

**DATA EVALUATION RECORD  
AQUATIC INVERTEBRATE LIFE CYCLE TEST  
GUIDELINE OPPTS 850.1350 [72-4(C)]**

1. **CHEMICAL:** Orthosulfamuron

PC Code No.: 108209

2. **TEST MATERIAL:** IR5878 Technical

Purity: 98.56%

3. **CITATION**

Blankinship, A.S., T.Z. Znedall, and H.O. Krueger. 2003. IR5878: A Flow-Through Life-Cycle Toxicity Test with the Saltwater Mysid (*Mysidopsis bahia*). Completed by Wildlife International, Ltd., Easton, MD. Submitted by ISAGRO S.p.A., Milano Italy. Report ID 544A-112. Study initiated on February 12, 2003 and completed July 3, 2003.

MRID No.: 465789-54

4. **REVIEWED BY:** Christie E. Padova, Staff Scientist, Dynamac Corporation

Signature: *Christie E. Padova*

Date: 3/2/06

**APPROVED BY:** Teri S. Myers, Senior Scientist, Cambridge Environmental Inc.

Signature:

*Teri S. Myers*

Date: 3/20/06

5. **APPROVED BY:** Kristina Garber, Biologist, OPP/EFED/ERBIV

Signature:

*Beil Kristina Garber*

Date: 7/27/06

6. **STUDY PARAMETERS**

Age of Test Organism:	Neonates, <24 hours old
Definitive Test Duration:	29 days
Study Method:	Flow-through
Type of Concentrations:	Mean measured

7. **CONCLUSIONS:**

In this 29-day, flow-through study, a saltwater invertebrate, the mysid shrimp was exposed to Orthosulfamuron (IR5878 Technical) at nominal concentrations of 0 (negative control), 1.75, 3.25, 6.5, 13, and 26 mg/L. Mean-measured concentrations were <0.5, (negative control, LOQ), 1.88, 3.56, 6.6, 14, and 27 mg a.i./L.

No statistically significant effects to survival, growth or reproduction of adult mysids were observed. The NOAEC was equivalent to the highest concentration tested (27 mg a.i./L) and the resulting LOAEC was > 27 mg a.i./L. This study is scientifically sound but does not satisfy the guideline requirements for an invertebrate life cycle test since offspring production in controls was below recommended. However, this study may be useful for risk assessment purposes and is classified SUPPLEMENTAL.

LOAEC: >27 mg a.i./L

NOAEC: 27 mg a.i./L

Endpoint(s) Affected: None

8. **BACKGROUND:**



The method of this study followed USEPA OPPTS 850.1350, and ASTM standards (see reference section). The study was evaluated based on the OPPTS guideline.

This study was conducted in accordance with USEPA (40 CFR Parts 160 and 792), OECD, and JMAFF Good Laboratory Practice Regulations. A Quality Assurance Statement was included.

**9. MAJOR GUIDELINE DEVIATIONS:**

1. The survival of first-generation mysids on Days 7 and 21 (gender-specific on Day 21) and the body length of organisms at the time of sexual discernment were not assessed as endpoints in this study. In addition, offspring were apparently counted then discarded.
2. The time of first brood release was reported in the study text as Day 16, however, this endpoint was not assessed for possible treatment-related effects.
3. A LOEC was not determined.
4. Offspring production in controls was below recommended (successful reproduction in at least 75% of control females with an average of at least 8 young in the first two broods).

**10. MATERIALS AND METHODS:**

The test substance was IR 5878. It was described as a white powder with 98.56% purity. The CAS number was 213464-77-8 and the batch number as G009/02. Test organism descriptions are located in table 1. Descriptions of test characteristics, such as water characteristics, testing vessels, and test substance concentrations are located in table 2.

Table 1. Descriptions of test organisms.

<b>Parameter</b>	<b>Reported Information</b>
<b>Species</b>	<i>Mysidopsis bahia</i> (recently renamed <i>Americamysis bahia</i> )
<b>Duration of the Test</b>	29 days
<b>Source</b>	In-house cultures maintained by Wildlife International
<b>Parental Acclimation</b>	Adult mysids were held in water from the same source as used during the test.  Health was not reported
<b>Parental Acclimation Period</b>	Continuous
<b>Chamber Location</b>	Organisms were impartially selected and distributed to test compartments.
<b>Brood Stock</b>	At test initiation, juvenile mysids were collected from the laboratory culture stock. The in-house culture was maintained with the same food, water, temperature, salinity, and pH as used in the definitive test.

Parameter	Reported Information
Distribution	15 mysids per test compartment, 1 test compartment per aquarium, and 4 replicate aquaria per treatment level (60 mysids/level).  When possible, 5 mature pair per replicate aquarium (20 pair/level); excess mature male organisms were maintained in a separate compartment within the replicate.
Pairing	When the mysids reached sexual maturity, they were redistributed (paired) within the test aquaria. All pairing occurred on Day 14.
Feeding	Mysids were fed live brine shrimp ( <i>Artemia</i> sp.) nauplii, one to four times daily. This was supplemented occasionally with Algamac 2000. Quantity not reported.
Observations	Daily observations of adult mortality, clinical signs and reproduction were made. Second generation mysids were observed for abnormal development or behavior. At test termination, total adult length and dry weight were measured.
Controls	A negative control group was included.
Other	Mean time for first brood release occurred on Day 16 (apparently for all test levels).

Table 2. Descriptions of water characteristics and testing conditions and test design.

Parameter	Reported Information
Test Water	<p>Natural seawater collected at Indian River Inlet, Delaware and diluted to a salinity of approx. 20 ppt with well water. The water was then passed through a sand filter, aerated, filtered again (0.45 <math>\mu</math>m), and UV sterilized prior to use.</p> <p>Results of periodic analysis for pesticides, organics, and metals were also provided (from water collected on 07/31/02); all pesticide and organic analytes were below the LOD. The following metals were detected: arsenic at 0.042 ppm, magnesium at 788 ppm, molybdenum at 0.008 ppm, and sodium at 6603 ppm.</p> <p>Salinity was measured daily in alternating replicates of the negative control group. Salinity ranged from 18-20 ppt.</p> <p>pH was measured in alternating replicates of each test level at study initiation, termination, and weekly throughout the test. It ranged from 8.1-8.4.</p> <p>Dissolved oxygen (DO) was measured in alternating replicates of each test level at study initiation, termination, and weekly throughout the test. DO was maintained at <math>\geq</math>80% of saturation.</p>

Parameter	Reported Information
Test Temperature	Temperature was measured in each test chamber at study initiation, termination, and weekly throughout the test, and was measured continuously in one negative control replicate. Target: 25 ± 2°C, Actual range: 24.4 to 26.0°C.
Photoperiod	16 hours light, 8 hours dark, with 120-minute gradual transitions of light intensity. Light intensity was 34 lux over the surface of one representative test chamber at test initiation.
Dosing Apparatus	A continuous-flow serial diluter. A dilution factor of 0.5 and a dilution water control were used.
Test Vessels	Prior to pairing: glass containers (12 cm diameter and 19 cm in height) with nylon mesh screen attached to two holes on opposite sides.  Following pairing: glass Petri dishes (6 cm diameter) with sides of nylon mesh screen attached with silicone adhesive.
Flow Rate	7 volume additions/24 hours prior to sexual maturity and 5 volume additions/24 hours following sexual maturity.  Meter systems were calibrated before the study and visually checked twice daily during the test period.
Aeration	The dilution water was aerated prior to use.  The test chambers were not aerated.
Concentrations	Nominal: 1.75, 3.25, 6.5, 13, 26 mg/L Mean measured: 1.88, 3.56, 6.6, 14, and 27 mg a.i./L  Measured in alternating replicate aquaria from all levels on Days 0, 7, 14, 21, and 29.
Solvents	N/A
Other	All of the test solutions appeared clear and colorless in the mixing chambers and test chambers at test initiation and termination.

## 11. REPORTED RESULTS:

Table 3. General observations.

Parameter	Reported Information
Controls:	Mean control survival was 91% (from Days 14-29).  20% of control females (4/20) failed to produce young. Reproduction averaged 0.345 young per reproductive day in the controls.

Parameter	Reported Information
<b>Data Endpoints</b>	<p><b>Endpoints evaluated in this study included:</b></p> <ul style="list-style-type: none"> <li>- Cumulative survival of first-generation mysids on Day 14 (prior to pairing) and Day 29 (following pairing; not gender specific).</li> <li>- Number of offspring/reproductive day</li> <li>- Total body length of each surviving first-generation mysid</li> <li>- Dry weight of each surviving first-generation mysid</li> <li>- Behavior and appearance of first-generation mysids</li> <li>- Abnormal development and aberrant behavior of offspring</li> </ul> <p>The time of first brood release was reported in the study text as Day 16, however, this endpoint was not assessed for possible treatment-related effects.</p>
<b>Raw data included? (Y/N)</b>	<p><b>Raw data included:</b></p> <ul style="list-style-type: none"> <li>- Daily replicate survival and clinical observation data were provided (not gender specific).</li> <li>- For each compartment, the total number of young produced and number of reproductive days.</li> <li>- Individual length measurements at study termination (not gender specific).</li> <li>- Individual dry weight measurements at study termination (not gender specific).</li> </ul>
<b>Other</b>	<p>Following pairing, a few mysids were injured during handling of the test compartments during daily observations and subsequently died. Incidental mortalities include: one mysid at the 1.88 and 3.56 mg a.i./L levels, and two mysids at the 27 mg a.i./L level. These deaths were not attributed to treatment, and therefore were not included in the percent survival calculations or statistical comparisons.</p>

**Toxicity Observations:** No treatment-related effects were observed for any endpoint assessed in this study, and the subsequent NOEC and LOEC were 27 and >27 mg a.i./L, respectively.

In general, all first-generation mysids appeared normal throughout the study. Prior to pairing (on Day 14), a few mysids ( $\leq 5\%$ ) appeared smaller compared to the others in the 14 and 27 mg a.i./L treatment groups, but these observations were infrequent and were not considered to be treatment-related. Survival on Day 14 ranged from 92-100% for all test levels. Survival on Day 29 was statistically reduced at the 6.6 mg a.i./L level compared to the control (76 versus 91%); however, this difference did not follow a dose-response and therefore not considered to be related to treatment. Survival in the remaining treatment groups ranged from 87-92%, with no other statistically-significant differences observed.

The day of first brood release was Day 16 (apparently the same for all treatment levels, but not clearly specified). Overall reproductive success ranged from 0.210-0.517 offspring/reproductive day for all test levels, with no statistically-significant differences observed.

At study termination, average total body length and dry weight ranged from 7.73-8.09 mm and 0.844-0.933 mg for all test groups, with no statistically-significant differences observed (Table 4).

Table 4. Observations of reproduction, mortality and growth of adult mysid shrimp during testing.

Toxicant Conc.		Mean # Young/ fem/ repro day	Survival (%)		Mean Total Length (mm)	Mean Dry Weight (mg)
Nom. (mg/L)	Meas. (mg a.i./L)		Days 0 - 14	Days 15-29		
Ctrl	<0.500	0.345	93	91	7.87	0.844
1.75	1.88	0.517	95	90	8.09	0.919
3.25	3.56	0.334	97	92	7.86	0.887
6.5	6.6	0.405	100	76 *	7.93	0.933
13	14	0.210	92	87	7.77	0.889
26	27	0.307	95	91	7.73	0.848

\* Statistically significant ( $p < 0.05$ ) difference from the negative control (Fisher's Exact Test), but not considered to be treatment related due to lack of dose-response.

### **Statistical Results:**

Statistical analyses were performed on survival (Days 14 and 29), the number of young per reproductive day, and the terminal length and dry weight of each surviving first-generation mysid. No gender-specific data were generated or analyzed.

Survival data were analyzed using Chi-square and Fisher's Exact Test to identify treatment groups that showed a statistically significant difference from the control group ( $p \leq 0.05$ ). Reproductive and growth data were checked for normality using Shapiro-Wilks' test and for homogeneity of variance using Bartlett's test, and were subsequently analyzed using analysis of variance (ANOVA) and Dunnett's test to identify treatments that were significantly different from the control ( $p \leq 0.05$ ) (Table 5).

The NOAEC and LOAEC were based on significance data. All analyses were performed using TOXSTAT or SAS software programs and mean-measured concentrations.

### **12. REVIEWER'S STATISTICAL RESULTS:**

The reviewer's results agreed with those of the study authors. Survival, reproduction (offspring/reproductive day), total length, and dry weight data were analyzed using the Chi-square and Shapiro-Wilks tests for normality and the Hartley and Bartlett's tests for homogeneity of variances. Data which did not meet these assumptions were analyzed using the non-parametric Steele's many-one rank test. Data which did satisfy these assumptions were analyzed using ANOVA via TOXSTAT statistical software. Mean-measured values were used in all estimations (Table 5). Detailed results of the reviewer's statistical analysis are located in Appendix 1.

Table 5. Statistical methods of report and reviewer to determine NOEC and LOEC values.

Endpoint	Reported Method	Reviewer's Method	Results (mg a.i./L)*	
			NOAEC	LOAEC
Survival	Chi-square/Fisher's Exact Test	Steele's many-one rank test (to pairing); ANOVA (to test end)	27	>27
Reproduction (offspring/repro. day)	ANOVA/Dunnett's	ANOVA	27	>27
Total length	ANOVA/Dunnett's	ANOVA	27	>27
Dry weight	ANOVA/Dunnett's	ANOVA	27	>27

\*Results of statistical analysis of report and of study reviewer were consistent.

### 13. REFERENCES:

U.S. Environmental Protection Agency. 1996. Series 850-Ecological Effects Test Guidelines (draft), OPPTS Number 850.1350: *Mysid Chronic Toxicity Test*.

ASTM Standard E1191-90. 1991. *Standard Guide for Conducting Early Life-Stage Toxicity Tests with Saltwater Mysids*, American Society for Testing and Materials.

West, Inc. and D.D. Gulley. 1996. TOXSTAT Version 3.5. Western EcoSystems Technology, Inc. Cheyenne, Wyoming.

The SAS System for Windows. 2001. The SAS System for Windows. Release 8.2. Cary, North Carolina.

**14. RESULTS OF STATISTICAL VERIFICATION:**

survival (# of 15) through pairing  
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----- STEELS MANY-ONE RANK TEST ----- Ho:Control<Treatment -----

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	control	14.000				
2	1.88	14.250	19.50	10.00	4.00	
3	3.56	14.500	21.00	10.00	4.00	
4	6.6	15.000	24.00	10.00	4.00	
5	14	13.750	16.50	10.00	4.00	
6	27	14.250	19.50	10.00	4.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

% survival through termination  
 File: 8954st Transform: NO TRANSFORM

----- ANOVA TABLE -----

SOURCE	DF	SS	MS	F
Between	5	736.375	147.275	1.676
Within (Error)	18	1581.250	87.847	
Total	23	2317.625		

Critical F value = 2.77 (0.05,5,18)  
 Since F < Critical F FAIL TO REJECT Ho:All groups equal

% survival through termination  
 File: 8954st Transform: NO TRANSFORM

----- DUNNETTS TEST - TABLE 1 OF 2 ----- Ho:Control<Treatment -----

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	91.750	91.750		
2	1.88	88.750	88.750	0.453	
3	3.56	90.000	90.000	0.264	
4	6.6	74.750	74.750	2.565	*
5	14	87.500	87.500	0.641	
6	27	87.000	87.000	0.717	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

% survival through termination  
 File: 8954st Transform: NO TRANSFORM



DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	1.88	4	15.972	17.4	3.000
3	3.56	4	15.972	17.4	1.750
4	6.6	4	15.972	17.4	17.000
5	14	4	15.972	17.4	4.250
6	27	4	15.972	17.4	4.750

% survival through termination  
 File: 8954st Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	91.750	91.750	91.750
2	1.88	4	88.750	88.750	89.375
3	3.56	4	90.000	90.000	89.375
4	6.6	4	74.750	74.750	83.083
5	14	4	87.500	87.500	83.083
6	27	4	87.000	87.000	83.083

% survival through termination  
 File: 8954st Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	91.750				
1.88	89.375	0.358		1.73	k= 1, v=18
3.56	89.375	0.358		1.82	k= 2, v=18
6.6	83.083	1.308		1.85	k= 3, v=18
14	83.083	1.308		1.86	k= 4, v=18
27	83.083	1.308		1.87	k= 5, v=18

s = 9.373

Note: df used for table values are approximate when v > 20.

number of young per repro day  
 File: 8954r Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.210	0.042	1.448
Within (Error)	18	0.515	0.029	
Total	23	0.725		

Critical F value = 2.77 (0.05,5,18)  
 Since  $F < \text{Critical } F$  FAIL TO REJECT  $H_0$ :All groups equal

number of young per repro day  
 File: 8954r Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2  $H_0$ :Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	0.345	0.345		
2	1.88	0.517	0.517	-1.426	
3	3.56	0.334	0.334	0.093	
4	6.6	0.405	0.405	-0.496	
5	14	0.210	0.210	1.121	
6	27	0.307	0.307	0.313	

Dunnett table value = 2.41 (1 Tailed Value,  $P=0.05$ ,  $df=18,5$ )

number of young per repro day  
 File: 8954r Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 2 OF 2  $H_0$ :Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	1.88	4	0.290	84.1	-0.172
3	3.56	4	0.290	84.1	0.011
4	6.6	4	0.290	84.1	-0.060
5	14	4	0.290	84.1	0.135
6	27	4	0.290	84.1	0.038

number of young per repro day  
 File: 8954r Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	0.345	0.345	0.431
2	1.88	4	0.517	0.517	0.431
3	3.56	4	0.334	0.334	0.369
4	6.6	4	0.405	0.405	0.369
5	14	4	0.210	0.210	0.259
6	27	4	0.307	0.307	0.259

number of young per repro day  
 File: 8954r Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	0.431				
1.88	0.431	0.718		1.73	k= 1, v=18
3.56	0.369	0.203		1.82	k= 2, v=18
6.6	0.369	0.203		1.85	k= 3, v=18
14	0.259	0.722		1.86	k= 4, v=18
27	0.259	0.722		1.87	k= 5, v=18

s = 0.169  
 Note: df used for table values are approximate when v > 20.

total length  
 File: 89541 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.317	0.063	3.150
Within (Error)	18	0.358	0.020	
Total	23	0.675		

Critical F value = 2.77 (0.05,5,18)  
 Since F > Critical F REJECT Ho:All groups equal

total length

DP Barcode: D319377

MRID No.: 465789-54

File: 89541 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	7.870	7.870		
2	1.88	8.085	8.085	-2.150	
3	3.56	7.858	7.858	0.125	
4	6.6	7.930	7.930	-0.600	
5	14	7.768	7.768	1.025	
6	27	7.732	7.732	1.375	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

total length

File: 89541 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	1.88	4	0.241	3.1	-0.215
3	3.56	4	0.241	3.1	0.012
4	6.6	4	0.241	3.1	-0.060
5	14	4	0.241	3.1	0.103
6	27	4	0.241	3.1	0.138

total length

File: 89541 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	7.870	7.870	7.978
2	1.88	4	8.085	8.085	7.978
3	3.56	4	7.858	7.858	7.894
4	6.6	4	7.930	7.930	7.894
5	14	4	7.768	7.768	7.768
6	27	4	7.732	7.732	7.732

total length

File: 89541 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	7.978				
1.88	7.978	1.079		1.73	k= 1, v=18
3.56	7.894	0.238		1.82	k= 2, v=18
6.6	7.894	0.238		1.85	k= 3, v=18
14	7.768	1.029		1.86	k= 4, v=18
27	7.732	1.380		1.87	k= 5, v=18

s = 0.141

Note: df used for table values are approximate when v > 20.

dry weight  
File: 8954w Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.025	0.005	1.000
Within (Error)	18	0.084	0.005	
Total	23	0.109		

Critical F value = 2.77 (0.05,5,18)  
Since F < Critical F FAIL TO REJECT Ho:All groups equal

dry weight  
File: 8954w Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	0.845	0.845		
2	1.88	0.918	0.918	-1.460	
3	3.56	0.887	0.887	-0.850	
4	6.6	0.933	0.933	-1.760	
5	14	0.889	0.889	-0.880	
6	27	0.848	0.848	-0.065	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

dry weight  
File: 8954w Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

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GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	1.88	4	0.120	14.3	-0.073
3	3.56	4	0.120	14.3	-0.043
4	6.6	4	0.120	14.3	-0.088
5	14	4	0.120	14.3	-0.044
6	27	4	0.120	14.3	-0.003

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dry weight  
File: 8954w Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

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GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	0.845	0.845	0.845
2	1.88	4	0.918	0.918	0.895
3	3.56	4	0.887	0.887	0.895
4	6.6	4	0.933	0.933	0.895
5	14	4	0.889	0.889	0.895
6	27	4	0.848	0.848	0.895

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dry weight  
File: 8954w Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

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IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	0.845				
1.88	0.895	1.040		1.73	k= 1, v=18
3.56	0.895	1.040		1.82	k= 2, v=18
6.6	0.895	1.040		1.85	k= 3, v=18
14	0.895	1.040		1.86	k= 4, v=18
27	0.895	1.040		1.87	k= 5, v=18

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s = 0.068

Note: df used for table values are approximate when v > 20.