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Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Data Requirement:

PMRA Data Code	{.....}
EPA DP Barcode	D319377
OECD Data Point	{.....}
EPA MRID	465789-50
EPA Guideline	§71-4a

Test material: IR5878 Technical **Purity:** 98.56%
Common name: Orthosulfamuron
Chemical name: IUPAC: Not reported
CAS name: Not reported
CAS No.: 213464-77-8
Synonyms: None reported

Primary Reviewer: Christie E. Padova
Staff Scientist, Dynamac Corporation

Signature: *Christie E. Padova*
Date: 2/27/06

Secondary Reviewer: Teri S. Myers
Senior Scientist, Cambridge Environmental Inc.

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Date: 3/17/06

Primary Reviewer: Christopher Salice
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Date: 6/30/06 *Chris Salice*

Secondary Reviewer(s): Christopher Salice
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Date: 7/28/06 *Chris Salice*

Reference/Submission No.: {.....}

Company Code {.....} [For PMRA]
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EPA PC Code 108209

Date Evaluation Completed: 31-07-2006

CITATION: Frey, L.T., *et al.* 2003. IR5878: A Reproduction Study with the Northern Bobwhite. Unpublished study performed by Wildlife International Ltd., Easton, MD. Laboratory Project No. 544-108. Study submitted by Isagro S.p.A., Milano, Italy. Study initiated July 24, 2002 and submitted May 29, 2003.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the reproductive effects of a pesticide on avian species. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

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EXECUTIVE SUMMARY

The one-generation reproductive toxicity of IR5878 Technical (orthosulfamuron) to groups (16 pens/treatment level) of 1 male and 1 female, 19-week-old northern bobwhite quail was assessed over approximately 21 weeks. IR5878 Technical was administered to the birds in the diet at nominal concentrations of 0 (vehicle control), 200, 500, and 1250 mg ai/kg diet. Mean-measured concentrations were <50 (<LOD, control), 195, 500, and 1280 mg ai/kg diet, respectively.

There were no significant treatment-related effects on any adult or offspring parameter.

This toxicity study is scientifically sound and satisfies guideline requirement for a northern bobwhite reproductive toxicity study. This study is classified ACCEPTABLE.

Results Synopsis

Test Organism Size/Age(mean Weight): 19-weeks old; 181-227 g (combined sexes)

NOAEC: 1280 mg ai/kg diet

LOAEC: >1280 mg ai/kg diet

Endpoint(s) Affected: None

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I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures of the U.S. EPA Pesticide Assessment Guidelines, §71-4 (1982). Deviations from §71-4 include:

1. Mortality of the quail during acclimation was not reported.
2. The expected field residue level was not reported. As no treatment-related effects were observed during the study, it is unknown if the highest level tested represents the maximum expected field residue level.
3. The average egg storage temperature (prior to setting for incubation) was 14.1°C, slightly lower than the recommended level of 16°C.
4. The average hatching temperature was 37.2°C, slightly lower than the recommended level of 39°C.

These deviations did not affect the scientific soundness of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided.

A. MATERIALS:

1. Test Material IR5878 Technical

Description: White powder

Lot No./Batch No. : G009/02

Purity: 98.56%

Stability of compound under test conditions: Verified. Samples of feed from all treatment levels were collected on Day 0 of Week 1 and again on Day 7 of Week 1, following 7 days of open bin ambient storage. Recoveries ranged from 91-96% of initial values.

Storage conditions of test chemicals: Ambient conditions in locked storage

Physicochemical properties of IR5878 Technical.

Parameter	Values	Comments
Water solubility at 20EC	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

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2. Test organism:

Table 1: Test organism.

Parameter	Details	Remarks
		Criteria
Species (common and scientific names):	Northern bobwhite quail (<i>Colinus virginianus</i>)	Birds were from the same hatch, and were phenotypically indistinguishable from wild birds. <i>Recommended species include a wild waterfowl species, preferably the mallard (<i>Anas platyrhynchos</i>) or an upland game species, preferably the northern bobwhite (<i>Colinus virginianus</i>)</i>
Age at Study Initiation:	19 weeks	It was stated that birds were approaching their first breeding season. <i>Birds approaching their first breeding season should be used.</i>
Body Weight: (mean and range)	Males: Overall range (n=64) 181 to 225 g, with group means of 197 to 199 g. Females: Overall range (n=64) 182 to 227 g, with group means of 198 to 199 g.	Individual body weights were recorded at Weeks 0, 2, 4, 6, 8 and 21 (test termination). <i>Body weights should be recorded at test initiation and at biweekly intervals up to week eight or up to the onset of egg laying and at termination.</i>
Source:	K & L Quail Oroville, CA	<i>All birds should be from the same source.</i>

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding study: The test concentrations were selected in consultation with the Sponsor, based upon the results of a pilot reproduction study (Wildlife International Project No. 544-107; not provided) and additional toxicity information provided by the Sponsor.

b. Definitive Study

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Table 2: Experimental Parameters.

Parameter	Details	Remarks
		<i>Criteria</i>
<u>Acclimation</u> Period: Conditions: (same as test or not) Feeding: Health: (any mortality observed)	5 weeks Same as test Water and feed were provided <i>ad libitum</i> . Pre-test mortality was not reported.	The study author reported that at test initiation, all birds were examined for physical injuries and general health, and birds that did not appear healthy or were outside the desired weight range were excluded from the study. Quail were fed a basal diet formulated by Agway Inc., to meet laboratory specifications, and provided public tap water from the city of Easton. <i>Recommended observation period includes a 2-3 week health observation period prior to selection of birds for treatment. Generally, birds should be healthy without excess mortality. Feeding should be <u>ad libitum</u>, and sickness, injuries or mortality should be noted</i>
<u>Test duration</u> pre-laying exposure: egg-laying exposure: withdrawal period, if used:	10 weeks 11 weeks None	----- <u><i>Recommended pre-laying exposure duration:</i></u> <i>At least 10 weeks prior to the onset of egg-laying.</i> <u><i>Recommended exposure duration with egg-laying:</i></u> <i>At least 10 weeks.</i> <u><i>Recommended withdrawal period:</i></u> <i>If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.</i>

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Parameter	Details	Remarks <i>Criteria</i>
<p><u>Pen (for parental and offspring) size:</u></p> <p>construction materials:</p> <p>number:</p>	<p>Parents (one pair) were housed in battery cages measuring 27 x 51 x 20/25 cm high (sloping floors). Offspring (by set and group) were housed in 72 x 90 x 23 cm high battery brooders.</p> <p>Parental and offspring pens were constructed of galvanized wire mesh and galvanized sheeting.</p> <p>16 parental pens/treatment level. Hatchlings were group-housed according to the appropriate parental concentration.</p>	<p><u>Pens</u> <i>Pens should have adequate room and be arranged to prevent cross-contamination.</i></p> <p><u>Materials</u> <i>Recommended materials include nontoxic material and nonbinding material, such as galvanized steel.</i></p> <p><u>Number</u> <i>At least 5 replicate pens should be used for mallards housed in groups of 7. For other arrangements, at least 12 pens should be used, but considerably more may be used if birds are kept in pairs. Chicks should be housed according to parental grouping.</i></p>
<p>Number of birds per pen (male:female)</p>	<p>2 birds/pen (1 male:1 female)</p>	<p><i>One male and one female per pen should be used. For quail, one male and two females should be used. For ducks, two males and five females should be used.</i></p>
<p><u>Number of pens per group/treatment</u></p> <p>negative control:</p> <p>solvent control:</p> <p>treated:</p>	<p>N/A</p> <p>16 pens</p> <p>16 pens/treatment</p>	<p><i>At least 12-16 pens should be used, but considerably more if birds are kept in pairs.</i></p>

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Parameter	Details	Remarks <i>Criteria</i>
<p><u>Test concentrations (mg ai/kg diet)</u> nominal: measured:</p>	<p>0 (vehicle control), 200, 500, and 1250 mg ai/kg diet <50 (<LOD, control), 195, 500, and 1280 mg ai/kg diet</p>	<p><i>Recommended test concentrations include at least two concentrations other than the control; three or more will provide a better statistical analysis. The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level.</i></p>
<p>Maximum labeled field residue anticipated and source of information:</p>	<p>Not specified</p>	<p><i>The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level. The source (i.e., maximum label rate in lb ai/A and ppm), label registration no., label date, and site should be cited]</i></p>
<p>Solvent/vehicle, if used type: amount:</p>	<p>Corn oil Approx. 0.08% by weight</p>	<p>Percent of corn oil in the final test diets was the same for all levels and was calculated by the reviewer on a weight basis (using the general assumption that 1 g ≈ 1 mL): $\{[(180 \text{ g corn oil}/8118 \text{ g total premix weight}) \times 2000 \text{ g subsample of premix}] / 55000 \text{ total final diet weight}\} \times 100$. <i>Recommended solvents include corn oil or other appropriate vehicle not more than 2% of diet by weight</i></p>
<p>Was detailed description and nutrient analysis of the basal diet provided (Yes/No)</p>	<p>Yes. Parental diets contained at least 27% protein and 2.5% fat, and no more than 5% fiber. In addition, supplemental limestone was added to the diets to increase the final calcium level to approximately 3%. Offspring received basal diet without the addition of limestone.</p>	<p><i>A commercial breeder feed or an equivalent that is appropriate for the test species is recommended.</i></p>

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Parameter	Details	Remarks
		<i>Criteria</i>
Preparation of test diet	<p>The appropriate amount of test substance was blended with a portion of basal diet for at least 1 minute in a Waring blender. The test substance was weighed out and blended in batches as necessary for each level. Following the final blending sequence, the blender was rinsed with retained ration, and all remaining ration, blended (treated) feed, and corn oil were mixed for approximately 5 minutes on a Hobart mixer. Separate pre-mixes were prepared weekly for each concentration level and were stored frozen until needed.</p> <p>Final diets were prepared weekly. Portions of pre-mix were combined with additional basal ration and limestone and mixed for approximately 20 minutes in a Patterson-Kelly Twin Shell blender prior to offering.</p>	<p><i>A premixed diet containing the test substance should be mechanically mixed with basal diet. If an evaporative vehicle is used, it should be completely evaporated prior to feeding.</i></p>
Indicate whether stability and homogeneity of test material in diet determined (Yes/No)	Yes	
Were concentrations in diet verified by chemical analysis?	Yes	<p>Samples were analyzed from feed prepared during Weeks 1, 4, 8, 12, 16, and 20. Recoveries for all treatment levels ranged from 93-106% of nominal concentrations.</p>

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Parameter	Details	Remarks <i>Criteria</i>
Did chemical analysis confirm that diet was stable? and homogeneous?	Yes Yes	Stability was assessed in treated feed prepared at all treatment levels during Week 1. Samples were analyzed on Day 0 and again on Day 7 following 7 days of ambient feeder bin storage (actual use conditions). Recoveries ranged from 91-96% of initial concentrations. Homogeneity was assessed in treated feed prepared on Day 0 of Week 1 at the 200 and 1250 mg ai/kg treatment levels. Six samples per level were collected: one sample per side from the top, middle, and bottom of the batch. Calculated coefficients of variations (CV) were 2.41 and 1.17% for the 200 and 1250 mg ai/kg diets, respectively.
Feeding and husbandry	Feeding and husbandry conditions appeared to be adequate, given guideline recommendations.	
<u>Test conditions (pre-laying)</u> temperature: relative humidity: photoperiod:	$22.9 \pm 1.4^\circ\text{C}$ $51 \pm 17\%$ $\leq 8 \text{ hr light/day}$ up through Week 7; 17 hr light/day thereafter.	Light intensity averaged 229 lux (approx. 21 fc). Illumination was provided by fluorescent lights which closely approximated noon-day sunlight. <i>Recommended temperature: about 21 EC (70 EF)</i> <i>Recommended relative humidity: about 55%</i> <i>Recommended lighting</i> <i>First 8 weeks: 7 h per day.</i> <i>Thereafter: 16-17 h per day.</i> <i>At least 6 foot-candles are recommended at bird level.</i>

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Parameter	Details	Remarks
		Criteria
Egg Collection and Incubation		
<u>Egg collection and storage</u> collection interval: storage temperature: storage humidity:	Daily 14.1 ± 0.3°C 85 ± 7%	To prevent pathogen contamination, the collected eggs were washed in a commercial egg washer with a chlorine-based detergent at 45°C for approximately 3 minutes. <i>Eggs should be collected daily; recommended egg storage temperature is approximately 16 EC (61 EF); recommended humidity is approximately 65%. Recommended collection interval: daily</i>
Were eggs candled for cracks prior to setting for incubation?	Yes	<i>Eggs should be candled on day 0</i>
Were eggs set weekly?	Yes	
When candling was done for fertility?	Days 11-12	<i>Quail: approx. day 11 Ducks: approx. day 14</i>
When the eggs were transferred to the hatcher?	Day 21	Eggs were candled again on Day 21 to determine embryo survival. <i>Bobwhite: usually day 21 Mallard: usually day 23</i>
<u>Hatching conditions</u> temperature: humidity: photoperiod:	37.2 ± 0.0°C Approximately 77% 16 hours light/8 hours dark (hatchlings)	<i>Recommended temperature is 39 EC (102 EF) Recommended humidity is 70%</i>
Day the hatched eggs were removed and counted	Day 25 or 26	<i>Eggs for bobwhite should be removed on day 24; for mallard on day 27</i>
Were egg shells washed and dried for at least 48 hrs before measuring?	Yes	

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Parameter	Details	Remarks
		Criteria
<u>Egg shell thickness</u> no. of eggs used: intervals: mode of measurement:	One egg was collected (when available) from each odd numbered cage during odd numbered weeks and from each even numbered cage during the even numbered weeks. Once weekly throughout the egg laying period. Five points around the equatorial circumference were measured to the nearest 0.002 mm.	<i>Newly hatched eggs should be collected at least once every two weeks. Thickness of the shell plus membrane should be measured to the nearest 0.01 mm with 3 - 4 measurements per shell.</i>
Reference chemical, if used	N/A	

2. Observations:

Table 3: Observations.

Parameter	Details	Remarks
Parameters measured		
<u>Parental</u> (mortality, body weight, mean feed consumption)	- mortality - body weight - food consumption - signs of toxicity - necropsy	<i>Recommended endpoints measured include:</i> <ul style="list-style-type: none"> • Eggs laid/pen • Eggs cracked/pen • Eggs set/pen • Viable embryos/pen • Live 3-week embryos/pen • Normal hatchlings/pen • 14-day-old survivors/pen • 14-day-old survivors/pen • Weights of 14-day-old survivors (mean per pen) • Egg shell thickness • Food consumption (mean per pen) • Initial and final body weight (mean per pen)
<u>Egg collection and subsequent development</u> (no. of eggs laid, no. of eggs cracked, shell thickness, no. of eggs set, no. of viable embryos, no. of live 3 week embryos, no. hatched, no. of 14-day survivors, average weight of 14-d old survivors, mortality, gross pathology, others)	- eggs laid - eggs cracked - eggshell thickness - eggs set - viable embryos - live 3-week embryos - number of hatchlings - hatchling body weight - number of 14-day-old survivors - 14-day-old survivor body weight - signs of toxicity of hatchlings	
Indicate if the test material was regurgitated	No indications of dietary regurgitation.	

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Parameter	Details	Remarks
Observation intervals (for various parameters)	Parental and hatchling mortality and signs of toxicity were recorded once daily. Parental body weights were recorded at the start of acclimation, at Weeks 0, 2, 4, 6, 8 and at test termination (Week 21). Parental food consumption was measured weekly throughout the test.	<i>Body weights and food consumption should be measured at least biweekly</i>
Were raw data included?	Yes	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

No treatment-related mortality was observed during the study; however, seven incidental mortalities occurred, one in the control group, three in the 200 mg ai/kg treatment group, two in the 500 mg ai/kg treatment group, and one in the 1250 mg ai/kg treatment group.

The single mortality in the control group was a male that was euthanized on Day 6 of Week 16 due to a debilitated condition. Prior to death, the male was noted to be thin with foot lesions, and a swollen leg with associated lameness. The bird had also exhibited lethargy and a ruffled appearance. Necropsy revealed emaciation with a loss of muscle mass, a prominent keel, and a lack of abdominal fat; severe lesions on the left hock and the right ankle, with exposed tendons and necrotic tissue; and small testes. Necropsy of the pen-mate was unremarkable.

The first mortality in the 200 mg ai/kg group was a male that was euthanized on Day 2 of Week 14 due to a debilitated condition. Prior to death, the male was noted with an ocular injury, a head lesion, bruising on the head, feather loss, a thin general body condition, depression, and reduced reaction to external stimuli. Necropsy revealed emaciation with a loss of muscle mass and a prominent keel; an extensive head lesion with the cranium exposed and swelling around both eyes; a pale spleen; pale kidneys; and a small right testis. Necropsy of the pen mate showed an enlarged spleen, but was otherwise unremarkable. The second mortality in the 200 mg ai/kg group was a female that was euthanized on Day 3 of Week 20 due to a debilitated condition. Prior to death, the bird was noted with feather loss, foot lesions and lameness. Necropsy revealed emaciation with a loss of muscle mass and a prominent keel; leg and foot lesions; a slightly enlarged spleen; pale kidneys; a subcapsular hematoma on the left lobe of the liver; egg yolk peritonitis and egg remnants in the abdominal cavity; pasty cecal contents; and a regressing ovary. Necropsy of the pen-mate showed a slightly enlarged spleen, a slightly mottled liver, and a small right testis. The third mortality in the 200 mg ai/kg group was a female that was found dead on Day 1 of Week 21. Prior to death the female was noted to have foot lesions, lameness, depression, reduced reaction to external stimuli, wing droop, ataxia, prostrate posture, and loss of righting reflex. The animal was also feather picked. Necropsy revealed emaciation with a loss of muscle mass and prominent keel; ankle and foot lesions with swelling and necrotic tissue; feather loss on the head; a soiled vent; an enlarged spleen; pale kidneys; egg yolk peritonitis; white chalk-like plaques of the pericardium and organs of the abdominal cavity; and a regressing ovary. Necropsy of the pen-mate was unremarkable.

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The first mortality in the 500 mg ai/kg group was a female that was found dead on Day 1 of Week 18. Prior to death, the female was noted to have foot lesions, lameness, lethargy, and a ruffled appearance. Necropsy revealed emaciation with a loss of muscle mass and a prominent keel; ankle and foot lesions with necrotic tissue; feather loss on the head; a pale and firm liver; pale kidneys; a gelatinous material in the pericardium; firm intestinal contents; and a regressing ovary. Necropsy of the pen-mate was unremarkable. The second mortality in the 500 mg ai/kg group was also a female that was found dead on Day 1 of Week 20. Prior to death, the female was noted to have foot lesions, lameness, and a ruffled appearance. Necropsy revealed emaciation with a loss of muscle mass and a prominent keel; abrasions on the back and rump; pale kidneys; abdominal autolysis; and a regressed ovary. Necropsy of the pen-mate showed a slightly enlarged spleen, areas of hyperemia in the small intestines; and a small right testis.

The single mortality in the 1250 mg ai/kg group was a female that was euthanized on Day 0 of Week 17 due to her debilitated condition. Prior to death, the female was noted to have foot lesions with associated lameness, a thin general body condition, lethargy, and a ruffled appearance. Necropsy revealed emaciation with a loss of muscle mass and a prominent keel; foot lesions and feather loss; a pale spleen; a slight distention of the small intestines; firm cecal contents; and a developing ovary. Necropsy of the pen-mate showed an enlarged spleen, areas of hyperemia in the small intestines; and a small right testis.

No other mortalities were observed during the study, and due to the nature of lesions observed at necropsy, none of the mortalities that occurred were considered to be related to treatment. The LOAEC for adult survival was >1280 mg ai/kg.

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Table 4: Effect of IR5878 Technical on Mortality of Northern Bobwhite Quail (*Colinus virginianus*).

Treatment (mg ai/kg diet) Mean-measured (and Nominal) Concentrations	Observation Period					
	Week 7		Week 14		Week 21	
	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female	No. Dead Male	No. Dead Female
Control	0	0	0	0	1	0
195 (200)	0	0	1	0	1	2
500 (500)	0	0	0	0	0	2
1280 (1250)	0	0	0	0	0	1

B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: No overt signs of toxicity were observed in any treatment group, and except for incidental clinical findings, all birds appeared normal throughout the study. Incidental clinical observations normally associated with pen wear and/or interactions among pen mates included head, neck, breast, wing, leg, and foot lesions; feather loss; nostril picking; feather picking; a wing fracture, and ventral head curl. Secondary findings typically associated with the incidental injuries included bilateral wing droop, lameness, lethargy, a ruffled appearance, and a thin general body condition. The LOAEC for clinical signs of toxicity was >1280 mg ai/kg.

Food Consumption: No apparent treatment-related effects on feed consumption were observed (with no statistically-significant differences). Consumption generally increased over time, with overall feed consumption averaging 19 g/bird/day for all treatment and control groups (reviewer-calculated). The LOAEC for food consumption was >1280 mg ai/kg.

Body Weight: No treatment-related effects on body weight were observed (with no statistically-significant differences). The LOAEC for adult body weight was >1280 mg ai/kg.

Necropsy: There were no findings at necropsy that were related to treatment. The LOAEC for post-mortem findings was >1280 mg ai/kg.

Reproductive Effects: No treatment-related effects were observed on egg production or quality, fertility, embryonic development, hatchability, or survival of hatchlings at any treatment level. Furthermore, no overt signs of toxicity were reported in hatchlings, and no treatment-related effect on offspring body weights were observed at any treatment level. The LOAEC for effects on reproduction was >1280 mg ai/kg.

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Table 5: Reproductive and Other Parameters (nominal concentrations; study author-reported).

Parameter	Control	200 mg ai/kg	500 mg ai/kg	1250 mg ai/kg	NOAEC/ LOAEC
Eggs laid/pen	51	44	51	52	1250 mg ai/kg >1250 mg ai/kg
Eggs laid/hen/day	0.53	0.45	0.53	0.54	1250 mg ai/kg >1250 mg ai/kg
Eggs cracked	9	5	16	13	N/A
Eggs set	680	495	615	692	N/A
Shell thickness (mm \forall SD)	0.222 \pm 0.015	0.222 \pm 0.013	0.216 \pm 0.018	0.216 \pm 0.013	1250 mg ai/kg >1250 mg ai/kg
Viable embryos	618	482	536	643	N/A
Live 3-week embryos	616	476	529	641	N/A
No. of hatchling/hen ¹	39	35	35	41	N/A
No. of normal hatchlings	586	460	493	612	N/A
Hatchling weight (g \pm SD)	6 \pm 0	6 \pm 0	6 \pm 0	6 \pm 1	1250 mg ai/kg >1250 mg ai/kg
14-day old survivors	556	443	473	573	N/A
14-day old survivors weight (g \pm SD)	28 \pm 2	29 \pm 3	29 \pm 2	28 \pm 3	1250 mg ai/kg >1250 mg ai/kg
Mean food consumption ¹	19	19	19	19	1250 mg ai/kg >1250 mg ai/kg
Weight of females (parent) at test initiation: at onset of egg laying: at test termination:	198 215 253	198 208 256	198 216 245	199 219 258	1250 mg ai/kg >1250 mg ai/kg
Weight of males (parent) at test initiation: at onset of egg laying: at test termination:	198 212 214	204 217 223	197 214 223	199 213 217	1250 mg ai/kg >1250 mg ai/kg
Gross pathology	No treatment-related abnormalities observed.				1250 mg ai/kg >1250 mg ai/kg
Others, if any					

N/A = Not analyzed or not statistically-analyzed (as applicable).

¹ Reviewer-calculated.

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C. REPORTED STATISTICS:

The following variables were statistically analyzed: adult body weight, adult feed consumption, eggs laid of maximum laid, eggs cracked of eggs laid, viable embryos of eggs set, live 3-week embryos of viable embryos, hatchlings of 3-week embryos, 14-day old survivors of hatchlings, hatchlings of eggs set, 14-day old survivors of eggs set, hatchlings of maximum set, 14-day old survivors of maximum set, egg shell thickness, and offspring's body weight.

An analysis of variance (ANOVA) was performed to determine statistically-significant differences between groups. Dunnett's multiple comparison procedure was then used to compare the treatment means with the control group mean. Sample units were the individual pens within each experimental group, except adult body weights, where the sample unit was the individual bird. Percentage data were examined using Dunnett's method following arcsine square root transformation. Nominal concentrations were used for all estimations.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Analysis was conducted using "chicks.sas" (Ver. 3; March 2002), a SAS program provided by EFED/OPP/USEPA. Data for all endpoints were examined graphically using box plots to determine if they exhibited a dose-dependent response, which was ultimately used to select the multiple comparison test to detect LOAEC and NOAEC. Data for each endpoint were tested to determine if their distributions were normal and if their variances were homogeneous using Shapiro-Wilk's and Levene's tests, respectively. Data that satisfied these assumptions were subjected to Dunnett's and William's tests and data that did not satisfy these assumptions were subjected to the non-parametric MannWhitney-U (with a Bonferroni adjustment) and Jonckheere's tests. Data for dead birds were excluded from the analyses. See Appendix I for output of reviewer's statistical verification.

NOAEC: 1280 mg ai/kg diet

LOAEC: >1280 mg ai/kg diet

Endpoint(s) Affected: None

Table 6: Reproductive and Other Parameters (mean-measured concentrations; reviewer-reported).

Parameter	Control	195 mg ai/kg	500 mg ai/kg	1280 mg ai/kg	NOAEC/ LOAEC
Eggs laid/pen	51.0	44.1	51.4	52.1	1280 mg ai/kg/ >1280 mg ai/kg
Eggs cracked/pen	0.60	0.38	1.14	0.87	1280 mg ai/kg/ >1280 mg ai/kg
Eggs not cracked/eggs laid (%)	98.8	99.2	96.6	97.8	1280 mg ai/kg/ >1280 mg ai/kg
Eggs set/pen	45.3	38.1	43.9	46.1	1280 mg ai/kg/ >1280 mg ai/kg
Shell thickness	0.22	0.22	0.22	0.22	1280 mg ai/kg/ >1280 mg ai/kg
Eggs set/eggs laid (%)	88.3	84.2	83.5	87.8	1280 mg ai/kg/ >1280 mg ai/kg

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

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Viable embryos/pen	41.2	37.1	38.3	42.9	1280 mg ai/kg/ >1280 mg ai/kg
Viable embryos/eggs set (%)	91.0	96.7	85.6	93.3	1280 mg ai/kg/ >1280 mg ai/kg
Live embryos/pen	41.1	36.6	37.8	42.7	1280 mg ai/kg/ >1280 mg ai/kg
Live embryos/viable embryos (%)	99.7	98.6	97.9	99.7	1280 mg ai/kg/ >1280 mg ai/kg
No. of hatchlings/pen	39.1	35.4	35.2	40.8	1280 mg ai/kg/ >1280 mg ai/kg
No. of hatchlings/eggs laid (%)	76.8	78.1	65.5	78.1	1280 mg ai/kg/ >1280 mg ai/kg
No. of hatchlings/eggs set (%)	87.0	92.5	76.6	88.9	1280 mg ai/kg/ >1280 mg ai/kg
No. of hatchlings/live embryos (%)	95.8	97.0	91.0	95.4	1280 mg ai/kg/ >1280 mg ai/kg
Hatchling survival/pen	37.1	34.1	33.8	38.2	1280 mg ai/kg/ >1280 mg ai/kg
Hatchling survival/eggs set (%)	82.9	88.7	73.2	83.1	1280 mg ai/kg/ >1280 mg ai/kg
Hatchling survival/no. of hatchlings (%)	95.0	95.9	95.6	93.0	1280 mg ai/kg/ >1280 mg ai/kg
Hatchling weight (g)	6.1	6.0	6.4	6.1	1280 mg ai/kg/ >1280 mg ai/kg
Survivor weight (g)	27.8	28.6	29.4	27.7	1280 mg ai/kg/ >1280 mg ai/kg
Mean food consumption (g/bird/day)	18.8	18.9	19.0	19.1	1280 mg ai/kg/ >1280 mg ai/kg
Male weight gain (g)	15.1	19.7	24.8	17.3	1280 mg ai/kg/ >1280 mg ai/kg
Female weight gain (g)	24.3	27.0	48.9	59.7	1280 mg ai/kg/ >1280 mg ai/kg

E. STUDY DEFICIENCIES:

There were no study deficiencies that affected the scientific soundness of this study. All observed deviations were considered minor, and should have no impact on the results of the study.

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

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F. REVIEWER'S COMMENTS:

Results of the reviewer's statistical verification were identical to the study authors'. There were no significant adverse effects of orthosulfamuron on reproduction of bobwhite quail.

Estimated test substance intakes were calculated by treatment group for the pre-egg production period, the egg production period, and the overall adult period using the group mean feed consumption and group mean body weight data. Overall (Weeks 1-21) test substance intake was 17.8, 44.3, and 112 mg ai/kg bw/day for the nominal 200, 500, and 1250 mg ai/kg treatment levels, respectively.

Procedural recoveries were determined at every sampling interval at all test levels. Recoveries ranged from 93-100%. Analytical results were not corrected for the mean procedural recoveries.

G. CONCLUSIONS:

This study is scientifically sound and satisfies the guideline requirements for an avian reproduction study using northern bobwhite quail (§71-4a); this study is classified ACCEPTABLE. No treatment-related effects were observed on any adult, reproductive, or offspring parameter.

NOAEC: 1280 mg ai/kg diet

LOAEC: >1280 mg ai/kg diet

Endpoint(s) Affected: None

III. REFERENCES:

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Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

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APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Bobwhite repro, Orthosulfamuron, MRID 465789-50

PRINTOUT OF RAW DATA

Obs	TRT	EL	EC	ENC_EL	ES	ES_EL	VE	VE_ES	LE	LE_VE	NH	NH_EL	NH_ES
1	Ctrl	55	0	100.00	48	87.27	45	93.75	44	97.78	42	76.36	87.50
2	Ctrl	.	.	.	.	.	.	.	.	.	.	.	.
3	Ctrl	57	0	100.00	51	89.47	50	98.04	50	100.00	47	82.46	92.16
4	Ctrl	61	2	96.72	54	88.52	49	90.74	48	97.96	46	75.41	85.19
5	Ctrl	56	0	100.00	52	92.86	50	96.15	50	100.00	47	83.93	90.38
6	Ctrl	37	3	91.89	28	75.68	24	85.71	24	100.00	24	64.86	85.71
7	Ctrl	59	1	98.31	53	89.83	51	96.23	51	100.00	50	84.75	94.34
8	Ctrl	58	0	100.00	51	87.93	49	96.08	49	100.00	49	84.48	96.08
9	Ctrl	63	0	100.00	57	90.48	48	84.21	48	100.00	43	68.25	75.44
10	Ctrl	67	0	100.00	61	91.04	50	81.97	50	100.00	43	64.18	70.49
11	Ctrl	67	2	97.01	60	89.55	57	95.00	57	100.00	55	82.09	91.67
12	Ctrl	43	0	100.00	39	90.70	24	61.54	24	100.00	23	53.49	58.97
13	Ctrl	40	0	100.00	36	90.00	33	91.67	33	100.00	33	82.50	91.67
14	Ctrl	31	0	100.00	28	90.32	27	96.43	27	100.00	27	87.10	96.43
15	Ctrl	17	0	100.00	14	82.35	14	100.00	14	100.00	14	82.35	100.00
16	Ctrl	54	1	98.15	48	88.89	47	97.92	47	100.00	43	79.63	89.58
17	Dose1	15	0	100.00	8	53.33	7	87.50	7	100.00	7	46.67	87.50
18	Dose1	34	1	97.06	29	85.29	28	96.55	28	100.00	28	82.35	96.55
19	Dose1	63	0	100.00	58	92.06	57	98.28	57	100.00	57	90.48	98.28
20	Dose1	24	0	100.00	20	83.33	20	100.00	19	95.00	19	79.17	95.00
21	Dose1	53	1	98.11	47	88.68	45	95.74	45	100.00	43	81.13	91.49
22	Dose1	55	0	100.00	50	90.91	50	100.00	49	98.00	43	78.18	86.00
23	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
24	Dose1	41	0	100.00	37	90.24	37	100.00	37	100.00	37	90.24	100.00
25	Dose1	59	1	98.31	54	91.53	53	98.15	53	100.00	52	88.14	96.30
26	Dose1	53	1	98.11	43	81.13	42	97.67	42	100.00	40	75.47	93.02
27	Dose1	25	0	100.00	21	84.00	20	95.24	20	100.00	19	76.00	90.48
28	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
29	Dose1	.	.	.	.	.	.	.	.	.	.	.	.
30	Dose1	51	0	100.00	39	76.47	36	92.31	34	94.44	33	64.71	84.62
31	Dose1	45	0	100.00	40	88.89	38	95.00	36	94.74	34	75.56	85.00
32	Dose1	55	1	98.18	49	89.09	49	100.00	49	100.00	48	87.27	97.96
33	Dose2	63	0	100.00	58	92.06	58	100.00	58	100.00	56	88.89	96.55
34	Dose2	59	1	98.31	53	89.83	53	100.00	53	100.00	50	84.75	94.34
35	Dose2	45	0	100.00	40	88.89	34	85.00	34	100.00	30	66.67	75.00
36	Dose2	53	2	96.23	44	83.02	10	22.73	9	90.00	9	16.98	20.45
37	Dose2	40	0	100.00	33	82.50	29	87.88	29	100.00	27	67.50	81.82
38	Dose2	.	.	.	.	.	.	.	.	.	.	.	.
39	Dose2	63	0	100.00	57	90.48	56	98.25	56	100.00	54	85.71	94.74
40	Dose2	16	4	75.00	9	56.25	7	77.78	7	100.00	4	25.00	44.44
41	Dose2	50	0	100.00	46	92.00	39	84.78	39	100.00	39	78.00	84.78
42	Dose2	61	1	98.36	55	90.16	52	94.55	51	98.08	45	73.77	81.82
43	Dose2	58	1	98.28	52	89.66	45	86.54	45	100.00	44	75.86	84.62
44	Dose2	54	0	100.00	49	90.74	46	93.88	46	100.00	41	75.93	83.67
45	Dose2	.	.	.	.	.	.	.	.	.	.	.	.
46	Dose2	48	5	89.58	22	45.83	18	81.82	16	88.89	14	29.17	63.64
47	Dose2	60	2	96.67	53	88.33	45	84.91	44	97.78	40	66.67	75.47
48	Dose2	49	0	100.00	44	89.80	44	100.00	42	95.45	40	81.63	90.91
49	Dose3	35	8	77.14	24	68.57	22	91.67	22	100.00	22	62.86	91.67
50	Dose3	28	0	100.00	25	89.29	25	100.00	25	100.00	24	85.71	96.00
51	Dose3	54	0	100.00	49	90.74	48	97.96	48	100.00	47	87.04	95.92
52	Dose3	.	.	.	.	.	.	.	.	.	.	.	.
53	Dose3	71	0	100.00	64	90.14	55	85.94	55	100.00	55	77.46	85.94
54	Dose3	62	0	100.00	57	91.94	55	96.49	55	100.00	54	87.10	94.74
55	Dose3	28	0	100.00	24	85.71	24	100.00	24	100.00	24	85.71	100.00
56	Dose3	59	0	100.00	52	88.14	49	94.23	49	100.00	47	79.66	90.38
57	Dose3	58	0	100.00	53	91.38	52	98.11	52	100.00	50	86.21	94.34
58	Dose3	56	0	100.00	50	89.29	47	94.00	47	100.00	44	78.57	88.00

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

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Obs	TRT	NH_LE	HS	HS_ES	HS_NH	THICK	HATWT	SURVWT	FOOD	WTGAINM	WTGAINF		
59	Dose3	65	0	100.00	60	92.31	58	96.67	58	100.00	53	81.54	88.33
60	Dose3	58	0	100.00	52	89.66	36	69.23	36	100.00	32	55.17	61.54
61	Dose3	61	0	100.00	56	91.80	56	100.00	56	100.00	54	88.52	96.43
62	Dose3	46	3	93.48	39	84.78	37	94.87	36	97.30	33	71.74	84.62
63	Dose3	47	2	95.74	39	82.98	33	84.62	33	100.00	29	61.70	74.36
64	Dose3	53	0	100.00	48	90.57	46	95.83	45	97.83	44	83.02	91.67
Bobwhite repro, Orthosulfamuron, MRID 465789-50													
PRINTOUT OF RAW DATA (continued)													
1	Ctrl	95.45	38	79.17	90.48	0.23	5	27	18	3	59		
2	Ctrl												
3	Ctrl	94.00	47	92.16	100.00	0.23	6	31	21	29	34		
4	Ctrl	95.83	43	79.63	93.48	0.23	6	25	19	11	63		
5	Ctrl	94.00	42	80.77	89.36	0.23	6	26	19	34	66		
6	Ctrl	100.00	22	78.57	91.67	0.21	6	27	16	1	43		
7	Ctrl	98.04	47	88.68	94.00	0.20	6	28	19	10	58		
8	Ctrl	100.00	48	94.12	97.96	0.24	7	31	21	11	68		
9	Ctrl	89.58	41	71.93	95.35	0.21	6	25	18	21	67		
10	Ctrl	86.00	41	67.21	95.35	0.22	6	27	19	7	42		
11	Ctrl	96.49	51	85.00	92.73	0.23	6	29	22	22	66		
12	Ctrl	95.83	21	53.85	91.30	0.21	6	28	17	20	31		
13	Ctrl	100.00	33	91.67	100.00	0.23	6	28	18	9	45		
14	Ctrl	100.00	26	92.86	96.30	0.23	6	28	19	31	41		
15	Ctrl	100.00	14	100.00	100.00	0.19	6	27	17	7	60		
16	Ctrl	91.49	42	87.50	97.67	0.24	7	30	19	11	72		
17	Dose1	100.00	7	87.50	100.00	0.22	6	33	18	19	42		
18	Dose1	100.00	26	89.66	92.86	0.20	6	31	17	12	49		
19	Dose1	100.00	57	98.28	100.00	0.22	7	27	19	21	62		
20	Dose1	100.00	18	90.00	94.74	0.24	6	26	18	25	60		
21	Dose1	95.56	41	87.23	95.35	0.22	6	30	19	39	79		
22	Dose1	87.76	43	86.00	100.00	0.24	6	25	22	14	31		
23	Dose1												
24	Dose1	100.00	37	100.00	100.00	0.22	6	29	18	15	44		
25	Dose1	98.11	52	96.30	100.00	0.21	7	30	17	28	54		
26	Dose1	95.24	37	86.05	92.50	0.23	6	31	19	3	69		
27	Dose1	95.00	17	80.95	89.47	0.21	5	24	19	22	61		
28	Dose1												
29	Dose1												
30	Dose1	97.06	29	74.36	87.88	0.21	5	28	19	7	66		
31	Dose1	94.44	34	85.00	100.00	0.25	6	30	21	21	70		
32	Dose1	97.96	45	91.84	93.75	0.22	6	28	20	30	54		
33	Dose2	96.55	56	96.55	100.00	0.25	7	29	25	19	62		
34	Dose2	94.34	49	92.45	98.00	0.21	7	28	18	29	60		
35	Dose2	88.24	29	72.50	96.67	0.21	5	27	18	20	35		
36	Dose2	100.00	9	20.45	100.00	0.23	6	27	16	-26	39		
37	Dose2	93.10	27	81.82	100.00	0.21	6	30	18	31	-11		
38	Dose2												
39	Dose2	96.43	51	89.47	94.44	0.22	7	32	20	31	65		
40	Dose2	57.14	4	44.44	100.00	0.18	7	35	18	28	-25		
41	Dose2	100.00	39	84.78	100.00	0.21	7	29	20	38	82		
42	Dose2	88.24	45	81.82	100.00	0.22	6	30	18	7	76		
43	Dose2	97.78	42	80.77	95.45	0.22	7	33	21	60	66		
44	Dose2	89.13	39	79.59	95.12	0.21	6	29	19	17	59		
45	Dose2												
46	Dose2	87.50	11	50.00	78.57	0.20	6	27	17	41	23		
47	Dose2	90.91	36	67.92	90.00	0.21	7	28	21	37	82		
48	Dose2	95.24	36	81.82	90.00	0.25	6	28	17	15	71		
49	Dose3	100.00	17	70.83	77.27	0.21	5	21	20	31	59		
50	Dose3	96.00	24	96.00	100.00	0.20	6	28	17	-6	48		
51	Dose3	97.92	46	93.88	97.87	0.22	6	25	19	18	50		
52	Dose3												
53	Dose3	100.00	52	81.25	94.55	0.23	7	32	20	28	89		
54	Dose3	98.18	54	94.74	100.00	0.22	7	30	19	23	57		

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55	Dose3	100.00	24	100.00	100.00	0.22	6	29	18	17	52
56	Dose3	95.92	43	82.69	91.49	0.20	6	25	21	28	69
57	Dose3	96.15	48	90.57	96.00	0.20	6	26	23	8	81
58	Dose3	93.62	41	82.00	93.18	0.22	7	30	19	39	83
59	Dose3	91.38	49	81.67	92.45	0.23	6	29	20	30	56
60	Dose3	88.89	27	51.92	84.38	0.23	5	25	18	33	43
61	Dose3	96.43	49	87.50	90.74	0.21	6	30	18	-28	43
62	Dose3	91.67	30	76.92	90.91	0.24	7	30	19	-7	50
63	Dose3	87.88	25	64.10	86.21	0.21	6	24	19	33	49
64	Dose3	97.78	44	91.67	100.00	0.22	6	32	17	13	67

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE EL (Eggs Laid)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.
 Shapiro-Wilks Shapiro-Wilks Levenes Levenes Conclusion
 Test Stat P-value Test Stat P-value
 0.908 <.001 0.642 0.591 USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	51.00	14.37	3.71	28.18	43.04,	58.96
Dose1	13	44.08	15.14	4.20	34.35	34.93,	53.23
Dose2	14	51.36	12.37	3.31	24.09	44.21,	58.50
Dose3	15	52.07	12.97	3.35	24.91	44.88,	59.25

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	56.00	17.00	67.00	.	.
Dose1	51.00	15.00	63.00	86.43	13.57
Dose2	53.50	16.00	63.00	100.70	-0.70
Dose3	56.00	28.00	71.00	102.09	-2.09

NON-PARAMETRIC ANALYSES

- use alpha-level=0.05 for all tests
 Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 3.36 0.339

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	56.00	.	.
Dose1	51.00	0.210	0.061
Dose2	53.50	1.000	0.400
Dose3	56.00	1.000	0.663

SUMMARY

MannWhit (Bonf adjust)	NOEC Dose3	LOEC >highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE NEG_EC (Eggs Cracked)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.
 Shapiro-Wilks Shapiro-Wilks Levenes Levenes Conclusion
 Test Stat P-value Test Stat P-value
 0.697 <.001 2.272 0.091 USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	0.60	0.99	0.25	164.27	0.05,	1.15
Dose1	13	0.38	0.51	0.14	131.66	0.08,	0.69
Dose2	14	1.14	1.61	0.43	140.91	0.21,	2.07
Dose3	15	0.87	2.17	0.56	250.02	0.00,	2.07

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.00	0.00	3.00		
Dose1	0.00	0.00	1.00	64.10	35.90
Dose2	0.50	0.00	5.00	190.48	-90.48
Dose3	0.00	0.00	8.00	144.44	-44.44

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
 Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 2.34 0.504

MannWhit(Bon) - testing each trt median signif. greater than control
 Jonckheere - test assumes dose-response relationship, testing positive trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	0.00		
Dose1	0.00	1.000	0.554
Dose2	0.50	0.558	0.166
Dose3	0.00	1.000	0.563

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 LOEC >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE ENC_EL ((EL-EC)/EL (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.572	<.001	2.418	0.076	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	98.81	2.24	0.58	2.27	97.56,	100.00
Dose1	13	99.21	1.08	0.30	1.08	98.56,	99.86
Dose2	14	96.60	6.83	1.82	7.07	92.66,	100.00
Dose3	15	97.76	6.02	1.55	6.16	94.42,	100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	91.89	100.00	.	.
Dose1	100.00	97.06	100.00	100.41	-0.41
Dose2	99.18	75.00	100.00	97.77	2.23
Dose3	100.00	77.14	100.00	98.94	1.06

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 2.03 0.566

MannWhit(Bonf) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bonf adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	100.00	1.000	0.500
Dose2	99.18	0.542	0.188
Dose3	100.00	1.000	0.580

SUMMARY

MannWhit (Bonf adjust)	NOEC Dose3	LOEC >highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
ANALYSIS RESULTS FOR VARIABLE ES (Eggs Set)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.910	<.001	0.067	0.977	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	45.33	13.53	3.49	29.85	37.84,	52.83
Dose1	13	38.08	14.80	4.10	38.86	29.14,	47.02
Dose2	14	43.93	14.11	3.77	32.11	35.78,	52.07
Dose3	15	46.13	13.09	3.38	28.37	38.89,	53.38

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	51.00	14.00	61.00		
Dose1	40.00	8.00	58.00	83.99	16.01
Dose2	47.50	9.00	58.00	96.90	3.10
Dose3	50.00	24.00	64.00	101.76	-1.76

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	3.17	0.367

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	51.00		
Dose1	40.00	0.267	0.080
Dose2	47.50	1.000	0.409
Dose3	50.00	1.000	0.694

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE ES_EL (EggsSet/EggsLaid (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.687	<.001	2.822	0.048	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	88.33	4.20	1.09	4.76	86.00,	90.65
Dose1	13	84.23	10.36	2.87	12.29	77.97,	90.49
Dose2	14	83.54	14.21	3.80	17.01	75.34,	91.74
Dose3	15	87.82	5.99	1.55	6.82	84.50,	91.14

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	89.55	75.68	92.86	.	.
Dose1	88.68	53.33	92.06	95.36	4.64
Dose2	89.73	45.83	92.06	94.58	5.42
Dose3	89.66	68.57	92.31	99.43	0.57

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 1.64 0.651

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	89.55	.	.
Dose1	88.68	0.496	0.155
Dose2	89.73	1.000	0.352
Dose3	89.66	1.000	0.673

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 LOEC >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE VE (Viable Embryo(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.917	<.001	0.343	0.794	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	41.20	13.08	3.38	31.74	33.96,	48.44
Dose1	13	37.08	14.77	4.10	39.84	28.15,	46.00
Dose2	14	38.29	16.61	4.44	43.37	28.70,	47.87
Dose3	15	42.87	12.42	3.21	28.97	35.99,	49.74

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	48.00	14.00	57.00	.	.
Dose1	38.00	7.00	57.00	89.99	10.01
Dose2	44.50	7.00	58.00	92.93	7.07
Dose3	47.00	22.00	58.00	104.05	-4.05

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	1.39	0.708

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	48.00	.	.
Dose1	38.00	0.679	0.216
Dose2	44.50	0.975	0.322
Dose3	47.00	1.000	0.655

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE VE_ES (ViableEmbryo/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.
 Shapiro-Wilks Shapiro-Wilks Levenes Levenes Conclusion
 Test Stat P-value Test Stat P-value
 0.690 <.001 1.884 0.144 USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	91.03	9.77	2.52	10.73	85.62,	96.44
Dose1	13	96.65	3.64	1.01	3.77	94.45,	98.85
Dose2	14	85.58	19.55	5.22	22.84	74.29,	96.86
Dose3	15	93.31	8.12	2.10	8.70	88.81,	97.80

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	95.00	61.54	100.00	.	.
Dose1	97.67	87.50	100.00	106.17	-6.17
Dose2	87.21	22.73	100.00	94.01	5.99
Dose3	95.83	69.23	100.00	102.50	-2.50

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 6.89 0.075

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	95.00		
Dose1	97.67	1.000	0.983
Dose2	87.21	0.818	0.377
Dose3	95.83	1.000	0.568

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3
 Jonckheere Dose3 LOEC >highest dose
 >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE LE (Live Embryo(d21))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.923	0.001	0.361	0.781	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	41.07	13.02	3.36	31.70	33.86,	48.28
Dose1	13	36.62	14.82	4.11	40.47	27.66,	45.57
Dose2	14	37.79	16.79	4.49	44.44	28.09,	47.48
Dose3	15	42.73	12.44	3.21	29.11	35.84,	49.62

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	48.00	14.00	57.00	.	.
Dose1	37.00	7.00	57.00	89.16	10.84
Dose2	43.00	7.00	58.00	92.01	7.99
Dose3	47.00	22.00	58.00	104.06	-4.06

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 1.46 0.691

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	48.00	.	.
Dose1	37.00	0.640	0.203
Dose2	43.00	0.975	0.310
Dose3	47.00	1.000	0.655

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 LOEC >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50

ANALYSIS RESULTS FOR VARIABLE LE_VE (LiveEmbryo/ViableEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01

Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05

Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.726	<.001	8.504	<.001	USE NON-PARAMETRIC TESTS

***** BASIC SUMMARY STATISTICS *****

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	99.72	0.75	0.19	0.75	99.30,	100.00
Dose1	13	98.63	2.29	0.64	2.33	97.24,	100.00
Dose2	14	97.87	3.82	1.02	3.90	95.67,	100.00
Dose3	15	99.67	0.86	0.22	0.87	99.20,	100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	97.78	100.00	.	.
Dose1	100.00	94.44	100.00	98.91	1.09
Dose2	100.00	88.89	100.00	98.15	1.85
Dose3	100.00	97.30	100.00	99.96	0.04

***** NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests *****

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 3.88 0.275

MannWhit(Bon) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	100.00	1.000	0.111
Dose2	100.00	1.000	0.070
Dose3	100.00	1.000	0.454

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 LOEC >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
ANALYSIS RESULTS FOR VARIABLE NH (Number Hatched)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.941	0.008	0.521	0.670	USE NON-PARAMETRIC TESTS

***** BASIC SUMMARY STATISTICS *****

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	39.07	11.94	3.08	30.57	32.45,	45.68
Dose1	13	35.38	14.28	3.96	40.36	26.76,	44.01
Dose2	14	35.21	16.35	4.37	46.44	25.77,	44.66
Dose3	15	40.80	12.18	3.14	29.85	34.06,	47.54

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	43.00	14.00	55.00	.	.
Dose1	37.00	7.00	57.00	90.57	9.43
Dose2	40.00	4.00	56.00	90.14	9.86
Dose3	44.00	22.00	55.00	104.44	-4.44

***** NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests *****

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	1.72	0.633

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p value
Ctrl	43.00		
Dose1	37.00	0.720	0.230
Dose2	40.00	0.735	0.248
Dose3	44.00	1.000	0.666

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE NH_EL (NumberHatched/EggsLaid (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance (absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.865	<.001	3.891	0.014	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	76.79	9.75	2.52	12.70	71.39,	82.19
Dose1	13	78.10	11.90	3.30	15.24	70.91,	85.30
Dose2	14	65.47	23.77	6.35	36.32	51.74,	79.19
Dose3	15	78.13	10.55	2.72	13.50	72.29,	83.98

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	82.09	53.49	87.10	.	.
Dose1	79.17	46.67	90.48	101.71	-1.71
Dose2	74.82	16.98	88.89	85.25	14.75
Dose3	81.54	55.17	88.52	101.75	-1.75

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 3.56 0.312

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	82.09	.	.
Dose1	79.17	1.000	0.626
Dose2	74.82	0.399	0.113
Dose3	81.54	0.749	0.500

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50

ANALYSIS RESULTS FOR VARIABLE NH_ES (NumberHatched/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01

Levenes test for homogeneity of variance (absolute residuals) -- alpha-level=0.05

Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.826	<.001	3.400	0.024	USE NON-PARAMETRIC TESTS

***** BASIC SUMMARY STATISTICS *****

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	87.04	10.95	2.83	12.58	80.98,	93.11
Dose1	13	92.48	5.38	1.49	5.82	89.22,	95.73
Dose2	14	76.59	21.20	5.66	27.67	64.35,	88.83
Dose3	15	88.93	9.82	2.53	11.04	83.49,	94.36

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	90.38	58.97	100.00	.	.
Dose1	93.02	84.62	100.00	106.24	-6.24
Dose2	82.75	20.45	96.55	87.99	12.01
Dose3	91.67	61.54	100.00	102.17	-2.17

***** NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests *****

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	9.25	0.026

MannWhit(Bon) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	90.38	.	.
Dose1	93.02	1.000	0.897
Dose2	82.75	0.162	0.048
Dose3	91.67	1.000	0.321

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50

ANALYSIS RESULTS FOR VARIABLE NH_LE (NumberHatched/LiveEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.749	<.001	1.992	0.126	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	95.78	4.26	1.10	4.44	93.42,	98.14
Dose1	13	97.01	3.52	0.98	3.62	94.88,	99.13
Dose2	14	91.04	10.67	2.85	11.72	84.88,	97.20
Dose3	15	95.45	3.94	1.02	4.13	93.27,	97.64

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	95.83	86.00	100.00	.	.
Dose1	97.96	87.76	100.00	101.28	-1.28
Dose2	93.72	57.14	100.00	95.05	4.95
Dose3	96.15	87.88	100.00	99.66	0.34

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 5.23 0.156

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	95.83	.	.
Dose1	97.96	1.000	0.760
Dose2	93.72	0.211	0.066
Dose3	96.15	1.000	0.196

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE HS (Hatching Survival(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.949	0.018	0.566	0.640	USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	37.07	11.29	2.91	30.45	30.82	43.32
Dose1	13	34.08	14.39	3.99	42.23	25.38	42.77
Dose2	14	33.79	16.10	4.30	47.64	24.49	43.08
Dose3	15	38.20	12.29	3.17	32.17	31.39	45.01

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	41.00	14.00	51.00	.	.
Dose1	37.00	7.00	57.00	91.93	8.07
Dose2	37.50	4.00	56.00	91.15	8.85
Dose3	43.00	17.00	54.00	103.06	-3.06

 PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	53	0.37	0.773

Dunnett - testing each trt mean signif. less than control
 Williams - test assumes dose-response relationship, testing negative trend
 Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	37.07	.	37.07	.	0.937	0.915	0.996	.	.
Dose1	34.08	0.510	35.45	0.447	.	1.000	0.853	.	.
Dose2	33.79	0.479	35.45	0.474	.	.	0.817	.	.
Dose3	38.20	0.830	35.45	0.488	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE HS_ES (HatchingSurvival/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.900	<.001	3.243	0.029	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	82.87	11.94	3.08	14.41	76.26,	89.49
Dose1	13	88.70	6.99	1.94	7.88	84.48,	92.93
Dose2	14	73.17	21.14	5.65	28.90	60.96,	85.38
Dose3	15	83.05	13.04	3.37	15.70	75.83,	90.27

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	85.00	53.85	100.00		
Dose1	87.50	74.36	100.00	107.04	-7.04
Dose2	81.29	20.45	96.55	88.29	11.71
Dose3	82.69	51.92	100.00	100.21	-0.21

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 6.01 0.111

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	85.00		
Dose1	87.50	1.000	0.885
Dose2	81.29	0.455	0.117
Dose3	82.69	1.000	0.309

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 >highest dose
 Jonckheere Dose3 >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50

ANALYSIS RESULTS FOR VARIABLE HS_NH (HatchingSurvival/NumberHatched (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01

Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05

Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.910	<.001	1.057	0.375	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	95.04	3.57	0.92	3.75	93.07,	97.02
Dose1	13	95.89	4.41	1.22	4.60	93.22,	98.55
Dose2	14	95.59	6.06	1.62	6.34	92.09,	99.09
Dose3	15	93.00	6.61	1.71	7.10	89.34,	96.66

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	95.35	89.36	100.00	.	.
Dose1	95.35	87.88	100.00	100.89	-0.89
Dose2	97.33	78.57	100.00	100.58	-0.58
Dose3	93.18	77.27	100.00	97.85	2.15

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.51	0.474

MannWhit(Bon) - testing each trt median signif. less than control

Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	95.35	.	.
Dose1	95.35	1.000	0.752
Dose2	97.33	1.000	0.843
Dose3	93.18	0.804	0.350

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE THICK (Eggshell thickness)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks	Shapiro-Wilks	Levenes	Levenes	Conclusion
Test Stat	P-value	Test Stat	P-value	
0.985	0.712	0.183	0.908	USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	0.22	0.01	0.00	6.59	0.21,	0.23
Dose1	13	0.22	0.01	0.00	5.95	0.21,	0.23
Dose2	14	0.22	0.02	0.00	8.44	0.21,	0.23
Dose3	15	0.22	0.01	0.00	5.99	0.21,	0.22

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	0.23	0.19	0.24	.	.
Dose1	0.22	0.20	0.25	100.07	-0.07
Dose2	0.21	0.18	0.25	97.46	2.54
Dose3	0.22	0.20	0.24	97.42	2.58

 PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	53	0.71	0.551

Dunnett - testing each trt mean signif. less than control
 Williams - test assumes dose-response relationship, testing negative trend
 Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	0.22	.	0.22	.	1.000	0.740	0.719	.	.
Dose1	0.22	0.765	0.22	0.589	.	0.744	0.725	.	.
Dose2	0.22	0.321	0.22	0.200	.	.	1.000	.	.
Dose3	0.22	0.307	0.22	0.196	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE HATWT (Hatchling Weight)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance (absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.907	<.001	1.997	0.126	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	6.07	0.46	0.12	7.55	5.81,	6.32
Dose1	13	6.00	0.58	0.16	9.62	5.65,	6.35
Dose2	14	6.43	0.65	0.17	10.05	6.06,	6.80
Dose3	15	6.13	0.64	0.17	10.43	5.78,	6.49

Level	Median	Min	Max	%of Control (means)	%Reduction (means)
Ctrl	6.00	5.00	7.00	.	.
Dose1	6.00	5.00	7.00	98.90	1.10
Dose2	6.50	5.00	7.00	105.97	-5.97
Dose3	6.00	5.00	7.00	101.10	-1.10

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 4.60 0.203

MannWhit (Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit (Bon adjust) p-value	Jonckheere p-value
Ctrl	6.00	.	.
Dose1	6.00	1.000	0.369
Dose2	6.50	1.000	0.957
Dose3	6.00	1.000	0.823

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE SURVWT (Survivor Wt (d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
 Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.988	0.839	2.283	0.090	USE PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	27.80	1.86	0.48	6.69	26.77,	28.83
Dose1	13	28.62	2.60	0.72	9.08	27.04,	30.19
Dose2	14	29.43	2.41	0.64	8.19	28.04,	30.82
Dose3	15	27.73	3.22	0.83	11.60	25.95,	29.52

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	28.00	25.00	31.00	.	.
Dose1	29.00	24.00	33.00	102.93	-2.93
Dose2	29.00	27.00	35.00	105.86	-5.86
Dose3	29.00	21.00	32.00	99.76	0.24

 PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	53	1.38	0.257

Dunnett - testing each trt mean signif. less than control
 Williams - test assumes dose-response relationship, testing negative trend
 Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values				
					Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	27.80	.	28.60	.	0.836	0.331	1.000	.	.
Dose1	28.62	0.950	28.60	0.866	.	0.844	0.802	.	.
Dose2	29.43	0.996	28.60	0.895	.	.	0.296	.	.
Dose3	27.73	0.729	27.73	0.605	.	.	.	.	.

SUMMARY

	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE FOOD (Food Consumption)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.937	0.005	1.044	0.381	USE NON-PARAMETRIC TESTS

 BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	18.80	1.61	0.42	8.58	17.91,	19.69
Dose1	13	18.92	1.44	0.40	7.62	18.05,	19.79
Dose2	14	19.00	2.29	0.61	12.04	17.68,	20.32
Dose3	15	19.13	1.55	0.40	8.11	18.27,	19.99

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	19.00	16.00	22.00	.	.
Dose1	19.00	17.00	22.00	100.65	-0.65
Dose2	18.00	16.00	25.00	101.06	-1.06
Dose3	19.00	17.00	23.00	101.77	-1.77

 NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
 Degrees of Freedom TestStat P-value
 3 0.53 0.912

MannWhit(Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	19.00	.	.
Dose1	19.00	1.000	0.585
Dose2	18.00	1.000	0.439
Dose3	19.00	1.000	0.664

SUMMARY
 MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
 Jonckheere Dose3 LOEC >highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
 ANALYSIS RESULTS FOR VARIABLE WTGAINM (Male wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
 Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
 Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.939	0.006	1.819	0.155	USE NON-FARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval	
Ctrl	15	15.13	10.35	2.67	68.39	9.40	20.87
Dose1	13	19.69	9.74	2.70	49.47	13.81	25.58
Dose2	14	24.79	19.69	5.26	79.44	13.42	36.15
Dose3	15	17.33	18.64	4.81	107.55	7.01	27.66

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	11.00	1.00	34.00		
Dose1	21.00	3.00	39.00	130.13	-30.13
Dose2	28.50	-26.00	60.00	163.78	-63.78
Dose3	23.00	-28.00	39.00	114.54	-14.54

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	4.75	0.191

MannWhit (Bon) - testing each trt median signif. less than control
 Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit (Bon adjust)p-value	Jonckheere p-value
Ctrl	11.00		
Dose1	21.00	1.000	0.898
Dose2	28.50	1.000	0.990
Dose3	23.00	1.000	0.939

SUMMARY

	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Data Evaluation Report on the Reproductive Effects of Orthosulfamuron on Northern Bobwhite Quail (*Colinus virginianus*)

PMRA Submission Number {.....}

EPA MRID Number 465789-50

Bobwhite repro, Orthosulfamuron, MRID 465789-50
ANALYSIS RESULTS FOR VARIABLE WTGAINF (Female wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS

Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.918	<.001	5.980	0.001	USE NON-PARAMETRIC TESTS

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval	
Ctrl	15	54.33	13.57	3.50	24.97	46.82,	61.85
Dose1	13	57.00	13.17	3.65	23.10	49.04,	64.96
Dose2	14	48.86	33.25	8.89	68.06	29.66,	68.06
Dose3	15	59.73	14.82	3.83	24.80	51.53,	67.94

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	59.00	31.00	72.00	.	.
Dose1	60.00	31.00	79.00	104.91	-4.91
Dose2	61.00	-25.00	82.00	89.92	10.08
Dose3	56.00	43.00	89.00	109.94	-9.94

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests

Kruskal-Wallis test - equality among treatment groups
Degrees of Freedom TestStat P-value
3 0.41 0.938

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	59.00	.	.
Dose1	60.00	1.000	0.678
Dose2	61.00	1.000	0.631
Dose3	56.00	0.729	0.716

SUMMARY
MannWhit (Bonf adjust) NOEC Dose3 LOEC >highest dose
Jonckheere Dose3 >highest dose