX									
		26397/F	26385/F	26316/F	26409/F	26365/F	26319/F	26341/F	26421/F	26454/F	26343/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	0/0/d	SNR	SNR	SNR	0/0/d	SNR	0/0/d	0/0/d	SNR	SNR
5	0/0/d	0/0/d	SNR	SNR	SNR	0/0/d	SNR	0/0/d	SNR	SNR	SNR
6	0/0/d	0/0/d	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
7	0/0/d	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

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PAGE 9

GROUP : 5 MG/KG/DAY						ANIMAL NO. / SEX					
26370/F						26351/F					
26354/F						26378/F					
26323/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	0/0/d	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	0/0/d	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

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 10

GROUP : 25 MG/KG/DAY		ANIMAL NO. / SEX									
		26334/F	26324/F	26398/F	26373/F	26313/F	26345/F	26391/F	26379/F	26387/F	26390/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	0/0/d	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR	0/0/d	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

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 11

GROUP : 25 MG/KG/DAY		ANIMAL NO. / SEX									
		26400/F	26404/F	26399/F	26301/F	26332/F	26357/F	26396/F	26353/F	26372/F	26408/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	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
3	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
4	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	0/0/d
5	SNR	0/0/d	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	0/0/d
6	SNR	0/0/d	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	0/0/d
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

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 12

GROUP : 25 MG/KG/DAY					
ANIMAL NO. / SEX					
26415/F	26325/F	26431/F	26306/F	26425/F	
GESTATION DAY	ERYTHEMA+/EDEMA+/OTHER FINDINGS				
0	SNR	SNR	SNR	SNR	SNR
1	SNR	SNR	SNR	SNR	SNR
2	SNR	SNR	SNR	SNR	SNR
3	SNR	SNR	SNR	SNR	SNR
4	SNR	SNR	SNR	SNR	SNR
5	SNR	SNR	SNR	SNR	SNR
6	SNR	SNR	SNR	SNR	SNR
7	SNR	SNR	SNR	SNR	SNR
8	SNR	SNR	SNR	SNR	SNR
9	SNR	SNR	SNR	SNR	SNR
10	SNR	SNR	SNR	SNR	SNR
11	SNR	SNR	SNR	SNR	SNR
12	SNR	SNR	SNR	SNR	SNR
13	SNR	SNR	SNR	SNR	SNR
14	SNR	SNR	SNR	SNR	SNR
15	SNR	SNR	SNR	SNR	SNR
16	SNR	SNR	SNR	SNR	SNR
17	SNR	SNR	SNR	SNR	SNR
18	SNR	SNR	SNR	SNR	SNR
19	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR

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TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 13

GROUP : 50 MG/KG/DAY		ANIMAL NO. / SEX									
		26382/F	26347/F	26394/F	26389/F	26311/F	26416/F	26411/F	26448/F	26428/F	26339/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	0/0/d	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

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TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 14

GROUP : 50 MG/KG/DAY		ANIMAL NO. / SEX									
		26406/F	26326/F	26377/F	26376/F	26360/F	26427/F	26443/F	26314/F	26436/F	26413/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	0/0/d	SNR	0/0/d	SNR	SNR	SNR	SNR	SNR	SNR	SNR
6	SNR	0/0/d	SNR	0/0/d	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
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	DEAD	SNR	SNR

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SEX CODE: M = MALE F = FEMALE

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TABLE A4
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL DERMAL OBSERVATIONS

PAGE 15

GROUP : 50 MG/KG/DAY						ANIMAL NO. / SEX					
26356/F						26444/F					
26356/F						26452/F					
26356/F						26333/F					
26356/F						26393/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	DEAD	SNR	SNR	SNR	SNR	SNR	SNR	SNR
20	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR

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PIDERRv4.02
11/11/2011
R:12/16/2011

TABLE A5
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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											
26302	G	250.	248.	261.	280.	295.	312.	353.	386.	SCHEDULED	NECROPSY DAY 20
26304	G	255.	250.	262.	275.	279.	304.	334.	371.	SCHEDULED	NECROPSY DAY 20
26309	G	275.	274.	286.	307.	309.	329.	368.	400.	SCHEDULED	NECROPSY DAY 20
26312	G	252.	247.	266.	285.	305.	323.	372.	411.	SCHEDULED	NECROPSY DAY 20
26317	G	270.	274.	284.	305.	323.	341.	388.	425.	SCHEDULED	NECROPSY DAY 20
26318	G	235.	238.	248.	263.	278.	296.	334.	362.	SCHEDULED	NECROPSY DAY 20
26327	G	257.	239.	253.	265.	282.	299.	345.	394.	SCHEDULED	NECROPSY DAY 20
26330	G	262.	252.	272.	292.	307.	326.	368.	398.	SCHEDULED	NECROPSY DAY 20
26349	NG	251.	237.	250.	263.	268.	261.	268.	270.	SCHEDULED	NECROPSY DAY 20
26368	G	245.	226.	230.	250.	268.	288.	328.	365.	SCHEDULED	NECROPSY DAY 20
26369	G	244.	246.	256.	275.	286.	309.	346.	384.	SCHEDULED	NECROPSY DAY 20
26380	G	244.	242.	258.	263.	271.	283.	331.	353.	SCHEDULED	NECROPSY DAY 20
26383	G	242.	248.	273.	282.	303.	311.	346.	383.	SCHEDULED	NECROPSY DAY 20
26384	G	244.	245.	253.	267.	286.	299.	333.	368.	SCHEDULED	NECROPSY DAY 20
26395	G	253.	243.	255.	270.	288.	298.	335.	379.	SCHEDULED	NECROPSY DAY 20
26405	G	258.	253.	265.	281.	291.	311.	329.	373.	SCHEDULED	NECROPSY DAY 20
26407	G	244.	252.	265.	272.	296.	311.	353.	390.	SCHEDULED	NECROPSY DAY 20
26420	G	261.	269.	276.	289.	304.	317.	367.	397.	SCHEDULED	NECROPSY DAY 20
26426	G	254.	239.	248.	265.	279.	303.	350.	379.	SCHEDULED	NECROPSY DAY 20
26430	G	273.	272.	287.	304.	313.	336.	379.	421.	SCHEDULED	NECROPSY DAY 20
26432	G	257.	252.	265.	283.	306.	317.	351.	376.	SCHEDULED	NECROPSY DAY 20
26433	G	224.	239.	257.	266.	289.	298.	326.	363.	SCHEDULED	NECROPSY DAY 20
26434	G	261.	256.	266.	277.	283.	299.	343.	381.	SCHEDULED	NECROPSY DAY 20
26447	G	255.	266.	274.	283.	294.	313.	349.	389.	SCHEDULED	NECROPSY DAY 20
26451	G	251.	260.	269.	278.	297.	315.	356.	390.	SCHEDULED	NECROPSY DAY 20
MEAN		253.	251.	264.	278.	293.	310.	349.	385.		
S.D.		11.7	12.6	13.2	14.2	13.8	14.3	17.1	18.1		
S.E.		2.4	2.6	2.7	2.9	2.8	2.9	3.5	3.7		
N		24	24	24	24	24	24	24	24		

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

TABLE A5
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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.											
26303	G	245.	257.	250.	258.	269.	289.	328.	361.	SCHEDULED	NECROPSY DAY 20
26305	G	228.	242.	255.	257.	274.	292.	324.	354.	SCHEDULED	NECROPSY DAY 20
26315	G	251.	248.	259.	269.	293.	301.	341.	371.	SCHEDULED	NECROPSY DAY 20
26322	G	242.	249.	262.	277.	302.	314.	354.	391.	SCHEDULED	NECROPSY DAY 20
26331	G	261.	261.	271.	283.	300.	317.	351.	386.	SCHEDULED	NECROPSY DAY 20
26336	G	259.	261.	277.	285.	305.	320.	362.	399.	SCHEDULED	NECROPSY DAY 20
26337	G	252.	253.	264.	285.	298.	316.	349.	382.	SCHEDULED	NECROPSY DAY 20
26342	G	263.	265.	279.	297.	314.	335.	363.	427.	SCHEDULED	NECROPSY DAY 20
26344	G	273.	277.	280.	292.	309.	325.	356.	398.	SCHEDULED	NECROPSY DAY 20
26346	G	239.	228.	236.	245.	258.	274.	295.	320.	SCHEDULED	NECROPSY DAY 20
26350	G	258.	251.	267.	286.	296.	323.	359.	383.	SCHEDULED	NECROPSY DAY 20
26352	G	257.	249.	264.	284.	303.	326.	362.	399.	SCHEDULED	NECROPSY DAY 20
26355	NG	264.	252.	252.	265.	277.	280.	276.	285.	SCHEDULED	NECROPSY DAY 20
26366	G	247.	233.	255.	269.	296.	305.	338.	373.	SCHEDULED	NECROPSY DAY 20
26371	G	258.	264.	264.	285.	299.	321.	364.	394.	SCHEDULED	NECROPSY DAY 20
26386	G	232.	197.	222.	249.	257.	265.	281.	295.	SCHEDULED	NECROPSY DAY 20
26392	G	235.	230.	242.	245.	280.	289.	331.	364.	SCHEDULED	NECROPSY DAY 20
26403	G	242.	244.	256.	271.	286.	305.	338.	372.	SCHEDULED	NECROPSY DAY 20
26414	G	243.	227.	239.	256.	276.	296.	331.	371.	SCHEDULED	NECROPSY DAY 20
26418	G	260.	271.	284.	289.	309.	323.	364.	400.	SCHEDULED	NECROPSY DAY 20
26423	G	244.	239.	251.	271.	281.	299.	331.	367.	SCHEDULED	NECROPSY DAY 20
26438	G	261.	261.	273.	287.	299.	323.	371.	401.	SCHEDULED	NECROPSY DAY 20
26439	G	254.	263.	272.	282.	297.	322.	366.	402.	SCHEDULED	NECROPSY DAY 20
26442	G	252.	247.	257.	262.	276.	287.	316.	346.	SCHEDULED	NECROPSY DAY 20
26453	G	265.	265.	280.	291.	310.	322.	368.	402.	SCHEDULED	NECROPSY DAY 20
MEAN		251.	249.	261.	274.	291.	308.	343.	377.		
S.D.		11.3	17.6	15.6	15.7	16.2	18.2	23.3	28.7		
S.E.		2.3	3.6	3.2	3.2	3.3	3.7	4.8	5.9		
N		24	24	24	24	24	24	24	24		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 3

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20		
DAMS FROM GROUP 3:		5 MG/KG/DAY									
26316	G	247.	252.	260.	266.	275.	300.	337.	363.	SCHEDULED	NECROPSY DAY 20
26319	G	265.	255.	261.	277.	292.	318.	365.	398.	SCHEDULED	NECROPSY DAY 20
26320	G	272.	269.	281.	298.	303.	340.	371.	408.	SCHEDULED	NECROPSY DAY 20
26323	G	243.	233.	231.	237.	259.	266.	304.	331.	SCHEDULED	NECROPSY DAY 20
26328	G	231.	232.	242.	260.	280.	295.	328.	358.	SCHEDULED	NECROPSY DAY 20
26329	G	256.	256.	270.	285.	303.	315.	356.	402.	SCHEDULED	NECROPSY DAY 20
26341	G	279.	283.	303.	308.	325.	340.	382.	412.	SCHEDULED	NECROPSY DAY 20
26343	G	253.	258.	276.	284.	295.	319.	363.	390.	SCHEDULED	NECROPSY DAY 20
26351	G	247.	234.	239.	252.	253.	269.	311.	335.	SCHEDULED	NECROPSY DAY 20
26354	G	236.	228.	242.	257.	276.	291.	326.	355.	SCHEDULED	NECROPSY DAY 20
26358	G	244.	245.	258.	283.	300.	327.	372.	405.	SCHEDULED	NECROPSY DAY 20
26365	G	260.	254.	271.	274.	297.	315.	348.	382.	SCHEDULED	NECROPSY DAY 20
26370	G	253.	247.	257.	268.	278.	301.	337.	362.	SCHEDULED	NECROPSY DAY 20
26378	G	241.	236.	251.	266.	282.	296.	333.	366.	SCHEDULED	NECROPSY DAY 20
26385	G	235.	244.	261.	268.	280.	299.	342.	368.	SCHEDULED	NECROPSY DAY 20
26388	G	252.	247.	263.	270.	279.	291.	327.	350.	SCHEDULED	NECROPSY DAY 20
26397	G	242.	243.	255.	269.	280.	301.	333.	365.	SCHEDULED	NECROPSY DAY 20
26402	G	235.	243.	244.	266.	274.	292.	335.	358.	SCHEDULED	NECROPSY DAY 20
26409	G	260.	263.	267.	262.	279.	300.	346.	381.	SCHEDULED	NECROPSY DAY 20
26419	G	251.	249.	265.	276.	293.	312.	365.	392.	SCHEDULED	NECROPSY DAY 20
26421	G	259.	256.	265.	275.	287.	303.	336.	365.	SCHEDULED	NECROPSY DAY 20
26424	G	266.	269.	284.	301.	318.	328.	359.	392.	SCHEDULED	NECROPSY DAY 20
26435	G	252.	254.	259.	272.	287.	301.	330.	363.	SCHEDULED	NECROPSY DAY 20
26437	G	247.	253.	262.	279.	290.	306.	353.	383.	SCHEDULED	NECROPSY DAY 20
26454	G	256.	264.	273.	279.	299.	309.	345.	373.	SCHEDULED	NECROPSY DAY 20
MEAN		251.	251.	262.	273.	287.	305.	344.	374.		
S.D.		11.9	13.1	15.6	15.3	16.1	18.0	19.3	21.9		
S.E.		2.4	2.6	3.1	3.1	3.2	3.6	3.9	4.4		
N		25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 4

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20		
DAMS FROM GROUP 4:		25 MG/KG/DAY									
26301	G	259.	256.	261.	270.	287.	293.	322.	340.	SCHEDULED	NECROPSY DAY 20
26306	G	271.	253.	275.	284.	303.	319.	354.	390.	SCHEDULED	NECROPSY DAY 20
26313	G	253.	256.	262.	270.	289.	295.	329.	348.	SCHEDULED	NECROPSY DAY 20
26324	G	235.	228.	246.	251.	259.	271.	288.	300.	SCHEDULED	NECROPSY DAY 20
26325	G	247.	242.	258.	277.	289.	304.	333.	352.	SCHEDULED	NECROPSY DAY 20
26332	G	260.	250.	261.	274.	294.	311.	342.	371.	SCHEDULED	NECROPSY DAY 20
26334	G	229.	228.	247.	257.	267.	272.	286.	295.	SCHEDULED	NECROPSY DAY 20
26345	G	264.	255.	270.	290.	301.	305.	307.	315.	SCHEDULED	NECROPSY DAY 20
26353	G	262.	255.	279.	267.	293.	298.	321.	332.	SCHEDULED	NECROPSY DAY 20
26357	G	267.	259.	276.	286.	301.	316.	336.	368.	SCHEDULED	NECROPSY DAY 20
26372	G	255.	233.	241.	245.	266.	282.	304.	331.	SCHEDULED	NECROPSY DAY 20
26373	G	249.	243.	258.	272.	279.	282.	302.	329.	SCHEDULED	NECROPSY DAY 20
26379	G	257.	243.	263.	270.	281.	285.	290.	297.	SCHEDULED	NECROPSY DAY 20
26387	G	248.	246.	253.	258.	271.	287.	287.	325.	SCHEDULED	NECROPSY DAY 20
26390	G	244.	237.	247.	259.	276.	284.	311.	325.	SCHEDULED	NECROPSY DAY 20
26391	G	264.	264.	276.	287.	305.	309.	333.	343.	SCHEDULED	NECROPSY DAY 20
26396	G	272.	274.	278.	286.	306.	305.	315.	313.	SCHEDULED	NECROPSY DAY 20
26398	G	246.	252.	271.	288.	296.	316.	353.	383.	SCHEDULED	NECROPSY DAY 20
26399	G	255.	266.	277.	288.	303.	309.	350.	379.	SCHEDULED	NECROPSY DAY 20
26400	G	243.	238.	251.	267.	283.	298.	331.	342.	SCHEDULED	NECROPSY DAY 20
26404	G	243.	239.	245.	258.	277.	290.	302.	326.	SCHEDULED	NECROPSY DAY 20
26408	G	255.	247.	256.	265.	279.	298.	316.	317.	SCHEDULED	NECROPSY DAY 20
26415	G	252.	258.	266.	276.	282.	294.	323.	344.	SCHEDULED	NECROPSY DAY 20
26425	G	274.	268.	272.	283.	290.	302.	321.	337.	SCHEDULED	NECROPSY DAY 20
26431	G	231.	232.	245.	253.	265.	280.	315.	332.	SCHEDULED	NECROPSY DAY 20
MEAN		253.	249.	261.	271.	286.	296.	319.	337.		
S.D.		12.2	12.6	12.2	13.2	13.7	13.6	20.2	25.8		
S.E.		2.4	2.5	2.4	2.6	2.7	2.7	4.0	5.2		
N		25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 5

PREGNANCY STATUS		DAY 0	3	6	9	12	15	18	20	
DAMS FROM GROUP 5:		50 MG/KG/DAY								
26311	G	258.	259.	280.	294.	305.	322.	339.	349.	SCHEDULED NECROPSY DAY 20
26314	G	260.	241.	249.	262.	274.	290.	262.	NA	GRAVID, DIED DAY 19
26326	G	242.	237.	251.	261.	290.	284.	265.	269.	SCHEDULED NECROPSY DAY 20
26333	G	268.	259.	266.	271.	282.	281.	297.	309.	SCHEDULED NECROPSY DAY 20
26339	G	243.	238.	245.	260.	271.	284.	281.	286.	SCHEDULED NECROPSY DAY 20
26347	G	236.	229.	251.	253.	270.	272.	267.	273.	SCHEDULED NECROPSY DAY 20
26356	G	250.	244.	263.	260.	279.	282.	300.	306.	SCHEDULED NECROPSY DAY 20
26360	G	260.	249.	269.	277.	282.	298.	306.	316.	SCHEDULED NECROPSY DAY 20
26376	G	256.	238.	252.	253.	273.	277.	280.	289.	SCHEDULED NECROPSY DAY 20
26377	G	245.	225.	242.	253.	269.	268.	283.	300.	SCHEDULED NECROPSY DAY 20
26382	G	231.	229.	238.	248.	249.	243.	248.	258.	SCHEDULED NECROPSY DAY 20
26389	G	247.	237.	245.	259.	269.	274.	264.	249.	SCHEDULED NECROPSY DAY 20
26393	G	256.	256.	264.	272.	282.	296.	311.	331.	SCHEDULED NECROPSY DAY 20
26394	G	243.	233.	242.	246.	250.	253.	261.	267.	SCHEDULED NECROPSY DAY 20
26406	G	242.	238.	236.	246.	254.	261.	269.	249.	SCHEDULED NECROPSY DAY 20
26411	NG	258.	254.	263.	273.	279.	275.	268.	274.	SCHEDULED NECROPSY DAY 20
26413	G	255.	254.	261.	274.	277.	284.	295.	311.	SCHEDULED NECROPSY DAY 20
26416	G	267.	257.	276.	282.	309.	321.	313.	352.	SCHEDULED NECROPSY DAY 20
26427	G	270.	258.	267.	278.	292.	293.	309.	329.	SCHEDULED NECROPSY DAY 20
26428	G	248.	238.	244.	254.	264.	276.	240.	231.	SCHEDULED NECROPSY DAY 20
26436	G	257.	247.	256.	268.	284.	286.	295.	281.	SCHEDULED NECROPSY DAY 20
26443	G	284.	255.	292.	294.	320.	323.	334.	346.	SCHEDULED NECROPSY DAY 20
26444	G	245.	239.	235.	240.	247.	247.	254.	259.	SCHEDULED NECROPSY DAY 20
26448	G	257.	248.	252.	276.	287.	283.	290.	289.	SCHEDULED NECROPSY DAY 20
26452	G	238.	226.	243.	252.	265.	269.	NA	NA	GRAVID, DIED DAY 18
MEAN		252.	243.	255.	264.	277.	282.	285.	293.	
S.D.		12.3	10.9	14.8	14.8	18.4	20.9	26.4	34.8	
S.E.		2.5	2.2	3.0	3.0	3.8	4.3	5.5	7.4	
N		24	24	24	24	24	24	23	22	

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

PGBWv4.09
11/11/2011
R:12/16/2011

TABLE A6
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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												
26302	G		-2.	13.	19.	15.	17.	41.	33.	136.	SCHEDULED	NECROPSY DAY 20
26304	G		-5.	12.	13.	4.	25.	30.	37.	116.	SCHEDULED	NECROPSY DAY 20
26309	G		-1.	12.	21.	2.	20.	39.	32.	125.	SCHEDULED	NECROPSY DAY 20
26312	G		-5.	19.	19.	20.	18.	49.	39.	159.	SCHEDULED	NECROPSY DAY 20
26317	G		4.	10.	21.	18.	18.	47.	37.	155.	SCHEDULED	NECROPSY DAY 20
26318	G		3.	10.	15.	15.	18.	38.	28.	127.	SCHEDULED	NECROPSY DAY 20
26327	G		-18.	14.	12.	17.	17.	46.	49.	137.	SCHEDULED	NECROPSY DAY 20
26330	G		-10.	20.	20.	15.	19.	42.	30.	136.	SCHEDULED	NECROPSY DAY 20
26349	NG		-14.	13.	13.	5.	-7.	7.	2.	19.	SCHEDULED	NECROPSY DAY 20
26368	G		-19.	4.	20.	18.	20.	40.	37.	120.	SCHEDULED	NECROPSY DAY 20
26369	G		2.	10.	19.	11.	23.	37.	38.	140.	SCHEDULED	NECROPSY DAY 20
26380	G		-2.	16.	5.	8.	12.	48.	22.	109.	SCHEDULED	NECROPSY DAY 20
26383	G		6.	25.	9.	21.	8.	35.	37.	141.	SCHEDULED	NECROPSY DAY 20
26384	G		1.	8.	14.	19.	13.	34.	35.	124.	SCHEDULED	NECROPSY DAY 20
26395	G		-10.	12.	15.	18.	10.	37.	44.	126.	SCHEDULED	NECROPSY DAY 20
26405	G		-5.	12.	16.	10.	20.	18.	44.	115.	SCHEDULED	NECROPSY DAY 20
26407	G		8.	13.	7.	24.	15.	42.	37.	146.	SCHEDULED	NECROPSY DAY 20
26420	G		8.	7.	13.	15.	13.	50.	30.	136.	SCHEDULED	NECROPSY DAY 20
26426	G		-15.	9.	17.	14.	24.	47.	29.	125.	SCHEDULED	NECROPSY DAY 20
26430	G		-1.	15.	17.	9.	23.	43.	42.	148.	SCHEDULED	NECROPSY DAY 20
26432	G		-5.	13.	18.	23.	11.	34.	25.	119.	SCHEDULED	NECROPSY DAY 20
26433	G		15.	18.	9.	23.	9.	28.	37.	139.	SCHEDULED	NECROPSY DAY 20
26434	G		-5.	10.	11.	6.	16.	44.	38.	120.	SCHEDULED	NECROPSY DAY 20
26447	G		11.	8.	9.	11.	19.	36.	40.	134.	SCHEDULED	NECROPSY DAY 20
26451	G		9.	9.	9.	19.	18.	41.	34.	139.	SCHEDULED	NECROPSY DAY 20
MEAN			-2.	12.	15.	15.	17.	39.	36.	132.		
S.D.			8.9	4.7	4.8	6.1	4.7	7.4	6.3	12.8		
S.E.			1.8	1.0	1.0	1.2	1.0	1.5	1.3	2.6		
N			24	24	24	24	24	24	24	24		

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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.												
26303	G		12.	-7.	8.	11.	20.	39.	33.	116.	SCHEDULED	NECROPSY DAY 20
26305	G		14.	13.	2.	17.	18.	32.	30.	126.	SCHEDULED	NECROPSY DAY 20
26315	G		-3.	11.	10.	24.	8.	40.	30.	120.	SCHEDULED	NECROPSY DAY 20
26322	G		7.	13.	15.	25.	12.	40.	37.	149.	SCHEDULED	NECROPSY DAY 20
26331	G		0.	10.	12.	17.	17.	34.	35.	125.	SCHEDULED	NECROPSY DAY 20
26336	G		2.	16.	8.	20.	15.	42.	37.	140.	SCHEDULED	NECROPSY DAY 20
26337	G		1.	11.	21.	13.	18.	33.	33.	130.	SCHEDULED	NECROPSY DAY 20
26342	G		2.	14.	18.	17.	21.	28.	64.	164.	SCHEDULED	NECROPSY DAY 20
26344	G		4.	3.	12.	17.	16.	31.	42.	125.	SCHEDULED	NECROPSY DAY 20
26346	G		-11.	8.	9.	13.	16.	21.	25.	81.	SCHEDULED	NECROPSY DAY 20
26350	G		-7.	16.	19.	10.	27.	36.	24.	125.	SCHEDULED	NECROPSY DAY 20
26352	G		-8.	15.	20.	19.	23.	36.	37.	142.	SCHEDULED	NECROPSY DAY 20
26355	NG		-12.	0.	13.	12.	3.	-4.	9.	21.	SCHEDULED	NECROPSY DAY 20
26366	G		-14.	22.	14.	27.	9.	33.	35.	126.	SCHEDULED	NECROPSY DAY 20
26371	G		6.	0.	21.	14.	22.	43.	30.	136.	SCHEDULED	NECROPSY DAY 20
26386	G		-35.	25.	27.	8.	8.	16.	14.	63.	SCHEDULED	NECROPSY DAY 20
26392	G		-5.	12.	3.	35.	9.	42.	33.	129.	SCHEDULED	NECROPSY DAY 20
26403	G		2.	12.	15.	15.	19.	33.	34.	130.	SCHEDULED	NECROPSY DAY 20
26414	G		-16.	12.	17.	20.	20.	35.	40.	128.	SCHEDULED	NECROPSY DAY 20
26418	G		11.	13.	5.	20.	14.	41.	36.	140.	SCHEDULED	NECROPSY DAY 20
26423	G		-5.	12.	20.	10.	18.	32.	36.	123.	SCHEDULED	NECROPSY DAY 20
26438	G		0.	12.	14.	12.	24.	48.	30.	140.	SCHEDULED	NECROPSY DAY 20
26439	G		9.	9.	10.	15.	25.	44.	36.	148.	SCHEDULED	NECROPSY DAY 20
26442	G		-5.	10.	5.	14.	11.	29.	30.	94.	SCHEDULED	NECROPSY DAY 20
26453	G		0.	15.	11.	19.	12.	46.	34.	137.	SCHEDULED	NECROPSY DAY 20
MEAN			-2.	12.	13.	17.	17.	36.	34.	127.		
S.D.			10.6	6.4	6.4	6.1	5.5	7.6	8.6	21.6		
S.E.			2.2	1.3	1.3	1.3	1.1	1.5	1.8	4.4		
N			24	24	24	24	24	24	24	24		

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

TABLE A6
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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:		5 MG/KG/DAY										
26316	G		5.	8.	6.	9.	25.	37.	26.	116.	SCHEDULED	NECROPSY DAY 20
26319	G		-10.	6.	16.	15.	26.	47.	33.	133.	SCHEDULED	NECROPSY DAY 20
26320	G		-3.	12.	17.	5.	37.	31.	37.	136.	SCHEDULED	NECROPSY DAY 20
26323	G		-10.	-2.	6.	22.	7.	38.	27.	88.	SCHEDULED	NECROPSY DAY 20
26328	G		1.	10.	18.	20.	15.	33.	30.	127.	SCHEDULED	NECROPSY DAY 20
26329	G		0.	14.	15.	18.	12.	41.	46.	146.	SCHEDULED	NECROPSY DAY 20
26341	G		4.	20.	5.	17.	15.	42.	30.	133.	SCHEDULED	NECROPSY DAY 20
26343	G		5.	18.	8.	11.	24.	44.	27.	137.	SCHEDULED	NECROPSY DAY 20
26351	G		-13.	5.	13.	1.	16.	42.	24.	88.	SCHEDULED	NECROPSY DAY 20
26354	G		-8.	14.	15.	19.	15.	35.	29.	119.	SCHEDULED	NECROPSY DAY 20
26358	G		1.	13.	25.	17.	27.	45.	33.	161.	SCHEDULED	NECROPSY DAY 20
26365	G		-6.	17.	3.	23.	18.	33.	34.	122.	SCHEDULED	NECROPSY DAY 20
26370	G		-6.	10.	11.	10.	23.	36.	25.	109.	SCHEDULED	NECROPSY DAY 20
26378	G		-5.	15.	15.	16.	14.	37.	33.	125.	SCHEDULED	NECROPSY DAY 20
26385	G		9.	17.	7.	12.	19.	43.	26.	133.	SCHEDULED	NECROPSY DAY 20
26388	G		-5.	16.	7.	9.	12.	36.	23.	98.	SCHEDULED	NECROPSY DAY 20
26397	G		1.	12.	14.	11.	21.	32.	32.	123.	SCHEDULED	NECROPSY DAY 20
26402	G		8.	1.	22.	8.	18.	43.	23.	123.	SCHEDULED	NECROPSY DAY 20
26409	G		3.	4.	-5.	17.	21.	46.	35.	121.	SCHEDULED	NECROPSY DAY 20
26419	G		-2.	16.	11.	17.	19.	53.	27.	141.	SCHEDULED	NECROPSY DAY 20
26421	G		-3.	9.	10.	12.	16.	33.	29.	106.	SCHEDULED	NECROPSY DAY 20
26424	G		3.	15.	17.	17.	10.	31.	33.	126.	SCHEDULED	NECROPSY DAY 20
26435	G		2.	5.	13.	15.	14.	29.	33.	111.	SCHEDULED	NECROPSY DAY 20
26437	G		6.	9.	17.	11.	16.	47.	30.	136.	SCHEDULED	NECROPSY DAY 20
26454	G		8.	9.	6.	20.	10.	36.	28.	117.	SCHEDULED	NECROPSY DAY 20
MEAN			-1.	11.	12.	14.	18.	39.	30.	123.		
S.D.			6.1	5.6	6.5	5.4	6.5	6.2	5.1	17.0		
S.E.			1.2	1.1	1.3	1.1	1.3	1.2	1.0	3.4		
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 CLARIFIED OILS, 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:		25 MG/KG/DAY										
26301	G		-3.	5.	9.	17.	6.	29.	18.	81.	SCHEDULED	NECROPSY DAY 20
26306	G		-18.	22.	9.	19.	16.	35.	36.	119.	SCHEDULED	NECROPSY DAY 20
26313	G		3.	6.	8.	19.	6.	34.	19.	95.	SCHEDULED	NECROPSY DAY 20
26324	G		-7.	18.	5.	8.	12.	17.	12.	65.	SCHEDULED	NECROPSY DAY 20
26325	G		-5.	16.	19.	12.	15.	29.	19.	105.	SCHEDULED	NECROPSY DAY 20
26332	G		-10.	11.	13.	20.	17.	31.	29.	111.	SCHEDULED	NECROPSY DAY 20
26334	G		-1.	19.	10.	10.	5.	14.	9.	66.	SCHEDULED	NECROPSY DAY 20
26345	G		-9.	15.	20.	11.	4.	2.	8.	51.	SCHEDULED	NECROPSY DAY 20
26353	G		-7.	24.	-12.	26.	5.	23.	11.	70.	SCHEDULED	NECROPSY DAY 20
26357	G		-8.	17.	10.	15.	15.	20.	32.	101.	SCHEDULED	NECROPSY DAY 20
26372	G		-22.	8.	4.	21.	16.	22.	27.	76.	SCHEDULED	NECROPSY DAY 20
26373	G		-6.	15.	14.	7.	3.	20.	27.	80.	SCHEDULED	NECROPSY DAY 20
26379	G		-14.	20.	7.	11.	4.	5.	7.	40.	SCHEDULED	NECROPSY DAY 20
26387	G		-2.	7.	5.	13.	16.	0.	38.	77.	SCHEDULED	NECROPSY DAY 20
26390	G		-7.	10.	12.	17.	8.	27.	14.	81.	SCHEDULED	NECROPSY DAY 20
26391	G		0.	12.	11.	18.	4.	24.	10.	79.	SCHEDULED	NECROPSY DAY 20
26396	G		2.	4.	8.	20.	-1.	10.	-2.	41.	SCHEDULED	NECROPSY DAY 20
26398	G		6.	19.	17.	8.	20.	37.	30.	137.	SCHEDULED	NECROPSY DAY 20
26399	G		11.	11.	11.	15.	6.	41.	29.	124.	SCHEDULED	NECROPSY DAY 20
26400	G		-5.	13.	16.	16.	15.	33.	11.	99.	SCHEDULED	NECROPSY DAY 20
26404	G		-4.	6.	13.	19.	13.	12.	24.	83.	SCHEDULED	NECROPSY DAY 20
26408	G		-8.	9.	9.	14.	19.	18.	1.	62.	SCHEDULED	NECROPSY DAY 20
26415	G		6.	8.	10.	6.	12.	29.	21.	92.	SCHEDULED	NECROPSY DAY 20
26425	G		-6.	4.	11.	7.	12.	19.	16.	63.	SCHEDULED	NECROPSY DAY 20
26431	G		1.	13.	8.	12.	15.	35.	17.	101.	SCHEDULED	NECROPSY DAY 20
MEAN			-5.	12.	10.	14.	11.	23.	19.	84.		
S.D.			7.4	5.8	6.1	5.2	5.9	11.1	10.6	24.7		
S.E.			1.5	1.2	1.2	1.0	1.2	2.2	2.1	4.9		
N			25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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

PAGE 5

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9- 12	12- 15	15- 18	18- 20	0- 20	
DAMS FROM GROUP 5:		50 MG/KG/DAY									
26311	G		1.	21.	14.	11.	17.	17.	10.	91.	SCHEDULED NECROPSY DAY 20
26314	G		-19.	8.	13.	12.	16.	-28.	NA	NA	GRAVID, DIED DAY 19
26326	G		-5.	14.	10.	29.	-6.	-19.	4.	27.	SCHEDULED NECROPSY DAY 20
26333	G		-9.	7.	5.	11.	-1.	16.	12.	41.	SCHEDULED NECROPSY DAY 20
26339	G		-5.	7.	15.	11.	13.	-3.	5.	43.	SCHEDULED NECROPSY DAY 20
26347	G		-7.	22.	2.	17.	2.	-5.	6.	37.	SCHEDULED NECROPSY DAY 20
26356	G		-6.	19.	-3.	19.	3.	18.	6.	56.	SCHEDULED NECROPSY DAY 20
26360	G		-11.	20.	8.	5.	16.	8.	10.	56.	SCHEDULED NECROPSY DAY 20
26376	G		-18.	14.	1.	20.	4.	3.	9.	33.	SCHEDULED NECROPSY DAY 20
26377	G		-20.	17.	11.	16.	-1.	15.	17.	55.	SCHEDULED NECROPSY DAY 20
26382	G		-2.	9.	10.	1.	-6.	5.	10.	27.	SCHEDULED NECROPSY DAY 20
26389	G		-10.	8.	14.	10.	5.	-10.	-15.	2.	SCHEDULED NECROPSY DAY 20
26393	G		0.	8.	8.	10.	14.	15.	20.	75.	SCHEDULED NECROPSY DAY 20
26394	G		-10.	9.	4.	4.	3.	8.	6.	24.	SCHEDULED NECROPSY DAY 20
26406	G		-4.	-2.	10.	8.	7.	8.	-20.	7.	SCHEDULED NECROPSY DAY 20
26411	NG		-4.	9.	10.	6.	-4.	-7.	6.	16.	SCHEDULED NECROPSY DAY 20
26413	G		-1.	7.	13.	3.	7.	11.	16.	56.	SCHEDULED NECROPSY DAY 20
26416	G		-10.	19.	6.	27.	12.	-8.	39.	85.	SCHEDULED NECROPSY DAY 20
26427	G		-12.	9.	11.	14.	1.	16.	20.	59.	SCHEDULED NECROPSY DAY 20
26428	G		-10.	6.	10.	10.	12.	-36.	-9.	-17.	SCHEDULED NECROPSY DAY 20
26436	G		-10.	9.	12.	16.	2.	9.	-14.	24.	SCHEDULED NECROPSY DAY 20
26443	G		-29.	37.	2.	26.	3.	11.	12.	62.	SCHEDULED NECROPSY DAY 20
26444	G		-6.	-4.	5.	7.	0.	7.	5.	14.	SCHEDULED NECROPSY DAY 20
26448	G		-9.	4.	24.	11.	-4.	7.	-1.	32.	SCHEDULED NECROPSY DAY 20
26452	G		-12.	17.	9.	13.	4.	NA	NA	NA	GRAVID, DIED DAY 18
MEAN			-9.	12.	9.	13.	5.	3.	7.	40.	
S.D.			6.9	8.7	5.7	7.3	6.9	14.6	13.1	26.8	
S.E.			1.4	1.8	1.2	1.5	1.4	3.0	2.8	5.7	
N			24	24	24	24	24	23	22	22	

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

PGBWv4.09
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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PAGE 1

	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				
26302	G	250.	386.	85.7	300.3	50.3
26304	G	255.	371.	80.0	291.0	36.0
26309	G	275.	400.	87.9	312.1	37.1
26312	G	252.	411.	95.7	315.3	63.3
26317	G	270.	425.	89.3	335.7	65.7
26318	G	235.	362.	87.1	274.9	39.9
26327	G	257.	394.	90.3	303.7	46.7
26330	G	262.	398.	89.0	309.0	47.0
26349	NG	251.	270.	NA	NA	NA
26368	G	245.	365.	89.3	275.7	30.7
26369	G	244.	384.	97.7	286.3	42.3
26380	G	244.	353.	71.9	281.1	37.1
26383	G	242.	383.	84.4	298.6	56.6
26384	G	244.	368.	72.8	295.2	51.2
26395	G	253.	379.	95.1	283.9	30.9
26405	G	258.	373.	75.1	297.9	39.9
26407	G	244.	390.	86.9	303.1	59.1
26420	G	261.	397.	75.5	321.5	60.5
26426	G	254.	379.	91.3	287.7	33.7
26430	G	273.	421.	82.2	338.8	65.8
26432	G	257.	376.	72.6	303.4	46.4
26433	G	224.	363.	64.3	298.7	74.7
26434	G	261.	381.	88.8	292.2	31.2
26447	G	255.	389.	70.9	318.1	63.1
26451	G	251.	390.	92.5	297.5	46.5
MEAN		253.	385.	84.0	300.9	48.2
S.D.		11.7	18.1	9.05	16.68	12.86
S.E.		2.4	3.7	1.85	3.41	2.63
N		24	24	24	24	24

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PAGE 2

	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.				
26303	G	245.	361.	78.2	282.8	37.8
26305	G	228.	354.	73.2	280.8	52.8
26315	G	251.	371.	70.0	301.0	50.0
26322	G	242.	391.	82.1	308.9	66.9
26331	G	261.	386.	75.9	310.1	49.1
26336	G	259.	399.	94.6	304.4	45.4
26337	G	252.	382.	79.2	302.8	50.8
26342	G	263.	427.	105.4	321.6	58.6
26344	G	273.	398.	77.8	320.2	47.2
26346	G	239.	320.	63.2	256.8	17.8
26350	G	258.	383.	79.9	303.1	45.1
26352	G	257.	399.	80.1	318.9	61.9
26355	NG	264.	285.	NA	NA	NA
26366	G	247.	373.	68.8	304.2	57.2
26371	G	258.	394.	78.1	315.9	57.9
26386	G	232.	295.	13.0	282.0	50.0
26392	G	235.	364.	80.5	283.5	48.5
26403	G	242.	372.	76.0	296.0	54.0
26414	G	243.	371.	87.6	283.4	40.4
26418	G	260.	400.	85.6	314.4	54.4
26423	G	244.	367.	65.2	301.8	57.8
26438	G	261.	401.	87.5	313.5	52.5
26439	G	254.	402.	100.8	301.2	47.2
26442	G	252.	346.	61.4	284.6	32.6
26453	G	265.	402.	79.6	322.4	57.4
MEAN		251.	377.	76.8	300.6	49.7
S.D.		11.3	28.7	17.26	16.50	10.27
S.E.		2.3	5.9	3.52	3.37	2.10
N		24	24	24	24	24

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL GRAVID UTERINE WTS. AND NET BODY WT. CHANGES [G]

PAGE 3

	PREGNANCY STATUS	INITIAL BODY WT.	TERMINAL BODY WT.	GRAVID UTERINE WT.	NET BODY WT.	NET BODY WT. CHANGE
DAM #	GROUP	3:	5 MG/KG/DAY			
26316	G	247.	363.	75.0	288.0	41.0
26319	G	265.	398.	121.7-A	NA	NA
26320	G	272.	408.	78.5	329.5	57.5
26323	G	243.	331.	57.5	273.5	30.5
26328	G	231.	358.	71.7	286.3	55.3
26329	G	256.	402.	90.1	311.9	55.9
26341	G	279.	412.	78.0	334.0	55.0
26343	G	253.	390.	83.4	306.6	53.6
26351	G	247.	335.	75.5	259.5	12.5
26354	G	236.	355.	65.8	289.2	53.2
26358	G	244.	405.	82.9	322.1	78.1
26365	G	260.	382.	83.5	298.5	38.5
26370	G	253.	362.	67.2	294.8	41.8
26378	G	241.	366.	63.2	302.8	61.8
26385	G	235.	368.	73.3	294.7	59.7
26388	G	252.	350.	76.3	273.7	21.7
26397	G	242.	365.	73.3	291.7	49.7
26402	G	235.	358.	75.1	282.9	47.9
26409	G	260.	381.	83.5	297.5	37.5
26419	G	251.	392.	92.7	299.3	48.3
26421	G	259.	365.	77.3	287.7	28.7
26424	G	266.	392.	69.0	323.0	57.0
26435	G	252.	363.	67.1	295.9	43.9
26437	G	247.	383.	88.3	294.7	47.7
26454	G	256.	373.	79.1	293.9	37.9
MEAN		251.	374.	76.1	297.2	46.4
S.D.		11.9	21.9	8.64	17.67	14.16
S.E.		2.4	4.4	1.76	3.61	2.89
N		25	25	24	24	24

G = GRAVID

NA = NOT APPLICABLE

A = OBVIOUSLY ADVANCED BEYOND GESTATION DAY 20; WEIGHT NOT INCLUDED IN CALCULATIONS

TABLE A7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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:	25 MG/KG/DAY			
26301	G	259.	340.	47.5	292.5	33.5
26306	G	271.	390.	92.6	297.4	26.4
26313	G	253.	348.	60.9	287.1	34.1
26324	G	235.	300.	21.7	278.3	43.3
26325	G	247.	352.	51.6	300.4	53.4
26332	G	260.	371.	54.5	316.5	56.5
26334	G	229.	295.	20.3	274.7	45.7
26345	G	264.	315.	10.2	304.8	40.8
26353	G	262.	332.	31.5	300.5	38.5
26357	G	267.	368.	62.6	305.4	38.4
26372	G	255.	331.	58.6	272.4	17.4
26373	G	249.	329.	41.2	287.8	38.8
26379	G	257.	297.	9.4	287.6	30.6
26387	G	248.	325.	45.4	279.6	31.6
26390	G	244.	325.	49.8	275.2	31.2
26391	G	264.	343.	41.2	301.8	37.8
26396	G	272.	313.	4.8	308.2	36.2
26398	G	246.	383.	86.0	297.0	51.0
26399	G	255.	379.	61.4	317.6	62.6
26400	G	243.	342.	69.8	272.2	29.2
26404	G	243.	326.	62.9	263.1	20.1
26408	G	255.	317.	30.5	286.5	31.5
26415	G	252.	344.	61.0	283.0	31.0
26425	G	274.	337.	39.1	297.9	23.9
26431	G	231.	332.	53.1	278.9	47.9
MEAN		253.	337.	46.7	290.7	37.3
S.D.		12.2	25.8	22.37	14.47	11.11
S.E.		2.4	5.2	4.47	2.89	2.22
N		25	25	25	25	25

G = GRAVID

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A7
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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:	50 MG/KG/DAY			
26311	G	258.	349.	32.1	316.9	58.9
26326	G	242.	269.	12.3	256.7	14.7
26333	G	268.	309.	23.6	285.4	17.4
26339	G	243.	286.	23.1	262.9	19.9
26347	G	236.	273.	6.5	266.5	30.5
26356	G	250.	306.	23.5	282.5	32.5
26360	G	260.	316.	18.2	297.8	37.8
26376	G	256.	289.	13.6	275.4	19.4
26377	G	245.	300.	20.7	279.3	34.3
26382	G	231.	258.	0.9	257.1	26.1
26389	G	247.	249.	14.0	235.0	-12.0
26393	G	256.	331.	43.9	287.1	31.1
26394	G	243.	267.	3.4	263.6	20.6
26406	G	242.	249.	8.0	241.0	-1.0
26411	NG	258.	274.	NA	NA	NA
26413	G	255.	311.	3.5	307.5	52.5
26416	G	267.	352.	56.9	295.1	28.1
26427	G	270.	329.	27.3	301.7	31.7
26428	G	248.	231.	1.7	229.3	-18.7
26436	G	257.	281.	2.5	278.5	21.5
26443	G	284.	346.	25.1	320.9	36.9
26444	G	245.	259.	4.7	254.3	9.3
26448	G	257.	289.	27.3	261.7	4.7
MEAN		253.	293.	17.9	275.3	22.6
S.D.		12.4	34.8	14.47	25.21	18.53
S.E.		2.6	7.4	3.09	5.38	3.95
N		22	22	22	22	22

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

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11/23/2011
R:12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A8
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PAGE 1

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												
26302	G		21.	23.	25.	26.	26.	33.	27.	26.	SCHEDULED	NECROPSY DAY 20
26304	G		19.	21.	20.	22.	25.	30.	29.	23.	SCHEDULED	NECROPSY DAY 20
26309	G		20.	21.	22.	25.	25.	28.	28.	24.	SCHEDULED	NECROPSY DAY 20
26312	G		20.	23.	26.	27.	31.	32.	34.	27.	SCHEDULED	NECROPSY DAY 20
26317	G		20.	22.	25.	24.	29.	36.	30.	27.	SCHEDULED	NECROPSY DAY 20
26318	G		16.	20.	22.	22.	24.	26.	25.	22.	SCHEDULED	NECROPSY DAY 20
26327	G		15.	19.	21.	21.	28.	29.	34.	23.	SCHEDULED	NECROPSY DAY 20
26330	G		20.	22.	24.	24.	27.	33.	30.	26.	SCHEDULED	NECROPSY DAY 20
26349	NG		14.	18.	22.	21.	19.	19.	22.	19.	SCHEDULED	NECROPSY DAY 20
26368	G		16.	17.	25.	25.	29.	29.	31.	24.	SCHEDULED	NECROPSY DAY 20
26369	G		17.	18.	21.	27.	27.	28.	30.	24.	SCHEDULED	NECROPSY DAY 20
26380	G		19.	21.	20.	24.	23.	29.	28.	23.	SCHEDULED	NECROPSY DAY 20
26383	G		19.	22.	25.	24.	25.	29.	31.	25.	SCHEDULED	NECROPSY DAY 20
26384	G		18.	20.	22.	22.	26.	26.	28.	23.	SCHEDULED	NECROPSY DAY 20
26395	G		15.	19.	23.	24.	28.	27.	33.	24.	SCHEDULED	NECROPSY DAY 20
26405	G		18.	20.	23.	NA	30.	26.	34.	25.	SCHEDULED	NECROPSY DAY 20
26407	G		24.	21.	26.	23.	27.	31.	28.	26.	SCHEDULED	NECROPSY DAY 20
26420	G		22.	21.	25.	26.	29.	33.	33.	27.	SCHEDULED	NECROPSY DAY 20
26426	G		16.	19.	26.	23.	28.	29.	28.	24.	SCHEDULED	NECROPSY DAY 20
26430	G		18.	24.	26.	26.	29.	32.	35.	27.	SCHEDULED	NECROPSY DAY 20
26432	G		16.	21.	23.	23.	24.	28.	27.	23.	SCHEDULED	NECROPSY DAY 20
26433	G		20.	22.	24.	24.	27.	26.	32.	25.	SCHEDULED	NECROPSY DAY 20
26434	G		19.	21.	22.	23.	25.	28.	31.	24.	SCHEDULED	NECROPSY DAY 20
26447	G		22.	23.	23.	26.	27.	28.	31.	26.	SCHEDULED	NECROPSY DAY 20
26451	G		21.	21.	24.	25.	27.	29.	29.	25.	SCHEDULED	NECROPSY DAY 20
MEAN			19.	21.	23.	24.	27.	29.	30.	25.		
S.D.			2.4	1.7	1.9	1.7	2.0	2.7	2.7	1.5		
S.E.			0.5	0.3	0.4	0.3	0.4	0.5	0.5	0.3		
N			24	24	24	23	24	24	24	24		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A8
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PAGE 2

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.												
26303	G		20.	21.	20.	22.	26.	28.	26.	23.	SCHEDULED	NECROPSY DAY 20
26305	G		21.	20.	22.	23.	24.	28.	26.	23.	SCHEDULED	NECROPSY DAY 20
26315	G		17.	20.	22.	26.	26.	31.	30.	24.	SCHEDULED	NECROPSY DAY 20
26322	G		21.	21.	26.	21.	29.	28.	31.	25.	SCHEDULED	NECROPSY DAY 20
26331	G		21.	22.	28.	27.	28.	34.	31.	27.	SCHEDULED	NECROPSY DAY 20
26336	G		22.	24.	25.	25.	27.	32.	29.	26.	SCHEDULED	NECROPSY DAY 20
26337	G		21.	23.	33.	27.	31.	29.	34.	28.	SCHEDULED	NECROPSY DAY 20
26342	G		21.	23.	28.	25.	32.	27.	39.	27.	SCHEDULED	NECROPSY DAY 20
26344	G		22.	20.	28.	26.	26.	31.	30.	26.	SCHEDULED	NECROPSY DAY 20
26346	G		16.	17.	20.	22.	25.	27.	24.	22.	SCHEDULED	NECROPSY DAY 20
26350	G		21.	23.	27.	24.	30.	29.	29.	26.	SCHEDULED	NECROPSY DAY 20
26352	G		19.	24.	28.	28.	33.	33.	32.	28.	SCHEDULED	NECROPSY DAY 20
26355	NG		18.	19.	29.	23.	26.	24.	31.	24.	SCHEDULED	NECROPSY DAY 20
26366	G		14.	21.	25.	23.	28.	28.	33.	24.	SCHEDULED	NECROPSY DAY 20
26371	G		23.	19.	28.	24.	28.	32.	31.	26.	SCHEDULED	NECROPSY DAY 20
26386	G		7.	10.	27.	20.	27.	26.	27.	20.	SCHEDULED	NECROPSY DAY 20
26392	G		17.	18.	21.	22.	30.	29.	30.	23.	SCHEDULED	NECROPSY DAY 20
26403	G		20.	22.	27.	24.	35.	33.	32.	27.	SCHEDULED	NECROPSY DAY 20
26414	G		15.	18.	23.	24.	31.	28.	33.	24.	SCHEDULED	NECROPSY DAY 20
26418	G		23.	24.	24.	28.	27.	29.	30.	26.	SCHEDULED	NECROPSY DAY 20
26423	G		18.	20.	26.	23.	28.	29.	31.	25.	SCHEDULED	NECROPSY DAY 20
26438	G		20.	22.	23.	24.	28.	31.	28.	25.	SCHEDULED	NECROPSY DAY 20
26439	G		21.	22.	23.	25.	26.	29.	28.	25.	SCHEDULED	NECROPSY DAY 20
26442	G		17.	20.	21.	22.	24.	28.	28.	23.	SCHEDULED	NECROPSY DAY 20
26453	G		21.	24.	23.	28.	26.	32.	30.	26.	SCHEDULED	NECROPSY DAY 20
MEAN			19.	21.	25.	24.	28.	30.	30.	25.		
S.D.			3.6	3.1	3.2	2.3	2.8	2.2	3.1	2.0		
S.E.			0.7	0.6	0.7	0.5	0.6	0.4	0.6	0.4		
N			24	24	24	24	24	24	24	24		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A8
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PAGE 3

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
DAMS FROM GROUP 3:		5 MG/KG/DAY										
26316	G		18.	18.	20.	22.	23.	28.	24.	22.	SCHEDULED	NECROPSY DAY 20
26319	G		19.	20.	25.	24.	28.	31.	28.	25.	SCHEDULED	NECROPSY DAY 20
26320	G		18.	22.	26.	26.	34.	32.	33.	27.	SCHEDULED	NECROPSY DAY 20
26323	G		15.	16.	21.	20.	24.	24.	25.	21.	SCHEDULED	NECROPSY DAY 20
26328	G		17.	19.	27.	24.	27.	28.	28.	24.	SCHEDULED	NECROPSY DAY 20
26329	G		19.	21.	31.	26.	28.	27.	33.	26.	SCHEDULED	NECROPSY DAY 20
26341	G		25.	26.	25.	29.	29.	21.	33.	27.	SCHEDULED	NECROPSY DAY 20
26343	G		16.	22.	23.	23.	25.	31.	32.	24.	SCHEDULED	NECROPSY DAY 20
26351	G		14.	15.	19.	21.	21.	24.	24.	20.	SCHEDULED	NECROPSY DAY 20
26354	G		26.	20.	24.	25.	24.	29.	29.	25.	SCHEDULED	NECROPSY DAY 20
26358	G		19.	21.	27.	26.	32.	13.	33.	24.	SCHEDULED	NECROPSY DAY 20
26365	G		19.	21.	22.	24.	27.	30.	27.	24.	SCHEDULED	NECROPSY DAY 20
26370	G		18.	17.	21.	24.	24.	27.	27.	23.	SCHEDULED	NECROPSY DAY 20
26378	G		17.	22.	25.	26.	28.	16.	31.	23.	SCHEDULED	NECROPSY DAY 20
26385	G		20.	22.	24.	24.	25.	30.	26.	24.	SCHEDULED	NECROPSY DAY 20
26388	G		18.	20.	20.	21.	25.	28.	26.	22.	SCHEDULED	NECROPSY DAY 20
26397	G		20.	20.	26.	25.	29.	28.	31.	25.	SCHEDULED	NECROPSY DAY 20
26402	G		20.	18.	24.	21.	28.	27.	26.	23.	SCHEDULED	NECROPSY DAY 20
26409	G		18.	19.	19.	22.	26.	30.	27.	23.	SCHEDULED	NECROPSY DAY 20
26419	G		18.	20.	21.	24.	24.	29.	27.	23.	SCHEDULED	NECROPSY DAY 20
26421	G		20.	22.	23.	26.	26.	27.	26.	24.	SCHEDULED	NECROPSY DAY 20
26424	G		18.	24.	28.	27.	28.	32.	34.	27.	SCHEDULED	NECROPSY DAY 20
26435	G		19.	20.	25.	24.	29.	27.	31.	25.	SCHEDULED	NECROPSY DAY 20
26437	G		20.	21.	24.	23.	27.	27.	29.	24.	SCHEDULED	NECROPSY DAY 20
26454	G		20.	20.	23.	23.	24.	29.	27.	23.	SCHEDULED	NECROPSY DAY 20
MEAN			19.	20.	24.	24.	27.	27.	29.	24.		
S.D.			2.5	2.4	3.0	2.1	2.9	4.5	3.1	1.8		
S.E.			0.5	0.5	0.6	0.4	0.6	0.9	0.6	0.4		
N			25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A8
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PAGE 4

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
DAMS FROM GROUP 4:		25 MG/KG/DAY										
26301	G		16.	19.	21.	24.	25.	27.	28.	23.	SCHEDULED	NECROPSY DAY 20
26306	G		15.	20.	25.	25.	27.	28.	30.	24.	SCHEDULED	NECROPSY DAY 20
26313	G		18.	18.	22.	21.	24.	24.	23.	21.	SCHEDULED	NECROPSY DAY 20
26324	G		13.	19.	22.	19.	25.	15.	27.	20.	SCHEDULED	NECROPSY DAY 20
26325	G		17.	20.	22.	23.	26.	28.	29.	23.	SCHEDULED	NECROPSY DAY 20
26332	G		17.	19.	23.	26.	27.	32.	31.	25.	SCHEDULED	NECROPSY DAY 20
26334	G		14.	20.	23.	21.	26.	25.	27.	22.	SCHEDULED	NECROPSY DAY 20
26345	G		14.	21.	26.	21.	27.	25.	27.	23.	SCHEDULED	NECROPSY DAY 20
26353	G		19.	22.	20.	27.	24.	28.	27.	24.	SCHEDULED	NECROPSY DAY 20
26357	G		15.	20.	25.	23.	26.	27.	32.	24.	SCHEDULED	NECROPSY DAY 20
26372	G		12.	19.	19.	25.	23.	26.	28.	21.	SCHEDULED	NECROPSY DAY 20
26373	G		18.	20.	22.	20.	23.	26.	28.	22.	SCHEDULED	NECROPSY DAY 20
26379	G		17.	20.	21.	24.	27.	25.	24.	22.	SCHEDULED	NECROPSY DAY 20
26387	G		17.	18.	21.	22.	28.	21.	35.	23.	SCHEDULED	NECROPSY DAY 20
26390	G		14.	17.	19.	20.	22.	24.	26.	20.	SCHEDULED	NECROPSY DAY 20
26391	G		18.	21.	22.	24.	23.	29.	26.	23.	SCHEDULED	NECROPSY DAY 20
26396	G		19.	19.	22.	25.	25.	27.	25.	23.	SCHEDULED	NECROPSY DAY 20
26398	G		20.	22.	29.	23.	26.	27.	28.	25.	SCHEDULED	NECROPSY DAY 20
26399	G		19.	21.	25.	25.	42.	15.	30.	25.	SCHEDULED	NECROPSY DAY 20
26400	G		16.	20.	24.	23.	25.	28.	23.	23.	SCHEDULED	NECROPSY DAY 20
26404	G		16.	17.	21.	24.	24.	20.	20.	20.	SCHEDULED	NECROPSY DAY 20
26408	G		17.	18.	20.	22.	24.	26.	25.	22.	SCHEDULED	NECROPSY DAY 20
26415	G		21.	21.	22.	22.	26.	29.	30.	24.	SCHEDULED	NECROPSY DAY 20
26425	G		19.	21.	26.	25.	29.	26.	30.	25.	SCHEDULED	NECROPSY DAY 20
26431	G		17.	21.	21.	24.	24.	27.	30.	23.	SCHEDULED	NECROPSY DAY 20
MEAN			17.	20.	23.	23.	26.	25.	28.	23.		
S.D.			2.2	1.4	2.4	2.0	3.8	4.0	3.2	1.6		
S.E.			0.4	0.3	0.5	0.4	0.8	0.8	0.6	0.3		
N			25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A8
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/ANIMAL/DAY]

PAGE 5

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20	
STATUS											
DAMS FROM GROUP 5:			50 MG/KG/DAY								
26311	G		20.	22.	25.	23.	27.	26.	30.	24.	SCHEDULED NECROPSY DAY 20
26314	G		13.	20.	22.	24.	26.	NA	NA	NA	GRAVID, DIED DAY 19
26326	G		15.	18.	21.	24.	24.	17.	21.	20.	SCHEDULED NECROPSY DAY 20
26333	G		15.	19.	20.	20.	23.	26.	29.	21.	SCHEDULED NECROPSY DAY 20
26339	G		15.	16.	23.	23.	29.	23.	26.	22.	SCHEDULED NECROPSY DAY 20
26347	G		15.	19.	23.	23.	22.	20.	27.	21.	SCHEDULED NECROPSY DAY 20
26356	G		18.	20.	23.	24.	38.	33.	41.	27.	SCHEDULED NECROPSY DAY 20
26360	G		14.	20.	19.	22.	28.	27.	28.	22.	SCHEDULED NECROPSY DAY 20
26376	G		13.	19.	20.	21.	24.	23.	27.	21.	SCHEDULED NECROPSY DAY 20
26377	G		14.	17.	20.	23.	26.	24.	29.	21.	SCHEDULED NECROPSY DAY 20
26382	G		13.	19.	26.	19.	19.	18.	27.	20.	SCHEDULED NECROPSY DAY 20
26389	G		16.	18.	21.	20.	22.	17.	9.	18.	SCHEDULED NECROPSY DAY 20
26393	G		17.	19.	21.	22.	28.	25.	28.	23.	SCHEDULED NECROPSY DAY 20
26394	G		15.	18.	19.	16.	19.	22.	26.	19.	SCHEDULED NECROPSY DAY 20
26406	G		16.	17.	21.	18.	20.	24.	15.	19.	SCHEDULED NECROPSY DAY 20
26411	NG		18.	19.	22.	21.	21.	20.	24.	20.	SCHEDULED NECROPSY DAY 20
26413	G		17.	21.	20.	22.	17.	24.	30.	21.	SCHEDULED NECROPSY DAY 20
26416	G		14.	20.	23.	24.	29.	19.	31.	23.	SCHEDULED NECROPSY DAY 20
26427	G		17.	21.	22.	22.	25.	27.	29.	23.	SCHEDULED NECROPSY DAY 20
26428	G		15.	16.	19.	21.	23.	12.	16.	18.	SCHEDULED NECROPSY DAY 20
26436	G		15.	18.	22.	22.	21.	NA	20.	20.	SCHEDULED NECROPSY DAY 20
26443	G		14.	23.	22.	24.	27.	27.	30.	24.	SCHEDULED NECROPSY DAY 20
26444	G		18.	17.	18.	19.	20.	25.	26.	20.	SCHEDULED NECROPSY DAY 20
26448	G		16.	19.	25.	24.	22.	26.	22.	22.	SCHEDULED NECROPSY DAY 20
26452	G		14.	20.	20.	22.	26.	NA	NA	NA	GRAVID, DIED DAY 18
MEAN			15.	19.	21.	22.	24.	23.	26.	21.	
S.D.			1.8	1.8	2.1	2.2	4.5	4.6	6.6	2.1	
S.E.			0.4	0.4	0.4	0.4	0.9	1.0	1.4	0.5	
N			24	24	24	24	24	21	22	22	

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

PGFWv4.11
11/11/2011
R:12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A9
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PAGE 1

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												
26302	G		84.	90.	92.	90.	86.	99.	73.	87.	SCHEDULED	NECROPSY DAY 20
26304	G		75.	82.	74.	79.	86.	94.	82.	79.	SCHEDULED	NECROPSY DAY 20
26309	G		73.	75.	74.	81.	78.	80.	73.	75.	SCHEDULED	NECROPSY DAY 20
26312	G		80.	89.	94.	92.	99.	92.	87.	88.	SCHEDULED	NECROPSY DAY 20
26317	G		74.	79.	85.	76.	87.	99.	74.	83.	SCHEDULED	NECROPSY DAY 20
26318	G		68.	82.	86.	81.	84.	83.	72.	78.	SCHEDULED	NECROPSY DAY 20
26327	G		60.	77.	81.	77.	96.	90.	92.	79.	SCHEDULED	NECROPSY DAY 20
26330	G		78.	84.	85.	80.	85.	95.	78.	84.	SCHEDULED	NECROPSY DAY 20
26349	NG		57.	74.	86.	79.	72.	72.	82.	73.	SCHEDULED	NECROPSY DAY 20
26368	G		68.	75.	104.	97.	104.	94.	89.	87.	SCHEDULED	NECROPSY DAY 20
26369	G		69.	72.	79.	96.	91.	85.	82.	82.	SCHEDULED	NECROPSY DAY 20
26380	G		78.	84.	77.	90.	83.	94.	82.	82.	SCHEDULED	NECROPSY DAY 20
26383	G		78.	84.	90.	82.	81.	88.	85.	84.	SCHEDULED	NECROPSY DAY 20
26384	G		73.	80.	85.	79.	89.	82.	80.	80.	SCHEDULED	NECROPSY DAY 20
26395	G		60.	76.	87.	86.	96.	85.	92.	83.	SCHEDULED	NECROPSY DAY 20
26405	G		70.	77.	84.	NA	100.	81.	97.	85.	SCHEDULED	NECROPSY DAY 20
26407	G		97.	81.	97.	81.	89.	93.	75.	87.	SCHEDULED	NECROPSY DAY 20
26420	G		83.	77.	88.	88.	93.	96.	86.	87.	SCHEDULED	NECROPSY DAY 20
26426	G		65.	78.	101.	85.	96.	89.	77.	83.	SCHEDULED	NECROPSY DAY 20
26430	G		66.	86.	88.	84.	89.	89.	88.	84.	SCHEDULED	NECROPSY DAY 20
26432	G		63.	81.	84.	78.	77.	84.	74.	76.	SCHEDULED	NECROPSY DAY 20
26433	G		86.	89.	92.	86.	92.	83.	93.	88.	SCHEDULED	NECROPSY DAY 20
26434	G		73.	80.	81.	82.	86.	87.	86.	81.	SCHEDULED	NECROPSY DAY 20
26447	G		84.	85.	82.	90.	89.	85.	84.	86.	SCHEDULED	NECROPSY DAY 20
26451	G		82.	79.	88.	87.	88.	86.	78.	83.	SCHEDULED	NECROPSY DAY 20
MEAN			74.	81.	87.	85.	89.	89.	82.	83.		
S.D.			9.0	4.8	7.6	5.9	6.8	5.7	7.2	3.7		
S.E.			1.8	1.0	1.5	1.2	1.4	1.2	1.5	0.8		
N			24	24	24	23	24	24	24	24		

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

TABLE A9
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

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.												
26303	G		80.	83.	79.	83.	93.	91.	75.	82.	SCHEDULED	NECROPSY DAY 20
26305	G		89.	80.	86.	86.	85.	91.	77.	83.	SCHEDULED	NECROPSY DAY 20
26315	G		68.	79.	83.	93.	88.	97.	84.	82.	SCHEDULED	NECROPSY DAY 20
26322	G		85.	82.	96.	72.	94.	84.	83.	84.	SCHEDULED	NECROPSY DAY 20
26331	G		80.	83.	101.	92.	91.	102.	84.	89.	SCHEDULED	NECROPSY DAY 20
26336	G		85.	89.	89.	85.	86.	94.	76.	84.	SCHEDULED	NECROPSY DAY 20
26337	G		83.	89.	120.	92.	101.	87.	93.	93.	SCHEDULED	NECROPSY DAY 20
26342	G		80.	85.	97.	82.	98.	77.	99.	85.	SCHEDULED	NECROPSY DAY 20
26344	G		80.	72.	98.	86.	82.	91.	80.	83.	SCHEDULED	NECROPSY DAY 20
26346	G		68.	73.	83.	87.	94.	95.	78.	84.	SCHEDULED	NECROPSY DAY 20
26350	G		82.	89.	97.	82.	97.	85.	78.	86.	SCHEDULED	NECROPSY DAY 20
26352	G		75.	93.	102.	95.	105.	96.	84.	92.	SCHEDULED	NECROPSY DAY 20
26355	NG		70.	75.	112.	85.	93.	86.	110.	89.	SCHEDULED	NECROPSY DAY 20
26366	G		58.	86.	95.	81.	93.	87.	93.	83.	SCHEDULED	NECROPSY DAY 20
26371	G		88.	72.	102.	82.	90.	93.	82.	85.	SCHEDULED	NECROPSY DAY 20
26386	G		33.	48.	114.	79.	103.	95.	94.	80.	SCHEDULED	NECROPSY DAY 20
26392	G		73.	76.	86.	84.	105.	94.	86.	83.	SCHEDULED	NECROPSY DAY 20
26403	G		82.	88.	102.	86.	118.	102.	90.	93.	SCHEDULED	NECROPSY DAY 20
26414	G		64.	77.	93.	90.	108.	89.	94.	86.	SCHEDULED	NECROPSY DAY 20
26418	G		86.	86.	84.	94.	85.	84.	79.	83.	SCHEDULED	NECROPSY DAY 20
26423	G		74.	82.	100.	83.	97.	92.	89.	88.	SCHEDULED	NECROPSY DAY 20
26438	G		77.	82.	82.	82.	90.	89.	73.	81.	SCHEDULED	NECROPSY DAY 20
26439	G		81.	82.	83.	86.	84.	84.	73.	81.	SCHEDULED	NECROPSY DAY 20
26442	G		68.	79.	81.	82.	85.	93.	85.	82.	SCHEDULED	NECROPSY DAY 20
26453	G		79.	88.	80.	93.	82.	93.	78.	83.	SCHEDULED	NECROPSY DAY 20
MEAN			76.	81.	93.	86.	94.	91.	84.	85.		
S.D.			12.0	9.0	10.9	5.5	9.2	5.8	7.3	3.7		
S.E.			2.5	1.8	2.2	1.1	1.9	1.2	1.5	0.8		
N			24	24	24	24	24	24	24	24		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A9
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PAGE 3

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
DAMS FROM GROUP 3:		5 MG/KG/DAY										
26316	G		72.	70.	76.	81.	80.	88.	69.	76.	SCHEDULED	NECROPSY DAY 20
26319	G		73.	78.	93.	84.	92.	91.	73.	82.	SCHEDULED	NECROPSY DAY 20
26320	G		66.	80.	90.	86.	106.	90.	85.	85.	SCHEDULED	NECROPSY DAY 20
26323	G		63.	69.	90.	81.	91.	84.	79.	80.	SCHEDULED	NECROPSY DAY 20
26328	G		73.	80.	108.	89.	94.	90.	82.	86.	SCHEDULED	NECROPSY DAY 20
26329	G		74.	80.	112.	88.	91.	80.	87.	85.	SCHEDULED	NECROPSY DAY 20
26341	G		89.	89.	82.	91.	87.	58.	83.	82.	SCHEDULED	NECROPSY DAY 20
26343	G		63.	82.	82.	79.	81.	91.	85.	79.	SCHEDULED	NECROPSY DAY 20
26351	G		58.	63.	77.	83.	80.	83.	74.	75.	SCHEDULED	NECROPSY DAY 20
26354	G	112.	85.	96.	94.	85.	94.	85.	85.	91.	SCHEDULED	NECROPSY DAY 20
26358	G		78.	83.	100.	89.	102.	37.	85.	79.	SCHEDULED	NECROPSY DAY 20
26365	G		74.	80.	81.	84.	88.	90.	74.	80.	SCHEDULED	NECROPSY DAY 20
26370	G		72.	67.	80.	88.	83.	85.	77.	80.	SCHEDULED	NECROPSY DAY 20
26378	G		71.	90.	97.	95.	97.	51.	89.	81.	SCHEDULED	NECROPSY DAY 20
26385	G		83.	87.	91.	88.	86.	93.	73.	84.	SCHEDULED	NECROPSY DAY 20
26388	G		72.	78.	75.	76.	88.	91.	77.	77.	SCHEDULED	NECROPSY DAY 20
26397	G		82.	80.	99.	91.	100.	88.	89.	87.	SCHEDULED	NECROPSY DAY 20
26402	G		84.	74.	94.	78.	99.	86.	75.	82.	SCHEDULED	NECROPSY DAY 20
26409	G		69.	72.	72.	81.	90.	93.	74.	78.	SCHEDULED	NECROPSY DAY 20
26419	G		72.	78.	77.	84.	79.	86.	71.	77.	SCHEDULED	NECROPSY DAY 20
26421	G		78.	84.	85.	93.	88.	84.	74.	82.	SCHEDULED	NECROPSY DAY 20
26424	G		67.	87.	96.	87.	87.	93.	90.	86.	SCHEDULED	NECROPSY DAY 20
26435	G		75.	78.	94.	86.	99.	85.	89.	86.	SCHEDULED	NECROPSY DAY 20
26437	G		80.	81.	89.	81.	91.	82.	79.	81.	SCHEDULED	NECROPSY DAY 20
26454	G		77.	74.	83.	80.	79.	89.	75.	77.	SCHEDULED	NECROPSY DAY 20
MEAN			75.	79.	89.	85.	90.	83.	80.	82.		
S.D.			10.5	6.9	10.4	5.2	7.6	13.9	6.5	4.0		
S.E.			2.1	1.4	2.1	1.0	1.5	2.8	1.3	0.8		
N			25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A9
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY]

PAGE 4

PREGNANCY STATUS		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20		
DAMS FROM GROUP 4:		25 MG/KG/DAY										
26301	G		62.	73.	79.	86.	86.	88.	85.	80.	SCHEDULED	NECROPSY DAY 20
26306	G		57.	76.	89.	85.	87.	83.	81.	78.	SCHEDULED	NECROPSY DAY 20
26313	G		71.	69.	83.	75.	82.	77.	68.	73.	SCHEDULED	NECROPSY DAY 20
26324	G		56.	80.	88.	75.	94.	54.	92.	77.	SCHEDULED	NECROPSY DAY 20
26325	G		69.	80.	82.	81.	88.	88.	85.	80.	SCHEDULED	NECROPSY DAY 20
26332	G		67.	74.	86.	92.	89.	98.	87.	85.	SCHEDULED	NECROPSY DAY 20
26334	G		61.	84.	91.	80.	96.	90.	93.	85.	SCHEDULED	NECROPSY DAY 20
26345	G		54.	80.	93.	71.	89.	82.	87.	80.	SCHEDULED	NECROPSY DAY 20
26353	G		73.	82.	73.	96.	81.	90.	83.	83.	SCHEDULED	NECROPSY DAY 20
26357	G		57.	75.	89.	78.	84.	83.	91.	80.	SCHEDULED	NECROPSY DAY 20
26372	G		49.	80.	78.	98.	84.	89.	88.	78.	SCHEDULED	NECROPSY DAY 20
26373	G		73.	80.	83.	72.	82.	89.	89.	79.	SCHEDULED	NECROPSY DAY 20
26379	G		68.	79.	79.	87.	95.	87.	82.	81.	SCHEDULED	NECROPSY DAY 20
26387	G		69.	72.	82.	83.	100.	73.	114.	85.	SCHEDULED	NECROPSY DAY 20
26390	G		58.	70.	75.	75.	79.	81.	82.	73.	SCHEDULED	NECROPSY DAY 20
26391	G		68.	78.	78.	81.	75.	90.	77.	77.	SCHEDULED	NECROPSY DAY 20
26396	G		70.	69.	78.	84.	82.	87.	80.	78.	SCHEDULED	NECROPSY DAY 20
26398	G		80.	84.	104.	79.	85.	81.	76.	83.	SCHEDULED	NECROPSY DAY 20
26399	G		73.	77.	88.	84.	137.	45.	82.	83.	SCHEDULED	NECROPSY DAY 20
26400	G		66.	82.	93.	84.	86.	89.	68.	82.	SCHEDULED	NECROPSY DAY 20
26404	G		66.	70.	83.	90.	85.	68.	64.	73.	SCHEDULED	NECROPSY DAY 20
26408	G		68.	71.	77.	81.	83.	85.	79.	79.	SCHEDULED	NECROPSY DAY 20
26415	G		82.	80.	81.	79.	90.	94.	90.	84.	SCHEDULED	NECROPSY DAY 20
26425	G		70.	78.	94.	87.	98.	83.	91.	85.	SCHEDULED	NECROPSY DAY 20
26431	G		73.	88.	84.	93.	88.	91.	93.	86.	SCHEDULED	NECROPSY DAY 20
MEAN			66.	77.	84.	83.	89.	83.	84.	80.		
S.D.			8.0	5.2	7.1	7.1	11.7	11.9	10.0	3.9		
S.E.			1.6	1.0	1.4	1.4	2.3	2.4	2.0	0.8		
N			25	25	25	25	25	25	25	25		

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

PROJECT NO.:WIL-402016 TABLE A9
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FOOD CONSUMPTION DURING GESTATION [G/KG/DAY] PAGE 5

PREGNANCY		DAY	0- 3	3- 6	6- 9	9-12	12-15	15-18	18-20	0-20	
STATUS											
DAMS FROM GROUP 5:			50 MG/KG/DAY								
26311	G		77.	81.	87.	77.	86.	79.	87.	80.	SCHEDULED NECROPSY DAY 20
26314	G		52.	82.	86.	90.	92.	NA	NA	NA	GRAVID, DIED DAY 19
26326	G		63.	74.	82.	87.	84.	62.	79.	76.	SCHEDULED NECROPSY DAY 20
26333	G		57.	72.	74.	72.	82.	90.	96.	75.	SCHEDULED NECROPSY DAY 20
26339	G		62.	66.	91.	86.	104.	81.	92.	83.	SCHEDULED NECROPSY DAY 20
26347	G		64.	79.	91.	88.	81.	74.	100.	82.	SCHEDULED NECROPSY DAY 20
26356	G		73.	79.	88.	89.	135.	113.	135.	99.	SCHEDULED NECROPSY DAY 20
26360	G		55.	77.	70.	79.	97.	89.	90.	78.	SCHEDULED NECROPSY DAY 20
26376	G		53.	78.	79.	80.	87.	82.	95.	79.	SCHEDULED NECROPSY DAY 20
26377	G		60.	73.	81.	88.	97.	87.	99.	80.	SCHEDULED NECROPSY DAY 20
26382	G		57.	81.	107.	76.	77.	73.	107.	82.	SCHEDULED NECROPSY DAY 20
26389	G		66.	75.	83.	76.	81.	63.	35.	70.	SCHEDULED NECROPSY DAY 20
26393	G		66.	73.	78.	79.	97.	82.	87.	81.	SCHEDULED NECROPSY DAY 20
26394	G		63.	76.	78.	65.	75.	86.	98.	76.	SCHEDULED NECROPSY DAY 20
26406	G		67.	72.	87.	72.	78.	91.	58.	76.	SCHEDULED NECROPSY DAY 20
26411	NG		70.	73.	82.	76.	76.	74.	89.	75.	SCHEDULED NECROPSY DAY 20
26413	G		67.	81.	75.	80.	60.	83.	99.	76.	SCHEDULED NECROPSY DAY 20
26416	G		53.	75.	82.	81.	92.	60.	93.	77.	SCHEDULED NECROPSY DAY 20
26427	G		64.	80.	81.	77.	85.	90.	91.	80.	SCHEDULED NECROPSY DAY 20
26428	G		62.	66.	76.	81.	85.	47.	68.	72.	SCHEDULED NECROPSY DAY 20
26436	G		60.	71.	84.	80.	74.	NA	69.	74.	SCHEDULED NECROPSY DAY 20
26443	G		52.	84.	75.	78.	84.	82.	88.	78.	SCHEDULED NECROPSY DAY 20
26444	G		74.	72.	76.	78.	81.	100.	101.	81.	SCHEDULED NECROPSY DAY 20
26448	G		63.	76.	95.	85.	77.	91.	76.	81.	SCHEDULED NECROPSY DAY 20
26452	G		60.	85.	81.	85.	97.	NA	NA	NA	GRAVID, DIED DAY 18
MEAN			62.	76.	83.	80.	87.	81.	88.	79.	
S.D.			6.8	5.1	8.0	6.1	14.0	14.6	19.6	5.6	
S.E.			1.4	1.0	1.6	1.2	2.9	3.2	4.2	1.2	
N			24	24	24	24	24	21	22	22	

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

PGFWv4.11
 11/11/2011
 R:12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 1

DAMS FROM GROUP 1: 0 MG/KG/DAY SHAM		MATERNAL GROSS OBSERVATION
26302		NO SIGNIFICANT CHANGES OBSERVED
26304		NO SIGNIFICANT CHANGES OBSERVED
26309		NO SIGNIFICANT CHANGES OBSERVED
26312		NO SIGNIFICANT CHANGES OBSERVED
26317		NO SIGNIFICANT CHANGES OBSERVED
26318		NO SIGNIFICANT CHANGES OBSERVED
26327		NO SIGNIFICANT CHANGES OBSERVED
26330		NO SIGNIFICANT CHANGES OBSERVED
26349		NONGRAVID -- AMMONIUM SULFIDE NEGATIVE
26368		NO SIGNIFICANT CHANGES OBSERVED
26369		NO SIGNIFICANT CHANGES OBSERVED
26380		NO SIGNIFICANT CHANGES OBSERVED
26383		NO SIGNIFICANT CHANGES OBSERVED
26384		NO SIGNIFICANT CHANGES OBSERVED
26395		NO SIGNIFICANT CHANGES OBSERVED
26405		NO SIGNIFICANT CHANGES OBSERVED
26407		NO SIGNIFICANT CHANGES OBSERVED
26420		NO SIGNIFICANT CHANGES OBSERVED
26426		NO SIGNIFICANT CHANGES OBSERVED
26430		NO SIGNIFICANT CHANGES OBSERVED
26432		NO SIGNIFICANT CHANGES OBSERVED
26433		NO SIGNIFICANT CHANGES OBSERVED
26434		NO SIGNIFICANT CHANGES OBSERVED
26447		NO SIGNIFICANT CHANGES OBSERVED
26451		NO SIGNIFICANT CHANGES OBSERVED

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SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 2

DAMS FROM GROUP 2: 0 MG/KG/DAY VEH.	MATERNAL GROSS OBSERVATION
26303	NO SIGNIFICANT CHANGES OBSERVED
26305	NO SIGNIFICANT CHANGES OBSERVED
26315	NO SIGNIFICANT CHANGES OBSERVED
26322	NO SIGNIFICANT CHANGES OBSERVED
26331	NO SIGNIFICANT CHANGES OBSERVED
26336	NO SIGNIFICANT CHANGES OBSERVED
26337	NO SIGNIFICANT CHANGES OBSERVED
26342	NO SIGNIFICANT CHANGES OBSERVED
26344	NO SIGNIFICANT CHANGES OBSERVED
26346	NO SIGNIFICANT CHANGES OBSERVED
26350	NO SIGNIFICANT CHANGES OBSERVED
26352	NO SIGNIFICANT CHANGES OBSERVED
26355	NONGRAVID -- AMMONIUM SULFIDE NEGATIVE
26366	NO SIGNIFICANT CHANGES OBSERVED
26371	NO SIGNIFICANT CHANGES OBSERVED
26386	NO SIGNIFICANT CHANGES OBSERVED
26392	NO SIGNIFICANT CHANGES OBSERVED
26403	NO SIGNIFICANT CHANGES OBSERVED
26414	NO SIGNIFICANT CHANGES OBSERVED
26418	NO SIGNIFICANT CHANGES OBSERVED
26423	NO SIGNIFICANT CHANGES OBSERVED
26438	NO SIGNIFICANT CHANGES OBSERVED
26439	NO SIGNIFICANT CHANGES OBSERVED
26442	NO SIGNIFICANT CHANGES OBSERVED
26453	NO SIGNIFICANT CHANGES OBSERVED

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TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 3

DAMS FROM GROUP 3: 5 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26316	NO SIGNIFICANT CHANGES OBSERVED
26319	NO SIGNIFICANT CHANGES OBSERVED
26320	NO SIGNIFICANT CHANGES OBSERVED
26323	NO SIGNIFICANT CHANGES OBSERVED
26328	NO SIGNIFICANT CHANGES OBSERVED
26329	NO SIGNIFICANT CHANGES OBSERVED
26341	NO SIGNIFICANT CHANGES OBSERVED
26343	NO SIGNIFICANT CHANGES OBSERVED
26351	NO SIGNIFICANT CHANGES OBSERVED
26354	NO SIGNIFICANT CHANGES OBSERVED
26358	DIAPHRAGM: HERNIA PORTION OF MEDIAN LOBE OF LIVER PROTRUDES INTO THORACIC CAVITY THROUGH AN OPENING IN THE DIAPHRAGM
26365	NO SIGNIFICANT CHANGES OBSERVED
26370	NO SIGNIFICANT CHANGES OBSERVED
26378	NO SIGNIFICANT CHANGES OBSERVED
26385	NO SIGNIFICANT CHANGES OBSERVED
26388	NO SIGNIFICANT CHANGES OBSERVED
26397	NO SIGNIFICANT CHANGES OBSERVED
26402	NO SIGNIFICANT CHANGES OBSERVED
26409	NO SIGNIFICANT CHANGES OBSERVED
26419	NO SIGNIFICANT CHANGES OBSERVED
26421	NO SIGNIFICANT CHANGES OBSERVED
26424	NO SIGNIFICANT CHANGES OBSERVED
26435	NO SIGNIFICANT CHANGES OBSERVED
26437	NO SIGNIFICANT CHANGES OBSERVED
26454	NO SIGNIFICANT CHANGES OBSERVED

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SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 4

DAMS FROM GROUP 4: 25 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26301	NO SIGNIFICANT CHANGES OBSERVED
26306	NO SIGNIFICANT CHANGES OBSERVED
26313	LIVER: AREA(S), WHITE ONE, 5 X 4 MM, LEFT LOBE
26324	NO SIGNIFICANT CHANGES OBSERVED
26325	NO SIGNIFICANT CHANGES OBSERVED
26332	NO SIGNIFICANT CHANGES OBSERVED
26334	NO SIGNIFICANT CHANGES OBSERVED
26345	NO SIGNIFICANT CHANGES OBSERVED
26353	NO SIGNIFICANT CHANGES OBSERVED
26357	NO SIGNIFICANT CHANGES OBSERVED
26372	NO SIGNIFICANT CHANGES OBSERVED
26373	NO SIGNIFICANT CHANGES OBSERVED
26379	NO SIGNIFICANT CHANGES OBSERVED
26387	NO SIGNIFICANT CHANGES OBSERVED
26390	NO SIGNIFICANT CHANGES OBSERVED
26391	NO SIGNIFICANT CHANGES OBSERVED
26396	NO SIGNIFICANT CHANGES OBSERVED
26398	NO SIGNIFICANT CHANGES OBSERVED
26399	NO SIGNIFICANT CHANGES OBSERVED
26400	NO SIGNIFICANT CHANGES OBSERVED
26404	NO SIGNIFICANT CHANGES OBSERVED
26408	NO SIGNIFICANT CHANGES OBSERVED
26415	NO SIGNIFICANT CHANGES OBSERVED
26425	NO SIGNIFICANT CHANGES OBSERVED
26431	NO SIGNIFICANT CHANGES OBSERVED

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SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 5

DAMS FROM GROUP 5: 50 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26311	NO SIGNIFICANT CHANGES OBSERVED
26314	SKIN: MATTING, RED UROGENITAL; NASAL VAGINA: CONTENTS, DARK RED DIED GESTATION DAY 19 UTERUS: LEFT- 1 LATE RESORPTION, 7 EARLY RESORPTIONS; RIGHT- 1 LATE RESORPTION, 7 EARLY RESORPTIONS OVARIES: CORPORA LUTEA- 8, LEFT; 8, RIGHT FETAL GROSS OBSERVATIONS IN UTERO: 2 LATE RESORPTIONS, CROWN-RUMP LENGTHS: 1.5 CM, MUMMIFIED
26326	LIVER: AREA(S), WHITE ONE, 10 X 3 MM, MEDIAN LOBE
26333	NO SIGNIFICANT CHANGES OBSERVED
26339	NO SIGNIFICANT CHANGES OBSERVED
26347	NO SIGNIFICANT CHANGES OBSERVED
26356	UTERUS: CONTENTS, DARK RED SURROUNDS SITES #8 THROUGH #14
26360	NO SIGNIFICANT CHANGES OBSERVED
26376	NO SIGNIFICANT CHANGES OBSERVED
26377	NO SIGNIFICANT CHANGES OBSERVED
26382	NO SIGNIFICANT CHANGES OBSERVED
26389	BRAIN: PALE PITUITARY: PALE
26393	NO SIGNIFICANT CHANGES OBSERVED
26394	NO SIGNIFICANT CHANGES OBSERVED
26406	NO SIGNIFICANT CHANGES OBSERVED
26411	NONGRAVID -- AMMONIUM SULFIDE NEGATIVE
26413	NO SIGNIFICANT CHANGES OBSERVED
26416	NO SIGNIFICANT CHANGES OBSERVED
26427	NO SIGNIFICANT CHANGES OBSERVED
26428	NO SIGNIFICANT CHANGES OBSERVED
26436	NO SIGNIFICANT CHANGES OBSERVED

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A10
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL MATERNAL MACROSCOPIC FINDINGS

PAGE 6

DAMS FROM GROUP 5: 50 MG/KG/DAY	MATERNAL GROSS OBSERVATION
26443	NO SIGNIFICANT CHANGES OBSERVED
26444	NO SIGNIFICANT CHANGES OBSERVED
26448	NO SIGNIFICANT CHANGES OBSERVED
26452	SKIN: MATTING, RED UROGENITAL; NASAL LIVER: PALE ALL LOBES BRAIN: PALE PITUITARY: PALE DIED GESTATION DAY 18 UTERUS: LEFT- 2 LATE RESORPTIONS, 2 EARLY RESORPTIONS; RIGHT- 2 LATE RESORPTIONS, 8 EARLY RESORPTIONS OVARIES: CORPORA LUTEA- 5, LEFT; 10, RIGHT FETAL GROSS OBSERVATIONS IN UTERO: 4 LATE RESORPTIONS, CROWN-RUMP LENGTHS: 1 TO 1.5 CM, MUMMIFIED

PMFGRDv4.16
10/27/2011
R:12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 1

FEMALE GROUP:0 MG/KG/DAY SHAM

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26433	G	1.96	15.78	0.2100
26383	G	1.91	15.35	0.1800
26384	G	1.96	15.10	0.2890
26349	NG	1.88	10.74	0.4289
26395	G	2.18	14.36	0.1454
26405	G	2.00	15.17	0.2781
26327	G	1.83	15.44	0.1544
26426	G	2.15	14.85	0.2488
26312	G	2.00	17.94	0.2893
26368	G	2.06	14.36	0.1335
26318	G	2.07	14.88	0.1457
26407	G	1.92	15.66	0.2227
26451	G	1.92	16.43	0.2301
26432	G	2.05	15.20	0.2450
26330	G	2.01	18.27	0.3363
26317	G	1.98	18.72	0.3593
26309	G	1.91	16.45	0.3241
26434	G	2.07	16.24	0.1993
26447	G	1.88	16.87	0.2105
26304	G	1.82	15.77	0.2421
26302	G	1.94	16.79	0.1955
26369	G	1.88	16.70	0.1342
26380	G	1.82	14.96	0.1286
26420	G	2.04	18.12	0.1853
26430	G	2.09	18.62	0.4537
MEAN		1.98	16.17	0.2309
S.D.		0.099	1.342	0.08160
S.E.		0.020	0.274	0.01666
N		24	24	24

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 2

FEMALE GROUP:0 MG/KG/DAY VEH.

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26386	G	2.11	12.96	0.2188
26392	G	1.95	14.03	0.1999
26322	G	2.09	16.11	0.1854
26366	G	2.06	16.30	0.1559
26350	G	1.94	16.05	0.2100
26342	G	2.17	17.03	0.1700
26355	NG	1.93	12.31	0.3607
26352	G	1.93	17.36	0.2978
26337	G	1.92	15.60	0.2239
26414	G	1.83	14.46	0.1339
26403	G	1.97	16.38	0.1776
26305	G	1.84	15.37	0.2134
26315	G	1.89	15.77	0.2807
26336	G	1.98	16.14	0.2402
26331	G	2.08	17.40	0.3717
26344	G	1.97	16.51	0.2425
26453	G	2.00	17.09	0.3521
26418	G	2.02	16.87	0.2295
26371	G	1.91	15.76	0.2368
26439	G	1.92	16.05	0.3819
26442	G	1.94	14.07	0.1887
26303	G	1.88	14.55	0.2068
26346	G	1.86	12.03	0.1891
26438	G	2.02	16.35	0.2420
26423	G	1.87	15.99	0.2557
MEAN		1.96	15.68	0.2335
S.D.		0.090	1.363	0.06419
S.E.		0.018	0.278	0.01310
N		24	24	24

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 3

FEMALE GROUP: 5 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26328	G	1.77	14.70	0.2361
26402	G	1.97	14.80	0.2770
26358	G	1.89	18.24	0.2954
26388	G	1.94	15.11	0.1472
26329	G	2.04	15.50	0.2200
26320	G	2.01	17.93	0.3172
26424	G	2.08	19.81	0.2683
26435	G	1.99	16.25	0.3479
26419	G	2.08	16.68	0.1964
26437	G	2.02	15.39	0.1921
26397	G	1.91	15.71	0.2430
26385	G	2.01	16.93	0.2876
26316	G	1.92	15.74	0.1965
26409	G	1.76	16.42	0.3034
26365	G	2.05	16.48	0.2632
26319	G	1.98	14.03	0.1370
26341	G	2.00	20.75	0.4397
26421	G	1.85	14.92	0.2298
26454	G	2.03	15.82	0.1895
26343	G	1.90	16.39	0.1566
26370	G	1.91	15.37	0.2028
26351	G	1.96	14.31	0.1474
26354	G	1.99	15.85	0.2199
26378	G	1.90	16.96	0.2177
26323	G	1.94	14.09	0.1682
MEAN		1.96	16.17	0.2360
S.D.		0.084	1.642	0.07086
S.E.		0.017	0.328	0.01417
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 4

FEMALE GROUP: 25 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26334	G	2.01	14.41	0.2039
26324	G	1.76	14.62	0.1458
26398	G	1.99	18.50	0.2122
26373	G	1.86	17.01	0.1433
26313	G	1.99	15.03	0.1400
26345	G	1.95	16.70	0.3700
26391	G	2.10	16.56	0.1800
26379	G	1.97	14.87	0.1127
26387	G	2.00	15.21	0.1868
26390	G	2.09	15.57	0.2029
26400	G	1.93	15.64	0.1921
26404	G	1.91	13.65	0.1358
26399	G	1.99	19.15	0.1720
26301	G	1.92	15.62	0.1946
26332	G	1.95	17.40	0.2615
26357	G	2.07	17.53	0.2059
26396	G	1.99	14.78	0.2230
26353	G	1.97	16.96	0.2049
26372	G	1.90	14.78	0.1282
26408	G	1.86	15.64	0.1818
26415	G	2.00	16.90	0.1812
26325	G	2.14	18.46	0.1748
26431	G	1.89	15.59	0.1593
26306	G	1.95	18.58	0.0808
26425	G	2.06	16.77	0.1985
MEAN		1.97	16.24	0.1837
S.D.		0.085	1.478	0.05480
S.E.		0.017	0.296	0.01096
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A11 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS [G]

PAGE 5

FEMALE GROUP: 50 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN	LIVER	THYMUS
26382	G	1.85	12.50	0.1163
26347	G	1.85	16.28	0.1551
26394	G	1.91	13.24	0.0943
26389	G	1.98	10.95	0.0900
26311	G	2.13	17.71	0.2100
26416	G	2.06	18.71	0.0920
26411	NG	1.98	13.63	0.1922
26448	G	2.04	13.85	0.1476
26428	G	1.97	11.11	0.1114
26339	G	1.89	13.85	0.1475
26406	G	1.91	11.93	0.0965
26326	G	1.81	15.31	0.0714
26377	G	1.94	16.35	0.1297
26376	G	1.87	15.67	0.1505
26360	G	2.03	16.52	0.0834
26427	G	2.00	17.63	0.1385
26443	G	2.08	19.59	0.1486
26436	G	1.85	14.25	0.1807
26413	G	2.02	17.31	0.1414
26356	G	1.89	16.28	0.1409
26444	G	1.85	14.05	0.1277
26333	G	2.01	17.47	0.1515
26393	G	1.77	16.48	0.1653
MEAN		1.94	15.32	0.1314
S.D.		0.096	2.419	0.03420
S.E.		0.021	0.516	0.00729
N		22	22	22

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

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11/11/2011
R:12/16/2011

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SPONSOR:AMERICAN PETROLEUM

TABLE A12 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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
26433	G	1.96	805.102	10.714
26383	G	1.91	803.665	9.424
26384	G	1.96	770.408	14.745
26349	NG	1.88	571.277	22.819
26395	G	2.18	658.716	6.651
26405	G	2.00	758.500	13.900
26327	G	1.83	843.716	8.415
26426	G	2.15	690.698	11.581
26312	G	2.00	897.000	14.450
26368	G	2.06	697.087	6.505
26318	G	2.07	718.841	7.053
26407	G	1.92	815.625	11.615
26451	G	1.92	855.729	11.979
26432	G	2.05	741.463	11.951
26330	G	2.01	908.955	16.716
26317	G	1.98	945.455	18.131
26309	G	1.91	861.257	16.963
26434	G	2.07	784.541	9.614
26447	G	1.88	897.340	11.223
26304	G	1.82	866.484	13.297
26302	G	1.94	865.464	10.103
26369	G	1.88	888.298	7.128
26380	G	1.82	821.978	7.088
26420	G	2.04	888.235	9.069
26430	G	2.09	890.909	21.722
MEAN		1.98	819.811	11.668
S.D.		0.099	77.9996	3.9906
S.E.		0.020	15.9216	0.8146
N		24	24	24

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A12 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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
26386	G	2.11	614.218	10.379
26392	G	1.95	719.487	10.256
26322	G	2.09	770.813	8.852
26366	G	2.06	791.262	7.573
26350	G	1.94	827.320	10.825
26342	G	2.17	784.793	7.834
26355	NG	1.93	637.824	18.705
26352	G	1.93	899.482	15.440
26337	G	1.92	812.500	11.667
26414	G	1.83	790.164	7.322
26403	G	1.97	831.472	9.036
26305	G	1.84	835.326	11.576
26315	G	1.89	834.392	14.868
26336	G	1.98	815.151	12.121
26331	G	2.08	836.539	17.885
26344	G	1.97	838.071	12.335
26453	G	2.00	854.500	17.600
26418	G	2.02	835.149	11.386
26371	G	1.91	825.131	12.408
26439	G	1.92	835.938	19.896
26442	G	1.94	725.258	9.742
26303	G	1.88	773.936	11.011
26346	G	1.86	646.774	10.161
26438	G	2.02	809.406	11.980
26423	G	1.87	855.080	13.690
MEAN		1.96	798.423	11.910
S.D.		0.090	65.4161	3.2708
S.E.		0.018	13.3530	0.6677
N		24	24	24

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A12 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 3

FEMALE GROUP: 5 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26328	G	1.77	830.508	13.333
26402	G	1.97	751.269	14.061
26358	G	1.89	965.079	15.608
26388	G	1.94	778.866	7.577
26329	G	2.04	759.804	10.784
26320	G	2.01	892.040	15.771
26424	G	2.08	952.404	12.885
26435	G	1.99	816.583	17.487
26419	G	2.08	801.923	9.423
26437	G	2.02	761.881	9.505
26397	G	1.91	822.513	12.723
26385	G	2.01	842.289	14.328
26316	G	1.92	819.792	10.260
26409	G	1.76	932.955	17.216
26365	G	2.05	803.902	12.829
26319	G	1.98	708.586	6.919
26341	G	2.00	1037.500	22.000
26421	G	1.85	806.486	12.432
26454	G	2.03	779.310	9.360
26343	G	1.90	862.632	8.263
26370	G	1.91	804.712	10.628
26351	G	1.96	730.102	7.500
26354	G	1.99	796.482	11.055
26378	G	1.90	892.632	11.474
26323	G	1.94	726.289	8.660
MEAN		1.96	827.062	12.083
S.D.		0.084	80.6767	3.6294
S.E.		0.017	16.1353	0.7259
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A12 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 4

FEMALE GROUP: 25 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26334	G	2.01	716.915	10.149
26324	G	1.76	830.682	8.295
26398	G	1.99	929.648	10.653
26373	G	1.86	914.516	7.688
26313	G	1.99	755.276	7.035
26345	G	1.95	856.410	18.974
26391	G	2.10	788.571	8.571
26379	G	1.97	754.822	5.736
26387	G	2.00	760.500	9.350
26390	G	2.09	744.976	9.713
26400	G	1.93	810.363	9.948
26404	G	1.91	714.660	7.120
26399	G	1.99	962.312	8.643
26301	G	1.92	813.542	10.156
26332	G	1.95	892.308	13.436
26357	G	2.07	846.860	9.952
26396	G	1.99	742.714	11.206
26353	G	1.97	860.914	10.406
26372	G	1.90	777.895	6.737
26408	G	1.86	840.860	9.785
26415	G	2.00	845.000	9.050
26325	G	2.14	862.617	8.178
26431	G	1.89	824.868	8.413
26306	G	1.95	952.820	4.154
26425	G	2.06	814.078	9.660
MEAN		1.97	824.565	9.320
S.D.		0.085	70.2748	2.7577
S.E.		0.017	14.0550	0.5515
N		25	25	25

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A12 (GESTATION DAY 20)
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL ORGAN WEIGHTS RELATIVE TO BRAIN WEIGHTS [G/100 G]

PAGE 5

FEMALE GROUP: 50 MG/KG/DAY

ANIMAL	PREGNANCY STATUS	BRAIN WT (GRAMS)	LIVER	THYMUS
26382	G	1.85	675.676	6.270
26347	G	1.85	880.000	8.378
26394	G	1.91	693.194	4.921
26389	G	1.98	553.030	4.545
26311	G	2.13	831.455	9.859
26416	G	2.06	908.252	4.466
26411	NG	1.98	688.384	9.697
26448	G	2.04	678.922	7.255
26428	G	1.97	563.959	5.635
26339	G	1.89	732.804	7.831
26406	G	1.91	624.607	5.079
26326	G	1.81	845.856	3.923
26377	G	1.94	842.784	6.701
26376	G	1.87	837.968	8.075
26360	G	2.03	813.793	4.089
26427	G	2.00	881.500	6.950
26443	G	2.08	941.827	7.163
26436	G	1.85	770.270	9.784
26413	G	2.02	856.931	6.980
26356	G	1.89	861.376	7.460
26444	G	1.85	759.459	6.919
26333	G	2.01	869.154	7.562
26393	G	1.77	931.073	9.322
MEAN		1.94	788.813	6.780
S.D.		0.096	114.1607	1.7663
S.E.		0.021	24.3392	0.3766
N		22	22	22

G = GRAVID, NG = NONGRAVID - WEIGHTS NOT INCLUDED IN CALCULATION OF THE MEAN

POFBWv4.29
11/11/2011
R:12/16/2011

TABLE A13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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		
			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																		
26302	11	3	7	7	14	0	0	0	0	0	0	0	0	0	7	7	14	8	8	16
26304	9	6	6	9	15	0	0	0	1	0	1	0	0	0	7	9	16	7	9	16
26309	3	13	7	9	16	0	0	0	1	0	1	0	0	0	8	9	17	8	9	17
26312	6	9	5	10	15	0	0	0	0	1	1	0	0	0	5	11	16	5	11	16
26317	10	5	8	7	15	0	0	0	0	4	4	0	0	0	8	11	19	8	11	19
26318	6	8	9	5	14	0	0	0	0	0	0	0	0	0	9	5	14	9	5	14
26327	9	6	11	4	15	0	0	0	0	0	0	0	0	0	11	4	15	11	5	16
26330	10	7	8	9	17	0	0	0	0	1	1	0	0	0	8	10	18	8	10	18
26349	NONGRAVID																			
26368	9	6	7	8	15	0	0	0	1	1	2	0	0	0	8	9	17	8	10	18
26369	6	10	5	11	16	0	0	0	0	1	1	0	0	0	5	12	17	5	12	17
26380	5	8	3	10	13	0	0	0	1	0	1	0	0	0	4	10	14	4	10	14
26383	9	4	7	6	13	0	0	0	1	0	1	0	0	0	8	6	14	8	7	15
26384	8	5	4	9	13	0	0	0	1	0	1	0	0	0	5	9	14	6	9	15
26395	6	10	11	5	16	0	0	0	0	0	0	0	0	0	11	5	16	11	5	16
26405	2	11	6	7	13	0	0	0	0	0	0	0	0	0	6	7	13	6	7	13
26407	12	4	6	10	16	0	0	0	0	0	0	0	0	0	6	10	16	6	10	16
26420	7	7	7	7	14	0	0	0	1	0	1	0	0	0	8	7	15	8	7	15
26426	11	5	6	10	16	0	0	0	0	0	0	0	0	0	6	10	16	6	11	17
26430	6	7	7	6	13	0	0	0	0	0	0	0	0	0	7	6	13	7	6	13
26432	8	5	6	7	13	0	0	0	1	1	2	0	0	0	7	8	15	7	8	15
26433	7	4	6	5	11	0	0	0	2	5	7	0	0	0	8	10	18	8	10	18
26434	7	7	7	7	14	0	0	0	2	0	2	0	0	0	9	7	16	9	7	16
26447	9	4	6	7	13	0	0	0	1	1	2	0	0	0	7	8	15	7	8	15
26451	10	6	5	11	16	0	0	0	0	0	0	0	0	0	5	11	16	5	11	16
TOTAL	186	160	160	186	346	0	0	0	13	15	28	0	0	0	173	201	374	175	206	381
MEAN	7.8	6.7	6.7	7.8	14.4	0.0	0.0	0.0	0.5	0.6	1.2	0.0	0.0	0.0	7.2	8.4	15.6	7.3	8.6	15.9
S.D.	2.49	2.51	1.86	2.03	1.47	0.00	0.00	0.00	0.66	1.28	1.58	0.00	0.00	0.00	1.79	2.18	1.59	1.76	2.10	1.54
S.E.	0.51	0.51	0.38	0.41	0.30	0.00	0.00	0.00	0.13	0.26	0.32	0.00	0.00	0.00	0.37	0.45	0.32	0.36	0.43	0.31
N =	24																			

TABLE A13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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
26303	4	10	4	10	14	0	0	0	1	0	1	0	0	0	5	10	15	5	10	15
26305	4	9	8	5	13	0	0	0	1	0	1	0	0	0	9	5	14	9	5	14
26315	9	3	3	9	12	0	0	0	3	1	4	0	0	0	6	10	16	7	10	17
26322	8	8	9	7	16	0	0	0	0	0	0	0	0	0	9	7	16	9	7	16
26331	8	6	10	4	14	0	0	0	0	1	1	0	0	0	10	5	15	11	5	16
26336	9	7	8	8	16	0	0	0	0	0	0	0	0	0	8	8	16	8	8	16
26337	9	4	5	8	13	0	0	0	1	0	1	0	0	0	6	8	14	7	8	15
26342	11	6	6	11	17	0	0	0	0	0	0	0	0	0	6	11	17	6	11	17
26344	6	8	7	7	14	0	0	0	1	0	1	0	0	0	8	7	15	8	7	15
26346	6	6	7	5	12	0	0	0	1	1	2	0	0	0	8	6	14	9	7	16
26350	6	7	6	7	13	0	0	0	1	2	3	0	0	0	7	9	16	8	9	17
26352	7	6	8	5	13	0	0	0	0	0	0	0	0	0	8	5	13	8	7	15
26355	NONGRAVID																			
26366	5	7	4	8	12	0	0	0	0	0	0	0	0	0	4	8	12	7	8	15
26371	6	8	8	6	14	0	0	0	1	0	1	0	0	0	9	6	15	12	9	21
26386	2	0	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2	2	3	5
26392	6	7	6	7	13	0	0	0	0	0	0	0	0	0	6	7	13	6	7	13
26403	6	7	3	10	13	0	0	0	0	0	0	0	0	0	3	10	13	3	10	13
26414	4	12	9	7	16	0	0	0	0	0	0	0	0	0	9	7	16	11	7	18
26418	12	4	8	8	16	0	0	0	0	2	2	0	0	0	8	10	18	8	10	18
26423	9	3	6	6	12	0	0	0	1	2	3	0	0	0	7	8	15	7	8	15
26438	9	6	5	10	15	0	0	0	0	0	0	0	0	0	5	10	15	5	10	15
26439	7	10	8	9	17	0	0	0	2	0	2	0	0	0	10	9	19	10	9	19
26442	6	5	6	5	11	0	0	0	2	0	2	0	0	0	8	5	13	8	6	14
26453	9	5	5	9	14	0	0	0	0	0	0	0	0	0	5	9	14	5	10	15
TOTAL	168	154	151	171	322	0	0	0	15	9	24	0	0	0	166	180	346	179	191	370
MEAN	7.0	6.4	6.3	7.1	13.4	0.0	0.0	0.0	0.6	0.4	1.0	0.0	0.0	0.0	6.9	7.5	14.4	7.5	8.0	15.4
S.D.	2.38	2.59	2.12	2.42	2.96	0.00	0.00	0.00	0.82	0.71	1.18	0.00	0.00	0.00	2.15	2.45	3.12	2.41	1.97	2.89
S.E.	0.49	0.53	0.43	0.49	0.60	0.00	0.00	0.00	0.17	0.15	0.24	0.00	0.00	0.00	0.44	0.50	0.64	0.49	0.40	0.59
N =	24																			

TABLE A13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 3: 5 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
26316	10	5	6	9	15	0	0	0	0	0	0	0	0	0	6	9	15	6	9	15
26319	10	3	4	9	13	0	0	0	2	0	2	0	0	0	6	9	15	6	9	15
26320	4	10	6	8	14	0	0	0	0	1	1	0	0	0	6	9	15	6	10	16
26323	6	4	6	4	10	0	0	0	1	1	2	0	0	0	7	5	12	7	5	12
26328	5	8	6	7	13	0	0	0	0	0	0	0	0	0	6	7	13	6	7	13
26329	8	8	6	10	16	0	0	0	0	0	0	0	0	0	6	10	16	6	10	16
26341	7	7	7	7	14	0	0	0	2	0	2	1	0	1	10	7	17	10	8	18
26343	13	2	9	6	15	0	0	0	0	1	1	0	0	0	9	7	16	9	8	17
26351	7	7	6	8	14	0	0	0	1	1	2	0	0	0	7	9	16	7	10	17
26354	7	6	6	7	13	0	0	0	1	2	3	0	1	1	7	10	17	8	10	18
26358	7	7	8	6	14	0	0	0	0	0	0	0	0	0	8	6	14	8	6	14
26365	8	6	5	9	14	0	0	0	0	0	0	0	0	0	5	9	14	6	11	17
26370	8	4	9	3	12	0	0	0	1	0	1	0	0	0	10	3	13	11	5	16
26378	2	10	4	8	12	0	0	0	0	1	1	0	0	0	4	9	13	4	9	13
26385	7	6	6	7	13	0	0	0	2	1	3	0	0	0	8	8	16	8	8	16
26388	7	7	6	8	14	0	0	0	0	0	0	0	0	0	6	8	14	6	8	14
26397	6	6	5	7	12	0	0	0	1	0	1	0	0	0	6	7	13	6	7	13
26402	6	8	7	7	14	0	0	0	0	0	0	0	0	0	7	7	14	7	8	15
26409	3	11	9	5	14	0	0	0	1	0	1	0	0	0	10	5	15	10	8	18
26419	5	11	11	5	16	0	0	0	0	0	0	0	0	0	11	5	16	11	5	16
26421	4	10	7	7	14	0	0	0	0	3	3	0	0	0	7	10	17	7	11	18
26424	4	8	4	8	12	0	0	0	2	1	3	0	0	0	6	9	15	7	9	16
26435	3	9	4	8	12	0	0	0	0	0	0	0	0	0	4	8	12	5	8	13
26437	9	6	8	7	15	0	0	0	1	0	1	0	1	1	9	8	17	9	8	17
26454	9	6	10	5	15	0	0	0	2	0	2	0	0	0	12	5	17	12	5	17
TOTAL	165	175	165	175	340	0	0	0	17	12	29	1	2	3	183	189	372	188	202	390
MEAN	6.6	7.0	6.6	7.0	13.6	0.0	0.0	0.0	0.7	0.5	1.2	0.0	0.1	0.1	7.3	7.6	14.9	7.5	8.1	15.6
S.D.	2.55	2.38	1.91	1.66	1.41	0.00	0.00	0.00	0.80	0.77	1.11	0.20	0.28	0.33	2.10	1.87	1.62	2.04	1.82	1.83
S.E.	0.51	0.48	0.38	0.33	0.28	0.00	0.00	0.00	0.16	0.15	0.22	0.04	0.06	0.07	0.42	0.37	0.32	0.41	0.36	0.37
N =	25																			

TABLE A13
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY

DAMS FROM GROUP 4: 25 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
26301	6	3	4	5	9	0	0	0	5	2	7	0	0	0	9	7	16	12	9	21
26306	12	7	6	13	19	0	0	0	1	1	2	0	0	0	7	14	21	7	14	21
26313	6	5	4	7	11	0	0	0	2	5	7	0	0	0	6	12	18	6	12	18
26324	2	1	2	1	3	0	0	0	1	0	1	0	0	0	3	1	4	4	6	10
26325	4	5	4	5	9	0	0	0	4	2	6	0	0	0	8	7	15	8	7	15
26332	4	6	5	5	10	0	0	0	2	4	6	0	0	0	7	9	16	7	9	16
26334	1	2	2	1	3	0	0	0	2	4	6	0	0	0	4	5	9	10	7	17
26345	1	0	0	1	1	0	0	0	8	8	16	0	0	0	8	9	17	8	9	17
26353	1	4	2	3	5	0	0	0	5	3	8	0	0	0	7	6	13	7	6	13
26357	5	7	4	8	12	0	0	0	3	4	7	0	0	0	7	12	19	7	15	22
26372	3	9	6	6	12	0	0	0	2	1	3	0	0	0	8	7	15	9	7	16
26373	4	3	4	3	7	1	0	1	2	3	5	0	0	0	7	6	13	7	6	13
26379	0	1	0	1	1	0	0	0	6	6	12	0	0	0	6	7	13	7	7	14
26387	4	4	4	4	8	0	0	0	5	2	7	0	0	0	9	6	15	9	6	15
26390	3	7	4	6	10	0	0	0	2	2	4	0	0	0	6	8	14	7	8	15
26391	5	2	4	3	7	0	0	0	7	3	10	0	0	0	11	6	17	12	6	18
26396	0	0	0	0	0	0	0	0	6	10	16	0	0	0	6	10	16	6	11	17
26398	10	5	9	6	15	0	0	0	0	0	0	0	1	1	9	7	16	9	7	16
26399	7	5	3	9	12	0	0	0	3	1	4	0	0	0	6	10	16	6	10	16
26400	8	5	2	11	13	0	0	0	1	0	1	0	0	0	3	11	14	3	11	14
26404	7	5	6	6	12	0	0	0	2	0	2	0	0	0	8	6	14	8	6	14
26408	4	1	2	3	5	0	0	0	2	6	8	0	0	0	4	9	13	5	9	14
26415	8	3	4	7	11	0	0	0	1	3	4	0	0	0	5	10	15	6	10	16
26425	4	3	2	5	7	0	0	0	7	4	11	0	0	0	9	9	18	9	9	18
26431	6	5	3	8	11	0	0	0	1	1	2	0	1	1	4	10	14	5	11	16
TOTAL	115	98	86	127	213	1	0	1	80	75	155	0	2	2	167	204	371	184	218	402
MEAN	4.6	3.9	3.4	5.1	8.5	0.0	0.0	0.0	3.2	3.0	6.2	0.0	0.1	0.1	6.7	8.2	14.8	7.4	8.7	16.1
S.D.	3.03	2.36	2.08	3.24	4.66	0.20	0.00	0.20	2.27	2.55	4.30	0.00	0.28	0.28	2.06	2.73	3.29	2.16	2.56	2.69
S.E.	0.61	0.47	0.42	0.65	0.93	0.04	0.00	0.04	0.45	0.51	0.86	0.00	0.06	0.06	0.41	0.55	0.66	0.43	0.51	0.54
N =	25																			

DAMS FROM GROUP 5: 50 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
26311	3	2	2	3	5	0	0	0	7	3	10	0	0	0	9	6	15	9	6	15
26314	GRAVID, DIED DAY 19																			
26326	0	1	1	0	1	0	0	0	6	8	14	0	0	0	7	8	15	7	8	15
26333	0	4	1	3	4	0	0	0	11	7	18	0	0	0	12	10	22	12	10	22
26339	2	2	1	3	4	0	0	0	6	3	9	0	0	0	7	6	13	8	6	14
26347	0	0	0	0	0	0	0	0	6	7	13	0	0	0	6	7	13	6	7	13
26356	1	3	1	3	4	0	0	0	6	4	10	0	0	0	7	7	14	7	8	15
26360	1	1	0	2	2	0	0	0	8	6	14	0	1	1	8	9	17	8	9	17
26376	0	1	0	1	1	0	0	0	9	8	17	0	1	1	9	10	19	9	10	19
26377	1	3	4	0	4	0	0	0	3	5	8	0	0	0	7	5	12	7	5	12
26382	0	0	0	0	0	0	0	0	2	0	2	0	0	0	2	0	2	3	5	8
26389	1	1	1	1	2	0	0	0	3	8	11	0	0	0	4	9	13	5	9	14
26393	5	3	4	4	8	0	0	0	6	5	11	0	0	0	10	9	19	10	10	20
26394	0	0	0	0	0	0	0	0	6	8	14	0	0	0	6	8	14	6	9	15
26406	0	0	0	0	0	0	0	0	8	4	12	0	1	1	8	5	13	8	5	13
26411	NONGRAVID																			
26413	0	0	0	0	0	0	0	0	7	7	14	0	0	0	7	7	14	8	7	15
26416	8	3	5	6	11	0	0	0	2	1	3	0	1	1	7	8	15	7	8	15
26427	5	0	2	3	5	0	0	0	5	7	12	0	0	0	7	10	17	8	11	19
26428	0	0	0	0	0	0	0	0	6	10	16	0	0	0	6	10	16	6	10	16
26436	0	0	0	0	0	0	0	0	6	7	13	0	0	0	6	7	13	6	7	13
26443	2	2	2	2	4	0	0	0	3	8	11	0	0	0	5	10	15	5	10	15
26444	0	0	0	0	0	0	0	0	8	8	16	0	0	0	8	8	16	8	8	16
26448	1	3	0	4	4	0	0	0	7	4	11	1	1	2	8	9	17	9	9	18
26452	GRAVID, DIED DAY 18																			
TOTAL	30	29	24	35	59	0	0	0	131	128	259	1	5	6	156	168	324	162	177	339
MEAN	1.4	1.3	1.1	1.6	2.7	0.0	0.0	0.0	6.0	5.8	11.8	0.0	0.2	0.3	7.1	7.6	14.7	7.4	8.0	15.4
S.D.	2.13	1.36	1.51	1.79	2.95	0.00	0.00	0.00	2.28	2.56	3.95	0.21	0.43	0.55	2.04	2.34	3.74	1.92	1.84	3.00
S.E.	0.45	0.29	0.32	0.38	0.63	0.00	0.00	0.00	0.49	0.55	0.84	0.05	0.09	0.12	0.44	0.50	0.80	0.41	0.39	0.64
N =	22																			

DAMS FROM GROUP 1:0 MG/KG/DAY SHAM

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES		RESORPTIONS			PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
	#	#	VIABLE	DEAD	EARLY	LATE	TOTAL				
			%	%	%	%	%	%	%	%	%
26302	16.0	14.0	100.0	0.0	0.0	0.0	0.0	12.5	0.0	78.6	21.4
26304	16.0	16.0	93.8	0.0	6.3	0.0	6.3	0.0	6.3	60.0	40.0
26309	17.0	17.0	94.1	0.0	5.9	0.0	5.9	0.0	5.9	18.8	81.3
26312	16.0	16.0	93.8	0.0	6.3	0.0	6.3	0.0	6.3	40.0	60.0
26317	19.0	19.0	78.9	0.0	21.1	0.0	21.1	0.0	21.1	66.7	33.3
26318	14.0	14.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	57.1
26327	16.0	15.0	100.0	0.0	0.0	0.0	0.0	6.3	0.0	60.0	40.0
26330	18.0	18.0	94.4	0.0	5.6	0.0	5.6	0.0	5.6	58.8	41.2
26368	18.0	17.0	88.2	0.0	11.8	0.0	11.8	5.6	11.8	60.0	40.0
26369	17.0	17.0	94.1	0.0	5.9	0.0	5.9	0.0	5.9	37.5	62.5
26380	14.0	14.0	92.9	0.0	7.1	0.0	7.1	0.0	7.1	38.5	61.5
26383	15.0	14.0	92.9	0.0	7.1	0.0	7.1	6.7	7.1	69.2	30.8
26384	15.0	14.0	92.9	0.0	7.1	0.0	7.1	6.7	7.1	61.5	38.5
26395	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	62.5
26405	13.0	13.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	84.6
26407	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	25.0
26420	15.0	15.0	93.3	0.0	6.7	0.0	6.7	0.0	6.7	50.0	50.0
26426	17.0	16.0	100.0	0.0	0.0	0.0	0.0	5.9	0.0	68.8	31.3
26430	13.0	13.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	46.2	53.8
26432	15.0	15.0	86.7	0.0	13.3	0.0	13.3	0.0	13.3	61.5	38.5
26433	18.0	18.0	61.1	0.0	38.9	0.0	38.9	0.0	38.9	63.6	36.4
26434	16.0	16.0	87.5	0.0	12.5	0.0	12.5	0.0	12.5	50.0	50.0
26447	15.0	15.0	86.7	0.0	13.3	0.0	13.3	0.0	13.3	69.2	30.8
26451	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	37.5
MEAN	15.9	15.6	93.0	0.0	7.0	0.0	7.0	1.8	7.0	53.8	46.2
S.D.	1.54	1.59	8.84	0.00	8.84	0.00	8.84	3.44	8.84	16.46	16.46
S.E.	0.31	0.32	1.80	0.00	1.80	0.00	1.80	0.70	1.80	3.36	3.36
N	24	24	24	24	24	24	24	24	24	24	24

DAMS FROM GROUP 2:0 MG/KG/DAY VEH.

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES		RESORPTIONS			PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
			VIABLE	DEAD	EARLY	LATE	TOTAL				
	#	#	%	%	%	%	%	%	%	%	%
26303	15.0	15.0	93.3	0.0	6.7	0.0	6.7	0.0	6.7	28.6	71.4
26305	14.0	14.0	92.9	0.0	7.1	0.0	7.1	0.0	7.1	30.8	69.2
26315	17.0	16.0	75.0	0.0	25.0	0.0	25.0	5.9	25.0	75.0	25.0
26322	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0
26331	16.0	15.0	93.3	0.0	6.7	0.0	6.7	6.3	6.7	57.1	42.9
26336	16.0	16.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	56.3	43.8
26337	15.0	14.0	92.9	0.0	7.1	0.0	7.1	6.7	7.1	69.2	30.8
26342	17.0	17.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	64.7	35.3
26344	15.0	15.0	93.3	0.0	6.7	0.0	6.7	0.0	6.7	42.9	57.1
26346	16.0	14.0	85.7	0.0	14.3	0.0	14.3	12.5	14.3	50.0	50.0
26350	17.0	16.0	81.3	0.0	18.8	0.0	18.8	5.9	18.8	46.2	53.8
26352	15.0	13.0	100.0	0.0	0.0	0.0	0.0	13.3	0.0	53.8	46.2
26366	15.0	12.0	100.0	0.0	0.0	0.0	0.0	20.0	0.0	41.7	58.3
26371	21.0	15.0	93.3	0.0	6.7	0.0	6.7	28.6	6.7	42.9	57.1
26386	5.0	2.0	100.0	0.0	0.0	0.0	0.0	60.0	0.0	100.0	0.0
26392	13.0	13.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	46.2	53.8
26403	13.0	13.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	46.2	53.8
26414	18.0	16.0	100.0	0.0	0.0	0.0	0.0	11.1	0.0	25.0	75.0
26418	18.0	18.0	88.9	0.0	11.1	0.0	11.1	0.0	11.1	75.0	25.0
26423	15.0	15.0	80.0	0.0	20.0	0.0	20.0	0.0	20.0	75.0	25.0
26438	15.0	15.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0
26439	19.0	19.0	89.5	0.0	10.5	0.0	10.5	0.0	10.5	41.2	58.8
26442	14.0	13.0	84.6	0.0	15.4	0.0	15.4	7.1	15.4	54.5	45.5
26453	15.0	14.0	100.0	0.0	0.0	0.0	0.0	6.7	0.0	64.3	35.7
MEAN	15.4	14.4	93.5	0.0	6.5	0.0	6.5	7.7	6.5	54.0	46.0
S.D.	2.89	3.12	7.56	0.00	7.57	0.00	7.57	13.37	7.57	17.13	17.13
S.E.	0.59	0.64	1.54	0.00	1.55	0.00	1.55	2.73	1.55	3.50	3.50
N	24	24	24	24	24	24	24	24	24	24	24

[illegible]

DAMS FROM GROUP 4: 25 MG/KG/DAY

DAM #	CORPORA LUTEA	IMPLANTATION SITES	FETUSES		RESORPTIONS			PRE-IMPLANTATION LOSS	POST-IMPLANTATION LOSS	MALES	FEMALES
	#	#	VIABLE	DEAD	EARLY	LATE	TOTAL				
			%	%	%	%	%	%	%	%	%
26301	21.0	16.0	56.3	0.0	43.8	0.0	43.8	23.8	43.8	66.7	33.3
26306	21.0	21.0	90.5	0.0	9.5	0.0	9.5	0.0	9.5	63.2	36.8
26313	18.0	18.0	61.1	0.0	38.9	0.0	38.9	0.0	38.9	54.5	45.5
26324	10.0	4.0	75.0	0.0	25.0	0.0	25.0	60.0	25.0	66.7	33.3
26325	15.0	15.0	60.0	0.0	40.0	0.0	40.0	0.0	40.0	44.4	55.6
26332	16.0	16.0	62.5	0.0	37.5	0.0	37.5	0.0	37.5	40.0	60.0
26334	17.0	9.0	33.3	0.0	66.7	0.0	66.7	47.1	66.7	33.3	66.7
26345	17.0	17.0	5.9	0.0	94.1	0.0	94.1	0.0	94.1	100.0	0.0
26353	13.0	13.0	38.5	0.0	61.5	0.0	61.5	0.0	61.5	20.0	80.0
26357	22.0	19.0	63.2	0.0	36.8	0.0	36.8	13.6	36.8	41.7	58.3
26372	16.0	15.0	80.0	0.0	20.0	0.0	20.0	6.3	20.0	25.0	75.0
26373	13.0	13.0	53.8	7.7	38.5	0.0	38.5	0.0	46.2	57.1	42.9
26379	14.0	13.0	7.7	0.0	92.3	0.0	92.3	7.1	92.3	0.0	100.0
26387	15.0	15.0	53.3	0.0	46.7	0.0	46.7	0.0	46.7	50.0	50.0
26390	15.0	14.0	71.4	0.0	28.6	0.0	28.6	6.7	28.6	30.0	70.0
26391	18.0	17.0	41.2	0.0	58.8	0.0	58.8	5.6	58.8	71.4	28.6
26396	17.0	16.0	0.0	0.0	100.0	0.0	100.0	5.9	100.0	0.0	0.0
26398	16.0	16.0	93.8	0.0	0.0	6.3	6.3	0.0	6.3	66.7	33.3
26399	16.0	16.0	75.0	0.0	25.0	0.0	25.0	0.0	25.0	58.3	41.7
26400	14.0	14.0	92.9	0.0	7.1	0.0	7.1	0.0	7.1	61.5	38.5
26404	14.0	14.0	85.7	0.0	14.3	0.0	14.3	0.0	14.3	58.3	41.7
26408	14.0	13.0	38.5	0.0	61.5	0.0	61.5	7.1	61.5	80.0	20.0
26415	16.0	15.0	73.3	0.0	26.7	0.0	26.7	6.3	26.7	72.7	27.3
26425	18.0	18.0	38.9	0.0	61.1	0.0	61.1	0.0	61.1	57.1	42.9
26431	16.0	14.0	78.6	0.0	14.3	7.1	21.4	12.5	21.4	54.5	45.5
MEAN	16.1	14.8	57.2	0.3	41.9	0.5	42.5	8.1	42.8	53.1	46.9
S.D.	2.69	3.29	26.57	1.54	27.21	1.86	26.56	14.98	26.56	21.34	21.34
S.E.	0.54	0.66	5.31	0.31	5.44	0.37	5.31	3.00	5.31	4.36	4.36
N	25	25	25	25	25	25	25	25	25	24	24

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A14
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL DATA AT SCHEDULED NECROPSY [% PER LITTER]

PAGE 5

DAMS FROM GROUP 5: 50 MG/KG/DAY

CORPORA DAM #	LUTEA	IMPLANTATION SITES	FETUSES		RESORPTIONS			PRE- IMPLANTATION LOSS	POST- IMPLANTATION LOSS	MALES	FEMALES
			VIABLE	DEAD	EARLY	LATE	TOTAL				
	#	#	%	%	%	%	%	%	%	%	%
26311	15.0	15.0	33.3	0.0	66.7	0.0	66.7	0.0	66.7	60.0	40.0
26326	15.0	15.0	6.7	0.0	93.3	0.0	93.3	0.0	93.3	0.0	100.0
26333	22.0	22.0	18.2	0.0	81.8	0.0	81.8	0.0	81.8	0.0	100.0
26339	14.0	13.0	30.8	0.0	69.2	0.0	69.2	7.1	69.2	50.0	50.0
26347	13.0	13.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0
26356	15.0	14.0	28.6	0.0	71.4	0.0	71.4	6.7	71.4	25.0	75.0
26360	17.0	17.0	11.8	0.0	82.4	5.9	88.2	0.0	88.2	50.0	50.0
26376	19.0	19.0	5.3	0.0	89.5	5.3	94.7	0.0	94.7	0.0	100.0
26377	12.0	12.0	33.3	0.0	66.7	0.0	66.7	0.0	66.7	25.0	75.0
26382	8.0	2.0	0.0	0.0	100.0	0.0	100.0	75.0	100.0	0.0	0.0
26389	14.0	13.0	15.4	0.0	84.6	0.0	84.6	7.1	84.6	50.0	50.0
26393	20.0	19.0	42.1	0.0	57.9	0.0	57.9	5.0	57.9	62.5	37.5
26394	15.0	14.0	0.0	0.0	100.0	0.0	100.0	6.7	100.0	0.0	0.0
26406	13.0	13.0	0.0	0.0	92.3	7.7	100.0	0.0	100.0	0.0	0.0
26413	15.0	14.0	0.0	0.0	100.0	0.0	100.0	6.7	100.0	0.0	0.0
26416	15.0	15.0	73.3	0.0	20.0	6.7	26.7	0.0	26.7	72.7	27.3
26427	19.0	17.0	29.4	0.0	70.6	0.0	70.6	10.5	70.6	100.0	0.0
26428	16.0	16.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0
26436	13.0	13.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0
26443	15.0	15.0	26.7	0.0	73.3	0.0	73.3	0.0	73.3	50.0	50.0
26444	16.0	16.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0
26448	18.0	17.0	23.5	0.0	64.7	11.8	76.5	5.6	76.5	25.0	75.0
MEAN	15.4	14.7	17.2	0.0	81.1	1.7	82.8	5.9	82.8	40.7	59.3
S.D.	3.00	3.74	18.94	0.00	19.79	3.40	18.94	15.82	18.94	29.67	29.67
S.E.	0.64	0.80	4.04	0.00	4.22	0.72	4.04	3.37	4.04	7.93	7.93
N	22	22	22	22	22	22	22	22	22	14	14

PILPv4.02
11/23/2011
R:12/16/2011

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A15
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

PAGE 1

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																					
26302	4.0	3.6	3.7	4.2	3.8	4.1	4.3	4.3/	4.3	4.4	4.4	3.8	3.9	3.9	3.8								
26304	3.3	E	3.1	3.2	3.2	3.4	3.5	3.8/	3.7	3.4	3.2	3.0	3.3	3.3	3.4	3.2	2.9						
26309	3.6	3.0	3.1	3.7	3.5	3.2	3.7	3.9	E /	4.1	3.9	3.7	3.9	3.8	3.7	4.0	3.4	3.1					
26312	4.2	4.4	4.4	4.5	4.1	4.6/	3.9	E	4.0	4.3	4.2	4.4	4.0	4.1	4.4	4.0	4.1						
26317	3.8	3.2	3.7	3.8	3.8	4.1	3.7	3.6	4.1/	E	E	4.0	4.2	3.9	4.0	3.8	4.0	3.8	E		E		
26318	3.9	3.8	4.0	3.7	4.1	4.0	4.0	3.8	3.7	4.0/	3.9	4.1	4.1	3.8	3.9								
26327	3.7	3.7	3.4	3.8	4.1	3.5	3.8	3.6	3.9	3.5	3.8	4.1/	3.9	3.8	4.2	3.1							
26330	3.3	2.6	2.9	3.3	3.5	3.0	3.4	3.2	3.7/	E	3.8	3.5	3.5	3.6	3.6	3.1	2.9	3.3	2.8				
26368	3.8	E	3.4	3.8	3.9	4.1	4.1	3.9	3.6/	3.9	3.2	4.0	3.3	3.8	E	3.8	4.0	3.5					
26369	4.0	4.0	4.0	4.5	4.3	4.0/	3.8	3.7	3.8	3.7	4.3	4.5	3.8	3.7	3.9	4.0	4.5	E					
26380	3.5	E	3.5	3.7	3.8/	3.4	3.7	3.6	3.5	4.1	3.3	3.9	3.1	2.9	3.0								
26383	4.3	4.2	4.4	4.4	4.4	4.4	4.0	E	4.4/	4.3	3.6	4.3	4.5	4.7	3.7								
26384	3.4	3.4	3.6	3.3	3.4	E /	3.2	3.3	3.2	3.6	3.6	3.5	3.4	3.2	3.1								
26395	3.9	3.8	3.4	3.9	4.0	4.2	4.2	3.5	4.1	3.9	3.5	4.3/	3.9	3.9	3.8	4.1	4.0						
26405	3.9	3.5	3.5	4.3	4.0	4.2	4.1/	4.4	4.1	4.0	3.8	3.9	3.8	3.4									
26407	3.4	3.0	3.5	3.4	3.7	3.4	3.6/	3.4	3.4	3.4	3.3	3.5	3.5	3.6	3.5	3.4	2.8						
26420	3.3	3.2	3.2	3.0	3.4	E	3.4	3.2	3.6/	3.2	3.5	3.6	3.1	3.4	3.1	3.2							
26426	3.8	2.9	3.9	3.8	3.8	4.0	4.1/	3.6	3.8	3.9	3.9	3.9	3.8	3.7	3.6	3.6	3.8						
26430	4.0	3.8	4.0	3.6	3.8	3.9	4.1	4.2/	4.1	4.2	4.1	4.1	4.0	4.0									
26432	3.7	2.7	E	3.6	3.9	4.0	4.0	4.1/	3.7	E	3.7	3.7	3.9	3.6	3.7	3.6							
26433	3.7	4.0	4.1	E	E	4.4	2.3	4.0	4.4/	E	E	E	4.4	4.2	2.5	4.6	E	E	2.3				
26434	4.0	E	E	3.9	4.0	4.4	4.0	3.9	4.2	4.2/	4.1	3.8	4.1	3.6	4.2	4.0	4.1						
26447	3.3	3.0	3.0	E	3.5	3.1	3.5	3.7/	3.6	3.0	3.3	3.5	3.5	E	3.5	3.2							
26451	3.7	3.4	3.9	3.9	4.2	4.1/	4.0	3.4	3.8	3.6	3.7	3.5	3.7	3.5	3.7	4.0	3.3						
MEAN	3.7																						
S.D.	0.29																						
S.E.	0.06																						
N	24																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A15
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

PAGE 2

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.																						
26303	3.6	3.4	3.7	3.8	E	4.0/	3.9	3.5	3.4	3.8	3.5	3.5	3.7	3.3	3.5	3.0							
26305	3.6	E	3.4	3.6	3.7	3.5	3.4	4.1	3.9	3.5/	3.2	3.7	3.6	3.3	3.4								
26315	3.6	E	E	E	3.9	3.8	4.0/	3.6	3.7	3.5	3.5	3.8	E	3.5	3.3	3.6	2.9						
26322	3.4	3.0	3.2	3.6	3.4	3.6	2.5	3.2	3.5	3.7/	3.5	3.5	3.6	3.7	3.4	3.2	3.2						
26331	3.3	2.7	3.1	3.2	3.6	3.3	3.2	3.4	3.7	3.5	3.6/	3.8	3.6	E	3.0	3.1							
26336	3.8	3.5	3.1	4.0	4.1	3.8	4.1	4.0	4.1/	4.0	3.9	4.0	3.9	3.9	4.0	3.3	3.7						
26337	4.2	E	4.1	4.3	4.1	4.2	4.4/	4.3	4.3	4.4	4.1	4.3	3.9	3.9	3.8								
26342	4.1	3.7	4.2	4.0	4.9	4.4	4.2/	4.3	4.3	4.0	3.9	4.5	4.2	4.2	3.7	4.4	4.0	3.6					
26344	3.4	3.2	3.1	3.3	3.4	E	3.7	3.6	3.5/	3.5	3.1	3.3	3.4	3.4	3.4	3.4							
26346	3.4	2.7	3.2	3.3	3.6	3.2	3.6	E	3.5/	E	3.6	3.5	3.9	3.4	3.0								
26350	4.1	3.8	4.4	4.5	4.1	3.8	4.3	E /	E	4.6	4.1	3.7	4.4	4.2	3.5	3.8	E						
26352	4.2	4.2	3.7	4.2	4.3	4.5	3.9	4.3	4.3/	4.2	4.2	4.6	4.4	4.2									
26366	3.5	3.2	2.8	3.7	4.0/	3.8	3.4	3.8	3.5	2.8	3.8	3.5	3.2										
26371	3.5	3.6	3.6	3.7	3.0	3.8	E	3.7	3.3	3.9/	3.5	3.6	3.7	3.6	3.5	3.0							
26386	3.4	2.9	3.9/																				
26392	4.0	3.9	3.8	3.8	4.1	4.2	4.0/	3.9	3.8	4.2	4.1	4.1	4.1	3.8									
26403	3.7	2.8	4.2	4.2/	3.8	3.5	3.6	3.8	2.8	3.9	4.0	3.7	3.7	4.0									
26414	3.6	3.7	3.9	3.8	3.5	3.3	3.6	3.5	3.4	3.8/	3.3	3.6	3.7	3.6	3.8	3.5	3.7						
26418	3.5	2.0	3.3	3.5	3.2	3.4	3.6	3.9	3.8/	E	4.2	3.7	3.8	E	3.8	3.8	3.7	3.6	3.0				
26423	3.5	3.1	3.5	3.5	3.7	3.5	3.7	E /	3.7	3.6	3.3	3.5	E	3.7	E	3.3							
26438	3.8	3.7	3.9	4.2	4.0	4.0/	4.1	3.8	3.9	4.0	4.3	3.7	3.5	3.1	3.6	3.4							
26439	4.0	3.8	3.8	4.1	4.0	4.1	4.1	4.3	4.3	E	E /	4.4	4.0	3.4	4.0	3.9	4.0	4.0	4.3	3.4			
26442	3.6	3.6	3.6	3.8	3.8	3.3	3.7	E	E /	3.5	3.7	3.4	3.3	3.4									
26453	3.6	3.5	3.4	3.9	3.7	3.8/	3.4	3.9	3.4	3.7	3.7	3.7	3.5	3.3	3.4								
MEAN	3.7																						
S.D.	0.28																						
S.E.	0.06																						
N	24																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

TABLE A15
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, 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:	5	MG/KG/DAY																			
26316	3.1	2.7	3.1	3.2	3.2	2.9	3.5/	3.1	3.2	3.2	3.6	3.2	3.0	3.3	3.0	2.5							
26319	6.7-A	E	6.3	E	6.7	6.5	7.1/	6.4	7.0	7.7	7.2	6.8	6.7	6.5	6.1	6.3							
26320	3.7	3.0	2.5	3.8	3.7	4.3	3.9/	E	3.9	3.9	3.9	4.2	3.8	3.2	4.0	3.7							
26323	3.5	3.4	3.3	E	3.7	3.6	3.7	3.6/	3.4	3.5	3.6	E	3.6										
26328	3.6	3.4	3.5	3.9	3.8	3.7	3.6/	3.7	3.8	3.7	3.8	3.5	3.7	3.2									
26329	3.8	3.6	3.7	4.0	3.8	3.8	3.6/	3.7	3.6	3.8	4.3	3.6	3.9	4.0	3.8	3.3	3.5						
26341	3.2	2.5	3.5	3.2	3.0	3.5	3.5	E	2.7	E	L /	3.3	3.8	3.2	3.0	3.1	3.4	2.9					
26343	3.7	3.5	3.5	3.6	3.7	3.7	3.5	3.9	4.0	3.4/	4.1	E	4.2	3.9	4.0	3.4	3.1						
26351	3.6	3.5	3.5	3.7	3.9	3.6	3.9	E /	E	3.6	3.8	3.8	3.6	3.8	3.7	3.5	3.1						
26354	2.8	2.5	2.4	3.2	2.9	3.2	3.1	E /	E	2.4	2.7	2.8	E	2.6	2.4	L	2.9	2.7					
26358	4.1	3.8	4.0	4.0	4.4	4.5	3.7	4.2	3.8/	4.6	4.1	4.2	3.9	4.1	3.7								
26365	4.0	3.6	3.9	4.0	4.1	4.2/	4.1	4.0	4.1	4.0	3.9	4.2	4.0	3.5	4.1								
26370	3.5	3.3	3.3	3.5	3.7	3.6	3.4	4.1	3.7	E	3.1/	3.0	3.7	3.5									
26378	3.3	2.6	3.5	3.3	3.6/	3.4	3.5	3.4	3.4	3.6	3.5	3.2	2.9	E									
26385	3.6	2.7	E	E	3.4	4.0	3.9	3.7	4.0/	3.7	3.7	4.0	E	3.3	3.9	3.5	3.2						
26388	3.6	3.0	3.7	3.8	3.8	3.6	3.8/	3.7	3.8	3.7	3.7	3.8	3.8	2.9	3.3								
26397	3.9	3.7	4.1	E	3.9	3.6	4.0/	3.9	4.0	4.3	4.2	4.1	3.6	3.1									
26402	3.7	3.6	4.1	3.4	3.7	3.7	4.0	3.7/	3.5	3.6	3.4	3.5	4.0	3.5	3.7								
26409	3.9	3.9	3.9	3.8	3.7	4.1	E	4.1	4.2	4.2	4.2/	3.7	3.9	4.2	3.8	3.3							
26419	3.7	3.5	3.5	3.6	3.6	3.5	3.6	4.0	3.6	3.9	4.3	3.7/	3.7	3.7	4.1	3.8	3.6						
26421	3.7	3.2	3.3	3.7	3.5	4.1	4.0	3.8/	E	4.0	E	3.6	4.1	3.7	3.7	3.4	3.2	E					
26424	3.5	3.1	3.5	E	E	3.4	3.9/	3.6	3.7	3.6	3.6	3.6	E	3.6	3.5	3.2							
26435	3.6	3.4	3.6	3.9	3.7/	3.3	4.0	3.8	3.7	3.8	3.7	3.3	3.2										
26437	3.9	3.8	3.7	4.1	4.1	3.7	3.8	3.7	3.6	E /	L	4.1	4.2	4.3	3.9	3.9	3.3	3.7					
26454	3.6	E	3.4	3.3	3.4	3.3	3.6	3.8	3.5	3.7	3.7	3.2	E /	3.9	3.6	3.6	3.8	3.5					
MEAN	3.6																						
S.D.	0.29																						
S.E.	0.06																						
N	24																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX
A = FETUSES OBVIOUSLY ADVANCED BEYOND GESTATION DAY 20; WEIGHT NOT INCLUDED IN CALCULATIONS

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A15
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

PAGE 4

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:	25 MG/KG/DAY																				
26301	3.2	3.2	E	E	2.9	E	E	3.1	2.9	E /	3.7	E	3.8	3.2	2.8	3.0	E						
26306	3.3	E	2.6	3.1	2.9	3.9	3.3	3.4/	E	3.0	3.3	3.2	3.8	3.6	3.5	3.3	3.5	3.4	3.1	3.2	3.2	2.6	
26313	3.3	3.3	3.2	E	3.2	3.5	E /	E	E	3.4	E	3.1	3.6	3.8	3.3	3.0	3.2	E	E				
26324	3.6	3.4	3.7	E /	3.6																		
26325	3.3	E	3.1	3.1	E	3.2	3.0	E	E /	E	3.5	3.3	3.7	3.8	2.9	E							
26332	3.1	E	3.3	3.2	E	2.9	3.0	3.4/	E	E	3.1	3.1	3.5	E	E	3.1	2.5						
26334	3.8	4.1	3.7	E	E /	E	3.6	E	E	E													
26345	4.1	E	E	E	E	E	E	E	E /	E	E	E	E	E	E	E	4.1	E					
26353	3.2	2.7	E	E	E	3.4	E	E /	E	3.6	E	E	3.3	3.2									
26357	3.3	E	E	E	3.6	3.7	3.1	2.7/	E	E	2.8	3.3	3.7	3.4	3.8	3.0	3.6	2.7	E	E			
26372	3.1	E	3.1	2.9	3.5	3.1	3.1	3.6	E /	3.2	2.6	3.1	3.5	3.2	E	2.3							
26373	3.1	2.7	D	E	3.6	3.0	3.3	E /	E	E	E	2.9	3.1	2.9									
26379	2.8	E	E	E	E	E	E /	E	E	E	2.8	E	E	E									
26387	3.4	3.1	E	E	3.4	3.5	3.5	E	E	E /	E	E	3.0	3.3	3.6	3.4							
26390	2.7	E	E	2.8	3.0	2.6	2.3/	E	2.8	3.0	E	2.8	2.5	2.8	2.8								
26391	3.1	E	E	2.8	2.7	E	3.0	E	E	E	3.3	E /	E	E	3.1	E	3.8	3.1					
26396	0.0	E	E	E	E	E	E /	E	E	E	E	E	E	E	E	E							
26398	3.3	2.9	3.6	3.5	3.2	2.9	2.9	3.3	3.1	3.4/	3.7	3.7	3.7	3.3	3.5	L	3.1						
26399	3.1	E	E	3.0	E	3.1	3.2/	2.8	3.3	3.9	3.4	3.6	2.6	3.0	2.9	2.7	E						
26400	3.5	E	3.7	3.6/	3.2	2.9	3.4	3.7	3.6	3.9	3.3	3.7	3.4	3.2	3.4								
26404	3.1	E	2.1	3.1	E	3.2	3.3	3.1	3.1/	3.3	3.2	3.4	3.2	3.5	3.1								
26408	3.4	2.9	E	3.8	E /	E	E	E	E	3.5	E	3.5	3.2	E									
26415	3.4	3.1	E	3.4	3.3	3.2/	E	E	3.5	E	3.6	2.9	3.6	3.9	3.4	3.6							
26425	3.2	E	E	3.1	3.7	E	E	E	E	E /	3.1	3.2	E	E	E	2.7	E	3.6	3.3				
26431	2.5	2.3	2.8	2.8	E /	2.7	2.7	2.1	2.2	E	2.9	L	2.4	2.3	2.1								
MEAN	3.2																						
S.D.	0.33																						
S.E.	0.07																						
N	24																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A15
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL WEIGHTS [G]

PAGE 5

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:	50	MG/KG/DAY																			
26311	3.4	E	E	E	E	E	E	3.6	3.7	E /	E	3.5	3.1	E	3.0	E							
26326	1.8	E	E	E	E	E	1.8	E /	E	E	E	E	E	E	E	E							
26333	2.4	E	E	E	E	E	E	E	E	E	E	3.0	E /	E	E	E	E	E	2.4	E	2.1	2.0	
26339	3.0	E	E	2.7	E	E	E	E /	E	3.0	E	3.4	2.8	E									
26347	0.0	E	E	E	E	E	E /	E	E	E	E	E	E	E									
26356	2.5	E	E	E	E	E	2.3	E /	E	E	2.9	E	2.5	2.4	E								
26360	2.9	E	E	E	E	E	E	E /	E	E	E	2.9	E	2.8	E	E	L						
26376	3.1	E	E	E	E	E	E	E	E /	E	E	3.1	E	E	L	E	E	E	E				
26377	2.8	3.0	E	E	E	2.4	2.8	3.0/	E	E	E	E	E										
26382	0.0	E	E /																				
26389	1.5	E	E	E	1.4/	E	E	E	E	E	1.6	E	E	E									
26393	3.3	3.1	E	E	E	E	2.9	3.4	E	3.5	E /	E	E	E	3.1	3.3	E	3.5	3.3	E			
26394	0.0	E	E	E	E	E	E /	E	E	E	E	E	E	E									
26406	0.0	E	E	E	E	E	E	E /	E	E	E	L	E	E									
26413	0.0	E	E	E	E	E	E	E /	E	E	E	E	E	E									
26416	2.8	E	3.0	3.1	E	2.6	3.0	2.5/	3.1	E	2.7	3.1	2.5	3.4	L	2.3							
26427	3.0	E	E	E	3.2	3.4	E	E /	E	E	3.2	E	E	E	2.7	2.4	E	E					
26428	0.0	E	E	E	E	E	E /	E	E	E	E	E	E	E	E	E	E						
26436	0.0	E	E	E	E	E	E /	E	E	E	E	E	E	E									
26443	2.3	2.2	E	2.4	E	E /	E	E	2.2	E	E	E	2.2	E	E	E							
26444	0.0	E	E	E	E	E	E	E /	E	E	E	E	E	E	E	E	E						
26448	2.3	E	E	E	E	E	L	E	E /	E	E	2.1	2.2	2.5	E	E	2.5	L					
MEAN	2.7																						
S.D.	0.55																						
S.E.	0.15																						
N	14																						

E = EARLY RESORPTION L = LATE RESORPTION D = DEAD FETUS '/' DENOTES POSITION OF CERVIX

PFWTv4.15
11/23/2011
R:12/16/2011

PROJECT NO.:WIL-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 1

 DAMS FROM GROUP 1:0 MG/KG/DAY SHAM FETUS # GRADE

26302		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 M M M F M M M	
	CEPHALIC:	1,3,5,7,9,11,13	
	VISCERAL	10 V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S) URETER, LEFT	1
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	VISCERAL	1,2,3,4,5,6,7,8,9,11,12,13,14	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14	
26304		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		E A A A A A A/ A A A A A A A A	
	SEX:	- F F F M M M M M F M F F M M M	
	CEPHALIC:	2,4,6,8,10,12,14,16	
	EXTERNAL	1 EARLY RESORPTION	
	SKELETAL	4 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	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

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-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 2

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26304	(CONTINUED)		
		#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	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		2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
VISCERAL		2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
SKELETAL		2,3,7,8,14	
26309		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:	F F F F M F F - F M F F F F M F F		
CEPHALIC:	2,4,6,9,11,13,15,17		
SKELETAL	3	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 CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL	8	EARLY RESORPTION	
SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	14	V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	

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-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 3

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26309	(CONTINUED)		
	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	1,2,4,9,10,12,15,17	
26312		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
		A A A A A/ A E A A A A A A A A	
	SEX:	M M F F M M - F M F F F F M F F	
	CEPHALIC:	1,3,5,8,10,12,14,16	
	SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5 V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
	EXTERNAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 EARLY RESORPTION	
		9 V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16	
	VISCERAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16	
	SKELETAL	1,3,4,6,8,10,11,12,13,14,15,16	
26317		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/ E E A A A A A A E E	
	SEX:	M F M M M M F F - - M M F M M M F - -	
	CEPHALIC:	2,4,6,8,12,14,16	
	SKELETAL	2 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-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 4

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26317	(CONTINUED)		
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	9 EARLY RESORPTION	
	EXTERNAL	10 EARLY RESORPTION	
	SKELETAL	16 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	18 EARLY RESORPTION	
	EXTERNAL	19 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,11,12,13,14,15,16,17	
	VISCERAL	1,2,3,4,5,6,7,8,11,12,13,14,15,16,17	
	SKELETAL	1,3,4,6,7,8,11,12,13,14,15,17	
26318		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 F M M M M F F M F F M F F	
	CEPHALIC:	1,3,5,7,9,11,13	
	SKELETAL	7 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
		#3 THROUGH #5	
	SKELETAL	8 V HYOID UNOSSIFIED	P
		V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12 V CERVICAL CENTRUM #1 OSSIFIED	P
	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	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL	1,2,3,4,5,6,10,11,13	
26327		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 F M M F F M M F F M M M M F	
	CEPHALIC:	2,4,6,8,10,12,14	

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 5

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26327	(CONTINUED)			
	SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12	V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
			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		3,4,6,7,8,10,11,13,14,15	
26330		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:	F F M M M F M M - M M F M M F M F F		
	CEPHALIC:	1,3,5,7,10,12,14,16,18		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#4	
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	9	EARLY RESORPTION	

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 6

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26330	(CONTINUED)			
	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	16	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	17	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V 14TH RUDIMENTARY RIB (S)	P
			BILATERAL	
	SKELETAL	18	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18	
	VISCERAL		1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18	
	SKELETAL		3,6,8,13,14,15	
26368		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 E A A A		
	SEX:	- F M M M M M F M F M F F - F M M		
	CEPHALIC:	2,4,6,8,10,12,15,17		
	EXTERNAL	1	EARLY RESORPTION	
	SKELETAL	2	V 14TH RUDIMENTARY RIB (S)	P
			LEFT	
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	4	V 14TH RUDIMENTARY RIB (S)	P
			LEFT	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 7

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26368	(CONTINUED)		
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		BILATERAL	
	SKELETAL	9 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13 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
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	2,3,4,5,6,7,8,9,10,11,12,13,15,16,17	
	VISCERAL	2,3,4,5,6,7,8,9,10,11,12,13,15,16,17	
	SKELETAL	6,8,10,11,12,17	
26369		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 E	
	SEX:	F M F M F F F F F M M F M F F M -	
	CEPHALIC:	2,4,6,8,10,12,14,16	
	SKELETAL	1 V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
	SKELETAL	2 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	SKELETAL	6 V CERVICAL CENTRUM #1 OSSIFIED	P
		V 14TH RUDIMENTARY RIB(S)	P
		RIGHT	
	SKELETAL	8 V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 8

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26369	(CONTINUED)		
	SKELETAL	15 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	16 V 14TH RUDIMENTARY RIB(S) LEFT	P
	EXTERNAL	17 EARLY RESORPTION	
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	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 3,4,5,7,9,10,11,12,13	
26380		1 2 3 4 5 6 7 8 9 10 11 12 13 14 E A A A/ A A A A A A A A A SEX: - F F M F M M F M F F F F M CEPHALIC: 2,4,6,8,10,12,14	
	EXTERNAL	1 EARLY RESORPTION	
	SKELETAL	2 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	8 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	14 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL	2,3,4,5,6,7,8,9,10,11,12,13,14 3,4,5,6,7,9,11,12,13	
26383		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 M M F - M F M F M M M CEPHALIC: 2,4,6,9,11,13	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 9

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26383	(CONTINUED)			
	SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	2	V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	7	EARLY RESORPTION	
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13	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	3,5,8,9,10,14		
26384		1 2 3 4 5 6 7 8 9 10 11 12 13 14		
		A A A A E/ A A A A A A A A A		
	SEX:	M M F M - F M F M M M F F M		
	CEPHALIC:	1,3,6,8,10,12,14		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	2	V CERVICAL CENTRUM #1 OSSIFIED V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P 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	5	EARLY RESORPTION	
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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TABLE A16
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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 10

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #																GRADE
26384	(CONTINUED)																	
				#5														
	SKELETAL	8	V	STERNEBRA (E)	#5 AND/OR #6 UNOSSIFIED													P
				#5														
	SKELETAL	9	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														
		NO REMARKABLE OBSERVATIONS																
	EXTERNAL	1,2,3,4,6,7,8,9,10,11,12,13,14																
	VISCERAL	1,2,3,4,6,7,8,9,10,11,12,13,14																
	SKELETAL	7,10																
26395		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:	M	F	M	F	F	F	F	F	M	F	M	F	F	F	M	M	
	CEPHALIC:	2,4,6,8,10,12,14,16																
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED															P
	SKELETAL	6	V 14TH RUDIMENTARY RIB (S)															P
			LEFT															
	SKELETAL	7	V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE)															2
			#3 AND #4															
	SKELETAL	8	V 14TH RUDIMENTARY RIB (S)															P
			LEFT															

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 11

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26395	(CONTINUED)	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	1,2,3,4,9,10,11,12,13,14,15,16	
26405		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 F F F F F M M F F F F F CEPHALIC: 2,4,6,8,10,12,13	
	SKELETAL	7 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	1,2,3,4,5,6,8,9,10,11,12,13	
26407		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 SEX: M M M F M M F F M M M M M F M M CEPHALIC: 2,4,6,8,10,12,14,16	
	VISCERAL	1 M SITUS INVERSUS TRACHEA, ESOPHAGUS, HEART, GREAT AND MAJOR VESSELS, LUNGS, LIVER, STOMACH, PANCREAS, SPLEEN, KIDNEYS, ADRENALS AND INTESTINE Laterally transposed	P
	SKELETAL	5 V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE) #3 AND #4	1
	SKELETAL	6 V 14TH RUDIMENTARY RIB (S) RIGHT	P
	SKELETAL	7 V 14TH RUDIMENTARY RIB (S)	P

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 12

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26407	(CONTINUED)			
	SKELETAL	10	RIGHT V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	11	V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	13	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	16	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #4 THROUGH #7, BILATERAL	1
			M STERNEBRA(E) MALALIGNED (SEVERE) #2 AND #3; RIGHT COSTAL CARTILAGES #1 AND #2 FUSED AND ASSOCIATE WITH STERNUM IN NORMAL #1 POSITION; NO RIGHT COSTAL CARTILAGE ASSOCIATES IN NORMAL #2 POSITION	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	VISCERAL		2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
	SKELETAL		1,2,3,4,8,9,12,14,15	
26420			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 A A A A E A A A/ A A A A A A A SEX: F F F M - M F M M F M M M F F CEPHALIC: 1,3,6,8,12,14	
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	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	P

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 SPONSOR:AMERICAN PETROLEUM INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

 DAMS FROM GROUP 1:0 MG/KG/DAY SHAM FETUS # GRADE

26420 (CONTINUED)

			#5		
EXTERNAL	5		EARLY RESORPTION		
SKELETAL	6		V CERVICAL CENTRUM #1 OSSIFIED		P
SKELETAL	7		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
SKELETAL	8		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
SKELETAL	12		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
			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			9,10,11,13,14,15		

26426

	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:	M	M	M	F	F	F	F	F	M	M	M	M	M	M	M	M
CEPHALIC:	1	3	5	7	9	11	13	15								
SKELETAL				4												P
SKELETAL				5												P
VISCERAL				7												P
SKELETAL				14												P
EXTERNAL																
VISCERAL																
SKELETAL																

26430

	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	F	F	F	F	F	M	M	M	M	M
CEPHALIC:	1	3	5	7	9	11	13						

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 14

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #	GRADE
26430	(CONTINUED)		
	SKELETAL	10 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12 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	1,2,3,4,5,6,7,8,9,11,13	
26432		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A E A A A A A/ A E A A A A A	
	SEX:	F - F M F M F M - M M M F M M	
	CEPHALIC:	1,4,6,8,11,13,15	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
	EXTERNAL	2 EARLY RESORPTION	
	EXTERNAL	9 EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,3,4,5,6,7,8,10,11,12,13,14,15	
	VISCERAL	1,3,4,5,6,7,8,10,11,12,13,14,15	
	SKELETAL	3,4,5,6,7,8,10,11,12,13,14,15	
26433		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	
		A A E E A A A A/ E E E A A A A E E A	
	SEX:	M F - - F M F F - - - M M M M - - M	
	CEPHALIC:	2,6,8,13,15	
	EXTERNAL	3 EARLY RESORPTION	
	EXTERNAL	4 EARLY RESORPTION	
	EXTERNAL	6 M LOCALIZED FETAL EDEMA	
		NECK AND THORAX	

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

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26433	(CONTINUED)			
	VISCERAL	6	CONFIRMATION OF LOCALIZED FETAL EDEMA	P
	SKELETAL		V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #4 THROUGH #7, BILATERAL	
			V PUBIS UNOSSIFIED	P
			BILATERAL	
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
			#2 THROUGH #4	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			M STERNOSCHISIS	P
			STERNAL BANDS #1 AND #2 NOT JOINED	
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	14	V PUBIS UNOSSIFIED	P
			BILATERAL	
			V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
			M STERNOSCHISIS	P
			STERNAL BANDS #5 AND #6 NOT JOINED	
	EXTERNAL	16	EARLY RESORPTION	
	EXTERNAL	17	EARLY RESORPTION	
	SKELETAL	18	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
			V REDUCED OSSIFICATION OF THE SKULL	2
			ZYGOMATIC ARCH, LEFT	

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 16

DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26433	(CONTINUED)			
	SKELETAL	18	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #4 THROUGH #7, BILATERAL	
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
			V PUBIS UNOSSIFIED	P
			BILATERAL	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,5,7,8,12,13,14,15,18	
	VISCERAL		1,2,5,7,8,12,13,14,15,18	
	SKELETAL		1,2,5,15	
26434		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		
		E E A A A A A A A/ A A A A A A A		
	SEX:	- - M M M F M M F F F M F M F F		
	CEPHALIC:	3,5,7,9,11,13,15		
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			BILATERAL	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26434	(CONTINUED)			
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13	V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	15	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) BILATERAL	P P
	SKELETAL	16	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT	P P
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	3,4,5,6,7,8,9,10,11,12,13,14,15,16		
	VISCERAL	3,4,5,6,7,8,9,10,11,12,13,14,15,16		
	SKELETAL	3,9,14		
26447		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 E A A		
	SEX:	M M - M F F M M F F M M - M M		
	CEPHALIC:	2,5,7,9,11,14		
	SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P P
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8	V 14TH RUDIMENTARY RIB(S) LEFT	P
			V CERVICAL CENTRUM #1 OSSIFIED	P

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26447	(CONTINUED)			
	SKELETAL	9	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
	SKELETAL	10	#5 AND #6 V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE)	2
	SKELETAL	12	#3 V 14TH RUDIMENTARY RIB (S)	P
	EXTERNAL	13	BILATERAL EARLY RESORPTION	
	EXTERNAL		NO REMARKABLE OBSERVATIONS	
	VISCERAL		1,2,4,5,6,7,8,9,10,11,12,14,15	
	SKELETAL		1,2,4,5,6,7,8,9,10,11,12,14,15 2,4,5,11,14,15	
26451		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:	M M M M M M F M F F F F F M M M		
	CEPHALIC:	2,4,6,8,10,12,14,16		
	SKELETAL	2	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
			V 14TH RUDIMENTARY RIB (S)	P
			LEFT	
	SKELETAL	7	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8	V 14TH RUDIMENTARY RIB (S)	P
			BILATERAL	
	SKELETAL	9	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP		1:0 MG/KG/DAY SHAM	FETUS #		GRADE
26451	(CONTINUED)				
	SKELETAL		10	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 14TH RUDIMENTARY RIB(S)	P
				RIGHT	
	SKELETAL		15	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			1,6,16	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26303		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		A A A E A/ A A A A A A A A A		
	SEX:	F F F - M M F F M F F F M F F		
	CEPHALIC:	2,5,7,9,11,13,15		
	SKELETAL	3	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #4 AND #5	1
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #3 AND #4, MODERATE; #5, SLIGHT	P
			V REDUCED OSSIFICATION OF THE 13TH RIB(S) RIGHT	1
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
			V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12	V REDUCED OSSIFICATION OF THE 13TH RIB(S) RIGHT	1
	SKELETAL	13	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #2 THROUGH #4	1
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 21

 DAMS FROM GROUP 2:0 MG/KG/DAY VEH. FETUS # GRADE

26303 (CONTINUED)

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 1,2,7,9,10

26305

1 2 3 4 5 6 7 8 9 10 11 12 13 14
 E A A A A A A A A/ A A A A A
 SEX: - F M F F F M F M F M F F F
 CEPHALIC: 3,5,7,9,11,13

EXTERNAL 1 EARLY RESORPTION

NO REMARKABLE OBSERVATIONS

EXTERNAL 2,3,4,5,6,7,8,9,10,11,12,13,14
 VISCERAL 2,3,4,5,6,7,8,9,10,11,12,13,14
 SKELETAL 2,3,4,5,6,7,8,9,10,11,12,13,14

26315

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
 E E E A A A/ A A A A E A A A A
 SEX: - - - M M M M M F M M - F F M M
 CEPHALIC: 5,7,9,11,14,16

EXTERNAL 1 EARLY RESORPTION

EXTERNAL 2 EARLY RESORPTION

EXTERNAL 3 EARLY RESORPTION

VISCERAL 6 V HEMORRHAGIC RING AROUND THE IRIS

P

SKELETAL 7 V 14TH RUDIMENTARY RIB(S)
 BILATERAL

P

SKELETAL 8 V 14TH RUDIMENTARY RIB(S)
 BILATERAL

P

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 22

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26315	(CONTINUED)		
	SKELETAL	9 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	11 V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
	EXTERNAL	12 EARLY RESORPTION	
	SKELETAL	16 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	4,5,6,7,8,9,10,11,13,14,15,16	
	VISCERAL	4,5,7,8,9,10,11,13,14,15,16	
	SKELETAL	4,5,6,10,13,14,15	
26322		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: M F M F F F M F M F M M M F M F CEPHALIC: 1,3,5,7,9,11,13,15	
	SKELETAL	6 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	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	1,2,3,4,5,7,8,9,10,11,12,13,14,15,16	
26331		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 SEX: F M M M F M M M F M M F - F F CEPHALIC: 2,4,6,8,10,12,15	

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26331	(CONTINUED)			
	SKELETAL	1	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	SKELETAL	2	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	5	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB (S)	P
			LEFT	
	SKELETAL	12	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	13	EARLY RESORPTION	
	SKELETAL	15	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,9,10,11,12,14,15	
	VISCERAL		1,2,3,4,5,6,7,8,9,10,11,12,14,15	
	SKELETAL		3,4,6,7,8,10,11,14	
26336		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:	M F M M F M M F M M F F F M F M		
	CEPHALIC:	1,3,5,7,9,11,13,15		
	SKELETAL	5	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	14	V 14TH RUDIMENTARY RIB (S)	P
			LEFT	

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OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 24

 DAMS FROM GROUP 2:0 MG/KG/DAY VEH. FETUS # GRADE

26336 (CONTINUED)

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 1,2,3,4,6,7,8,11,12,13,15,16

26337

1 2 3 4 5 6 7 8 9 10 11 12 13 14
 E A A A A A/ A A A A A A A A
 SEX: - M M F M M F M M M M F F M
 CEPHALIC: 3,5,7,9,11,13

EXTERNAL 1 EARLY RESORPTION
 SKELETAL 12 V CERVICAL CENTRUM #1 OSSIFIED

P

NO REMARKABLE OBSERVATIONS

EXTERNAL 2,3,4,5,6,7,8,9,10,11,12,13,14
 VISCERAL 2,3,4,5,6,7,8,9,10,11,12,13,14
 SKELETAL 2,3,4,5,6,7,8,9,10,11,13,14

26342

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
 SEX: M M F M M M M F M F M F M F M M F
 CEPHALIC: 1,3,5,7,9,11,13,15,17

SKELETAL 4 V 14TH RUDIMENTARY RIB(S)
 RIGHT

P

SKELETAL 6 V REDUCED OSSIFICATION OF THE SKULL
 SUPRAOCCIPITAL

1

SKELETAL 7 V 14TH RUDIMENTARY RIB(S)
 LEFT

P

SKELETAL 9 V 14TH RUDIMENTARY RIB(S)
 BILATERAL

P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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PROJECT NO.:WIL-402016
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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 25

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26342	(CONTINUED)		
	SKELETAL	13 V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	14 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	15 V 14TH RUDIMENTARY RIB(S) RIGHT	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	1,2,3,5,8,10,11,12,16,17	
26344		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 A A A A E A A A/ A A A A A A A SEX: M F F F - M M F M F M F F F M CEPHALIC: 1,3,6,8,10,12,14	
	SKELETAL	3 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	5 EARLY RESORPTION	
		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	1,2,4,6,7,8,9,10,11,12,13,14,15	
26346		1 2 3 4 5 6 7 8 9 10 11 12 13 14 A A A A A A E A/ E A A A A A SEX: F M M M F F - M - M F M F F CEPHALIC: 1,3,5,8,11,13	
	SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P

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TABLE A16
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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 26

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26346	(CONTINUED)			
	SKELETAL	2	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	5	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	7	EARLY RESORPTION	
	SKELETAL	8	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	9	EARLY RESORPTION	
	SKELETAL	14	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,8,10,11,12,13,14	
	VISCERAL		1,2,3,4,5,6,8,10,11,12,13,14	
	SKELETAL		3,4,6,10,11,12,13	
26350		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 A A A A A E		
	SEX:	F M M F F M - - M F F M M F F -		
	CEPHALIC:	1,3,5,9,11,13,15		
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	16	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,9,10,11,12,13,14,15	
	VISCERAL		1,2,3,4,5,6,9,10,11,12,13,14,15	
	SKELETAL		1,2,3,4,5,6,9,11,12,13,14,15	
26352		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 F F F M M M M F M F F		
	CEPHALIC:	1,3,5,7,9,11,13		

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 27

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26352	(CONTINUED)			
	SKELETAL	2	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	4	V 14TH RUDIMENTARY RIB(S) RIGHT	P
	SKELETAL	5	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) BILATERAL	P P
	SKELETAL	9	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	12	V 14TH RUDIMENTARY RIB(S) LEFT	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		1,3,7,8,13	
26366		1 2 3 4 5 6 7 8 9 10 11 12		
		A A A A/ A A A A A A A		
	SEX:	F F F M M F M F F M M F		
	CEPHALIC:	1,3,5,7,9,11		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 28

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26366	(CONTINUED)		
		#5	
SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	6	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 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	
		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		4,9,12	
26371		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		A A A A A E A A A/ A A A A A A	
	SEX:	M M F M M - M F F F F F F M F	
	CEPHALIC:	2,4,7,9,11,13,15	
SKELETAL	1	V BENT RIB(S)	1
		#5 THROUGH #11, RIGHT; #8 THROUGH #10, LEFT	
SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	4	V PUBIS UNOSSIFIED	P
		BILATERAL	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 29

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26371	(CONTINUED)			
	SKELETAL	4	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	6	EARLY RESORPTION	
	SKELETAL	7	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB (S)	P
			RIGHT	
	SKELETAL	9	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
			V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	12	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	14	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
	SKELETAL	15	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15	
	VISCERAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15	
	SKELETAL		5,13	
26386		1 2		
		A A/		
	SEX:	M M		
	CEPHALIC:	1		

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 30

 DAMS FROM GROUP 2:0 MG/KG/DAY VEH. FETUS # GRADE

26386 (CONTINUED)

NO REMARKABLE OBSERVATIONS

EXTERNAL 1,2
 VISCERAL 1,2
 SKELETAL 1,2

26392

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 F F F M F F F M M M F M
 CEPHALIC: 1,3,5,7,9,11,13

SKELETAL 2 V 14TH RUDIMENTARY RIB(S) LEFT P

SKELETAL 3 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 P

SKELETAL 4 V CERVICAL CENTRUM #1 OSSIFIED P

SKELETAL 5 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 P

SKELETAL 6 V CERVICAL CENTRUM #1 OSSIFIED P

SKELETAL 8 V CERVICAL CENTRUM #1 OSSIFIED P

SKELETAL 12 V CERVICAL CENTRUM #1 OSSIFIED P

V 14TH RUDIMENTARY RIB(S) RIGHT P

SKELETAL 13 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
 VISCERAL 1,2,3,4,5,6,7,8,9,10,11,12,13
 SKELETAL 1,7,9,10,11

26403

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
 SEX: F M M M F F M F M F F F M
 CEPHALIC: 2,4,6,8,10,12

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 SPONSOR: AMERICAN PETROLEUM

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 31

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26403	(CONTINUED)		
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	8 V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE) #3 AND #4	1
	SKELETAL	11 V 14TH RUDIMENTARY RIB (S) RIGHT	P
	SKELETAL	13 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS	
	VISCERAL	1,2,3,4,5,6,7,8,9,10,11,12,13	
	SKELETAL	1,2,3,4,5,6,7,8,9,10,11,12,13 1,2,3,4,6,7,9,10,12	
26414		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: M M F M M F F F F F F F F F F F F CEPHALIC: 1,3,5,7,9,11,13,15	
	SKELETAL	4 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 14TH RUDIMENTARY RIB (S) LEFT	P
	SKELETAL	9 V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	10 V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	11 V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12 V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #4 THROUGH #7, BILATERAL	1

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 32

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26414	(CONTINUED)		
	SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	16 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		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	1,2,3,5,8,13,15	
26418		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 E A A A A	
	SEX:	F M F F M M M M - M M M - M M M M F	
	CEPHALIC:	1,3,5,7,10,12,15,17	
	SKELETAL	1 V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
		CERVICAL #3 THROUGH #7, BILATERAL	
		V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P
		#2 AND #4	
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5 AND #6	
	SKELETAL	5 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	9 EARLY RESORPTION	
	SKELETAL	11 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	13 EARLY RESORPTION	
	SKELETAL	17 V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,7,8,10,11,12,14,15,16,17,18	
	VISCERAL	1,2,3,4,5,6,7,8,10,11,12,14,15,16,17,18	
	SKELETAL	2,3,4,6,7,8,10,12,14,15,16,18	
26423		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 E A E A	
	SEX:	M M F M M M - F M F M - M - M	
	CEPHALIC:	2,4,6,9,11,15	

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PAGE 33

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26423	(CONTINUED)		
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	12	EARLY RESORPTION
	EXTERNAL	14	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,3,4,5,6,8,9,10,11,13,15	
	VISCERAL	1,2,3,4,5,6,8,9,10,11,13,15	
	SKELETAL	1,2,3,4,5,6,8,9,10,11,13,15	
26438		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 F M M F M F M M M F F F M M	
	CEPHALIC:	1,3,5,7,9,11,13,15	
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	4	V 14TH RUDIMENTARY RIB(S)
		LEFT	
		V 7TH CERVICAL RIB(S)	
		PINPOINT, RIGHT	
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	11	V 14TH RUDIMENTARY RIB(S)
		BILATERAL	
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED
		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	1,2,5,6,8,10,13,15	
26439		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 E E/ A A A A A A A A	
	SEX:	M F M F M F M F - - M F F F F F M M F	
	CEPHALIC:	2,4,6,8,12,14,16,18	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 34

DAMS FROM GROUP	2:0 MG/KG/DAY VEH.	FETUS #		GRADE
26439	(CONTINUED)			
	SKELETAL	1	V HYOID UNOSSIFIED	P
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	15	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	16	V 14TH RUDIMENTARY RIB (S)	P
			LEFT	
	SKELETAL	18	V 14TH RUDIMENTARY RIB (S)	P
			LEFT	
	SKELETAL	19	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,8,11,12,13,14,15,16,17,18,19	
	VISCERAL		1,2,3,4,5,6,7,8,11,12,13,14,15,16,17,18,19	
	SKELETAL		2,3,4,5,6,7,8,11,12,13,14,17	
26442		1 2 3 4 5 6 7 8 9 10 11 12 13		
		A A A A A A E E/ A A A A A		
	SEX:	M F M F F M - - M M F F M		
	CEPHALIC:	1,3,5,9,11,13		
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB (S)	P
			BILATERAL	
	SKELETAL	6	V BENT RIB (S)	1
			#5 THROUGH #11, RIGHT; #5 THROUGH #8 AND #11, LEFT	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP		2:0 MG/KG/DAY VEH.	FETUS #	GRADE
26442	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,9,10,11,12,13	
	VISCERAL		1,2,3,4,5,6,9,10,11,12,13	
	SKELETAL		1,2,4,5,9,10,11,12,13	
26453			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	
	SEX:	M F M M M F M F M F M M F M		
	CEPHALIC:	2,4,6,8,10,12,14		
	SKELETAL	8	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		1,2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		1,2,3,4,5,6,7,9,10,11,12,13,14	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26316			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 M M M F M M M F M F F CEPHALIC: 1,3,5,7,9,11,13,15	
		SKELETAL	1 V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		SKELETAL	9 V 14TH RUDIMENTARY RIB(S) LEFT	P
		SKELETAL	11 V 14TH RUDIMENTARY RIB(S) BILATERAL	P
		SKELETAL	14 V CERVICAL CENTRUM #1 OSSIFIED	P
		SKELETAL	15 V 14TH RUDIMENTARY RIB(S) BILATERAL	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	2,3,4,5,6,7,8,10,12,13	
26319			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E A E A A A/ A A A A A A A A SEX: - M - F F M M M M M M F M M CEPHALIC: 4,6,8,10,12,14	
		EXTERNAL	1 EARLY RESORPTION	
		SKELETAL	2 V CERVICAL CENTRUM #1 OSSIFIED	P
		EXTERNAL	3 EARLY RESORPTION	
		SKELETAL	4 V CERVICAL CENTRUM #1 OSSIFIED	P
		SKELETAL	7 V CERVICAL CENTRUM #1 OSSIFIED	P

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26319	(CONTINUED)			
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	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
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15	V CERVICAL CENTRUM #1 OSSIFIED	P
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	2,4,5,6,7,8,9,10,11,12,13,14,15		
	VISCERAL	2,4,5,6,7,8,9,10,11,12,13,14,15		
	SKELETAL	5,6,12		
26320		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 A		
	SEX:	M F F F M F - F F F M F F M F		
	CEPHALIC:	1,3,5,8,10,12,14		
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5		
	EXTERNAL	7	EARLY RESORPTION	
	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 CERVICAL CENTRUM #1 OSSIFIED		P
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15		
	VISCERAL	1,2,3,4,5,6,8,9,10,11,12,13,14,15		
	SKELETAL	1,3,4,5,6,8,9,10,11,12,15		
26323		1 2 3 4 5 6 7 8 9 10 11 12		
		A A E A A A A/ A A A E A		
	SEX:	M F - M M F M M F F - M		
	CEPHALIC:	2,5,7,9,12		

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 38

DAMS FROM GROUP	3: 5 MG/KG/DAY	FETUS #	GRADE
26323	(CONTINUED)		
	EXTERNAL	3	EARLY RESORPTION
	SKELETAL	4	V 14TH RUDIMENTARY RIB(S) BILATERAL
	EXTERNAL	11	EARLY RESORPTION
			NO REMARKABLE OBSERVATIONS
	EXTERNAL	1,2,4,5,6,7,8,9,10,12	
	VISCERAL	1,2,4,5,6,7,8,9,10,12	
	SKELETAL	1,2,5,6,7,8,9,10,12	
26328		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 F F M F F F M F M F M F CEPHALIC: 1,3,5,7,9,11,13	
		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	1,2,3,4,5,6,7,8,9,10,11,12,13	
26329		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: M F F M M F M F F M F F M M F M CEPHALIC: 2,4,6,8,10,12,14,16	
	SKELETAL	1	V 14TH RUDIMENTARY RIB(S) LEFT
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #		GRADE
26329	(CONTINUED)				
	SKELETAL		8	V CERVICAL CENTRUM #1 OSSIFIED	P
				V 14TH RUDIMENTARY RIB(S)	P
				BILATERAL	
	SKELETAL		9	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		12	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		14	V 14TH RUDIMENTARY RIB(S)	P
				LEFT	
	SKELETAL		15	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		16	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			2,4,6,7,11,13	
26341			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 E L/ A A A A A A A		
	SEX:		F M M F F F - F - - M M M M F M F		
	CEPHALIC:		2,4,6,11,13,15,17		
	SKELETAL		1	V 7TH CERVICAL RIB(S)	P
				INTERMEDIATE, BILATERAL	
				V 25 PRESACRAL VERTEBRAE	P
				V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
				BILATERAL	
				V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
				#5	
	SKELETAL		3	V 7TH CERVICAL RIB(S)	P
				PINPOINT, BILATERAL	
				V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3: 5 MG/KG/DAY	FETUS #		GRADE
26341	(CONTINUED)			
			#5	
SKELETAL			V 25 PRESACRAL VERTEBRAE	P
SKELETAL		4	V 25 PRESACRAL VERTEBRAE	P
			V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
			BILATERAL	
EXTERNAL		7	EARLY RESORPTION	
SKELETAL		8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V 7TH CERVICAL RIB(S)	P
			PINPOINT, BILATERAL	
			V 25 PRESACRAL VERTEBRAE	P
EXTERNAL		9	EARLY RESORPTION	
EXTERNAL		10	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.4 CM, MUMMIFIED	
SKELETAL		11	V 25 PRESACRAL VERTEBRAE	P
SKELETAL		12	V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
SKELETAL		13	V 25 PRESACRAL VERTEBRAE	P
			V 7TH CERVICAL RIB(S)	P
			PINPOINT, LEFT	
SKELETAL		14	V 25 PRESACRAL VERTEBRAE	P
			V REDUCED OSSIFICATION OF THE 13TH RIB(S)	1
			RIGHT	
			V 7TH CERVICAL RIB(S)	P
			PINPOINT, RIGHT	
SKELETAL		15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V 7TH CERVICAL RIB(S)	P
			PINPOINT, BILATERAL	
SKELETAL		16	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 41

DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26341	(CONTINUED)			
			#5	
SKELETAL		17	V 7TH CERVICAL RIB(S) PINPOINT, BILATERAL	P
			V REDUCED OSSIFICATION OF THE 13TH RIB(S) BILATERAL	2
			V 25 PRESACRAL VERTEBRAE	P
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			1,2,3,4,5,6,8,11,12,13,14,15,16,17	
VISCERAL			1,2,3,4,5,6,8,11,12,13,14,15,16,17	
SKELETAL			2,5,6	
26343			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 E A A A A A	
SEX:			M M M M M M M M M M - M M M F F	
CEPHALIC:			2,4,6,8,10,13,15	
SKELETAL		7	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		9	V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL		11	EARLY RESORPTION	
SKELETAL		12	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		13	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S) RIGHT	P
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			1,2,3,4,5,6,7,8,9,10,12,13,14,15,16	
VISCERAL			1,2,3,4,5,6,7,8,9,10,12,13,14,15,16	
SKELETAL			1,2,3,4,5,6,8,10,14,15,16	
26351			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 A A A A A	
SEX:			M F F F F M - - M M M F M F M F	
CEPHALIC:			2,4,6,10,12,14,16	

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26351	(CONTINUED)			
	SKELETAL	4	V 7TH CERVICAL RIB(S) INTERMEDIATE, RIGHT	P
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,9,10,11,12,13,14,15,16	
	VISCERAL		1,2,3,4,5,6,9,10,11,12,13,14,15,16	
	SKELETAL		1,2,3,6,9,10,12,13,14,16	
26354			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 A A A A A A E/ E A A E A A L A A SEX: M M M M F F - - M M F - M F - F F CEPHALIC: 1,3,5,9,11,14,17	
	VISCERAL	1	M SITUS INVERSUS TRACHEA, ESOPHAGUS, HEART, GREAT AND MAJOR VESSELS, LUNGS, LIVER, STOMACH, PANCREAS, SPLEEN, KIDNEYS, ADRENALS AND INTESTINE Laterally transposed	P
	SKELETAL		M VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY RIGHT CERVICAL ARCH AND CENTRUM #4 ABSENT; RIGHT HALF OF THORACIC CENTRUM #13 ABSENT; LEFT CERVICAL ARCHES #4 AND #5 FUSED; RIGHT THORACIC ARCH #13 SMALL; RIGHT HALF OF THORACIC CENTRUM #12 SMALL; RIGHT LUMBAR ARCH AND HALF OF CENTRUM #1 LARGER AND LOCATED MORE ANTERIOR THAN NORMAL V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3: 5 MG/KG/DAY	FETUS #		GRADE
26354	(CONTINUED)			
	SKELETAL	2	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
			V 14TH RUDIMENTARY RIB(S) BILATERAL	P
			M VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY LEFT HALF OF LUMBAR CENTRUM #1 ABSENT; LEFT LUMBAR ARCH #1 SMALL; LEFT LUMBAR ARCH AND HALF OF CENTRUM #2 LARGER AND LOCATED MORE ANTERIOR THAN NORMAL	P
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #6	P
	SKELETAL	3	V REDUCED OSSIFICATION OF THE 13TH RIB(S) BILATERAL	2
			V 25 PRESACRAL VERTEBRAE	P
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
			V REDUCED OSSIFICATION OF THE 13TH RIB(S) LEFT	1
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	10	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #3 THROUGH #7, BILATERAL	1
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
	EXTERNAL	12	EARLY RESORPTION	
	SKELETAL	13	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #3 THROUGH #5	1
	EXTERNAL	15	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.3 CM, MUMMIFIED	
	SKELETAL	16	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26354	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,9,10,11,13,14,16,17	
	VISCERAL		2,3,4,5,6,9,10,11,13,14,16,17	
	SKELETAL		4,5,9,11,14,17	
26358			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 M M F M F M F F F M F	
	CEPHALIC:		1,3,5,7,9,11,13	
	SKELETAL		4 V CERVICAL CENTRUM #1 OSSIFIED	P
			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		1,2,3,5,6,7,8,9,10,11,12,13,14	
26365			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	
	SEX:		F M F F F M F M M M M M F M	
	CEPHALIC:		2,4,6,8,10,12,14	
	SKELETAL		1 V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL		5 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		6 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		7 V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	SKELETAL		8 V CERVICAL CENTRUM #1 OSSIFIED	P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3: 5 MG/KG/DAY	FETUS #		GRADE
26365	(CONTINUED)			
	SKELETAL	8	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT	P P
	SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) RIGHT	P P
			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		2,3,4,9,10,12,14	
26370		1 2 3 4 5 6 7 8 9 10 11 12 13		
		A A A A A A A A E A/ A A A		
	SEX:	M F M M M F M F - M M M F		
	CEPHALIC:	1,3,5,7,10,12		
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT	P P
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) BILATERAL	P P
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	11	M MICROPTHALMIA AND/OR ANOPHTHALMIA RIGHT	
	VISCERAL		CONFIRMATION OF MICROPTHALMIA	P

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PROJECT NO.:WIL-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 46

DAMS FROM GROUP	3: 5 MG/KG/DAY	FETUS #		GRADE
26370	(CONTINUED)			
	SKELETAL	11	CONFIRMATION OF MICROPTHALMIA ORBIT SMALLER THAN NORMAL, RIGHT V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #4 AND #5	P
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	NO REMARKABLE OBSERVATIONS		
	VISCERAL	1,2,3,4,5,6,7,8,10,12,13		
	SKELETAL	1,2,3,4,5,6,7,8,10,12,13		
26378		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 E		
	CEPHALIC:	F F F F F M F F F M F F -		
		1,3,5,7,9,11		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
			V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED #2	P
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	10	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26378	(CONTINUED)			
	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	3,5,6,8,9		
26385		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 E A A A A		
	SEX:	F - - F M M F F M M M - M M F F		
	CEPHALIC:	4,6,8,10,13,15		
	SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) RIGHT	P P
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	5	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) RIGHT	P P
	SKELETAL	8	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	10	V 14TH RUDIMENTARY RIB(S) LEFT	P
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	12	EARLY RESORPTION	
	SKELETAL	15	V 14TH RUDIMENTARY RIB(S) LEFT	P

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 48

DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26385	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,4,5,6,7,8,9,10,11,13,14,15,16	
	VISCERAL		1,4,5,6,7,8,9,10,11,13,14,15,16	
	SKELETAL		4,6,9,13,14,16	
26388				
			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	
	SEX:		F M F M F M F M F F M M M F	
	CEPHALIC:		1,3,5,7,9,11,13	
	SKELETAL		9 V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #3	1
	SKELETAL		10 V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) BILATERAL	P P
			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		1,2,3,4,5,6,7,8,11,12,13,14	
26397				
			1 2 3 4 5 6 7 8 9 10 11 12 13	
			A A E A A A/ A A A A A A A	
	SEX:		F M - F F M F M M M F M F	
	CEPHALIC:		2,5,7,9,11,13	
	SKELETAL		1 V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL		2 V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL		3 EARLY RESORPTION	
	SKELETAL		4 V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S)	P P

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5	MG/KG/DAY	FETUS #		GRADE											
26397	(CONTINUED)																
	SKELETAL	5	V BILATERAL 14TH RUDIMENTARY RIB(S)			P											
	SKELETAL	7	V BILATERAL 14TH RUDIMENTARY RIB(S)			P											
	SKELETAL	10	V RIGHT CERVICAL CENTRUM #1 OSSIFIED			P											
			V 14TH RUDIMENTARY RIB(S)			P											
	SKELETAL	13	V BILATERAL CERVICAL CENTRUM #1 OSSIFIED			P											
	EXTERNAL	NO REMARKABLE OBSERVATIONS															
	VISCERAL	1,2,4,5,6,7,8,9,10,11,12,13															
	SKELETAL	1,2,4,5,6,7,8,9,10,11,12,13															
		6,8,9,11,12															
26402		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	SEX:	A	A	A	A	A	A	A/	A	A	A	A	A	A	A		
	CEPHALIC:	F	M	F	M	M	M	F	F	F	F	M	F	F			
		1,3,5,7,9,11,13															
	SKELETAL	1	V 14TH RUDIMENTARY RIB(S)														P
			RIGHT														
	SKELETAL	8	V CERVICAL CENTRUM #1 OSSIFIED														P
			V 14TH RUDIMENTARY RIB(S)														P
			LEFT														
	VISCERAL	9	RENAL PAPILLA(E) NOT FULLY DEVELOPED (WOO AND HOAR GRADE 1)														P
			BILATERAL														
			V RENAL PAPILLA(E) NOT DEVELOPED AND/OR DISTENDED URETER(S)														1
			URETER, LEFT														
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED														P

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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 50

 DAMS FROM GROUP 3: 5 MG/KG/DAY FETUS # GRADE

26402 (CONTINUED)

NO REMARKABLE OBSERVATIONS

EXTERNAL 1,2,3,4,5,6,7,8,9,10,11,12,13,14
 VISCERAL 1,2,3,4,5,6,7,8,10,11,12,13,14
 SKELETAL 2,3,4,5,6,7,9,10,11,13,14

26409

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
 A A A A A E A A A A/ A A A A A
 SEX: M M F F M - F F F F F F F F F
 CEPHALIC: 2,4,7,9,11,13,15

SKELETAL	1	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL	6	EARLY RESORPTION	
SKELETAL	9	V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	10	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
		V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL	11	V 14TH RUDIMENTARY RIB(S)	P
		LEFT	
SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
		#5	
		V CERVICAL CENTRUM #1 OSSIFIED	P

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 SPONSOR: AMERICAN PETROLEUM

TABLE A16
 RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26409	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15	
	VISCERAL		1,2,3,4,5,7,8,9,10,11,12,13,14,15	
	SKELETAL		2,4,7,8,13,14	
26419			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 F F F F M M F M M F F F M F F	
	CEPHALIC:		2,4,6,8,10,12,14,16	
			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	
26421			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 E A A A A A A E	
	SEX:		F F F F M M F - M - F M F F F F -	
	CEPHALIC:		2,4,6,9,12,14,16	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
			V 14TH RUDIMENTARY RIB(S) LEFT	P
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	17	EARLY RESORPTION	

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26421	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,4,5,6,7,9,11,12,13,14,15,16	
	VISCERAL		1,2,3,4,5,6,7,9,11,12,13,14,15,16	
	SKELETAL		1,2,3,4,5,6,7,11,12,13,14,15,16	
26424			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
			A A E E A A/ A A A A A E A A A	
	SEX:	M M - - F F F F M F F - F M F		
	CEPHALIC:	1,5,7,9,11,14		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	12	EARLY RESORPTION	
	SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	14	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,5,6,7,8,9,10,11,13,14,15	
	VISCERAL		1,2,5,6,7,8,9,10,11,13,14,15	
	SKELETAL		2,6,8,9,10	

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SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	3:	5 MG/KG/DAY	FETUS #	GRADE
26437	(CONTINUED)			
			CROWN-RUMP LENGTH: 3.5 CM, SEVERE AUTOLYSIS, NO APPARENT MALFORMATIONS	
SKELETAL	12		V 14TH RUDIMENTARY RIB(S) LEFT	P
SKELETAL	16		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			1,2,3,4,5,6,7,8,11,12,13,14,15,16,17	
VISCERAL			1,2,3,4,5,6,7,8,11,12,13,14,15,16,17	
SKELETAL			1,2,4,6,8,11,13,14,15,17	
26454			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 E/ A A A A A	
		SEX:	- M M F M M M F M M F - F F F M M	
		CEPHALIC:	2,4,6,8,10,13,15,17	
EXTERNAL	1		EARLY RESORPTION	
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
SKELETAL	5		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	6		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	8		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	11		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP 3: 5 MG/KG/DAY			FETUS #	GRADE
26454 (CONTINUED)				
			#5	
SKELETAL			V CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL		12	EARLY RESORPTION	
SKELETAL		13	V CERVICAL CENTRUM #1 OSSIFIED	P
SKELETAL		15	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
SKELETAL		17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			2,3,4,5,6,7,8,9,10,11,13,14,15,16,17	
VISCERAL			2,3,4,5,6,7,8,9,10,11,13,14,15,16,17	
SKELETAL			7,9,10,14,16	

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26301			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 A E E A E E A A E/ A E A A A A E SEX: M - - F - - M M - M - M F F M - CEPHALIC: 4,8,12,14 EXTERNAL 2 EARLY RESORPTION EXTERNAL 3 EARLY RESORPTION EXTERNAL 5 EARLY RESORPTION EXTERNAL 6 EARLY RESORPTION SKELETAL 8 V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5 P EXTERNAL 9 EARLY RESORPTION EXTERNAL 11 EARLY RESORPTION SKELETAL 12 V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE) #3 THROUGH #5 2 SKELETAL 15 V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5 P EXTERNAL 16 EARLY RESORPTION NO REMARKABLE OBSERVATIONS EXTERNAL 1,4,7,8,10,12,13,14,15 VISCERAL 1,4,7,8,10,12,13,14,15 SKELETAL 1,4,7,10,13,14	
26306			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 E A A A A A A/ E A A A A A A A A A A A SEX: - F F M M M M - F M M M F M F F M F M M M CEPHALIC: 2,4,6,9,11,13,15,17,19,21 EXTERNAL 1 EARLY RESORPTION	

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4: 25 MG/KG/DAY	FETUS #		GRADE
26306	(CONTINUED)			
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	7	V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	10	V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
			V 14TH RUDIMENTARY RIB(S)	P
			RIGHT	
	SKELETAL	13	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	
	SKELETAL	18	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	21	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		2,3,4,5,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21	
	VISCERAL		2,3,4,5,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21	
	SKELETAL		4,5,6,11,14,15,19,20	
26313		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		
		A A E A A E/ E E A E A A A A A A E E		
	SEX:	M M - F M - - - F - M M M F F F - -		
	CEPHALIC:	2,5,11,13,15		

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
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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4: 25 MG/KG/DAY	FETUS #	GRADE
26313	(CONTINUED)		
	EXTERNAL	3	EARLY RESORPTION
	EXTERNAL	6	EARLY RESORPTION
	EXTERNAL	7	EARLY RESORPTION
	EXTERNAL	8	EARLY RESORPTION
	EXTERNAL	10	EARLY RESORPTION
	EXTERNAL	17	EARLY RESORPTION
	EXTERNAL	18	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,4,5,9,11,12,13,14,15,16	
	VISCERAL	1,2,4,5,9,11,12,13,14,15,16	
	SKELETAL	1,2,4,5,9,11,12,13,14,15,16	
26324		1 2 3 4	
		A A E/ A	
	SEX:	F M - M	
	CEPHALIC:	1,4	
	EXTERNAL	3	EARLY RESORPTION
		NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,2,4	
	VISCERAL	1,2,4	
	SKELETAL	1,2,4	
26325		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
		E A A E A A E E/ E A A A A A E	
	SEX:	- F M - M M - - - F F F M F -	
	CEPHALIC:	3,6,11,13	
	EXTERNAL	1	EARLY RESORPTION
	SKELETAL	2	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)

1

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26325	(CONTINUED)			
			#2 THROUGH #5	
EXTERNAL		4	EARLY RESORPTION	
EXTERNAL		7	EARLY RESORPTION	
EXTERNAL		8	EARLY RESORPTION	
EXTERNAL		9	EARLY RESORPTION	
EXTERNAL		15	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL		2,3,5,6,10,11,12,13,14		
VISCERAL		2,3,5,6,10,11,12,13,14		
SKELETAL		3,5,6,10,11,12,13,14		
26332			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
			E A A E A A A/ E E A A A E E A A	
	SEX:	- M M - M F F - - F F M - - F F		
	CEPHALIC:	2,5,7,11,15		
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
EXTERNAL		1	EARLY RESORPTION	
EXTERNAL		4	EARLY RESORPTION	
EXTERNAL		8	EARLY RESORPTION	
EXTERNAL		9	EARLY RESORPTION	
EXTERNAL		13	EARLY RESORPTION	
EXTERNAL		14	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL		2,3,5,6,7,10,11,12,15,16		
VISCERAL		2,3,5,6,7,10,11,12,15,16		
SKELETAL		2,3,5,6,7,10,11,12,15,16		
26334			1 2 3 4 5 6 7 8 9	
			A A E E/ E A E E E	
	SEX:	M F - - - F - - -		
	CEPHALIC:	1,6		

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26334	(CONTINUED)			
	SKELETAL	2	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	1,2,6		
	VISCERAL	1,2,6		
	SKELETAL	1		
26345		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/ E E E E E E A 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	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	

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OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
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 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 61

DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26345	(CONTINUED)			
	EXTERNAL	14	EARLY RESORPTION	
	EXTERNAL	15	EARLY RESORPTION	
	SKELETAL	16	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	17	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	16		
	VISCERAL	16		
	SKELETAL			
26353		1 2 3 4 5 6 7 8 9 10 11 12 13		
		A E E E A E E/ E A E E A A		
	SEX:	F - - - F - - - F - - - F M		
	CEPHALIC:	5,12		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	1,5,9,12,13		
	VISCERAL	1,5,9,12,13		
	SKELETAL	5,9,12,13		
26357		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		
		E E E A A A A/ E E A A A A A A A E E		
	SEX:	- - - M M M F - - - F F F F M M F F - -		
	CEPHALIC:	5,7,11,13,15,17		

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 62

DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26357	(CONTINUED)			
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	6	V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE) #3 THROUGH #5	1
	SKELETAL	7	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	16	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	18	EARLY RESORPTION	
	EXTERNAL	19	EARLY RESORPTION	
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	4,5,6,7,10,11,12,13,14,15,16,17		
	VISCERAL	4,5,6,7,10,11,12,13,14,15,16,17		
	SKELETAL	5,11,12,13,14,15,17		
26372		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		E A A A A A A E/ A A A A A E A		
	SEX:	- M F F F M M - F F F F F - F		
	CEPHALIC:	2,4,6,9,11,13		
	EXTERNAL	1	EARLY RESORPTION	
	SKELETAL	4	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	12	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	14	EARLY RESORPTION	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26372	(CONTINUED)			
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		2,3,4,5,6,7,9,10,11,12,13,15	
	VISCERAL		2,3,4,5,6,7,9,10,11,12,13,15	
	SKELETAL		2,3,5,6,7,9,10,11,13,15	
26373			1 2 3 4 5 6 7 8 9 10 11 12 13	
			A D E A A A E/ E E E A A A	
	SEX:		F - - M M M - - - - F F M	
	CEPHALIC:		4,6,12	
	EXTERNAL		2	DEAD FETUS
				CROWN-RUMP LENGTH: 3.0 CM, WEIGHT: 2.67 G, FEMALE, NO APPARENT MALFORMATIONS
	EXTERNAL		3	EARLY RESORPTION
	EXTERNAL		7	EARLY RESORPTION
	EXTERNAL		8	EARLY RESORPTION
	EXTERNAL		9	EARLY RESORPTION
	EXTERNAL		10	EARLY RESORPTION
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,4,5,6,11,12,13	
	VISCERAL		1,4,5,6,11,12,13	
	SKELETAL		1,4,5,6,11,12,13	
26379			1 2 3 4 5 6 7 8 9 10 11 12 13	
			E E E E E E/ E E E A E E E	
	SEX:		- - - - - - - - F - - -	
	EXTERNAL		1	EARLY RESORPTION
	EXTERNAL		2	EARLY RESORPTION
	EXTERNAL		3	EARLY RESORPTION

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 64

DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26379	(CONTINUED)			
	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	
		NO REMARKABLE OBSERVATIONS		
	EXTERNAL	10		
	VISCERAL	10		
	SKELETAL	10		
26387		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		A E E A A A E E E/ E E A A A A		
	SEX:	F - - F M M - - - - F F M M		
	CEPHALIC:	4,6,13,15		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	SKELETAL	4	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	5	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26387	(CONTINUED)			
	EXTERNAL	10	EARLY RESORPTION	
	EXTERNAL	11	EARLY RESORPTION	
	SKELETAL	12	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		1,4,5,6,12,13,14,15	
	VISCERAL		1,4,5,6,12,13,14,15	
	SKELETAL		6,14,15	
26390			1 2 3 4 5 6 7 8 9 10 11 12 13 14	
			E E A A A A/ E A A E A A A A	
	SEX:		- - F F F F - M M - F F F M	
	CEPHALIC:		3,5,8,11,13	
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	VISCERAL	3	V MAJOR BLOOD VESSEL VARIATION	P
			RIGHT CAROTID AND RIGHT SUBCLAVIAN ARISE INDEPENDENTLY FROM	
			THE AORTIC ARCH (NO BRACHIOCEPHALIC TRUNK)	
	SKELETAL		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#6	
	SKELETAL	5	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, BILATERAL	
	SKELETAL	6	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P

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 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 66

DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26390	(CONTINUED)			
			#5	
SKELETAL	12	V	STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
SKELETAL	14	V	REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #4 THROUGH #7, BILATERAL	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL			3,4,5,6,8,9,11,12,13,14	
VISCERAL			4,5,6,8,9,11,12,13,14	
SKELETAL			4,8,9,13	
26391			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
			E E A A E A E E E A E/ E E A E A A	
	SEX:	- - M M - M - - - M - - - F - M F		
	CEPHALIC:	4,10,16		
EXTERNAL	1		EARLY RESORPTION	
EXTERNAL	2		EARLY RESORPTION	
SKELETAL	3	V	REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
		V	STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
EXTERNAL	5		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	
		V	CERVICAL CENTRUM #1 OSSIFIED	P
EXTERNAL	11		EARLY RESORPTION	
EXTERNAL	12		EARLY RESORPTION	

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 OBSERVATION CODE: M = MALFORMATION, V = VARIATION GRADE CODE: 1 = SLIGHT, 2 = MODERATE, 3 = MARKED, P = PRESENT
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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4: 25 MG/KG/DAY	FETUS #	GRADE
26391	(CONTINUED)		
	EXTERNAL	13	EARLY RESORPTION
	EXTERNAL	15	EARLY RESORPTION
	SKELETAL	16	V 14TH RUDIMENTARY RIB(S) BILATERAL
	SKELETAL	17	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5
			NO REMARKABLE OBSERVATIONS
	EXTERNAL	3,4,6,10,14,16,17	
	VISCERAL	3,4,6,10,14,16,17	
	SKELETAL	4,6,14	
26396		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

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4: 25 MG/KG/DAY	FETUS #	GRADE
26399	(CONTINUED)		
		#5	
EXTERNAL	4	EARLY RESORPTION	
SKELETAL	8	V 14TH RUDIMENTARY RIB(S) LEFT	P
		V 27 PRESACRAL VERTEBRAE	P
SKELETAL	12	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
		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		3,5,6,7,8,9,10,11,12,13,14,15	
VISCERAL		3,5,6,7,8,9,10,11,12,13,14,15	
SKELETAL		5,6,7,9,10,11,14	
26400		1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		E A A/ A A A A A A A A A A	
	SEX:	- M F F M M M M M F M M F F	
	CEPHALIC:	2,4,6,8,10,12,14	
		1	
EXTERNAL		EARLY RESORPTION	
SKELETAL	2	V 7TH CERVICAL RIB(S) PINPOINT, BILATERAL	P
		V REDUCED OSSIFICATION OF THE 13TH RIB(S)	
SKELETAL	4	BILATERAL	1
		V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1

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PROJECT NO.: WIL-402016
 SPONSOR: AMERICAN PETROLEUM

TABLE A16
 RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26400	(CONTINUED)			
			#3 THROUGH #5	
	SKELETAL	14	V 7TH CERVICAL RIB(S) PINPOINT, RIGHT	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		2,3,4,5,6,7,8,9,10,11,12,13,14	
	VISCERAL		2,3,4,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		3,5,6,7,8,9,10,11,12,13	
26404			1 2 3 4 5 6 7 8 9 10 11 12 13 14 E A A E A A A A/ A A A A A A SEX: - F M - M M F M F F M F M M CEPHALIC: 2,5,7,9,11,13	
	EXTERNAL	1	EARLY RESORPTION	
	SKELETAL	2	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	9	V 14TH RUDIMENTARY RIB(S) BILATERAL	P
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	13	V 14TH RUDIMENTARY RIB(S) LEFT	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		2,3,5,6,7,8,9,10,11,12,13,14	
	VISCERAL		2,3,5,6,7,8,9,10,11,12,13,14	
	SKELETAL		3,6,7,8,10,11,14	
26408			1 2 3 4 5 6 7 8 9 10 11 12 13 A E A E/ E E E E A E A A E SEX: M - M - - - - - M - F M - CEPHALIC: 1,9,12	

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26408	(CONTINUED)			
	EXTERNAL	2	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 14TH RUDIMENTARY RIB(S) LEFT	P
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED V 14TH RUDIMENTARY RIB(S) LEFT	P P
	EXTERNAL	13	EARLY RESORPTION	
		NO REMARKABLE	OBSERVATIONS	
	EXTERNAL	1,3,9,11,12		
	VISCERAL	1,3,9,11,12		
	SKELETAL	1,3,12		
26415		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
		A E A A A/ E E A E A A A A A		
	SEX:	M - F M F - - F - M M M M M M		
	CEPHALIC:	3,5,10,12,14		
	EXTERNAL	2	EARLY RESORPTION	
	SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	SKELETAL	4	V 14TH RUDIMENTARY RIB(S) LEFT	P
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	

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PROJECT NO.:WIL-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 72

DAMS FROM GROUP	4:	25 MG/KG/DAY	FETUS #	GRADE
26415	(CONTINUED)			
	EXTERNAL	9	EARLY RESORPTION	
	SKELETAL	13	V 14TH RUDIMENTARY RIB(S) LEFT	P
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	1,3,4,5,8,10,11,12,13,14,15		
	VISCERAL	1,3,4,5,8,10,11,12,13,14,15		
	SKELETAL	1,5,8,10,11,12,14,15		
26425		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		
		E E A A E E E E E/ A A E E E A E A A		
	SEX:	- - F M - - - - - M F - - - F - M M		
	CEPHALIC:	4,11,17		
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	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	
	SKELETAL	11	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
	EXTERNAL	14	EARLY RESORPTION	
	EXTERNAL	16	EARLY RESORPTION	

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SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP 4: 25 MG/KG/DAY FETUS # GRADE

26425 (CONTINUED)

EXTERNAL 3,4,10,11,15,17,18
VISCERAL 3,4,10,11,15,17,18
SKELETAL 3,4,15,17,18

NO REMARKABLE OBSERVATIONS

26431

1 2 3 4 5 6 7 8 9 10 11 12 13 14
A A A E/ A A A A E A L A A A
SEX: F M M - F M F F - F - M M M
CEPHALIC: 2,5,7,10,13

SKELETAL	1	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
		V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
SKELETAL	3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
EXTERNAL	4	EARLY RESORPTION	
SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
SKELETAL	8	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
EXTERNAL	9	EARLY RESORPTION	
SKELETAL	10	V 14TH RUDIMENTARY RIB(S) LEFT	P
EXTERNAL	11	LATE RESORPTION CROWN-RUMP LENGTH: 3.5 CM, SEVERE AUTOLYSIS, NO APPARENT MALFORMATIONS	
SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
		V STERNEBRA(E) #1,#2,#3 AND/OR #4 UNOSSIFIED	P

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP 4: 25 MG/KG/DAY			FETUS #	GRADE

26431	(CONTINUED)			
			#2	
	SKELETAL		V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE)	1
			#2 AND #3	
	SKELETAL	14	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,2,3,5,6,7,8,10,12,13,14	
	VISCERAL		1,2,3,5,6,7,8,10,12,13,14	
	SKELETAL		2,5,6,12	

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #													GRADE		

26311			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	A	A	E	A	E	
		SEX:	-	-	-	-	-	-	M	M	-	-	F	F	-	M	-	
		CEPHALIC:	8,12															
	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		8		V CERVICAL CENTRUM #1 OSSIFIED													P
	EXTERNAL		9		EARLY RESORPTION													
	EXTERNAL		10		EARLY RESORPTION													
	EXTERNAL		13		EARLY RESORPTION													
	SKELETAL		14		V 14TH RUDIMENTARY RIB(S)													P
					RIGHT													
	EXTERNAL		15		EARLY RESORPTION													
			NO REMARKABLE OBSERVATIONS															
	EXTERNAL		7,8,11,12,14															
	VISCERAL		7,8,11,12,14															
	SKELETAL		7,11,12															
26326			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			E	E	E	E	E	A	E/	E	E	E	E	E	E	E	E	
		SEX:	-	-	-	-	-	F	-	-	-	-	-	-	-	-	-	
		CEPHALIC:	6															
	EXTERNAL		1		EARLY RESORPTION													

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26326	(CONTINUED)			
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	SKELETAL	6	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #3 THROUGH #7, BILATERAL	2
	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	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	6		
	VISCERAL	6		
	SKELETAL			
26333		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22		
	SEX:	- - - - - - - - - - F - - - - - - - F - F F		
	CEPHALIC:	19,22		
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	

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SPONSOR:AMERICAN PETROLEUM

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26333	(CONTINUED)			
	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	
	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	
	SKELETAL	19	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	20	EARLY RESORPTION	
	SKELETAL	21	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, BILATERAL	
	SKELETAL	22	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #4 THROUGH #7, BILATERAL	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	11,19,21,22		
	VISCERAL	11,19,21,22		
	SKELETAL			
26339		1 2 3 4 5 6 7 8 9 10 11 12 13		
		E E A E E E E/ E A E A A E		
	SEX:	- - F - - - - F - M M -		
	CEPHALIC:	9,12		

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26339	(CONTINUED)			
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	SKELETAL	3	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, RIGHT; CERVICAL #4 THROUGH #7, LEFT	
			V 27 PRESACRAL VERTEBRAE	P
	EXTERNAL	4	EARLY RESORPTION	
	EXTERNAL	5	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	SKELETAL	9	V 14TH RUDIMENTARY RIB(S)	P
			LEFT	
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	12	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	13	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	3,9,11,12		
	VISCERAL	3,9,11,12		
	SKELETAL	11		
26347		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	

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TABLE A16
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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26347	(CONTINUED)			
	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
26356			1 2 3 4 5 6 7 8 9 10 11 12 13 14	
		SEX:	E E E E E A E/ E E A E A A E	
		CEPHALIC:	- - - - - F - - - M - F F -	
	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
				V 27 PRESACRAL VERTEBRAE
	EXTERNAL		7	EARLY RESORPTION
	EXTERNAL		8	EARLY RESORPTION
	EXTERNAL		9	EARLY RESORPTION
	SKELETAL		10	V 14TH RUDIMENTARY RIB (S)
				LEFT
	EXTERNAL		11	EARLY RESORPTION

P

P

P

A = VIABLE FETUS, E = EARLY RESORPTION, L = LATE RESORPTION, D = DEAD FETUS, "/" DENOTES CERVIX POSITION
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PROJECT NO.:WIL-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 80

DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26356	(CONTINUED)			
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	SKELETAL	13	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
			V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
	EXTERNAL	14	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	6,10,12,13		
	VISCERAL	6,10,12,13		
	SKELETAL			
26360				
		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/ E E E A E A E E L		
	SEX:	- - - - - - - - - - F - M - - -		
	CEPHALIC:	12		
	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 STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	

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PROJECT NO.: WIL-402016
 SPONSOR: AMERICAN PETROLEUM

TABLE A16
 RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26360	(CONTINUED)			
	EXTERNAL	13	EARLY RESORPTION	
	SKELETAL	14	V REDUCED OSSIFICATION OF THE SKULL	1
			NASAL, BILATERAL	
			V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	15	EARLY RESORPTION	
	EXTERNAL	16	EARLY RESORPTION	
	EXTERNAL	17	LATE RESORPTION	
			CROWN-RUMP LENGTH: 2.4 CM, MUMMIFIED	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	12,14		
	VISCERAL	12,14		
	SKELETAL			
26376		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		
		E E E E E E E E E/ E E A E E L E E E E		
	SEX:	- - - - - - - - - - - F - - - - - - -		
	CEPHALIC:	12		
	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	

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5: 50 MG/KG/DAY	FETUS #		GRADE
26376	(CONTINUED)			
	SKELETAL	12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	13	EARLY RESORPTION	
	EXTERNAL	14	EARLY RESORPTION	
	EXTERNAL	15	LATE RESORPTION	
			CROWN-RUMP LENGTH: 3.4 CM, SLIGHT AUTOLYSIS, NO APPARENT MALFORMATIONS	
	EXTERNAL	16	EARLY RESORPTION	
	EXTERNAL	17	EARLY RESORPTION	
	EXTERNAL	18	EARLY RESORPTION	
	EXTERNAL	19	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	12		
	VISCERAL	12		
	SKELETAL			
26377		1 2 3 4 5 6 7 8 9 10 11 12		
		A E E E A A A/ E E E E E		
	SEX:	F - - - M F F - - - -		
	CEPHALIC:	5,7		
	SKELETAL	1	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #5 THROUGH #7, BILATERAL	
			V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE)	1
			#3 AND #4	

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SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26377	(CONTINUED)			
	EXTERNAL		8	EARLY RESORPTION
	EXTERNAL		9	EARLY RESORPTION
	EXTERNAL		10	EARLY RESORPTION
	EXTERNAL		11	EARLY RESORPTION
	EXTERNAL		12	EARLY RESORPTION
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		1,5,6,7	
	VISCERAL		1,5,6,7	
	SKELETAL		6,7	
26382			1 2	
			E E/	
	SEX:		- -	
	EXTERNAL		1	EARLY RESORPTION
	EXTERNAL		2	EARLY RESORPTION
26389			1 2 3 4 5 6 7 8 9 10 11 12 13	
			E E E A/ E E E E E A E E E	
	SEX:		- - - M - - - - - F - - -	
	CEPHALIC:		10	
	EXTERNAL		1	EARLY RESORPTION
	EXTERNAL		2	EARLY RESORPTION
	EXTERNAL		3	EARLY RESORPTION
	SKELETAL		4	V REDUCED OSSIFICATION OF THE SKULL
				NASAL, BILATERAL; INTERPARIETAL; ZYGOMATIC ARCH, BILATERAL
				V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES
				CERVICAL #3 THROUGH #7, BILATERAL
				V PUBIS UNOSSIFIED
				1
				1
				P

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26389	(CONTINUED)			
			BILATERAL	
EXTERNAL		5	EARLY RESORPTION	
EXTERNAL		6	EARLY RESORPTION	
EXTERNAL		7	EARLY RESORPTION	
EXTERNAL		8	EARLY RESORPTION	
EXTERNAL		9	EARLY RESORPTION	
SKELETAL		10	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES	1
			CERVICAL #3 THROUGH #7, BILATERAL	
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
			V PUBIS UNOSSIFIED	P
			BILATERAL	
EXTERNAL		11	EARLY RESORPTION	
EXTERNAL		12	EARLY RESORPTION	
EXTERNAL		13	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
EXTERNAL		4,10		
VISCERAL		4,10		
SKELETAL				
26393				
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		
		A E E E E A A E A E/ E E E A A E A A E		
SEX:		M - - - - F M - F - - - - F M - M M -		
CEPHALIC:		6,9,15,18		
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	P

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SPONSOR:AMERICAN PETROLEUM

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RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #		GRADE
26393	(CONTINUED)				
			#5		
	SKELETAL	7	V REDUCED OSSIFICATION OF THE SKULL		1
			NASAL, BILATERAL		
	EXTERNAL	8	EARLY RESORPTION		
	SKELETAL	9	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
	EXTERNAL	10	EARLY RESORPTION		
	EXTERNAL	11	EARLY RESORPTION		
	EXTERNAL	12	EARLY RESORPTION		
	EXTERNAL	13	EARLY RESORPTION		
	SKELETAL	14	V REDUCED OSSIFICATION OF THE SKULL		1
			NASAL, BILATERAL		
			M VERTEBRAL ANOMALY WITH OR WITHOUT ASSOCIATED RIB ANOMALY		P
			LEFT ARCH AND HALF OF SACRAL CENTRUM #2 ABSENT; LEFT SACRAL		
			ARCH #1 LARGER AND LOCATED MORE POSTERIOR THAN NORMAL; LEFT		
			SACRAL ARCH #3 LARGER AND LOCATED MORE ANTERIOR THAN NORMAL		
			V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
	EXTERNAL	16	EARLY RESORPTION		
	SKELETAL	18	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED		P
			#5		
	EXTERNAL	19	EARLY RESORPTION		
			NO REMARKABLE OBSERVATIONS		
	EXTERNAL		1,6,7,9,14,15,17,18		
	VISCERAL		1,6,7,9,14,15,17,18		
	SKELETAL		1,15,17		
26394			1 2 3 4 5 6 7 8 9 10 11 12 13 14		
			E E E E E E/ E E E E E E E E		
	SEX:		- - - - - - - - - - - - - -		

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26394	(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
	EXTERNAL		12	EARLY RESORPTION
	EXTERNAL		13	EARLY RESORPTION
	EXTERNAL		14	EARLY RESORPTION
26406			1 2 3 4 5 6 7 8 9 10 11 12 13	
		SEX:	E E E E E E E E/ E E L E E	
			- - - - - - - - - - - - -	
	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	LATE RESORPTION

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 87

DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #														GRADE
26406 (CONTINUED)																	
CROWN-RUMP LENGTH: 2.5 CM, MUMMIFIED																	
EXTERNAL			12		EARLY RESORPTION												
EXTERNAL			13		EARLY RESORPTION												
26413																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	
			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												
26416																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			E	A	A	E	A	A	A/	A	E	A	A	A	A	L	A
SEX:			-	M	M	-	M	M	M	F	-	F	M	F	M	-	M
CEPHALIC:			2,5,7,10,12,15														
EXTERNAL			1		EARLY RESORPTION												
SKELETAL			2		V CERVICAL CENTRUM #1 OSSIFIED												
P																	

P

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26416	(CONTINUED)			
	SKELETAL	3	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	4	EARLY RESORPTION	
	SKELETAL	5	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	6	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	7	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	9	EARLY RESORPTION	
	SKELETAL	10	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	11	V CERVICAL CENTRUM #1 OSSIFIED	P
	SKELETAL	13	V CERVICAL CENTRUM #1 OSSIFIED	P
	EXTERNAL	14	LATE RESORPTION	
			CROWN-RUMP LENGTH: 4.0 CM, MUMMIFIED	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL		2,3,5,6,7,8,10,11,12,13,15	
	VISCERAL		2,3,5,6,7,8,10,11,12,13,15	
	SKELETAL		8,12,15	
26427			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
			E E E A A E E/ E E A E E E A A E E	
	SEX:		- - - M M - - - - M - - - M M - -	
	CEPHALIC:		5,14	
	EXTERNAL	1	EARLY RESORPTION	
	EXTERNAL	2	EARLY RESORPTION	
	EXTERNAL	3	EARLY RESORPTION	
	EXTERNAL	6	EARLY RESORPTION	
	EXTERNAL	7	EARLY RESORPTION	
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	

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SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

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DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26427	(CONTINUED)			
	SKELETAL	10	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
	EXTERNAL	11	EARLY RESORPTION	
	EXTERNAL	12	EARLY RESORPTION	
	EXTERNAL	13	EARLY RESORPTION	
	SKELETAL	14	V STERNEBRA (E) MALALIGNED (SLIGHT OR MODERATE)	1
			#3 THROUGH #5	
			V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5	
	SKELETAL	15	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED	P
			#5 AND #6	
	EXTERNAL	16	EARLY RESORPTION	
	EXTERNAL	17	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	4,5,10,14,15		
	VISCERAL	4,5,10,14,15		
	SKELETAL	4,5		
26428		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	

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PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

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INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 90

DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26428	(CONTINUED)			
	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
26436			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
26443			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
			A E A E E/ E E A E E E A E E E	
	SEX:		M - F - - - - M - - - F - - -	
	CEPHALIC:		3,12	

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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-402016 TABLE A16
 SPONSOR:AMERICAN PETROLEUM RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
 INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS PAGE 91

DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #		GRADE
26443	(CONTINUED)				
	SKELETAL		1	V REDUCED OSSIFICATION OF THE VERTEBRAL ARCHES CERVICAL #5 THROUGH #7, BILATERAL	1
				V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
	EXTERNAL		2	EARLY RESORPTION	
	SKELETAL		3	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL		4	EARLY RESORPTION	
	EXTERNAL		5	EARLY RESORPTION	
	EXTERNAL		6	EARLY RESORPTION	
	EXTERNAL		7	EARLY RESORPTION	
	SKELETAL		8	V STERNEBRA(E) MALALIGNED(SLIGHT OR MODERATE) #5	1
	EXTERNAL		9	EARLY RESORPTION	
	EXTERNAL		10	EARLY RESORPTION	
	EXTERNAL		11	EARLY RESORPTION	
	SKELETAL		12	V STERNEBRA(E) #5 AND/OR #6 UNOSSIFIED #5	P
	EXTERNAL		13	EARLY RESORPTION	
	EXTERNAL		14	EARLY RESORPTION	
	EXTERNAL		15	EARLY RESORPTION	
			NO REMARKABLE OBSERVATIONS		
	EXTERNAL		1,3,8,12		
	VISCERAL		1,3,8,12		
	SKELETAL				
26444			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:		- - - - - - - - - - - - - - - -		

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 SEX CODE: M = MALE, F = FEMALE, - = NOT APPLICABLE

PROJECT NO.:WIL-402016
SPONSOR:AMERICAN PETROLEUM

TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 92

DAMS FROM GROUP	5:	50 MG/KG/DAY	FETUS #	GRADE
26444	(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
	EXTERNAL		12	EARLY RESORPTION
	EXTERNAL		13	EARLY RESORPTION
	EXTERNAL		14	EARLY RESORPTION
	EXTERNAL		15	EARLY RESORPTION
	EXTERNAL		16	EARLY RESORPTION
26448			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	
			E E E E E L E E/ E E A A A E E A L	
	SEX:		- - - - - - - - - - F F F - - M -	
	CEPHALIC:		11,13	
	EXTERNAL		1	EARLY RESORPTION
	EXTERNAL		2	EARLY RESORPTION
	EXTERNAL		3	EARLY RESORPTION
	EXTERNAL		4	EARLY RESORPTION
	EXTERNAL		5	EARLY RESORPTION
	EXTERNAL		6	LATE RESORPTION
				CROWN-RUMP LENGTH: 2.0 CM, MUMMIFIED
	EXTERNAL		7	EARLY RESORPTION

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TABLE A16
RAT DERMAL DEV TOX STUDY OF CLARIFIED OILS, CATALYTIC CRACKED
INDIVIDUAL FETAL EXTERNAL, VISCERAL AND SKELETAL FINDINGS

PAGE 93

DAMS FROM GROUP	5: 50 MG/KG/DAY	FETUS #		GRADE
26448	(CONTINUED)			
	EXTERNAL	8	EARLY RESORPTION	
	EXTERNAL	9	EARLY RESORPTION	
	EXTERNAL	10	EARLY RESORPTION	
	SKELETAL	11	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5 AND #6	P
	SKELETAL	12	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #5	P
			V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
	SKELETAL	13	V STERNEBRA (E) #5 AND/OR #6 UNOSSIFIED #6	P
	EXTERNAL	14	EARLY RESORPTION	
	EXTERNAL	15	EARLY RESORPTION	
	SKELETAL	16	V REDUCED OSSIFICATION OF THE SKULL NASAL, BILATERAL	1
	EXTERNAL	17	LATE RESORPTION CROWN-RUMP LENGTH: 3.2 CM, SEVERE AUTOLYSIS, NO APPARENT MALFORMATIONS	
			NO REMARKABLE OBSERVATIONS	
	EXTERNAL	11,12,13,16		
	VISCERAL	11,12,13,16		
	SKELETAL			

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PFETv4.14
12/07/2011
R:12/16/2011