TEXT SEARCHABLE DOCUMENT October 2008

DATA EVALUATION RECORD
AQUATIC INVERTEBRATE LIFE CYCLE TEST
§ 72-4(B)

1. **CHEMICAL:** Fentin hydroxide (TPTH) PC Code No.: 083601

2. **TEST MATERIAL:** TPTH Technical Purity: 97.5%

3. **CITATION:**

Authors: Putt, A.

Title: TPTH Technical - Life-Cycle Toxicity Test with Mysids (*Mysidopsis bahia*).

Study Completion Date: November 9, 2000

Laboratory: Springborn Laboratories, Inc.
790 Main Street
Wareham, Massachusetts 02571-1075

Sponsor: TPTH Task Force
c/o Landis International, Inc.
3185 Madison Highway
Valdosta, GA 31603-5126

Laboratory Report ID: 13733.6102

MRID No.: 45276002

DP Barcode: D271841

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

Signature: **Date:** 4/17/01

APPROVED BY: Kathleen Ferguson, Ph.D., Senior Staff Scientist, Dynamac Corporation

Signature: **Date:** 4/17/01

5. **APPROVED BY:** ***Contractor Draft Copy***
Signature: **Date:**

6. STUDY PARAMETERS:

Scientific Name of Test Organisms: *Mysidopsis bahia*

Age of Test Organism: ≤24 Hours old

Definitive Test Duration 28 days

Study Method: Flow-through

Type of Concentrations: Mean-measured

7. CONCLUSIONS:

In this 28-day life cycle toxicity test, *Mysidopsis bahia* neonates were exposed under flow-through conditions to TPTH Technical (97.5% purity) at mean-measured concentrations of 0 (negative control), 0.011, 0.024, 0.047, 0.095, 0.18, and 0.33 µg a.i./L. Measured values were 17-19% of nominal concentrations. Each treatment group consisted of 60 mysids/level; thinning was not performed. Following sexual maturity on Day 12, 10 pairs per treatment level were isolated for the remainder of the study. Once daily throughout the study, first-generation mysids were observed for mortality and signs of abnormal behavior. Once daily during the reproduction period, second-generation mysids were counted, then discarded. Data endpoints included survival of first-generation mysids (Day 28; combined sexes), number of young produced per female per reproductive day, and dry weight and length of surviving first-generation mysids (Day 28; sex-specific).

No treatment-related effect on survival was observed. After 28 days, survival averaged 77-95% for all test groups, with no pattern of decline. Reproductive success was reduced compared to controls in all treatment groups, with statistically-significant reduction at the ≥0.095-µg a.i./L levels. The mean number of young/female/reproductive day was 1.4226 for the control group, 1.2818 for the 0.011-µg a.i./L group, 1.2681 for the 0.024-µg a.i./L group, 1.1245 for the 0.047-µg a.i./L group, 0.8125 for the 0.095-µg a.i./L group, 0.8734 for the 0.18-µg a.i./L group, and 0.9525 for the 0.33-µg a.i./L group. No apparent effect on terminal length was observed, with mean values of 6.6 to 7.5 mm for all groups (both sexes). Statistically-significant reductions in terminal dry weight of males was observed at the ≥0.095-µg a.i./L levels; mean dry weights ranged from 0.81-0.85 mg for the control and ≤0.047-µg a.i./L groups, and ranged from 0.77-0.79 mg for the ≥0.095-µg a.i./L groups. Although a slight reduction in terminal body weight was observed in females from the ≥0.047-µg a.i./L groups, no statistical significance was observed. **Based upon reproduction success and terminal dry body weights of males, the LOEL is 0.095 µg a.i./L, the NOEL is 0.047µg a.i./L, and the MATC is 0.067 µg a.i./L.**

This study is classified as SUPPLEMENTAL. It is scientifically valid and primarily

fulfills the guideline requirements for an aquatic invertebrate life-cycle test using the *Mysidopsis bahia* [§72-4(b)].

Results Synopsis
Most Sensitive Endpoint: Reproductive success and terminal body weight of first-generation
NOEL: 0.047 µg a.i./L LOEL: 0.095 µg a.i./L MATC: 0.067 µg a.i./L

8. ADEQUACY OF THE STUDY:

A. Classification: Supplemental

B. Rationale: Survival of second generation mysids for at least 4 days was not monitored.

C. Repairability: N/A

9. GUIDELINE DEVIATIONS:

1. Second-generation mysids should have been maintained for at least 4 days to monitor survival, development, and behavior.

2. Following sexual maturity and identification, raw data collected on the survival of each test mysid should have been provided. The summary tables provided used combined-sex data for Day 28. On day 28, it was possible to derive the number of each sex from raw growth data tables.

3. Recovery of TPTH Technical from the exposure solutions was extremely low, averaging 17 to 19% of the nominal levels. In addition, on three instances (Day 8, 0.13-µg a.i./L group and Day 28, 0.064- and 0.51-µg a.i./L groups), measured values exceeded 30% of the running average.

4. Although the first-generation mysids were reportedly observed for abnormal behavior once daily during the study, the results of these findings (if any) were not described.

5. It was not specified if the test chambers were covered during the study.

6. The flow splitting accuracy was apparently not verified.

7. The quantity of live brine shrimp fed to the mysids was not specified.

10. SUBMISSION PURPOSE: R(NC)

11. MATERIALS AND METHODS:

A. Test Organisms/Acclimation

Guideline Criteria	Reported Information
Species An estuarine shrimp species, preferably *Americamysis bahia*	*Mysidopsis bahia* (*Americamysis bahia*)
Source/Supplier	In-house cultures; the original culture was obtained from Aquatic BioSystems, Inc., Fort Collins, CO.
Age at Beginning of Test <24 hours old	≤24 Hours old
Parental Acclimation Parental stock must be maintained separately from the brood culture in dilution water and under test conditions. Mysids should be in good health.	During acclimation, parent mysids were maintained under test conditions. Mysids were in good health.
Parental Acclimation Period At least 14 days	14 Days
Brood Stock Test started with mysids from: - one brood stock, or - brood stock which has not obtained sexual maturity or had been maintained for >14 days in a laboratory with same food, water, temperature, and salinity used in the test.	Mysids were obtained from brood stock maintained for 14 days under conditions similar to those employed in the definitive test.

B. Test System

Guideline Criteria	Reported Information
Source of Dilution Water May be natural (sterilized and filtered) or a commercial mixture; water must be free of pollutants.	Artificial seawater was prepared daily by adding a commercially-prepared salt formula to soft freshwater and adjusting the salinity to 24-26‰ (with salt). The water was aerated vigorously for approximately 48 hours prior to use. Periodic contaminant analysis was provided.
Does water support test animals without observable signs of stress?	Yes
Water Temperature 27°C for mysids - At test termination, mean-measured temperature for each chamber should be within 1°C of selected test temperature. - Must be within 3°C of the mean of the time-weighted averages. - Must not differ by >2°C between chambers during the same interval.	Target: 27 ± 1°C Actual range: 24.7-28.7°C All criteria met.
Salinity 15-30 ‰ - The difference between highest and lowest measured salinities should be less than 5 ‰.	24-26 ‰ Criteria met.
pH 7.6 and 8.2	8.0-8.2
Dissolved Oxygen 60-100% saturation	≥88% saturation (≥6.3 mg/L)
Photoperiod 16-hr light/8-hr dark (14-hr light/10-hr dark also acceptable)	16-hr light/8-hr dark
Test Chambers 1. Material:	1. Glass

Guideline Criteria	Reported Information
All glass, No. 316 stainless steel, or perfluorocarbon plastic 2. Size: Typically 30 x 45 x 15 cm (20.25 L) 3. Fill depth: 10 cm 4. Were chambers identical and covered during the test?	2. 39 x 20 x 25 cm (19.5 L) 3. From 5-9 cm (adjusted using a siphon) 4. All chambers were identical; it was not specified if the chambers were covered.
Test Compartments (within chambers) - 250-mL glass beakers with side cutouts covered with nylon mesh or stainless steel screen, or - 90- or 140-mm id glass Petri dish bottoms with collars made of 200-250 µm mesh screen	- Prior to pairing (on Day 12), mysids were maintained in 10-cm glass Petri dishes to which an approximately 15-cm high collar of Nitex screen was attached with silicone adhesive. - Following pairing, the reproductive compartments were cylindrical glass jars (5.1-cm diameter, 10-cm high) covered with Nitex screens.
Type of Dilution System Intermittent flow proportional diluters or continuous flow serial diluters should be used.	An intermittent-flow proportional dilution system drawing from a single stock solution was used. A Harvard pump delivered 3.3 mL/cycle of a 1.2-mg a.i./L stock solution into the diluter system's chemical mixing chamber, where it was mixed with 1.965 L of dilution water per cycle (equivalent to 2.0 µg a.i./L) and serially diluted (50%) to produce the remaining nominal test concentrations.
Toxicant Mixing 1. Mixing chamber is recommended but not required; aeration should not be used for mixing. 2. If a mixing chamber was not employed, was it demonstrated that the test solution was completely mixed before introduction into the test system? 3. Was flow splitting accuracy within 10%?	1. A single mixing chamber was employed; test solutions were not aerated. 2. N/A 3. Not specified.

Guideline Criteria	Reported Information
Flow Rate 1. 5-10 volume additions per 24 hours. 2. Did the flow rate maintain the toxicant level and the DO at ≥60% of saturation? 3. Were the meter systems calibrated before study and checked twice daily during test period?	1. Approximately 7.6 turnovers per day 2. Yes 3. Yes
Solvents - Acceptable solvents include triethylene glycol, methanol, acetone, and methanol. - Solvent should not exceed 0.1 mL/L in a flow-through system.	N/A
Aeration Dilution water should be vigorously aerated, but the test tanks should not be aerated.	Criteria met

C. Test Design

Guideline Criteria	Reported Information
Duration of the Test Approximately 28 days. Was the test terminated within 7 days of the median time of first brood release in the controls?	28 Days No; test duration was adequate.
Nominal Concentrations Negative control, a solvent control (when applicable), and at least five treatment levels, one of which must adversely affect a life stage and one must not affect any life stage. The dilution factor should not be >50%.	Negative control and 0.064, 0.13, 0.26, 0.51, 1.0, and 2.0 µg a.i./L
Distribution Number of mysids before pairing:	60/level: 15/mysids per compartment, two

Guideline Criteria	Reported Information
Minimum of 15 mysids per compartment, 2 compartments per chamber, 2 chambers per concentration for a total of 60/treatment level. Number of mysids after pairing: ≥20 randomly selected pairs/treatment (excess males should be held in separate compartment in same treatment to replace paired males).	compartments per chamber, and two replicate chambers per concentration. 20 pairs/level: one pair per compartment, 10 compartments per chamber (theoretically), and two replicate chambers per concentration. Extra mysids were pooled into one of the original retention compartments within each chamber and maintained for the duration of the test. Paired males that died during the study were replaced with a male from the pooled group. Dead females were not replaced.
Pairing Should be conducted when most of the mysids are sexually mature, usually 10-14 days after test initiation. All pairing should occur on the same day.	All pairing was conducted on Day 12.
Test organisms randomly or impartially assigned to test vessels?	Yes
Were treatments randomly assigned to individual test chamber locations?	Yes
Feeding Mysids should be fed live brine shrimp nauplii at least once daily. 150 live brine shrimp nauplii per mysid per day or 75 twice a day is recommended.	Juvenile mysids were fed newly hatched live brine shrimp (*Artemia* sp.) nauplii generally twice a day. Prior to pairing, at least one feeding/day was enriched with Selco®, a substance high in saturated fatty acids. Following pairing, the Selco encrichment was used on an every-other day basis.
Counts Live adult mysids should be counted at initiation, at pairing, and daily after pairing.	Live adult mysids were estimated once daily; precise determinations were made at test initiation, post-pairing, and test termination.

Guideline Criteria	Reported Information
Live young must be counted and removed daily. Missing or impinged animals should be recorded.	After pairing, live young were counted once daily until test termination.
Controls Negative control and carrier control (when applicable) are required.	A negative control was included.
Water Parameter Measurements 1. Temperature should be monitored daily in one chamber and at least three times in all chambers. 2. Salinity should be measured daily in at least one test vessel. 3. pH should be measured at the beginning, the end, and at least weekly during the test in the control vessels and highest test level. 4. Dissolved oxygen must be measured at each concentration at least once a week.	1. Measured daily in each replicate chamber. Also measured continuously in one control replicate. 2. Measured daily in each replicate chamber. 3. Measured daily in each replicate chamber. 4. Measured daily in each replicate chamber.
Chemical Analysis Toxicant concentration must be measured in one chamber at each toxicant level every week.	Toxicant concentration was measured in alternating replicate chambers on Days 0, 8, 14, 21, and 28. Analysis was performed using HPLC in conjunction with UV (220 nm) detection. The LOQ was 0.006 µg a.i./L.

Comments: First-generation mysids were observed daily for signs of abnormal behavior. Once daily during the reproductive period (Days 12-28), second-generation mysids were counted and discarded.

12. REPORTED RESULTS

A. General Results

Guideline Criteria	Reported Information

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Chemical Analysis For all test groups, a) the measured concentration of the test material should not be <50% of the time-weighted average measured concentration for >10% of the duration of the test, and b) the measured concentration should not be >30% of the time-weighted average measured concentration for >5% of the duration of the test.	In three instances (Day 8, 0.13-µg a.i./L group and Day 28, 0.064- and 0.51-µg a.i./L groups), measured values exceeded 30% of the running average.
Controls - Survival of the paired first-generation controls must be ≥70%. - ≥75% of the paired first-generation female controls produced young, or - The average number of young produced by the first-generation female controls was ≥3.	- All criteria met.
Data Endpoints Must Include 1. Survival of first-generation mysids, gender specified 2. Number of live young produced per female 3. Dry weight and length of each first generation mysid alive at the end of the test, gender specified **Data Endpoints Should Also Include** 4. Incidence of morphological findings. 5. Survival, development, and behavior of	Data Endpoints Included 1. Survival of first generation mysids on Day 28 (combined sexes). 2. Criteria met. 3. Criteria met. 4. Not addressed in study Results and Discussion. 5. Apparently not performed.

Guideline Criteria	Reported Information
second-generation mysids for at least 4 days.	
Raw data must include 1. Survival of first-generation mysids, gender specified 2. Number of live young produced per female 3. Terminal weight and length measurements, individual and gender specified	1. Provided for Day 28; not differentiated by sex. Sex-specific survival for Day 28 was derived by the reviewer from raw terminal length data tables. 2. Provided 3. Provided

Effects Data

Concentration (µg a.i./L)		Percent Survival (ratio) Day 28[a]			Reproduction, Days 12-28		Growth, Day 28[b]			
Nominal	Mean Measured (% nominal)	_	_	_ and _	Cumulative No. of Young	Mean No. Young/ Female/Repro. Days	Mean Length, mm		Mean Dry Weight, mg	
							_	_	_	_
Control	—	26	26	52 (60)	441	1.4226	6.6	7.0	0.85	1.1
0.064	0.011 (17)	22	26	48 (60)	382	1.2817	6.9	7.4	0.81	1.0
0.13	0.024 (18)	25	32	57 (60)	402	1.2681	7.1	7.5	0.83	0.99
0.26	0.047 (18)	18	28	46 (60)	280	1.1245	7.3	7.5	0.82	0.94
0.51	0.095 (19)	23	32	55 (60)	260	0.8125*	7.2	7.2	0.77*	0.86
1.0	0.18 (18)	21	25	46 (60)	269	0.8734*	7.2	7.4	0.79*	0.91
2.0	0.33 (17)	21	32	53 (60)	301	0.9525*	7.1	7.4	0.79*	0.93

[a]The number of surviving organisms/sex was reviewer-derived from raw terminal length data tables. Only combined-sex data were evaluated statistically.

[b]Data for combined sexes was not analyzed statistically.

*Statistically significant from control at $p \leq 0.05$.

Toxicity Observations: First generation mysids were reportedly observed daily for abnormal appearance and behavior. No discussion of findings (if any) was provided.

B. Statistical Results:

Statistical Method: Survival of the first-generation mysids (combined sexes; Day 28), the number of young per surviving female per productive day (Day 28), and the length and dry weight of each surviving first-generation mysid (Day 28) were statistically analyzed. Data were evaluated for homogeneity of variances using Bartlett's test and for assessment of normality using the Shapiro-Wilks Test. Data were then compared to controls using Williams' Test. All comparisons were made at the 95% level of certainty except in the case of Bartlett's Test, in which the 99% level of certainty was applied.

Most sensitive endpoint: Reproductive success and male dry body weights were the most sensitive endpoints.

Endpoint	Method	NOEL	LOEL	MATC
Survival	Williams' test	0.33 µg a.i./L	>0.33 µg a.i./L	>0.33 µg a.i./L
Reproduction	Williams' test	0.047 µg a.i./L	0.095µg a.i./L	0.067 µg a.i./L
Weight	Williams' test	0.047 µg a.i./L	0.095 µg a.i./L	0.067 µg a.i./L
Length	Williams' test	0.33 µg a.i./L	>0.33 µg a.i./L	>0.33 µg a.i./L

13. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Data were assessed for normality and homogeneity of variance prior to analysis via Williams' test to detect adverse effects of treatment. TOXSTAT software was used for all statistical tests. The reviewer's conclusions were in accord with those of the study author.

Endpoint	Method	NOEL	LOEL	MATC
Survival	Williams' test	0.33 µg a.i./L	>0.33 µg a.i./L	>0.33 µg a.i./L
Reproduction	Williams' test	0.047 µg a.i./L	0.095µg a.i./L	0.067 µg a.i./L
Weight	Williams' test	0.047 µg a.i./L	0.095 µg a.i./L	0.067 µg a.i./L
Length	Williams' test	0.33 µg a.i./L	>0.33 µg a.i./L	>0.33 µg a.i./L

14. REVIEWER'S COMMENTS:

Recovery of TPTH Technical from the exposure solutions was extremely low, averaging only 17-19% of the nominal levels. This phenomenon was observed during preliminary testing and discussed with EPA via the Rapid Response Committee. The study authors reported that TPTH adsorbed "on the glass and silicon surfaces" of the test aquaria, and that based upon its "propensity to adsorb, will result in variability greater than the 1.5 ratio between the highest and lowest mean measured values in a treatment level." With respect to this deviation, several factors were considered:

- All test aquaria exhibited a similar response.
- A statistically-valid endpoint was derived.
- QC samples run concurrently with the definitive experiment resulted in recoveries of 87.4 to 117% (mean of 101%) of nominal fortified levels.
- Method validation samples using artificial seawater and analyzed prior to the start of the definitive experiment established an average recovery of 99.5 ± 6.76%.

- Recoveries of TPTH from the actual stock solutions were generally good, with the exception of Day 0; recoveries were 63% at Day 0, 100% at Day 8, 96% at Day 14, 95% at Day 21, and 86% at Day 28.

As predicted, the variability of the measured concentrations was acceptable only in half of the test concentrations, with ratios ranging from 1.05 to 1.32. At the remaining three levels, ratios of 1.73 to 2.12 were calculated. The highest ratio was observed at the 0.095-µg a.i./L level, which was determined to be the LOEL for the two most sensitive endpoints. Due to the binding nature of TPTH Technical, this study is considered to be a "best-effort" with respect to this issue.

Two other significant guideline deviations, however, were encountered: second-generation mysids should have been monitored for at least 4 days to obtain data on survival, development, and behavior; and insufficient raw data pertaining to the survival of mysids following sexual maturity were provided. As a result, this study is classified as SUPPLEMENTAL. Since second-generation mysids were not monitored, this study is not upgradable to core status. However, it is scientifically valid, and establishes first-generation LOEL and NOEL levels. Other guideline deviations pertaining to clinical effects, covering of the test chambers, flow splitting accuracy, and quantity of brine shrimp used to feed the mysids were considered minor, and should have no significant effect on the integrity of the results.

Although not statistically-significant, there appeared to be a treatment-related reduction in the dry body weight of female mysids at study termination (in addition to a clear-cut effect on male body weight). The mean dry body weight for females was 1.1 mg for the control

group, 1.0 mg for the 0.011-µg a.i./L group, 0.99 mg for the 0.024-µg a.i./L group, 0.94 mg for the 0.047-µg a.i./L group, 0.86 mg for the 0.095-µg a.i./L group, 0.91 mg for the 0.18-µg a.i./L group, and 0.93 mg for the 0.33-µg a.i./L group.

This study was conducted in accordance with USEPA Good Laboratory Practice Standards and included a Quality Assurance Statement.

15. RESULTS OF STATISTICAL VERIFICATION:

6002 percent survival
File: 6002ps Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	86.500	86.500	83.250
2	.011	2	80.000	80.000	83.250
3	.024	2	95.000	95.000	85.000
4	.047	2	76.500	76.500	85.000
5	.095	2	92.000	92.000	85.000
6	.18	2	76.500	76.500	85.000
7	.33	2	88.500	88.500	88.500

6002 percent survival
File: 6002ps Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
neg control	83.250			
.011	83.250	0.537	1.89	k= 1, v= 7
.024	85.000	0.248	2.00	k= 2, v= 7
.047	85.000	0.248	2.04	k= 3, v= 7
.095	85.000	0.248	2.06	k= 4, v= 7
.18	85.000	0.248	2.07	k= 5, v= 7
.33	88.500	0.331	2.08	k= 6, v= 7

s = 6.047
Note: df used for table values are approximate when v > 20.

6002 reproductive success
File: 6002rs Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	2	1.424	1.424	1.424
2	.011	2	1.285	1.285	1.285
3	.024	2	1.268	1.268	1.268
4	.047	2	1.095	1.095	1.095
5	.095	2	0.813	0.813	0.879
6	.18	2	0.875	0.875	0.879
7	.33	2	0.949	0.949	0.879

6002 reproductive success
File: 6002rs Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
control	1.424				
.011	1.285	0.657		1.89	k= 1, v= 7
.024	1.268	0.738		2.00	k= 2, v= 7
.047	**1.095**	**1.557**		**2.04**	**k= 3, v= 7**
.095	0.879	2.576	*	2.06	k= 4, v= 7
.18	0.879	2.576	*	2.07	k= 5, v= 7
.33	0.879	2.576	*	2.08	k= 6, v= 7

s = 0.212
Note: df used for table values are approximate when v > 20.

6002 male length
File: 6002ml Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	2	6.600	6.600	6.600
2	.011	2	6.900	6.900	6.900
3	.024	2	7.100	7.100	7.100
4	.047	2	7.300	7.300	7.213
5	.095	2	7.150	7.150	7.213
6	.18	2	7.250	7.250	7.213
7	.33	2	7.150	7.150	7.213

6002 male length
File: 6002ml 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	6.600				
.011	6.900	1.897		1.89	k= 1, v= 7
.024	7.100	3.162		2.00	k= 2, v= 7
.047	7.213	3.874		2.04	k= 3, v= 7
.095	7.213	3.874		2.06	k= 4, v= 7
.18	7.213	3.874		2.07	k= 5, v= 7
.33	7.213	3.874		2.08	k= 6, v= 7

s = 0.158
Note: df used for table values are approximate when v > 20.

6002 female length
File: 6002fl Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	2	7.000	7.000	7.000
2	.011	2	7.450	7.450	7.388
3	.024	2	7.450	7.450	7.388
4	.047	2	7.450	7.450	7.388
5	.095	2	7.200	7.200	7.388
6	.18	2	7.400	7.400	7.400
7	.33	2	7.400	7.400	7.400

6002 female length
File: 6002fl 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	7.000				
.011	7.388	2.322		1.89	k= 1, v= 7
.024	7.388	2.322		2.00	k= 2, v= 7
.047	7.388	2.322		2.04	k= 3, v= 7
.095	7.388	2.322		2.06	k= 4, v= 7
.18	7.400	2.396		2.07	k= 5, v= 7
.33	7.400	2.396		2.08	k= 6, v= 7

s = 0.167
Note: df used for table values are approximate when v > 20.

6002 male weight

File: 6002m Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	2	0.850	0.850	0.850
2	.011	2	0.815	0.815	0.825
3	.024	2	0.835	0.835	0.825
4	.047	2	0.805	0.805	0.805
5	.095	2	0.775	0.775	0.785
6	.18	2	0.790	0.790	0.785
7	.33	2	0.790	0.790	0.785

6002 male weight
File: 6002m Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
control	0.850				
.011	0.825	0.952		1.89	k= 1, v= 7
.024	0.825	0.952		2.00	k= 2, v= 7
.047	**0.805**	**1.713**		**2.04**	**k= 3, v= 7**
.095	0.785	2.475	*	2.06	k= 4, v= 7
.18	0.785	2.475	*	2.07	k= 5, v= 7
.33	0.785	2.475	*	2.08	k= 6, v= 7

s = 0.026
Note: df used for table values are approximate when v > 20.

6002 female weight
File: 6002f Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	2	1.085	1.085	1.085
2	.011	2	1.050	1.050	1.050
3	.024	2	0.995	0.995	0.995
4	.047	2	0.935	0.935	0.935
5	.095	2	0.875	0.875	0.905
6	.18	2	0.910	0.910	0.905
7	.33	2	0.930	0.930	0.905

6002 female weight

File: 6002f Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG	TABLE P=.05 WILLIAMS	DEGREES OF FREEDOM
control	1.085				
.011	1.050	0.335		1.89	k= 1, v= 7
.024	0.995	0.862		2.00	k= 2, v= 7
.047	0.935	1.437		2.04	k= 3, v= 7
.095	0.905	1.725		2.06	k= 4, v= 7
.18	0.905	1.725		2.07	k= 5, v= 7
.33	0.905	1.725		2.08	k= 6, v= 7

s = 0.104

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