Appendix for Section 17

Sediment Quality Triad Results

Appendix for Section 17

Table 17-2, Comparison of the Triad Results using the Reference Condition, Regional Board Background, NOAA Background, and the San Diego Bay Council Background

San Diego Bay Council Recommended Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation.[(1)]

Study	Station
Bight'98	2227
	2229
	2252
	2433
	2434
	2435
	2441

(1) San Diego Bay Council – Elaine M. Carlin, Scientific Consultant. "Selecting a Pool of Reference Stations for San Diego Bay - April 28, 2003."

Results of the Sediment Quality Triad Approach using the San Diego Bay Council Pool.

Site	Station	Sediment Chemistry[(a)]	Toxicity[(b)]	Benthic Community[(c)]	Weight-of-Evidence Category[(d)]
NASSCO	NA01	High	Moderate	Moderate	**Likely**
	NA03	High	Moderate	Moderate	**Likely**
	NA04	High	Moderate	Moderate	**Likely**
	NA05	High	Moderate	Moderate	**Likely**
	NA06	High	Moderate	Moderate	**Likely**
	NA07	High	Moderate	Moderate	**Likely**
	NA09	Moderate	Moderate	Moderate	**Likely**
	NA11	Moderate	Moderate	Moderate	**Likely**
	NA12	Moderate	Moderate	Moderate	**Likely**
	NA15	High	Moderate	Moderate	**Likely**
	NA16	High	Moderate	Moderate	**Likely**
	NA17	High	Moderate	Moderate	**Likely**
	NA19	High	Moderate	Moderate	**Likely**
	NA20	Moderate	Moderate	High	**Likely**
	NA22	Moderate	Moderate	Moderate	**Likely**
BAE Systems (formerly Southwest Marine)	SW02	High	Moderate	Moderate	**Likely**
	SW03	High	Moderate	Moderate	**Likely**
	SW04	High	Moderate	Moderate	**Likely**
	SW08	High	Moderate	Moderate	**Likely**
	SW09	High	Moderate	Moderate	**Likely**
	SW11	High	Moderate	Moderate	**Likely**
	SW13	High	Moderate	Moderate	**Likely**
	SW15	High	Moderate	Moderate	**Likely**
	SW17	High	Moderate	Moderate	**Likely**
	SW18	High	Moderate	Moderate	**Likely**
	SW21	High	Moderate	High	**Likely**
	SW22	High	Moderate	High	**Likely**
	SW23	High	Moderate	Moderate	**Likely**
	SW25	High	Moderate	Moderate	**Likely**
	SW27	High	Moderate	Moderate	**Likely**

(a) Relative likelihood that the contaminants present in the sediment are adversely impacting organisms living in or on the sediment (i.e., benthic community).

(b) Relative likelihood of toxic effects based on the toxic response from one test: amphipod survival. The other two toxicity tests (sea urchin fertilization and bivalve development) were not conducted in the Bay Protection and Toxic Cleanup Program stations.

(c) Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.

(d) Relative likelihood that aquatic life beneficial uses are impaired based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

Regional Board Recommended Final Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation.[(2)]

Study	Station
2001 Chollas/Paleta	2238
	2433
2001 NASSCO/ BAE Systems (formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2231
	2233
	2238
	2240
	2241
	2242
	2243
	2244
	2247
	2252
	2256
	2257
	2265
	2433
	2435
	2436
	2440

(2) Regional Water Quality Control Board – San Diego. "Regional Board Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and Seventh Street Channel Sediment Investigations. June 9, 2003".

Results of the Sediment Quality Triad Approach using the Regional Board Final Reference Pool.

Site	Station	Sediment Chemistry[a]	Toxicity[b]	Benthic Community[c]	Weight-of-Evidence Category[d]
NASSCO	NA01	High	Moderate	Moderate	**Likely**
	NA03	High	Low	Moderate	**Likely**
	NA04	High	Moderate	Moderate	**Likely**
	NA05	Moderate	Low	Moderate	**Likely**
	NA06	High	Moderate	Moderate	**Likely**
	NA07	High	Moderate	Moderate	**Likely**
	NA09	High	Moderate	Moderate	**Likely**
	NA11	High	Moderate	Moderate	**Likely**
	NA12	High	High	Moderate	**Likely**
	NA15	High	Low	Moderate	**Likely**
	NA16	High	Moderate	Moderate	**Likely**
	NA17	High	Low	Moderate	**Likely**
	NA19	High	Moderate	Moderate	**Likely**
	NA20	High	Low	High	**Likely**
	NA22	High	Moderate	Moderate	**Likely**
BAE Systems (formerly Southwest Marine)	SW02	High	Low	Moderate	**Likely**
	SW03	High	Low	Moderate	**Likely**
	SW04	High	Low	Moderate	**Likely**
	SW08	High	Low	Low	Possible
	SW09	High	Low	Moderate	**Likely**
	SW11	High	Moderate	Moderate	**Likely**
	SW13	High	Moderate	Moderate	**Likely**
	SW15	High	Moderate	Low	**Likely**
	SW17	High	Moderate	Moderate	**Likely**
	SW18	High	Low	Low	Possible
	SW21	High	Low	High	**Likely**
	SW22	High	Moderate	High	**Likely**
	SW23	High	Moderate	Moderate	**Likely**
	SW25	High	Moderate	Low	**Likely**
	SW27	High	High	Moderate	**Likely**

a. Relative likelihood that the contaminants present in the sediment are adversely impacting organisms living in or on the sediment (i.e., benthic community).
b. Relative likelihood of toxic effects based on the toxic response from one test: amphipod survival. The other two toxicity tests (sea urchin fertilization and bivalve development) were not conducted in the Bay Protection and Toxic Cleanup Program stations.
c. Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
d. Relative likelihood that aquatic life beneficial uses are impaired based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

NOAA Recommended Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation.[3]

Study	Station
2001 Chollas/Paleta	2243
	2433
	2243
2001 NASSCO/ BAE Systems (formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2224
	2227
	2228
	2229
	2231
	2233
	2239
	2242
	2243
	2433
	2434
	2435
	2436
	2440

(3) MacDonald and Klimas, 2003. "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations - January 16, 2003."

Results of the Sediment Quality Triad Approach using the NOAA Pool.

Site	Station	Sediment Chemistry[(a)]	Toxicity[(b)]	Benthic Community[(c)]	Weight-of-Evidence Category[(d)]
NASSCO	NA01	High	Moderate	Low	**Likely**
	NA03	High	Moderate	Low	**Likely**
	NA04	High	Moderate	Low	**Likely**
	NA05	High	Low	Low	Possible
	NA06	High	Moderate	Moderate	**Likely**
	NA07	High	Moderate	Low	**Likely**
	NA09	High	Moderate	Low	**Likely**
	NA11	High	Moderate	Low	**Likely**
	NA12	High	High	Low	**Likely**
	NA15	High	Low	Low	Possible
	NA16	High	Moderate	Low	**Likely**
	NA17	High	Low	Moderate	**Likely**
	NA19	High	Moderate	Low	**Likely**
	NA20	Moderate	Low	Moderate	Possible
	NA22	High	Moderate	Moderate	**Likely**
BAE Systems (formerly Southwest Marine)	SW02	High	Low	Low	Possible
	SW03	High	Low	Low	Possible
	SW04	High	Low	Moderate	**Likely**
	SW08	High	Low	Low	Possible
	SW09	High	Low	Low	Possible
	SW11	High	Moderate	Low	**Likely**
	SW13	High	Low	Low	Possible
	SW15	High	Moderate	Low	**Likely**
	SW17	High	Moderate	Low	**Likely**
	SW18	High	Moderate	Low	**Likely**
	SW21	High	Low	Low	Possible
	SW22	High	Moderate	Moderate	**Likely**
	SW23	High	Moderate	Low	**Likely**
	SW25	High	Moderate	Low	**Likely**
	SW27	High	High	Low	**Likely**

a) Relative likelihood that the contaminants present in the sediment are adversely impacting organisms living in or on the sediment (i.e., benthic community).
b) Relative likelihood of toxic effects based on the combined toxic response from three tests: amphipod survival, sea urchin fertilization, and bivalve development.
c) Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
d) Relative likelihood that aquatic life beneficial uses are impaired based on the three lines of evidence: sediment chemistry, toxicity, and benthic community

Regional Board's Final Recommended Reference Pool

California Regional Water Quality Control Board

San Diego Region

Internet Address: http://www.swrcb.ca.gov/rwqcb9
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 FAX (858) 571-6972

Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

June 9, 2003

Mr. Mike Chee
National Steel and Shipbuilding Company
P.O. Box 85278
San Diego, CA 92186-5278

Mr. Sandor Halvax
Southwest Marine Inc.
Foot of Sampson Street
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San Diego, CA 92170-3308

Mr. Bart Chadwick
SPAWAR Systems Center
Marine Environmental Quality Branch
53475 Strothe Road, Room 258
San Diego, CA 92152-6310

Mr. Steve Bay
Southern California Coastal Water Research Project
7171 Fenwick Lane
Westminster, CA 92683-5218

Dear Messrs. Chee, Halvax, Chadwick, and Bay:

REGIONAL BOARD FINAL POSITION ON A REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board's final decision on a reference pool is provided below and should be used to determine statistically significant differences between site sediment quality conditions (at NASSCO, Southwest Marine, mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions. The final pool is based on a modified version of Reference Pool #2b.

We considered all stakeholder input received during the technical meetings held on December 12, 2002 and January 22-23, 2003, and have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings. The

following descriptive statistics should be calculated on the final reference pool lines-of-evidence (sediment chemistry, toxicity, and benthic community structure):

General

- Calculate one-tailed 95% prediction limits (PL) on each line-of-evidence.
- Each reference pool line-of-evidence should be tested for normality and be transformed accordingly prior to calculating the 95% PL.

Sediment Chemistry

- Calculate upper 95% PL for organic and inorganic chemicals of concern (COCs).
- Use un-normalized data for organics.
- Perform two separate site-versus-reference evaluations using non-normalized data and normalized data for metals. The metals data should be normalized to percent fines and the upper 95% PL should be determined by graphing the metals concentrations against percent fines and then calculating an upper PL on the slope of the metals-to-fines regression line. The coefficients of determination (R-squared values) and p-values should be determined for each regression line and the strength and significance of each correlation should be assessed to determine the applicability of the metals-to-fines normalization. Recommendations concerning the applicability of normalization for each metal should be made based on the results.

Toxicity

- Calculate lower 95% PL for the amphipod survival test.
- Calculate lower 95% PL for the fertilization test.
- Calculate lower 95% PL for the development test.

Benthic Community Structure

- Calculate upper 95% PL using the Benthic Response Index (BRI) scores.
- Other benthic metrics may be considered in addition to the BRI to evaluate the health of the benthic community.

FINAL REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

***** The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

If you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

David Barker, P.E.
Supervising Water Resource Control Engineer

DTB:clc:tca

cc: Dreas Nielsen, Exponent
Tom Ginn, Exponent
Chuck Katz, SPAWAR Systems Center San Diego
Michael Martin, Department of Fish and Game
Denise Klimas, National Oceanic and Atmospheric Administration
Scott Sobiech, U.S. Fish and Wildlife
Donald MacDonald, National Oceanic and Atmospheric Administration
Michael Anderson, Department of Toxic Substances Control
Laura Hunter, Environmental Health Coalition
Ed Kimura, Sierra Club
Jim Peugh, San Diego Audubon Society
Bruce Reznik, San Diego Baykeeper
Elaine Carlin, Representative for San Diego Bay Council
Brian Anderson, UC Davis - Marine Pollution Studies Laboratory
Russell Fairey, Moss Landing Marine Laboratories

NASSCO File No.: 03-0066.05
Southwest Marine File No.: 03-0137.05

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From: Tom Alo
To: Bart Chadwick; Brian Anderson; Bruce Reznik; Chuck Katz; Denise Klimas; Don MacDonald; Dreas Nielsen; Ed Kimura; Elaine Carlin; Laura Hunter; Marco Gonzalez; Michael Martin; Mike Chee; Rusty Fairey; Scott Sobiech; Shaun Halvax; Steve Bay
Date: 6/23/2003 9:14:37 AM
Subject: Regional Board Approach on Final Reference Pool

All,

As you know the Regional Board made a final decision on a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment invesigations. The final pool is based on a modified version of Reference Pool #2b. Attached are summary evaluations on the Regional Board's approach to select stations for the final pool:

Table 1 - Station Comparison Between Pool 2b and Final Reference Pool
Table 2 - Summary Evaluations on 2001 Chollas/Paleta Reference Stations
Table 3 - Summary Evaluations on 2001 Shipyard Reference Stations
Table 4 - Summary Evaluations on 22 Bight'98 Reference Stations

Please contact me if you have any questions or comments.

--Tom

Tom C. Alo
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"The energy challenge facing California is real. Every Californian needs to
take immediate action to reduce energy consumption. For a list of simple
ways you can reduce demand and cut your energy costs,
see our Web-site at http://www.swrcb.ca.gov ."

****

CC: Alan Monji; Brennan Ott; Craig Carlisle; David Barker; Peter Peuron; Tom Alo

Table 1
Station Comparison Between Pool 2b and Final Reference Pool

Pool 2b		Regional Board Final Reference Pool (modified Pool 2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252
	2256		2256
	2257		2257
	2258		~~2258~~
	2260		~~2260~~
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2231	Out	Rationale: Remove CP 2231 based on 38% amphipod survival rate and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated PAH concentrations in sediment (1,063 ppb, TOC = 1.0%), however, uptake of PAHs in Macoma tissue is within reference station range (see Figure 1). Amphipod Toxicity[2]: Control-adjusted survival rate = 38% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 39.45 (Response Level 1 - Greater than 5% of reference species lost).
CP	2243	Out	Rationale: Remove CP 2243 based on 55% amphipod survival rate and BRI score of 55.05. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity[2]: Control-adjusted survival rate = 55% Benthic Community: BRI score = 55.05 (Response Level 3 - Greater than 50% of reference species lost).
CP	2433	In	Rationale: Retain CP 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 22.85 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
CP	2238	In	Rationale: Retain CP 2238 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 60.29 (Response Level 3 - Greater than 50% of reference species lost).
CP	2441	Out	Rationale: Remove CP 2441 based on elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (2,143 ppb, TOC = 1.82%) and in Macoma tissue (see Figure 1). Amphipod Toxicity: Control-adjusted survival rate = 78% Benthic Community: BRI score = 30.04 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2440	Out	Rationale: Remove CP 2440 based on elevated PCBs in sediment and elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (5,387 ppb, TOC = 1.04%) and in Macoma tissue (see Figure 1). Elevated PCB concentrations in sediment (283 ppb). Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 30.38 (Reference Level).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) Amphipod survival rates for CP 2231 and CP 2243 were previously adjusted based on SCCWRP's "mussel hypothesis" to remove amphipod toxicity replicate sample outliers. CP 2231 was adjusted from 38% to 84% survival and CP 2243 was adjusted from 55% to 83% survival. However, given the atypical benthic community in CP 2231, the relatively high BRI score for CP 2243, and uncertainties associated with the mussel hypothesis, the Regional Board decided to not apply the mussel hypothesis to adjust the amphipod toxicity results for these stations (and other Chollas site stations where the hypothesis was applied).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
SY	2231	Out	Rationale: Remove SY 2231 based on elevated PCBs in sediment and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated total PCB concentration in sediment (77 ppb) as compared to the other reference stations included in the pool. Amphipod Toxicity: Control-adjusted survival rate = 84% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 31 (Reference Level).
SY	2243	In	Rationale: Retain SY 2243 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 45.1 (Response Level 2 - Greater than 25% of reference species lost).
SY	2433	In	Rationale: Retain SY 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 16.8 (Reference Level).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2441	In	Rationale: Retain SY 2441 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 95% Benthic Community: BRI score = 19.9 (Reference Level).
SY	2440	Out	Rationale: Remove SY 2440 based on elevated lead, PAHs, and PCBs in sediment. Sediment Chemistry: Elevated lead (77 ppm), PAH (3,048 ppb), and PCB (117 ppb) concentrations in sediment. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 32.2 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
Bight'98	2231	In	Rationale: Retain B'98 2231 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 94% Benthic Community: BRI score = 16 (Reference Level).
Bight'98	2233	In	Rationale: Retain B'98 2233 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2235	Out	Rationale: Remove B'98 2235 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 42.1 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2238	In	Rationale: Retain B'98 2238 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 87% Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
Bight'98	2240	In	Rationale: Retain B'98 2240 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2241	In	Rationale: Retain B'98 2241 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 98% Benthic Community: BRI score = 35 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2242	In	Rationale: Retain B'98 2242 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 37 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2243	In	Rationale: Retain B'98 2243 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 36 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2244	In	Rationale: Retain B'98 2244 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 31.2 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2245	Out	Rationale: Remove B'98 2245 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity[2]: Control-adjusted survival rate = 82%. Benthic Community: BRI score = 42.6 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2247	In	Rationale: Retain B'98 2247 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 34 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2249	Out	Rationale: Remove B'98 2249 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 76% Benthic Community: BRI score = 45 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
Bight'98	2252	In	Rationale: Retain B'98 2252 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 104% Benthic Community: BRI score = 4.3 (Reference Level).
Bight'98	2256	In	Rationale: Retain B'98 2256 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2257	In	Rationale: Retain B'98 2257 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2258	Out	Rationale: Remove B'98 2258 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 43 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[(1)]	Regional Board Evaluation
Bight'98	2260	Out	Rationale: Remove B'98 2260 based on amphipod toxicity results. The 90th percentile minimum significant difference (MSD) approach was applied and the amphipod survival data met two criteria for being defined as toxic: (1) there was a significant difference ($p < 0.05$) in mean organism response between a sample and the negative control survival, as determined using a separate-variance t test, and (2) the difference in organism response between the sample and control was greater than the protocol-specific 90th percentile MSD value. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 73%. Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2265	In	Rationale: Retain B'98 2265 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 85% Benthic Community: BRI score = 27 (Reference Level).
Bight'98	2433	In	Rationale: Retain B'98 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 97% Benthic Community: BRI score = 21 (Reference Level).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2435	In	Rationale: Retain B'98 2435 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 102% Benthic Community: BRI score = -1.1 (Reference Level).
Bight'98	2436	In	Rationale: Retain B'98 2436 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 19 (Reference Level).
Bight'98	2440	In	Rationale: Retain B'98 2440 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 103% Benthic Community: BRI score = 32 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) The Regional Board adjusted the amphipod survival rate for B'98 2245 from 66% to 82%. The adjustment was made based on the results of the 5 replicate samples. Four of the replicate samples had relatively similar survival rates of 90%, 80%, 80%, and 75%, respectively, and one replicate had an anomolous survival rate of 0%. The 0% survival rate replicate was removed and the amphipod survival rate for B'98 2245 was adjusted accordingly.

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Regional Board Recommended Final Reference Pool for NASSCO and BAE Systems (Formerly Southwest Marine) Sediment Investigation.[1]

Study	Station
2001 Chollas/Paleta	2238
	2433
2001 NASSCO/BAE SYSTEMS (Formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2231
	2233
	2238
	2240
	2241
	2242
	2243
	2244
	2247
	2252
	2256
	2257
	2265
	2433
	2435
	2436
	2440

(1) Regional Water Quality Control Board – San Diego. "Regional Board Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and Seventh Street Channel Sediment Investigations. June 9, 2003".

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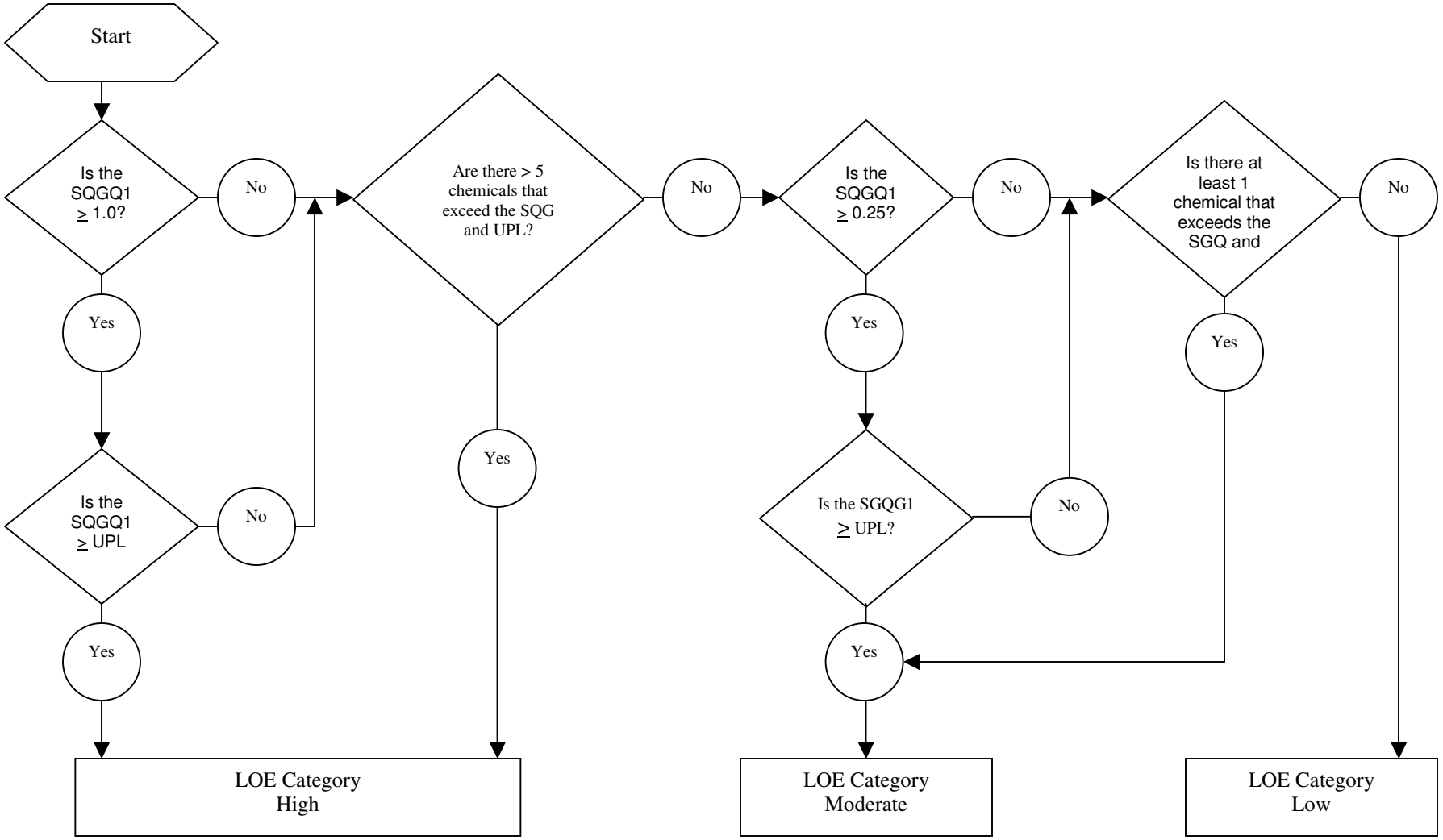
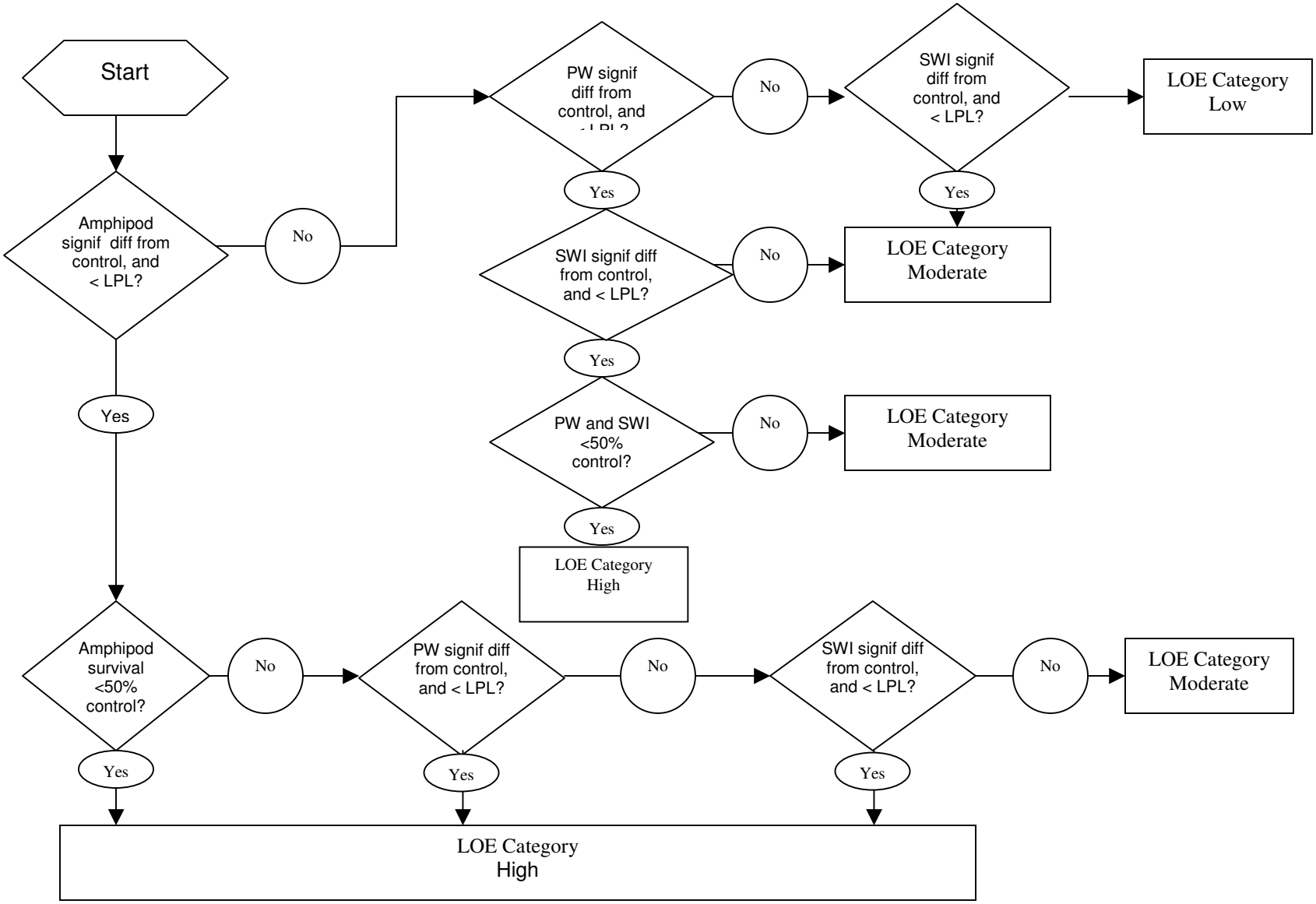
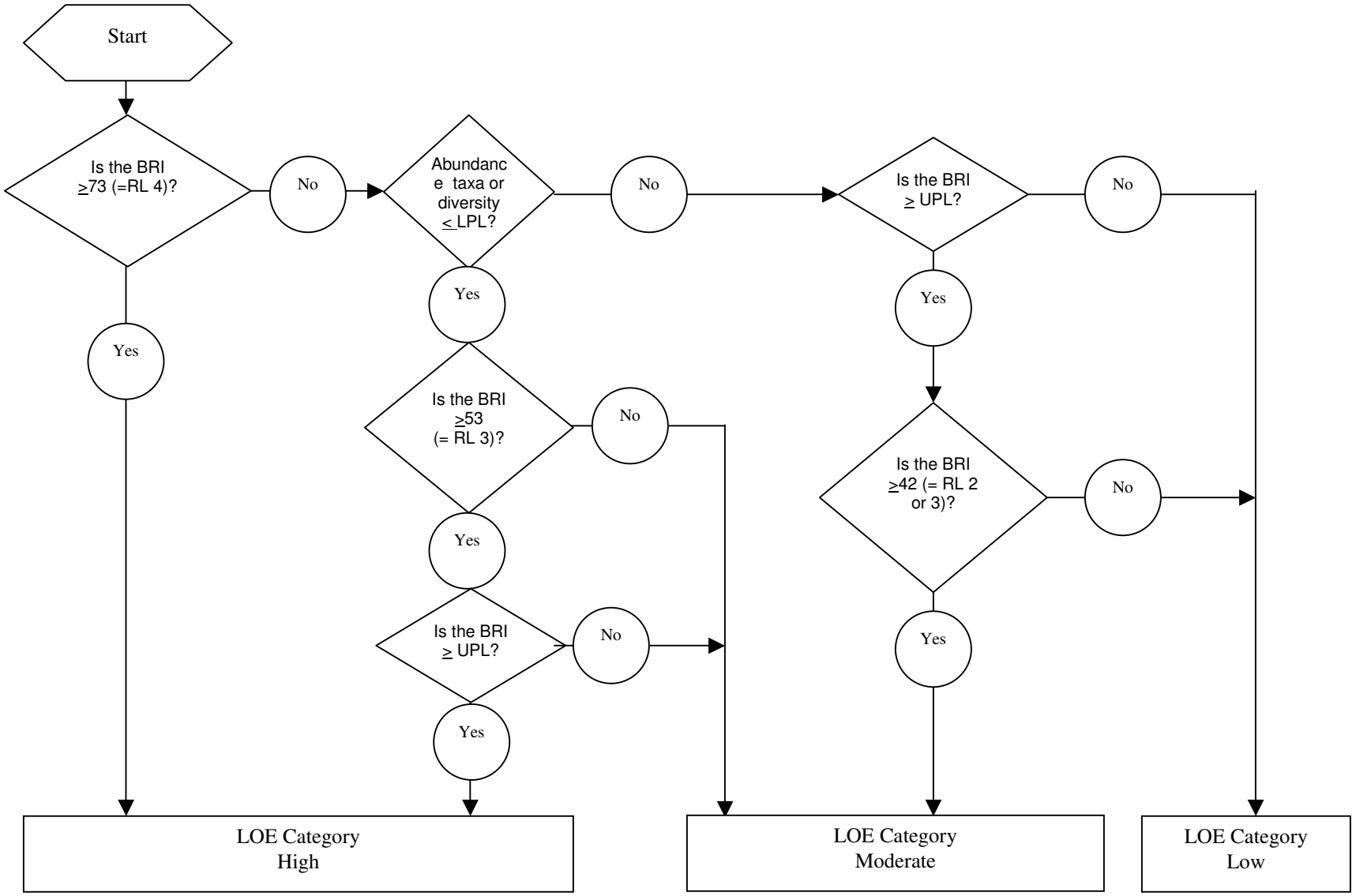


Flow Diagram for the Sediment Chemistry Line of Evidence using the Final Reference Pool



Flow Diagram for the Toxicity Line of Evidence using the Final Reference Pool



Flow Diagram for the Benthic Community Line of Evidence using the Final Reference Pool

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Results of the Sediment Quality Triad Approach using the Final Reference Pool

Site	Station	Sediment Chemistry[1]	Toxicity[2]	Benthic Community[3]	Weight-of-Evidence Category[4]
NASSCO	NA01	High	Moderate	Moderate	Likely
	NA03	High	Low	Moderate	Likely
	NA04	High	Moderate	Moderate	Likely
	NA05	Moderate	Low	Moderate	Likely
	NA06	High	Moderate	Moderate	Likely
	NA07	High	Moderate	Moderate	Likely
	NA09	High	Moderate	Moderate	Likely
	NA11	High	Moderate	Moderate	Likely
	NA12	High	High	Moderate	Likely
	NA15	High	Low	Moderate	Likely
	NA16	High	Moderate	Moderate	Likely
	NA17	High	Low	Moderate	Likely
	NA19	High	Moderate	Moderate	Likely
	NA20	High	Low	High	Likely
	NA22	High	Moderate	Moderate	Likely
BAE Systems (SW Marine)	SW02	High	Low	Moderate	Likely
	SW03	High	Low	Moderate	Likely
	SW04	High	Low	Moderate	Likely
	SW08	High	Low	Low	Possible
	SW09	High	Low	Moderate	Likely
	SW11	High	Moderate	Moderate	Likely
	SW13	High	Moderate	Moderate	Likely
	SW15	High	Moderate	Low	Likely
	SW17	High	Moderate	Moderate	Likely
	SW18	High	Low	Low	Possible
	SW21	High	Low	High	Likely
	SW22	High	Moderate	Moderate	Likely
	SW23	High	Moderate	Moderate	Likely
	SW25	High	Moderate	Low	Likely
	SW27	High	Moderate	Moderate	Likely

[1] Relative likelihood that the chemicals present in the sediment is adversely impacting organisms living in or on the sediment (i.e., benthic community).
[2] Relative likelihood of toxic effects based on the combined toxic response from three tests: amphipod survival, sea urchin fertilization, and bivalve development.
[3] Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
[4] Relative likelihood (likely, possible, or unlikely) that the health of the benthic community is adversely impacted based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

Sediment Chemistry Line-of-Evidence Results Using the Final Reference Pool

Site	Station	SQGQ1			SQGQ1 ≥ UPL	# Chemicals > SQG and UPL	LOE Category
		< 0.25	0.25 to 1.0	> 1.0			
NASSCO	NA01		X		Yes	9	**High**
	NA03		X		Yes	11	**High**
	NA04		X		Yes	10	**High**
	NA05		X		Yes	5	**Moderate**
	NA06		X		Yes	12	**High**
	NA07		X		Yes	10	**High**
	NA09		X		Yes	10	**High**
	NA11		X		Yes	8	**High**
	NA12		X		Yes	7	**High**
	NA15		X		Yes	9	**High**
	NA16		X		Yes	11	**High**
	NA17			X	Yes	14	**High**
	NA19			X	Yes	12	**High**
	NA20		X		Yes	6	**High**
	NA22		X		Yes	7	**High**
BAE Systems (SWM)	SW02			X	Yes	17	**High**
	SW03		X		Yes	10	**High**
	SW04			X	Yes	17	**High**
	SW08			X	Yes	17	**High**
	SW09			X	Yes	15	**High**
	SW11		X		Yes	9	**High**
	SW13			X	Yes	16	**High**
	SW15		X		Yes	9	**High**
	SW17		X		Yes	12	**High**
	SW18		X		Yes	10	**High**
	SW21			X	Yes	13	**High**
	SW22			X	Yes	11	**High**
	SW23			X	Yes	14	**High**
	SW25		X		Yes	10	**High**
	SW27		X		Yes	8	**High**

Comparison of NASSCO and BAE Systems Toxicity Data to the Final Reference Pool 95 Percent Lower Prediction Limit (LPL)

Site	Station	Amphipod Survival (95% LPL = 85.6)	Urchin Fertilization (95% LPL = 27.2%)	Bivalve Development (95% LPL = 20.1
NASSCO	NA01	**80**	86	49
	NA03	**84**	84	94
	NA04	**80**	88	84
	NA05	89	95	94
	NA06	**78**	103	74
	NA07	**74**	102	88
	NA09	88	99	**1**
	NA11	**70**	101	80
	NA12	**82**	89	**15**
	NA15	97	88	93
	NA16	90	84	**3**
	NA17	95	88	80
	NA19	89	72	**2**
	NA20	90	78	80
	NA22	95	111	**2**
BAE Systems (formerly Southwest Marine)	SW02	88	103	85
	SW03	92	103	88
	SW04	94	108	63
	SW08	91	103	93
	SW09	88	100	85
	SW11	**77**	89	83
	SW13	92	99	28
	SW15	92	103	**9**
	SW17	95	96	**16**
	SW18	**74**	83	64
	SW21	91	102	67
	SW22	90	104	**1**
	SW23	91	107	**16**
	SW25	**86**	103	**10**
	SW27	**73**	91	22

NOTES: Toxicity values less than the 95% lower prediction limit values are bold faced and shaded.

Toxicity Line-of-Evidence Results using the Final Reference Pool

Station	Amphipod Survival			Urchin Fertilization			Bivalve Development			LOE Category
	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	
NA01	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA03	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA04	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA05	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA06	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA07	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA09	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA11	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA12	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**High**
NA15	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA16	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA17	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA19	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA20	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA22	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW02	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW03	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW04	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW08	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW09	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW11	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
SW13	**Yes**	No	No	**Yes**	No	No	**Yes**	No	**Yes**	**Low**
SW15	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW17	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW18	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
SW21	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW22	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW23	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW25	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW27	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	**Yes**	**Moderate**

Comparison of Benthic Community Metrics Data from NASSCO and BAE Systems Stations to the Final Reference Pool 95 Percent Prediction Limits

Site	Station	BRI** (95% UPL = 38.1)	Abundance* (95% LPL = 260)	# Taxa* (95% LPL = 26)	S-W Diversity (95% LPL = 1.9)
NASSCO	NA01	**42.2**	447	33	2.8
	NA03	**45.5**	492	40	3.0
	NA04	**49.6**	285	**25**	2.5
	NA05	**44.4**	569	35	2.4
	NA06	**54.4**	611	37	2.7
	NA07	**44.6**	475	43	3.0
	NA09	**51.1**	862	44	2.6
	NA11	**46.0**	604	33	2.4
	NA12	**42.6**	538	37	2.7
	NA15	**51.0**	306	**26**	2.3
	NA16	**48.0**	522	33	2.6
	NA17	**55.3**	418	33	2.7
	NA19	**46.7**	828	43	2.7
	NA20	**54.0**	412	**22**	2.3
	NA22	**51.6**	**107**	**15**	2.2
BAE Systems (formerly Southwest Marine)	SW02	**52.1**	976	39	2.4
	SW03	**49.9**	361	31	2.8
	SW04	**41.1**	3,175	36	**1.6**
	SW08	**41.5**	2,457	41	2.4
	SW09	**53.2**	572	39	2.7
	SW11	**42.4**	777	44	2.9
	SW13	**43.6**	742	53	3.2
	SW15	37.8	806	59	3.1
	SW17	**45.7**	621	30	2.4
	SW18	**39.5**	829	42	2.8
	SW21	**53.2**	315	**24**	2.4
	SW22	**55.1**	363	26	2.4
	SW23	**50.0**	316	27	2.6
	SW25	**41.3**	611	40	2.8
	SW27	**42.9**	927	48	2.9

NOTES:

95% upper prediction limit values presented below each constituent in ( ).

* Values were derived from natural log transformed data.

For the BRI, concentrations greater than the 95% upper prediction limit value are bold faced and shaded.

For the abundance, # taxa, and S-W diversity metrics, concentrations lower than their respective 95% upper prediction limit values are bold faced and s haded.

Benthic Community Line-of-Evidence Results Using the Final Reference Pool Comparison

Station	Benthic Response Index				Abundance	# Taxa	S-W Diversity	LOE Category
	≥ 73	≥ 53	≥ 42	≥ 95% UPL	≤ 95% LPL	≤ 95% LPL	≤ 95% LPL	
NA01	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA03	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA04	No	No	**Yes**	**Yes**	No	**Yes**	No	**Moderate**
NA05	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA06	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA07	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA09	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA11	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA12	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA15	No	No	**Yes**	**Yes**	No	**Yes**	No	**Moderate**
NA16	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA17	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA19	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA20	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**High**
NA22	No	No	**Yes**	**Yes**	**Yes**	**Yes**	No	**Moderate**
SW02	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW03	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW04	No	No	No	**Yes**	No	No	**Yes**	**Moderate**
SW08	No	No	No	**Yes**	No	No	No	**Low**
SW09	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
SW11	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW13	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW15	No	No	No	No	No	No	No	**Low**
SW17	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW18	No	No	No	**Yes**	No	No	No	**Low**
SW21	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**High**
SW22	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
SW23	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW25	No	No	No	**Yes**	No	No	No	**Low**
SW27	No	No	**Yes**	**Yes**	No	No	No	**Moderate**

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REGIONAL BOARD'S FINAL REFERENCE POOL
(Sediment Chemistry - Metals)

	Ag	Ag - Trans	Ag - Sqrt	As	As - Trans	Cd	Cd - Trans	Cr	Cr - Trans	Cu
CP 2238	0.51	-0.292429824	0.714142843	7.8	0.892094603	0.13	-0.886056648	59.2	1.772321707	71
CP 2433	0.38	-0.420216403	0.6164414	5.55	0.744292983	0.29	-0.537602002	42.2	1.625312451	43.3
SY 2243	0.56	-0.251811973	0.748331477	4.3	0.633468456	0.12	-0.920818754	23	1.361727836	47
SY 2433	0.39	-0.408935393	0.6244998	4.6	0.662757832	0.29	-0.537602002	24	1.380211242	40
SY 2441	0.24	-0.619788758	0.489897949	5.4	0.73239376	0.29	-0.537602002	22	1.342422681	37
2231	0.3	-0.522878745	0.547722558	4.73	0.674861141	0.04	-1.397940009	26.7	1.426511261	58.1
2233	0.01	-2	0.1	4.26	0.629409599	0.01	-2	28.5	1.45484486	52
2238	0.43	-0.366531544	0.655743852	5.88	0.769377326	0.17	-0.769551079	33.1	1.519827994	55.1
2240	0.51	-0.292429824	0.714142843	4.33	0.636487896	0.08	-1.096910013	29.5	1.469822016	47.4
2241	0.54	-0.26760624	0.734846923	4.53	0.656098202	0.09	-1.045757491	27.5	1.439332694	59.2
2242	0.49	-0.30980392	0.7	4.27	0.630427875	0.1	-1	25.4	1.404833717	42
2243	0.5	-0.301029996	0.707106781	3.66	0.563481085	0.1	-1	20.8	1.318063335	38.8
2244	0.39	-0.408935393	0.6244998	4.23	0.626340367	0.1	-1	21.2	1.326335861	41.8
2247	0.41	-0.387216143	0.640312424	6.16	0.789580712	0.11	-0.958607315	28.3	1.451786436	53.4
2252	0.2	-0.698970004	0.447213595	4.34	0.63748973	0.04	-1.397940009	14.8	1.170261715	31.1
2256	1.29	0.11058971	1.135781669	7.47	0.873320602	0.2	-0.698970004	54.3	1.73479983	128
2257	1.25	0.096910013	1.118033989	9.08	0.958085849	0.18	-0.744727495	66.7	1.824125834	157
2265	0.19	-0.721246399	0.435889894	2.48	0.394451681	0.07	-1.15490196	NA	NA	18
2433	0.5	-0.301029996	0.707106781	8.32	0.920123326	0.25	-0.602059991	34.5	1.537819095	71.6
2435	0.19	-0.721246399	0.435889894	5.06	0.704150517	0.14	-0.853871964	20.6	1.31386722	28.4
2436	0.62	-0.207608311	0.787400787	8.62	0.935507266	0.21	-0.677780705	48.4	1.684845362	85.8
2440	0.01	-2	0.1	4.84	0.684845362	0.04	-1.397940009	24.3	1.385606274	41.8
Average	**0.4504545**	**-0.513282525**	**0.626591148**	**5.450455**	**0.715865735**	**0.1386364**	**-0.964392702**	**32.142857**	**1.473556163**	**56.71818**
t-stat	1.721	1.721	1.721	1.721	1.721	1.721	1.721	1.721	1.721	1.721
Std. Dev.	0.31	0.53	0.25	1.75	0.14	0.09	0.35	14.00	0.17	31.94
N	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
	1.0034711	**0.414179457**	**1.059744889**	**8.534605**	**0.956156381**	**0.2896484**	**-0.340774843**	**56.770542**	**1.771349602**	**112.921**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
		2.595251536			**9.039749191**		**0.456273406**		**59.06763765**	
		(Untr UPL)			**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**	
			1.2185							
			(95 upper percentile)							
Wilk-Shapiro	R: 0.9121	R: 0.8338		R: 0.9460	R: 0.9634	R: 0.9780	R: 0.9609	R: 0.9191	R: 0.9678	R: 0.8752
Test	P: < 0.01	P: < 0.01		P: 0.0339	P: > 0.10	P: > 0.10	P: 0.0898	P: < 0.01	P: > 0.10	P: < 0.01

REGIONAL BOARD'S FINAL REFERENCE POOL
(Sediment Chemistry - Metals)

	Cu - Trans	Hg	Hg - Trans	Ni	Ni - Trans	Pb	Pb - Trans	Zn	Zn - Trans
CP 2238	1.851258349	0.262	-0.581698709	16.5	1.217483944	28.8	1.459392488	214	2.330413773
CP 2433	1.636487896	0.251	-0.600326279	11.2	1.049218023	23.3	1.367355921	115	2.06069784
SY 2243	1.672097858	0.25	-0.602059991	5.6	0.748188027	21	1.322219295	93	1.968482949
SY 2433	1.602059991	0.21	-0.677780705	7.4	0.86923172	19	1.278753601	92	1.963787827
SY 2441	1.568201724	0.16	-0.795880017	9.9	0.995635195	13	1.113943352	80	1.903089987
2231	1.764176132	0.224	-0.649751982	8	0.903089987	21.6	1.334453751	92.5	1.966141733
2233	1.716003344	0.316	-0.500312917	7.9	0.897627091	26.8	1.428134794	106	2.025305865
2238	1.741151599	0.169	-0.772113295	12.2	1.086359831	18.1	1.257678575	143	2.155336037
2240	1.675778342	0.263	-0.580044252	8.1	0.908485019	22.5	1.352182518	103	2.012837225
2241	1.772321707	0.213	-0.671620397	7.3	0.86332286	26.3	1.419955748	104	2.017033339
2242	1.62324929	0.3	-0.522878745	6.8	0.832508913	17.8	1.250420002	89.8	1.953276337
2243	1.588831726	0.239	-0.621602099	5.1	0.707570176	19.9	1.298853076	81.2	1.909556029
2244	1.621176282	0.177	-0.752026734	5.7	0.755874856	15.4	1.187520721	82.4	1.915927212
2247	1.727541257	0.157	-0.804100348	8.5	0.929418926	17.4	1.240549248	103	2.012837225
2252	1.492760389	0.113	-0.946921557	4.2	0.62324929	13.8	1.139879086	64.2	1.807535028
2256	2.10720997	0.632	-0.199282922	14.3	1.155336037	54.1	1.733197265	197	2.294466226
2257	2.195899652	0.511	-0.2915791	18.7	1.271841607	64.1	1.80685803	233	2.367355921
2265	1.255272505	0.065	-1.187086643	1.5	0.176091259	12	1.079181246	43.2	1.635483747
2433	1.854913022	0.263	-0.580044252	14.9	1.173186268	21	1.322219295	126	2.100370545
2435	1.45331834	0.123	-0.910094889	9.9	0.995635195	7.1	0.851258349	64.4	1.808885867
2436	1.933487288	0.517	-0.286509457	15.3	1.184691431	34.4	1.536558443	145	2.161368002
2440	1.621176282	0.235	-0.628932138	7.2	0.857332496	20.6	1.31386722	81.1	1.909020854
Average	**1.703380588**	**0.256818**	**-0.643756701**	**9.372727**	**0.918244461**	**23.54545**	**1.322474183**	**111.4909**	**2.012691344**
t-stat	1.721	1.721	1.721	1.721	1.721	1.721	1.721	1.721	1.721
Std. Dev.	0.21	0.14	0.22	4.37	0.24	13.06	0.21	48.55	0.17
N	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
	2.065548823	**0.497666**	**-0.252577609**	**17.0557**	**1.342206436**	**46.51807**	**1.684025383**	**196.9267**	**2.319277979**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
	116.2917277		**0.559013622**		**21.98904843**		**48.30870359**		**208.5825529**
	(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.9694	R: 0.9170	R: 0.9733	R: 0.9775	R: 0.9478	R: 0.8726	R: 0.9663	R: 0.9253	R: 0.9753
Test	P: > 0.10	P: < 0.01	P: > 0.10	P: > 0.10	P: 0.0377	P: < 0.01	P: > 0.10	P: < 0.01	P: > 0.10

REGIONAL BOARD'S FINAL REFERENCE POOL
(Sediment Chemistry - Organics)

	LMWPAH	LMWPAH - Trans	HMWPAH	HMWPAH - Trans	PPPAH	PPPAH - Trans	TPCB
CP 2238	17	1.230448921	103	2.012837225	199	2.298853076	11
CP 2433	56	1.748188027	415	2.618048097	780	2.892094603	27
SY 2243	23	1.361727836	90	1.954242509	204	2.309630167	22
SY 2433	44	1.643452676	250	2.397940009	486	2.686636269	21
SY 2441	45	1.653212514	174	2.240549248	343	2.53529412	11
2231	111	2.045322979	271	2.432969291	604	2.781036939	51
2233	111	2.045322979	80	1.903089987	237	2.374748346	51
2238	111	2.045322979	77	1.886490725	234	2.369215857	51
2240	111	2.045322979	116	2.064457989	315	2.498310554	51
2241	111	2.045322979	77	1.886490725	234	2.369215857	51
2242	111	2.045322979	127	2.103803721	359	2.555094449	51
2243	111	2.045322979	77	1.886490725	234	2.369215857	51
2244	111	2.045322979	77	1.886490725	234	2.369215857	51
2247	111	2.045322979	86	1.934498451	258	2.411619706	51
2252	111	2.045322979	79	1.897627091	236	2.372912003	51
2256	111	2.045322979	142	2.152288344	369	2.567026366	51
2257	111	2.045322979	184	2.264817823	449	2.652246341	52
2265	111	2.045322979	77	1.886490725	234	2.369215857	51
2433	111	2.045322979	283	2.451786436	574	2.758911892	51
2435	111	2.045322979	77	1.886490725	234	2.369215857	51
2436	111	2.045322979	268	2.428134794	565	2.752048448	51
2440	111	2.045322979	77	1.886490725	234	2.369215857	51
Average	**37**	**1.527405995**	**206.4**	**2.244723418**	**402.4**	**2.544501647**	**18.4**
t-stat	2.132	2.132	2.132	2.132	2.132	2.132	2.132
Std. Dev.	16.36	0.22	132.95	0.27	241.78	0.25	7.13
N	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	75.19792015 UPL	**2.04130854 UPL**	**516.9085086 UPL**	**2.885403885 UPL**	**967.0780603 UPL**	**3.136048925 UPL**	**35.045992 UPL**
		109.9786895 (Untr UPL)		**768.0754521 (Untr UPL)**		**1367.882914 (Untr UPL)**	
Wilk-Shapiro Test	R: 0.9616 P: > 0.10	R: 0.9485 P: > 0.10	R: 0.9482 P: > 0.10	R: 0.9811 P: > 0.10	R: 0.9430 P: > 0.10	R: 0.9675 P: > 0.10	R: 0.9759 P: > 0.10

REGIONAL BOARD'S FINAL REFERENCE POOL
(Sediment Chemistry - Organics)

	TPCB - Trans	TCHLOR	TCHLOR - Trans	TDDT	TDDT - Trans	TBT	TBT - Trans
CP 2238	1.041392685	0.18	-0.744727495	1.3	0.113943352	NA	NA
CP 2433	1.431363764	0.57	-0.244125144	2.1	0.322219295	NA	NA
SY 2243	1.342422681	NA	NA	NA	NA	2.6	0.414973348
SY 2433	1.322219295	NA	NA	NA	NA	3.3	0.51851394
SY 2441	1.041392685	NA	NA	NA	NA	3.7	0.568201724
2231	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2233	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2238	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2240	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2241	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2242	1.707570176	0.6	-0.22184875	3.3	0.51851394	NA	NA
2243	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2244	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2247	1.707570176	0.6	-0.22184875	2.45	0.389166084	NA	NA
2252	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2256	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2257	1.716003344	0.6	-0.22184875	1.67	0.222716471	NA	NA
2265	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2433	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2435	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2436	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2440	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
Average	**1.235758222**	**0.375**	**-0.49442632**	**1.7**	**0.218081324**	**3.2**	**0.500563004**
t-stat	2.132	6.314	6.314	6.314	6.314	2.92	2.92
Std. Dev.	0.18	0.28	0.35	0.57	0.15	0.56	0.08
N	5.00	2.00	2.00	2.00	2.00	3.00	3.00
	1.661096672 UPL	**2.507553 UPL**	**2.242909584 UPL**	**6.074468 UPL**	**1.356951755 UPL**	**5.077297 UPL**	**0.764149381 UPL**
	45.8243878 (Untr UPL)		**174.9482425 (Untr UPL)**		**22.74844709 (Untr UPL)**		**5.809642136 (Untr UPL)**
Wilk-Shapiro Test	R: 0.9552 P: > 0.10	R: -- P: --	R: -- P: --	R: -- P: --	R: -- P: --	R: 0.9878 P: > 0.10	R: 0.980 P: > 0.10

REGIONAL BOARD'S FINAL REFERENCE POOL
(Sediment Chemistry - SQGQ1)

	SQGQ1	SQGQ1 - Trans
CP 2238	0.1998	-0.699334899
CP 2433	0.1525395	-0.816617818
SY 2243	0.1439174	-0.841886626
SY 2433	0.1307197	-0.883658979
SY 2441	0.0990993	-1.00392929
2231	0.1406908	-0.851734156
2233	0.2416746	-0.616768929
2238	0.1618126	-0.790987544
2240	0.1556529	-0.807842647
2241	0.1684778	-0.77345727
2242	0.1403838	-0.852683073
2243	0.1395421	-0.855294839
2244	0.128782	-0.89014488
2247	0.1439277	-0.841855628
2252	0.0949835	-1.022351921
2256	0.3361846	-0.473422215
2257	0.3730177	-0.428270615
2265	0.0801809	-1.095929281
2433	0.1785865	-0.748151489
2435	0.0869673	-1.06064387
2436	0.2174134	-0.66271371
2440	0.0998252	-1.000759736
Average	**0.1642823**	**-0.819019973**
t-stat	1.721	1.721
Std. Dev.	0.07	0.17
N	22.00	22.00
	0.2944158	**-0.517340525**
	UPL	**UPL**
		0.303850164
		(Untr UPL)
Wilk-Shapiro	R: 0.9077	R: 0.9742
Test	P: < 0.01	P: > 0.10

REGIONAL BOARD'S FINAL REFERENCE POOL
(Toxicity)

	Amphipod	Amphipod - Trans	Bivalve SWI	Bivalve SWI - Trans	Urchin Pore Water	Urchin Pore Water - Trans
CP 2238	90	1.954242509	NA	NA	36	1.556302501
CP 2433	91	1.959041392	NA	NA	100	2
SY 2243	92	1.963787827	70	1.84509804	92	1.963787827
SY 2433	96	1.982271233	66	1.819543936	79	1.897627091
SY 2441	95	1.977723605	93	1.968482949	90	1.954242509
2231	94	1.973127854	NA	NA	NA	NA
2233	99	1.995635195	NA	NA	NA	NA
2238	87	1.939519253	NA	NA	NA	NA
2240	89	1.949390007	NA	NA	NA	NA
2241	98	1.991226076	NA	NA	NA	NA
2242	92	1.963787827	NA	NA	NA	NA
2243	96	1.982271233	NA	NA	NA	NA
2244	100	2	NA	NA	NA	NA
2247	90	1.954242509	NA	NA	NA	NA
2252	104	2.017033339	NA	NA	NA	NA
2256	100	2	NA	NA	NA	NA
2257	91	1.959041392	NA	NA	NA	NA
2265	85	1.929418926	NA	NA	NA	NA
2433	97	1.986771734	NA	NA	NA	NA
2435	102	2.008600172	NA	NA	NA	NA
2436	100	2	NA	NA	NA	NA
2440	103	2.012837225	NA	NA	NA	NA
Average	**95.04545455**	**1.977271332**	**76.33333333**	**1.877708308**	**79.4**	**1.874391986**
t-stat	1.721	1.721	2.92	2.92	2.132	2.132
Std. Dev.	5.35	0.02	14.57	0.08	25.39	0.18
N	22.00	22.00	3.00	3.00	5.00	5.00
	85.63209574	**1.93408584**	**27.20168795**	**1.609168208**	**20.09513279**	**1.450344925**
	LPL	**LPL**	**LPL**	**LPL**	**LPL**	**LPL**
		85.91833253		**40.66007804**		**28.20622236**
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.992	R: 0.9914	R: 0.9265	R: 0.935	R: 0.8914	R: 0.8462
Test	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10	P: 0.0742	P: 0.0218

REGIONAL BOARD'S FINAL REFERENCE POOL
(Toxicity)

	Urchin Pore Water - Sqrt
CP 2238	6
CP 2433	10
SY 2243	9.591663047
SY 2433	8.888194417
SY 2441	9.486832981
2231	NA
2233	NA
2238	NA
2240	NA
2241	NA
2242	NA
2243	NA
2244	NA
2247	NA
2252	NA
2256	NA
2257	NA
2265	NA
2433	NA
2435	NA
2436	NA
2440	NA
Average	**8.793338089**
t-stat	2.132
Std. Dev.	1.61
N	5.00
	5.030006065
	LPL
	44.6
	(95th lower percentile)
Wilk-Shapiro	R:
Test	P:

REGIONAL BOARD'S FINAL REFERENCE POOL
(Benthic Community)

	Abundance	Abundance - Trans	# Taxa	# Tax - Trans	S-W Diversity	S-W Diversity - Trans	BRI	BRI - Trans	BRI - Sqrt
CP 2238	NA	NA	NA	NA	NA	NA	NA	NA	NA
CP 2433	421	2.624282096	57	1.75587486	2.82	0.45024911	22.85	1.358886	4.780167361
SY 2243	NA	NA	NA	NA	NA	NA	NA	NA	NA
SY 2433	441	2.644438589	77	1.88649073	2.58	0.41161971	16.8	1.225309	4.098780306
SY 2441	506	2.704150517	108	2.03342376	2.8	0.44715803	19.9	1.298853	4.460941605
2231	1502	3.176669933	70	1.84509804	2.75	0.43933269	15.97	1.203305	3.996248241
2233	395	2.596597096	39	1.59106461	2.73	0.43616265	28.81	1.459543	5.36749476
2238	760	2.880813592	41	1.61278386	2.47	0.39269695	38.48	1.585235	6.203224968
2240	1201	3.079543007	40	1.60205999	2.18	0.33845649	28.83	1.459845	5.369357503
2241	1526	3.183554534	44	1.64345268	2.31	0.36361198	34.74	1.54083	5.894064811
2242	1117	3.048053173	28	1.44715803	1.8	0.25527251	36.61	1.5636	6.050619803
2243	966	2.984977126	47	1.67209786	2.74	0.43775056	36.36	1.560624	6.029925373
2244	1376	3.138618434	48	1.68124124	2.69	0.42975228	31.23	1.494572	5.588380803
2247	900	2.954242509	33	1.51851394	2.09	0.32014629	34.11	1.532882	5.8403767
2252	327	2.514547753	37	1.56820172	2.81	0.44870632	4.26	0.62941	2.063976744
2256	237	2.374748346	28	1.44715803	2.66	0.42488164	37.9	1.578639	6.156297589
2257	503	2.701567985	37	1.56820172	2.31	0.36361198	38.1	1.580925	6.172519745
2265	1543	3.188365926	48	1.68124124	2.39	0.3783979	26.68	1.426186	5.165268628
2433	709	2.850646235	59	1.77085201	3.08	0.48855072	20.99	1.322012	4.581484476
2435	466	2.668385917	60	1.77815125	3.41	0.53275438	-1.11	NA	NA
2436	599	2.777426822	48	1.68124124	3.06	0.48572143	19.38	1.287354	4.402272141
2440	651	2.813580989	59	1.77085201	3.16	0.49968708	31.66	1.500511	5.626721959
Average	**807.3**	**2.845260529**	**50.4**	**1.67775794**	**2.642**	**0.41722603**	**26.1275**	**1.400448**	**5.149901238**
t-stat	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729
Std. Dev.	431.49	0.24	18.86	0.15	0.39	0.07	11.22	0.22	1.05
N	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	42.8381805 LPL	**2.415886006 LPL**	**16.9944144 LPL**	**1.41876786 LPL**	**1.951537753 LPL**	**0.29932966 LPL**	**45.9987198 UPL**	**1.798714 UPL**	**7.005811758 UPL**
		260.5469573 (Untr LPL)		**26.2281623 (Untr LPL)**		**1.99218499 (Untr LPL)**		**62.90919 (Untr LPL)**	
									38.119 (95 upper percentile)
Wilk-Shapiro Test	R: 0.9576 P: 0.088	R: 0.9831 P: > 0.10	R: 0.9333 P: 0.018	R: 0.9874 P: > 0.10	R: 0.9901 P: > 0.10	R: 0.9805 P: > 0.10	R: 0.9512 P: 0.0549	R: 0.8513 P: < 0.01	

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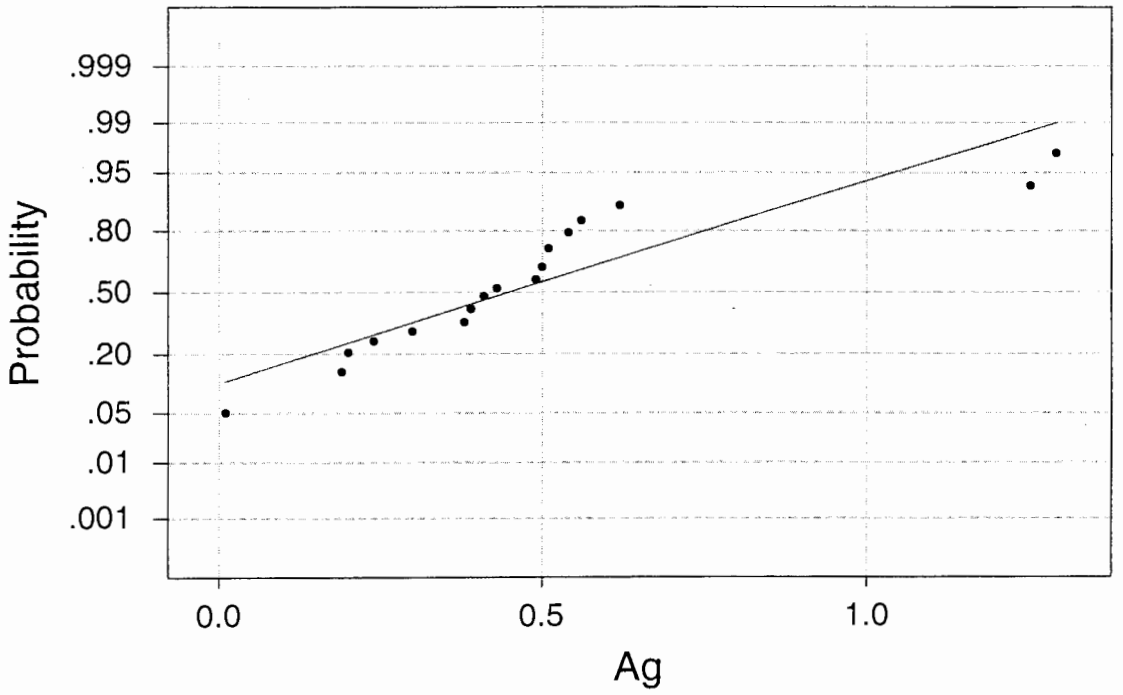
SEDIMENT
CHEMISTRY
METALS

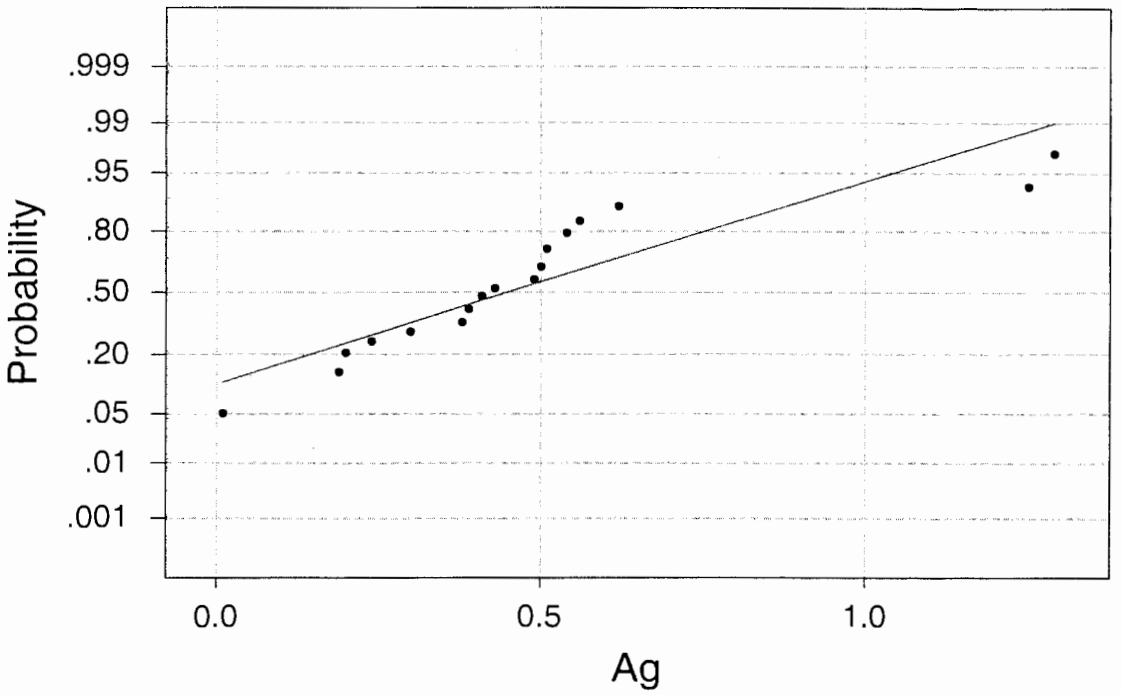
Normal Probability Plot



Average: 0.450455
StDev: 0.314271
N: 22

W-test for Normality
R: 0.9121
P-Value (approx): < 0.0100

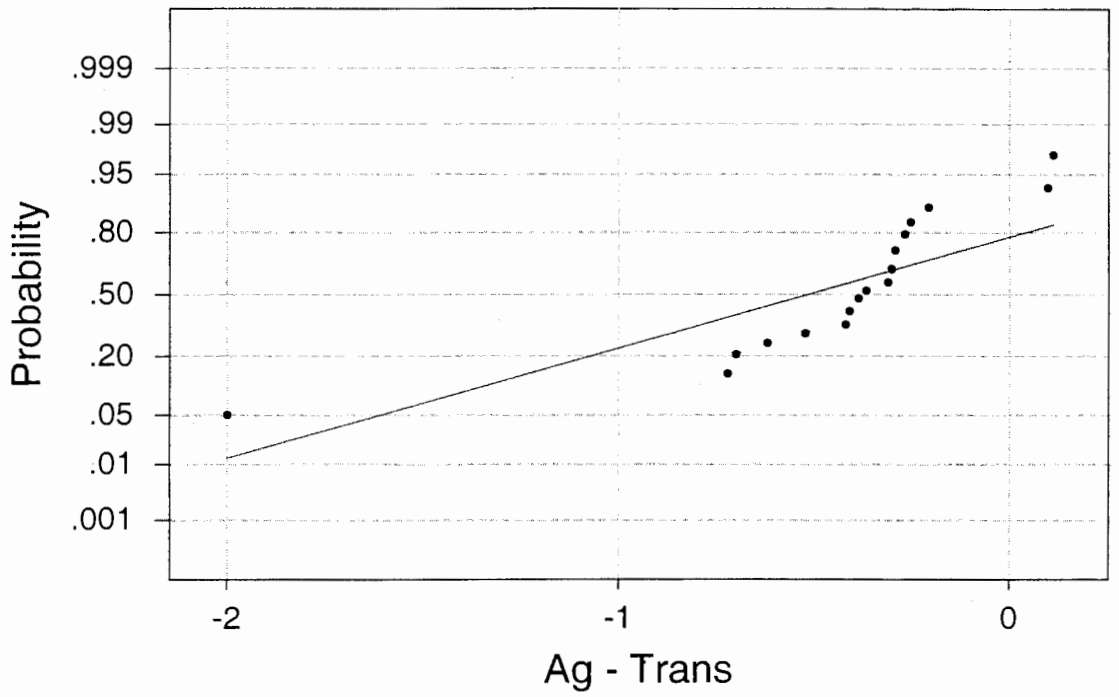
Normal Probability Plot



Average: 0.450455
StDev: 0.314271
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.227 D-: 0.093 D : 0.227
Approximate P-Value < 0.01

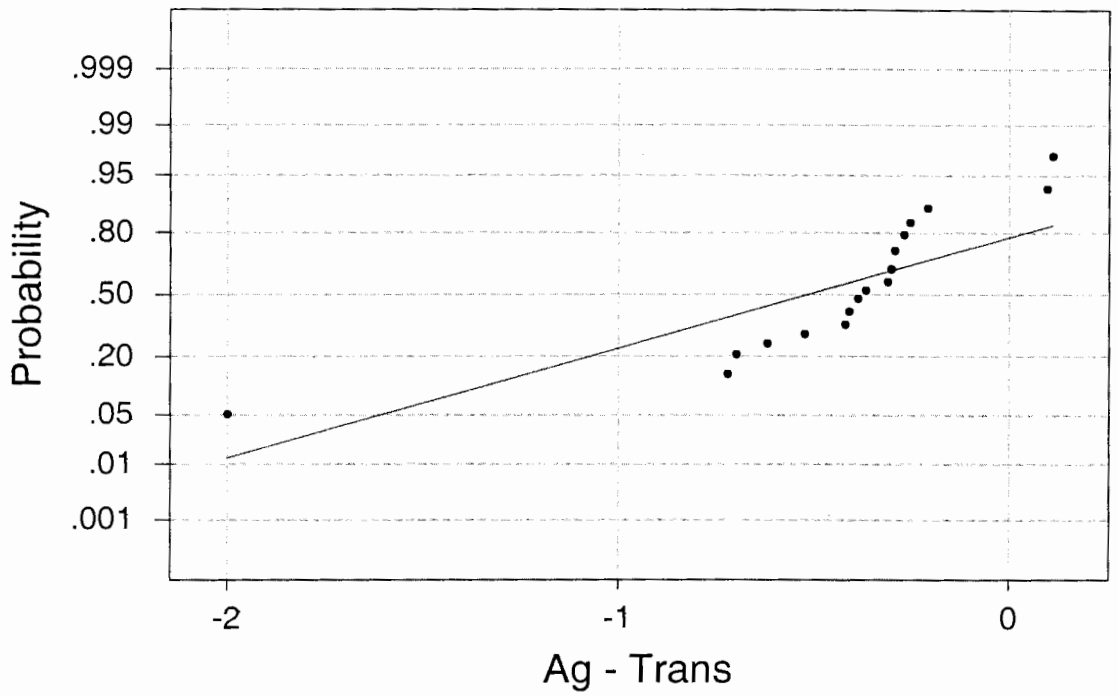
Normal Probability Plot



Average: -0.513283
StDev: 0.527063
N: 22

W-test for Normality
R: 0.8338
P-Value (approx): < 0.0100

Normal Probability Plot

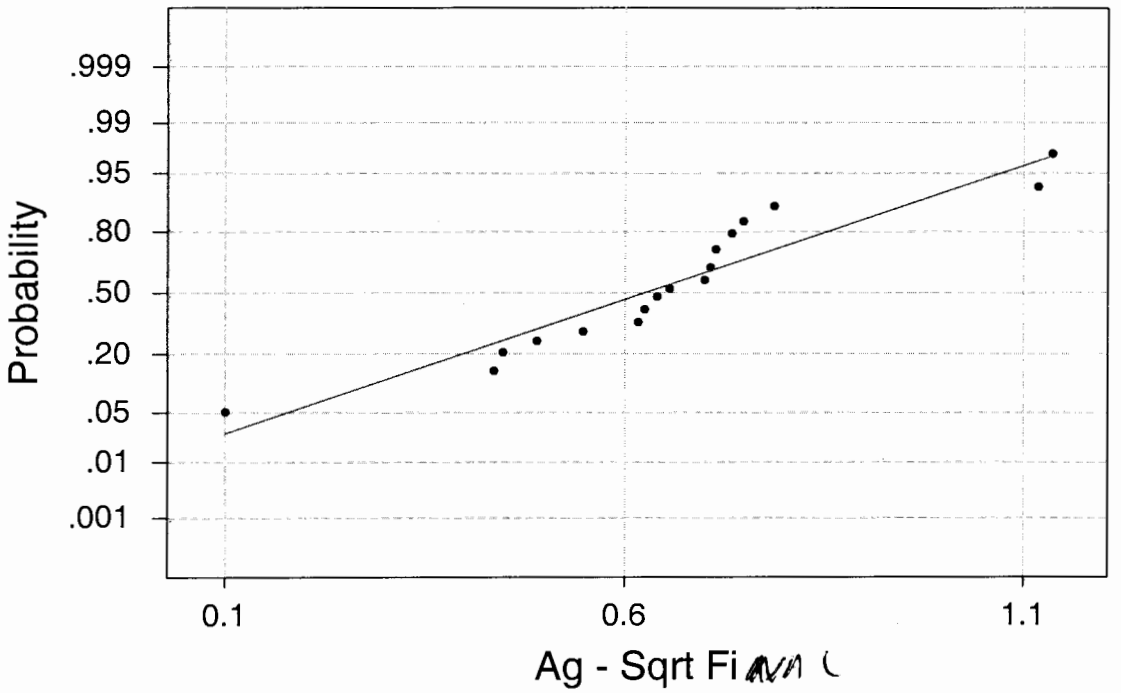


Average: -0.513283
StDev: 0.527063
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.190 D-: 0.252 D : 0.252
Approximate P-Value < 0.01

FINAL
POOL

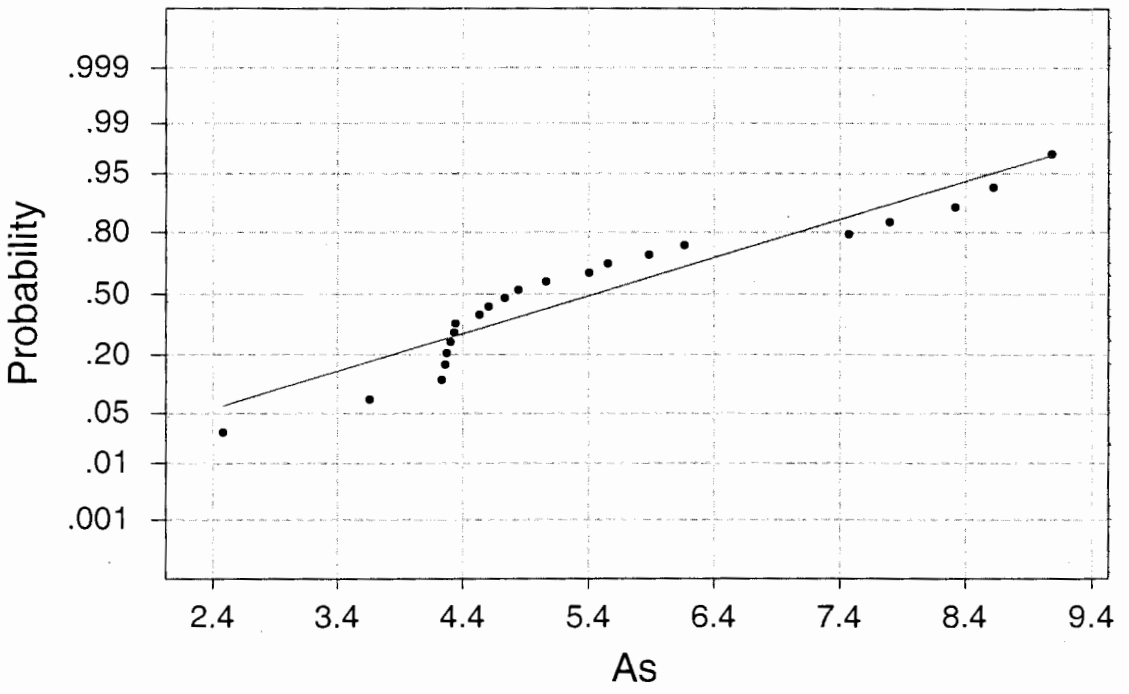
Normal Probability Plot



Average: 0.626591
StDev: 0.246155
N: 22

W-test for Normality
R: 0.9485
P-Value (approx): 0.0392

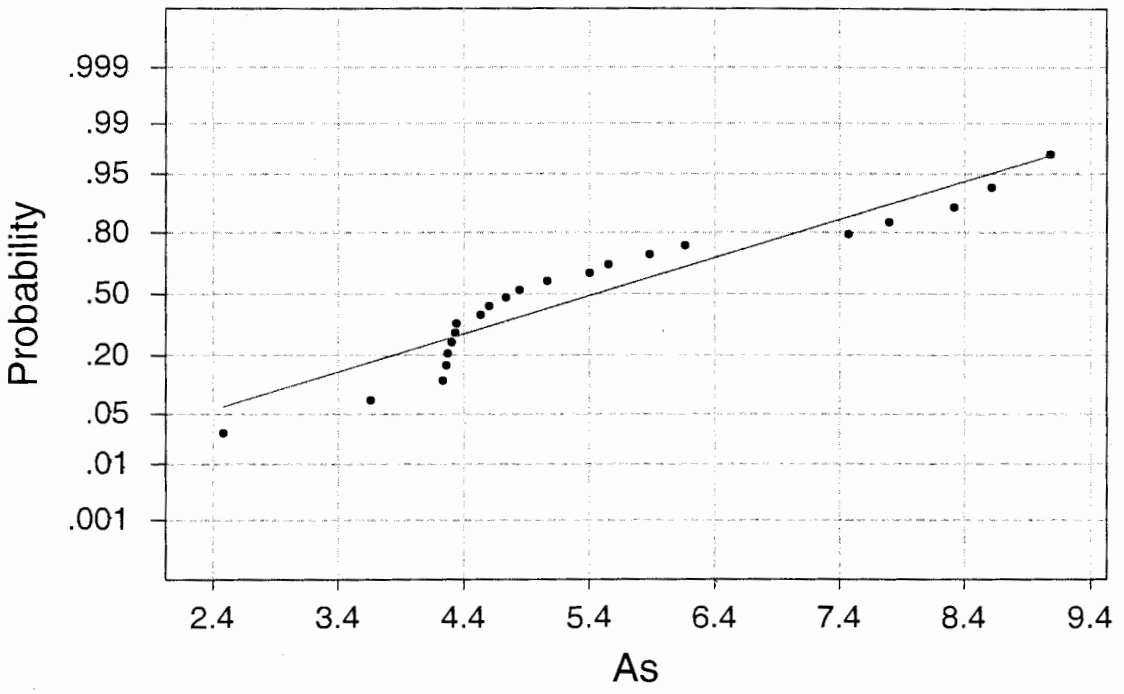
Normal Probability Plot



Average: 5.45045
StDev: 1.75268
N: 22

W-test for Normality
R: 0.9460
P-Value (approx): 0.0339

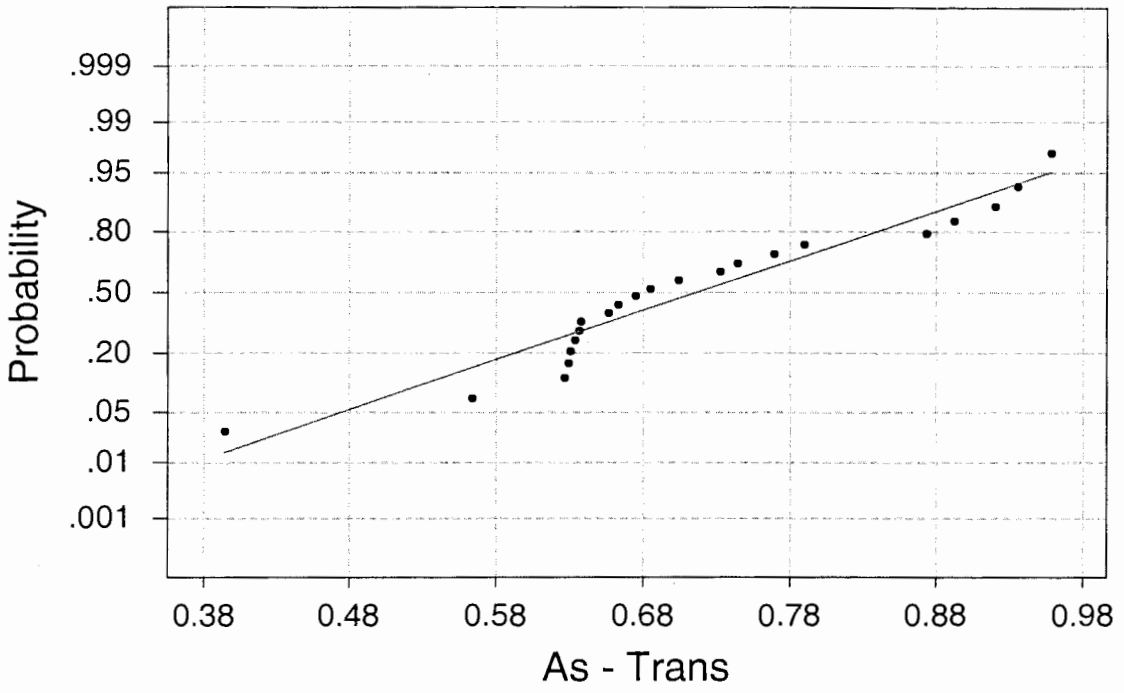
Normal Probability Plot



Average: 5.45045
StDev: 1.75268
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.182 D-: 0.152 D : 0.182
Approximate P-Value: 0.058

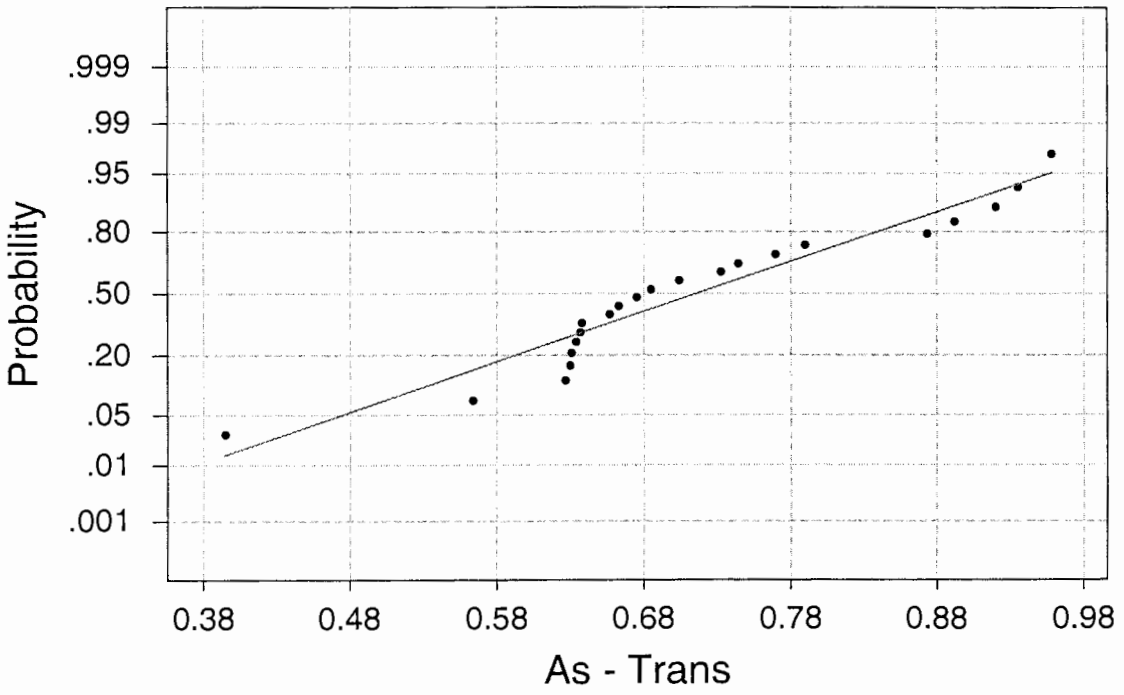
Normal Probability Plot



Average: 0.715866
StDev: 0.136554
N: 22

W-test for Normality
R: 0.9634
P-Value (approx): > 0.1000

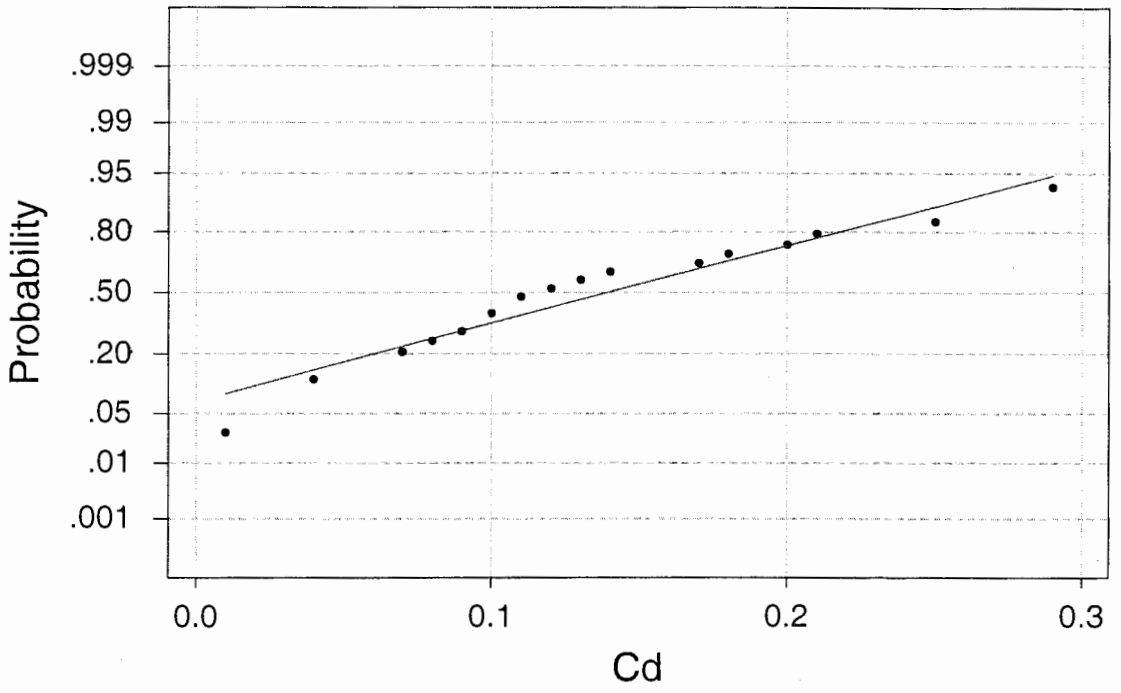
Normal Probability Plot



Average: 0.715866
StDev: 0.136554
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.135 D-: 0.165 D : 0.165
Approximate P-Value: 0.118

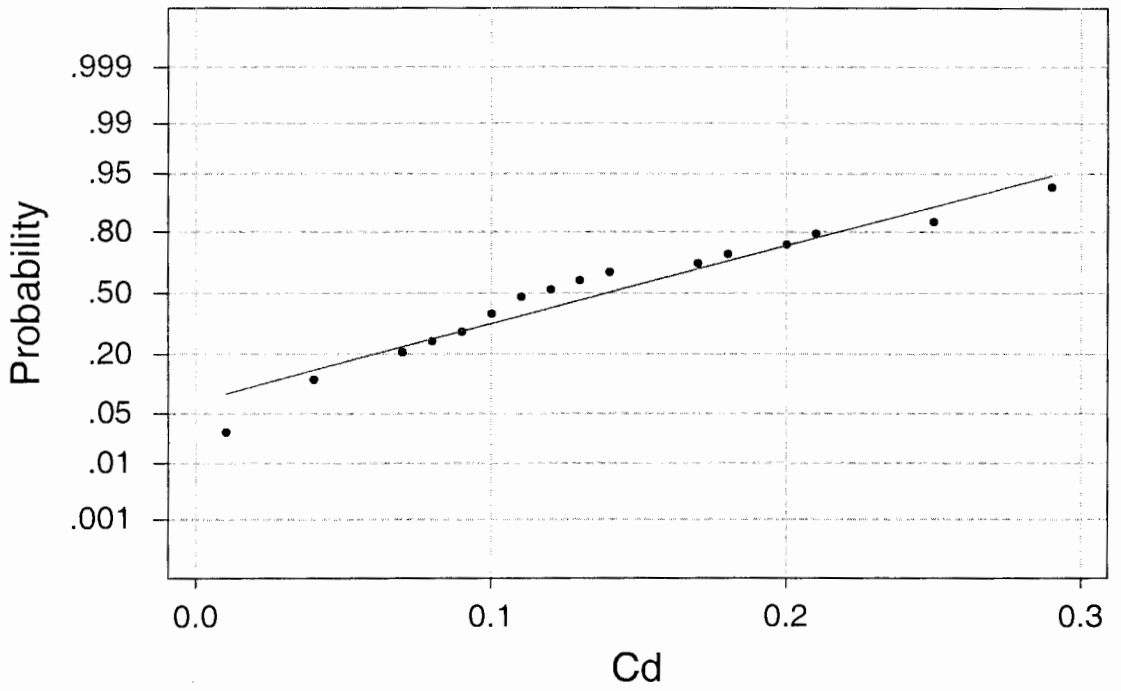
Normal Probability Plot



Average: 0.138636
StDev: 0.0858179
N: 22

W-test for Normality
R: 0.9780
P-Value (approx): > 0.1000

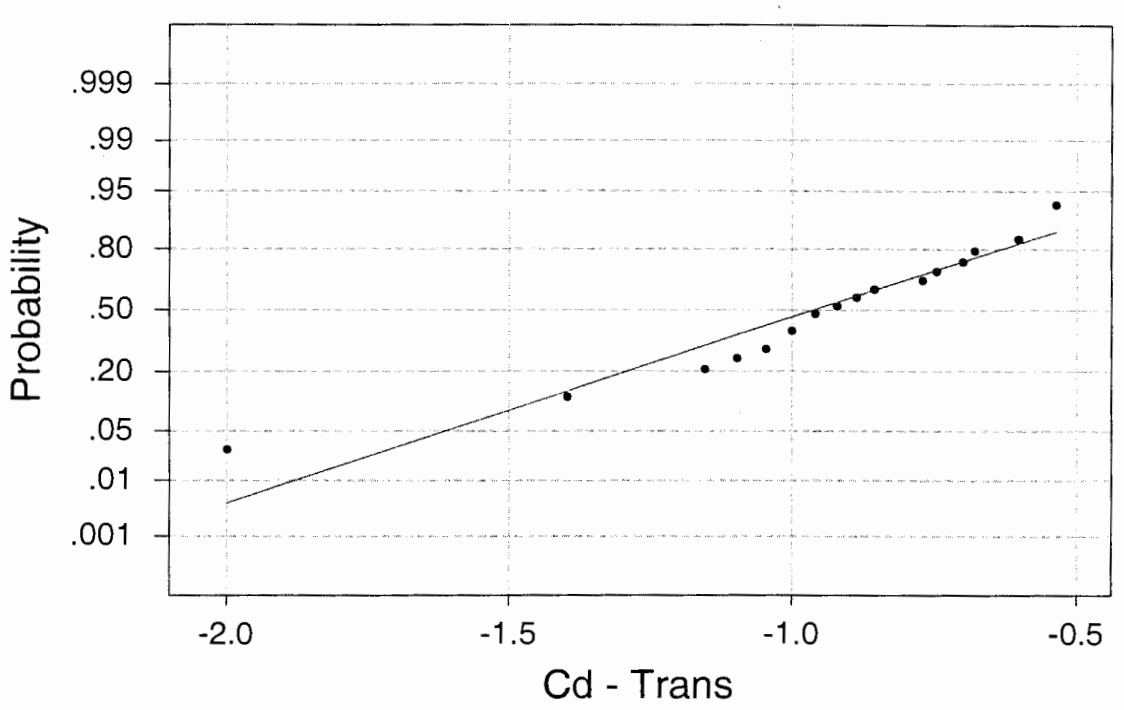
Normal Probability Plot



Average: 0.138636
StDev: 0.0858179
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.131 D-: 0.085 D : 0.131
Approximate P-Value > 0.15

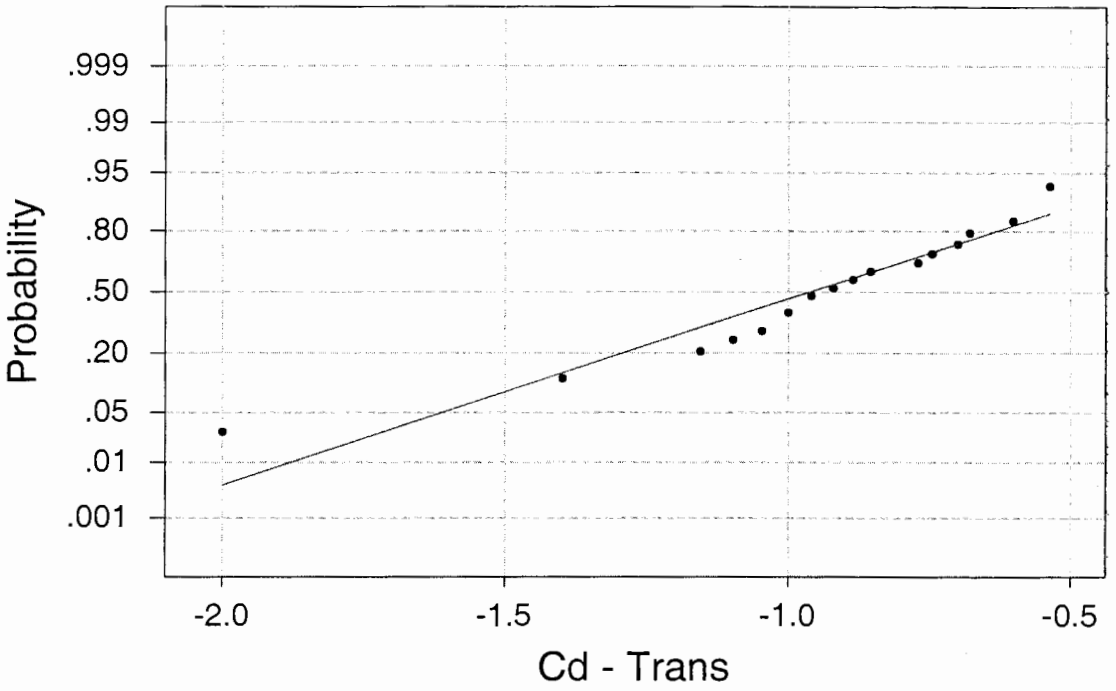
Normal Probability Plot



Average: -0.964393
StDev: 0.354393
N: 22

W-test for Normality
R: 0.9609
P-Value (approx): 0.0898

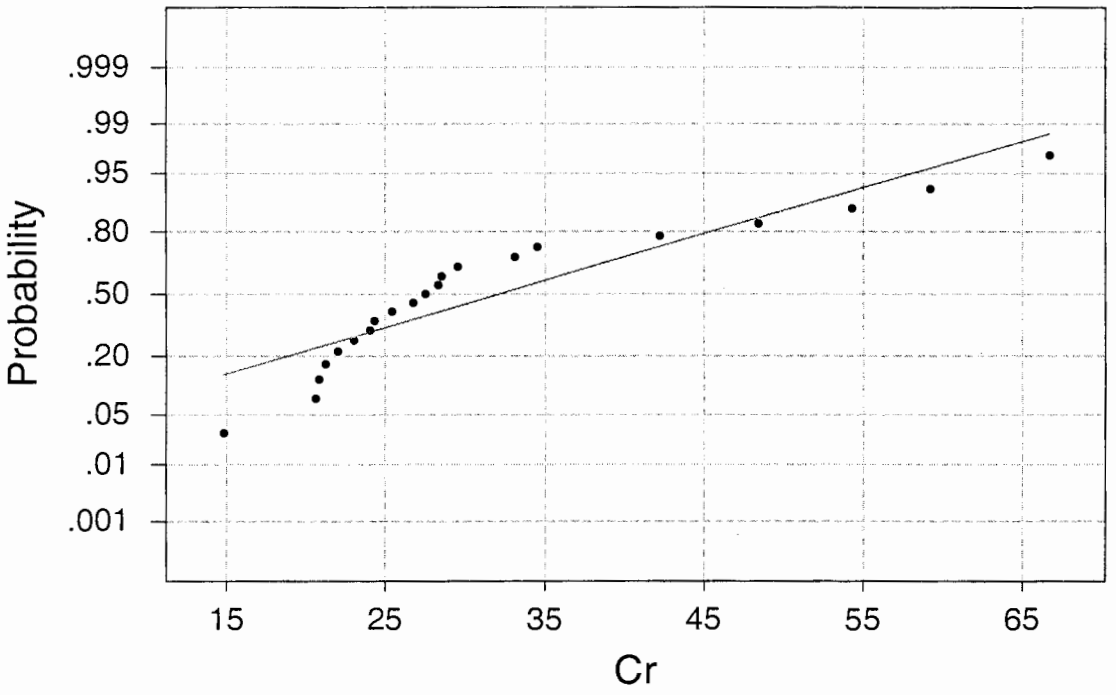
Normal Probability Plot



Average: -0.964393
StDev: 0.354393
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.069 D-: 0.136 D : 0.136
Approximate P-Value > 0.15

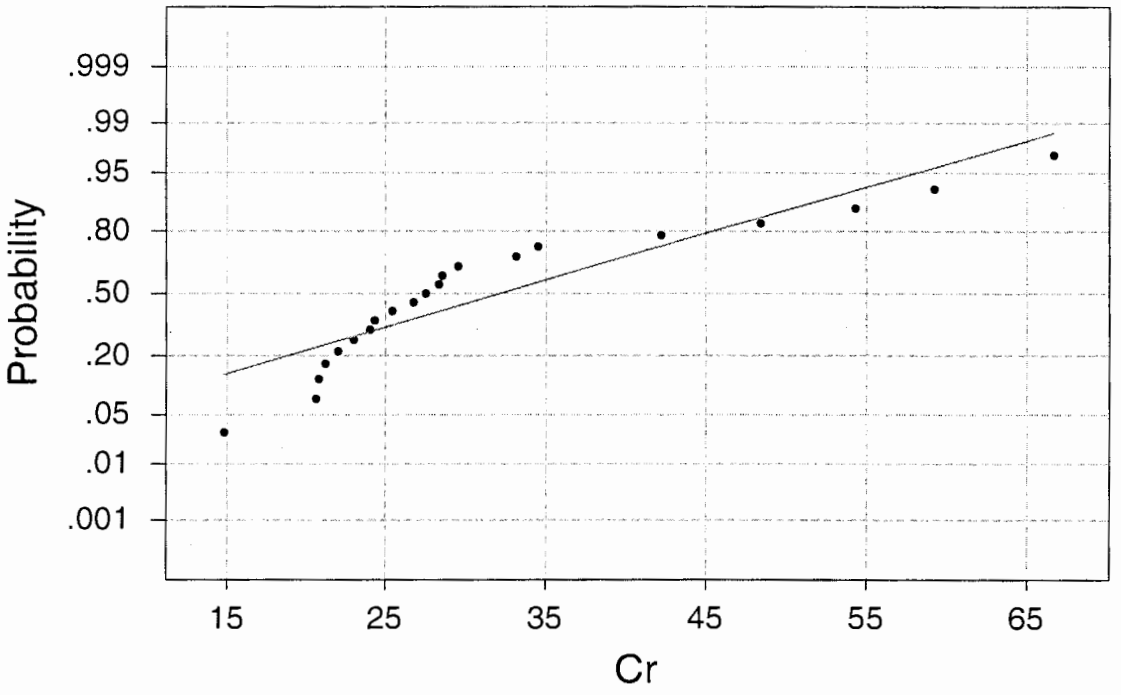
Normal Probability Plot



Average: 32.1429
StDev: 13.9956
N: 21

W-test for Normality
R: 0.9191
P-Value (approx): < 0.0100

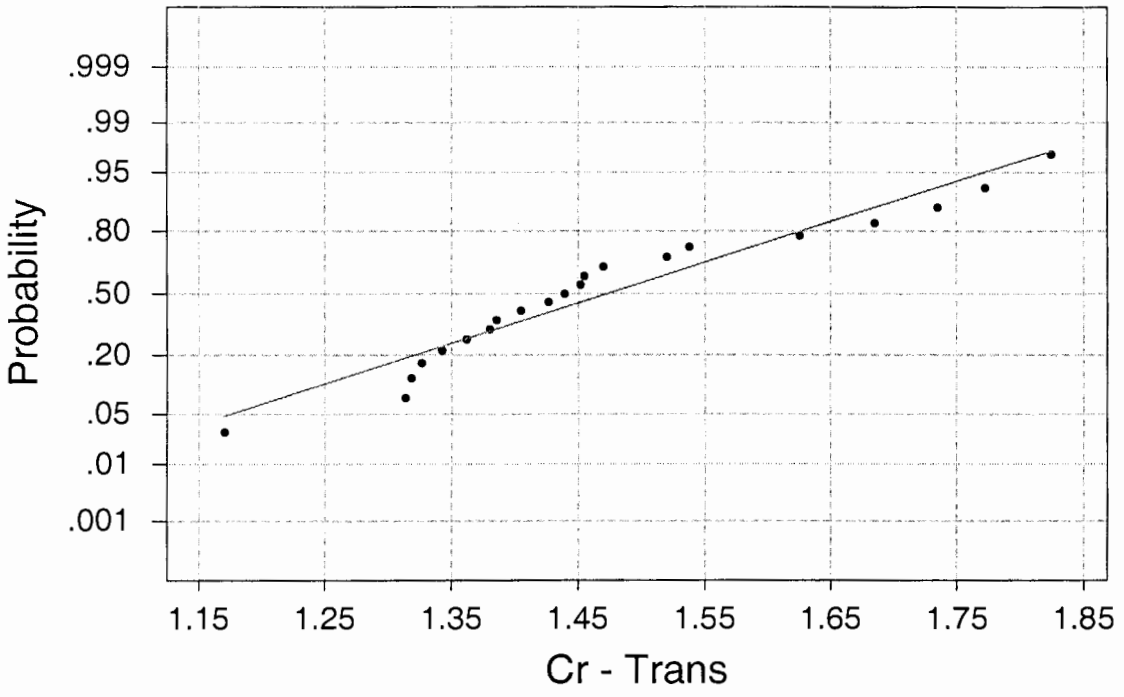
Normal Probability Plot



Average: 32.1429
StDev: 13.9956
N: 21

Kolmogorov-Smirnov Normality Test
D+: 0.242 D-: 0.157 D : 0.242
Approximate P-Value < 0.01

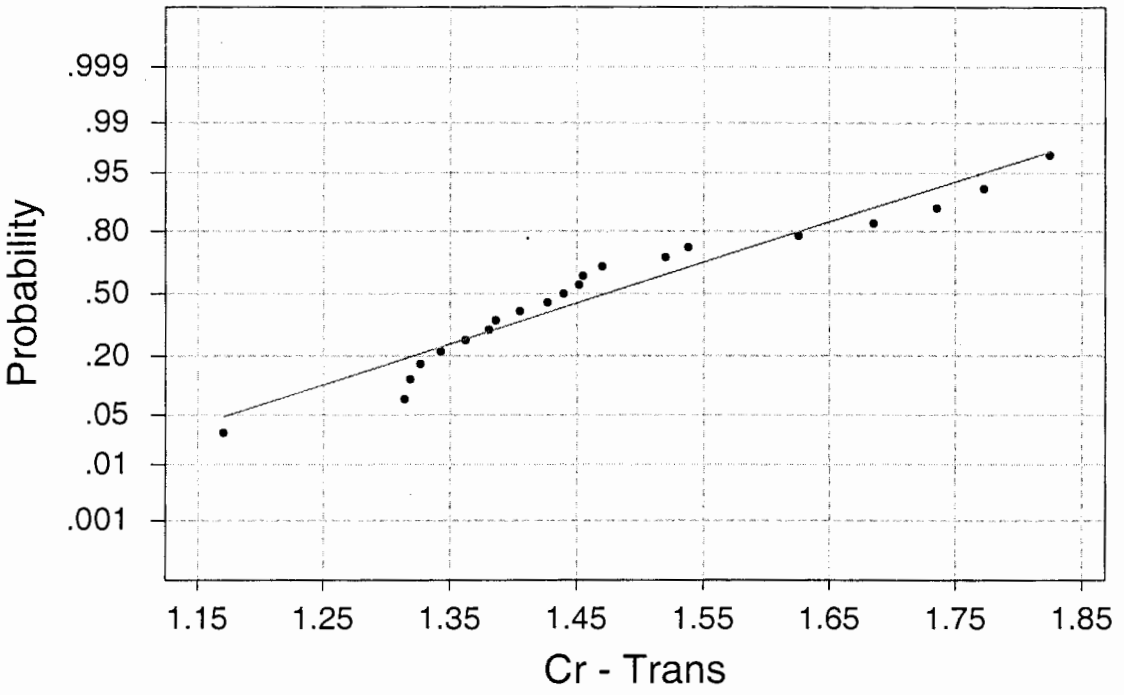
Normal Probability Plot



Average: 1.47356
StDev: 0.169232
N: 21

W-test for Normality
R: 0.9678
P-Value (approx): > 0.1000

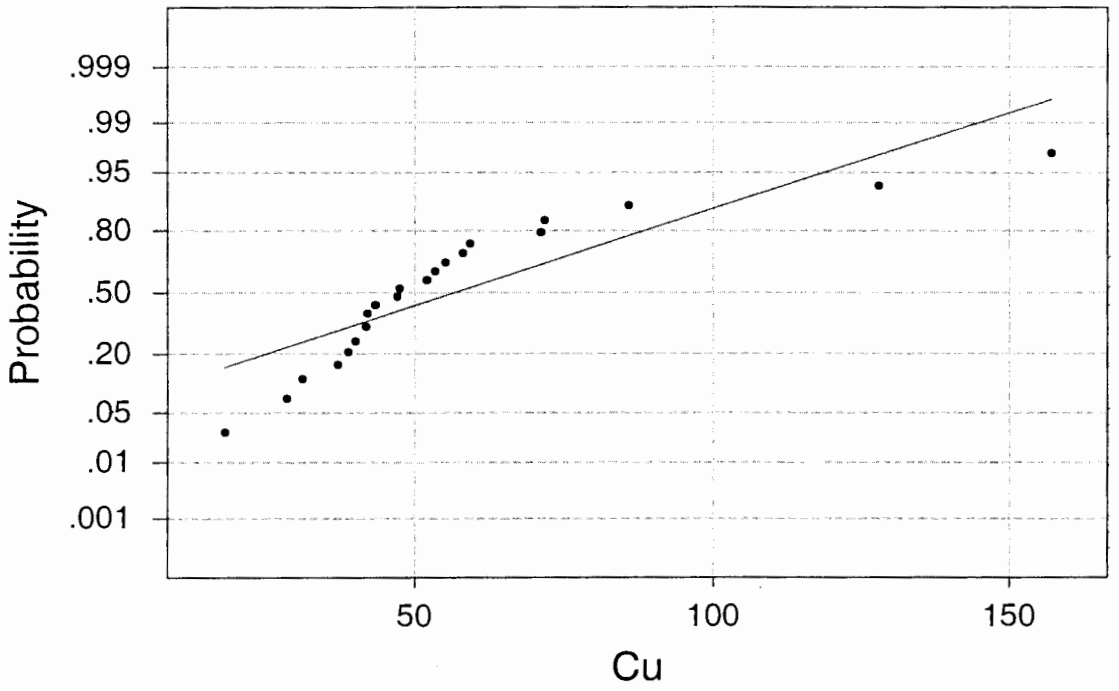
Normal Probability Plot



Average: 1.47356
StDev: 0.169232
N: 21

Kolmogorov-Smirnov Normality Test
D+: 0.175 D-: 0.125 D : 0.175
Approximate P-Value: 0.090

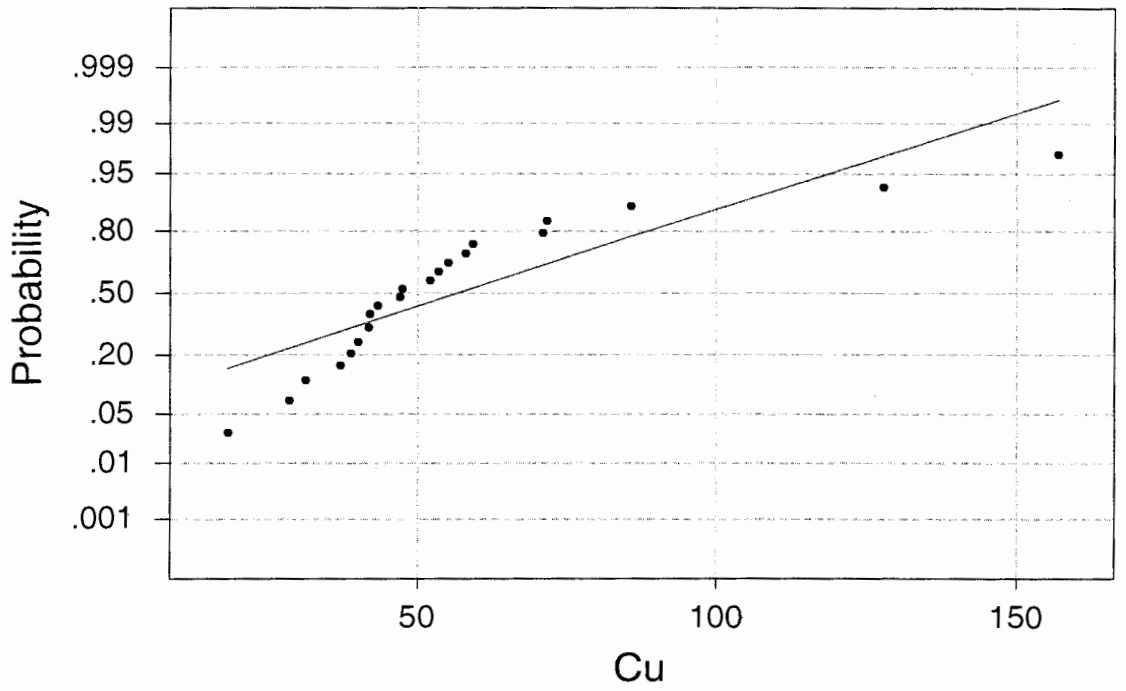
Normal Probability Plot



Average: 56.7182
StDev: 31.9392
N: 22

W-test for Normality
R: 0.8752
P-Value (approx): < 0.0100

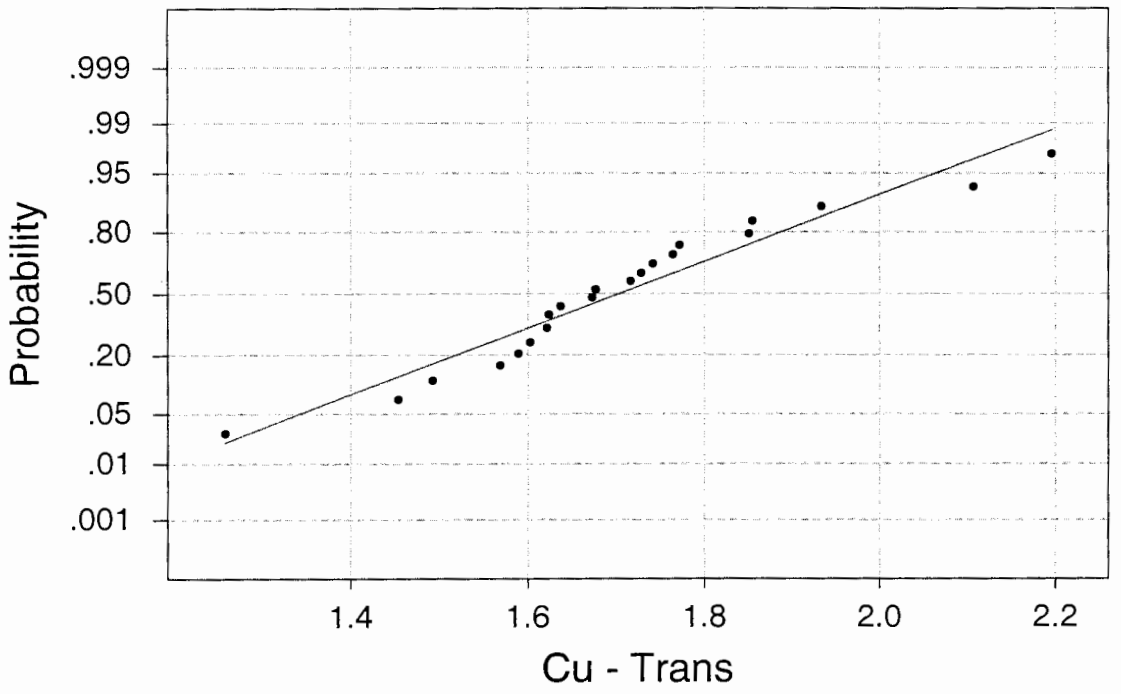
Normal Probability Plot



Average: 56.7182
StDev: 31.9392
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.242 D-: 0.142 D : 0.242
Approximate P-Value < 0.01

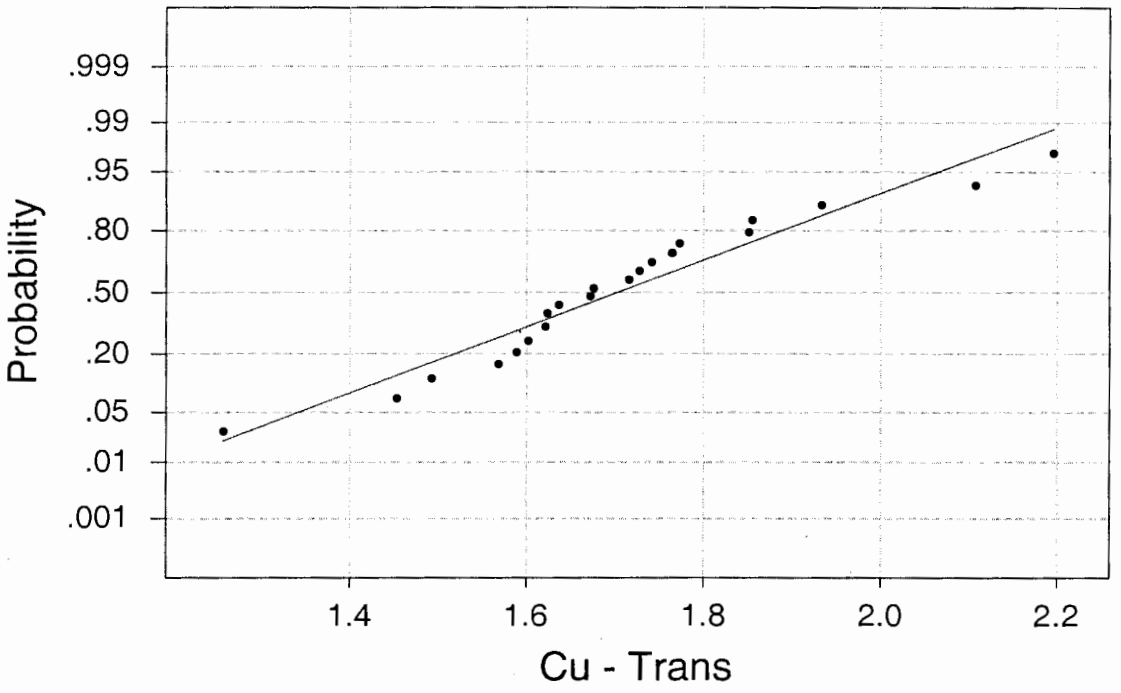
Normal Probability Plot



Average: 1.70338
StDev: 0.205815
N: 22

W-test for Normality
R: 0.9694
P-Value (approx): > 0.1000

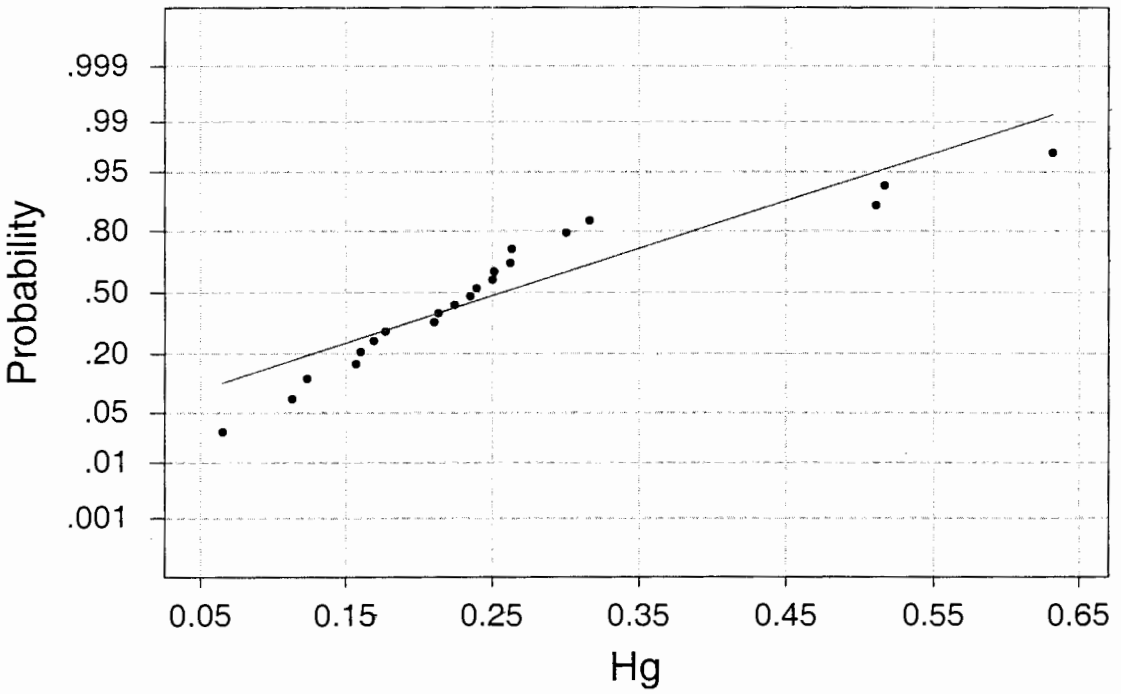
Normal Probability Plot



Average: 1.70338
StDev: 0.205815
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.142 D-: 0.119 D : 0.142
Approximate P-Value > 0.15

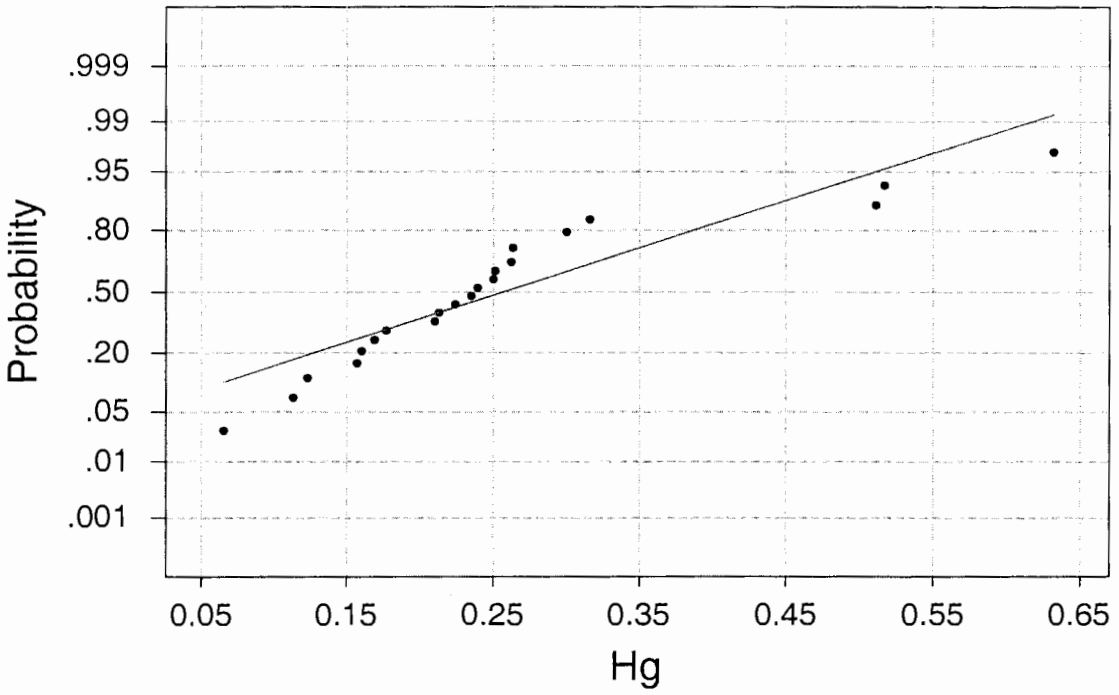
Normal Probability Plot



Average: 0.256818
StDev: 0.136870
N: 22

W-test for Normality
R: 0.9170
P-Value (approx): < 0.0100

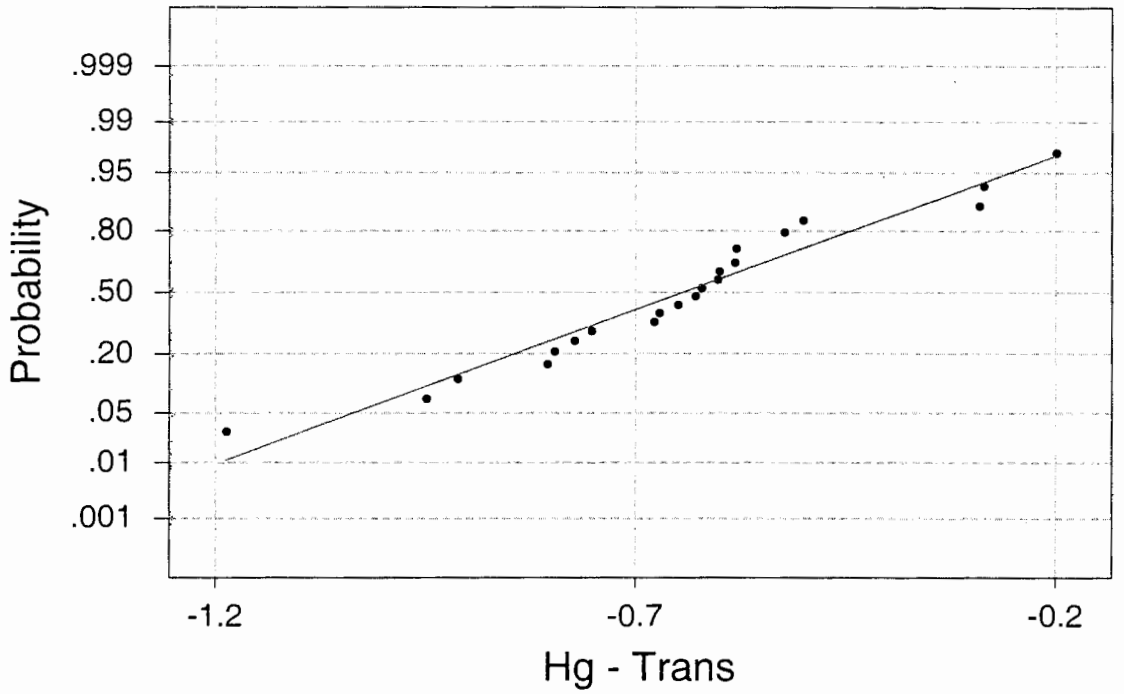
Normal Probability Plot



Average: 0.256818
StDev: 0.136870
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.232 D-: 0.105 D : 0.232
Approximate P-Value < 0.01

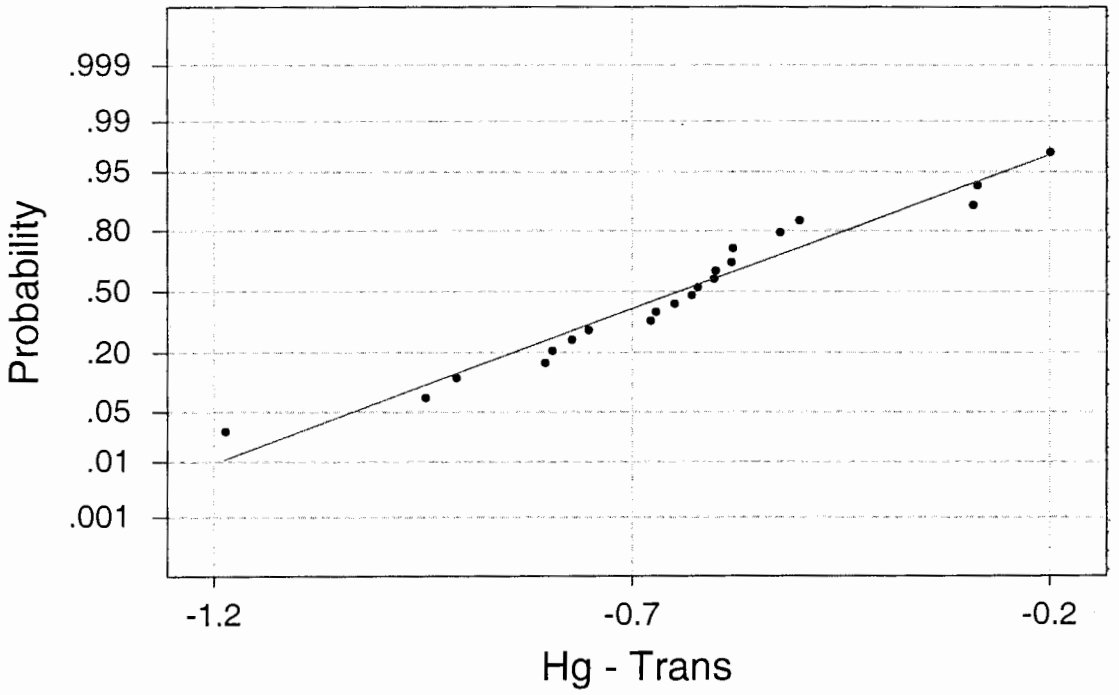
Normal Probability Plot



Average: -0.643757
StDev: 0.222301
N: 22

W-test for Normality
R: 0.9733
P-Value (approx): > 0.1000

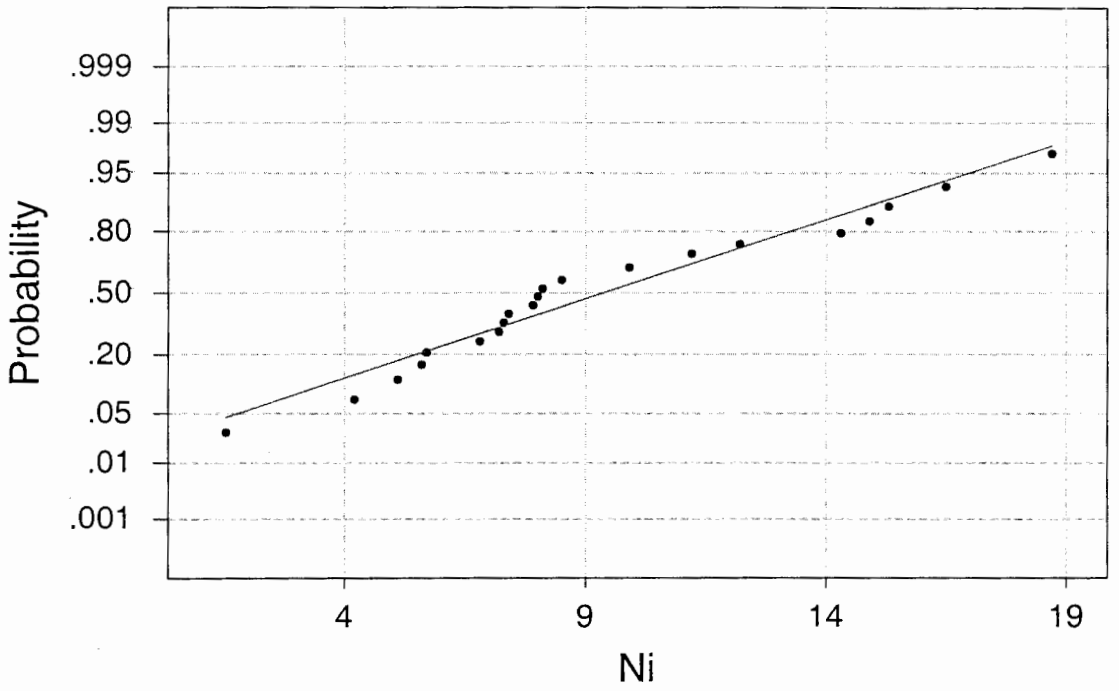
Normal Probability Plot



Average: -0.643757
StDev: 0.222301
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.137 D-: 0.121 D : 0.137
Approximate P-Value > 0.15

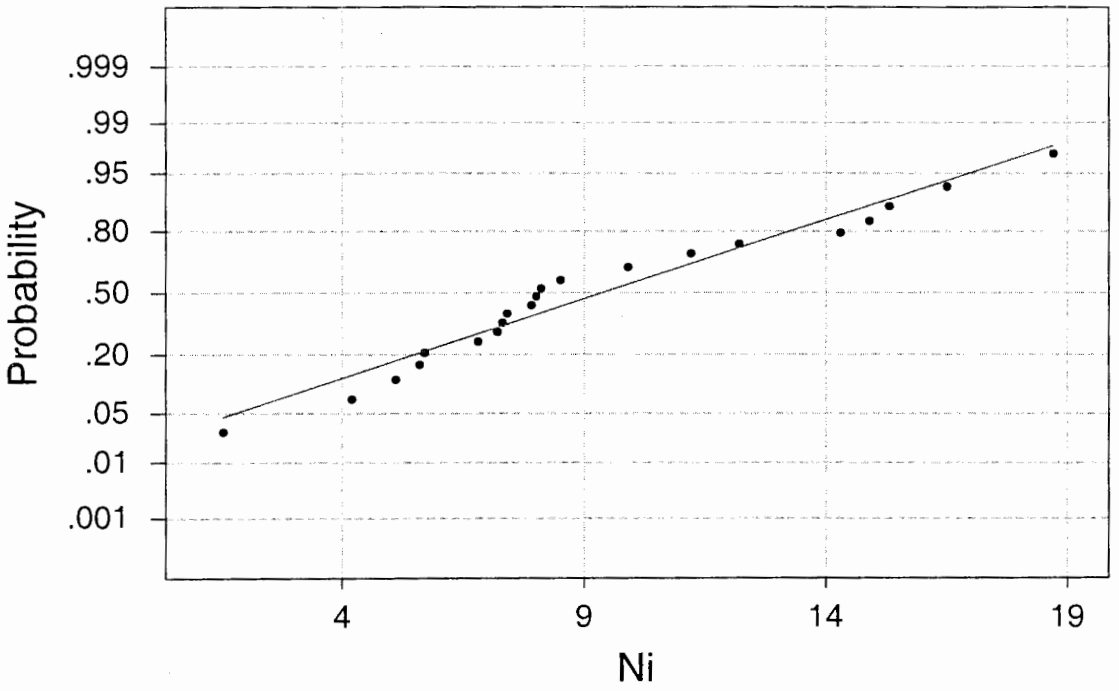
Normal Probability Plot



Average: 9.37273
StDev: 4.36612
N: 22

W-test for Normality
R: 0.9775
P-Value (approx): > 0.1000

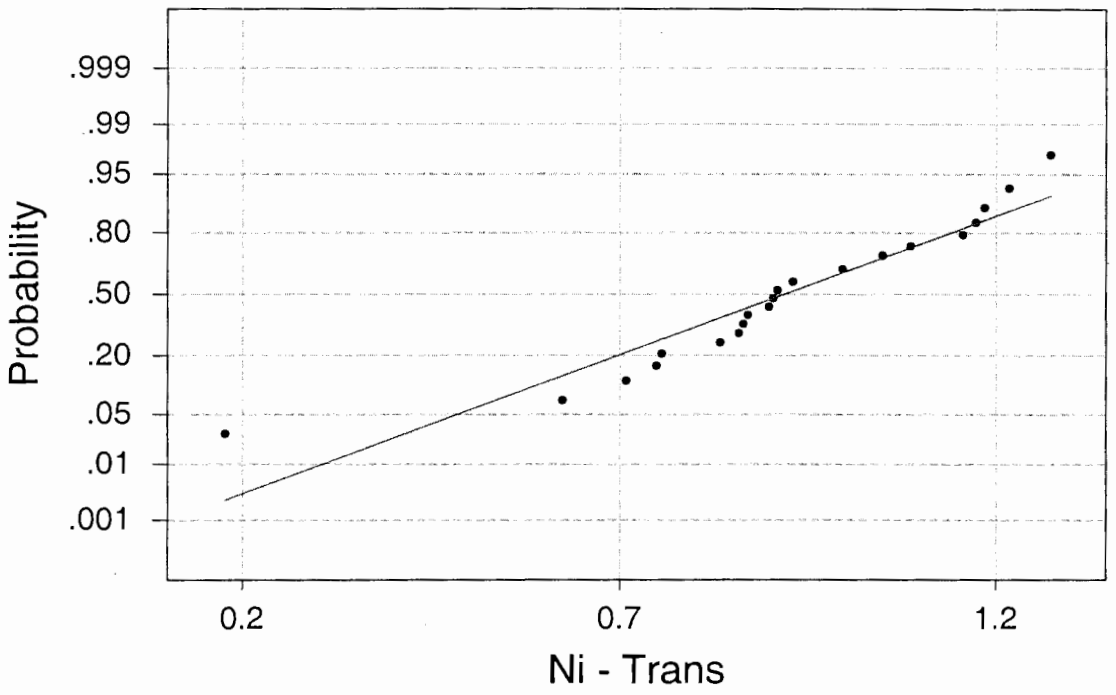
Normal Probability Plot



Average: 9.37273
StDev: 4.36612
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.170 D-: 0.098 D : 0.170
Approximate P-Value: 0.095

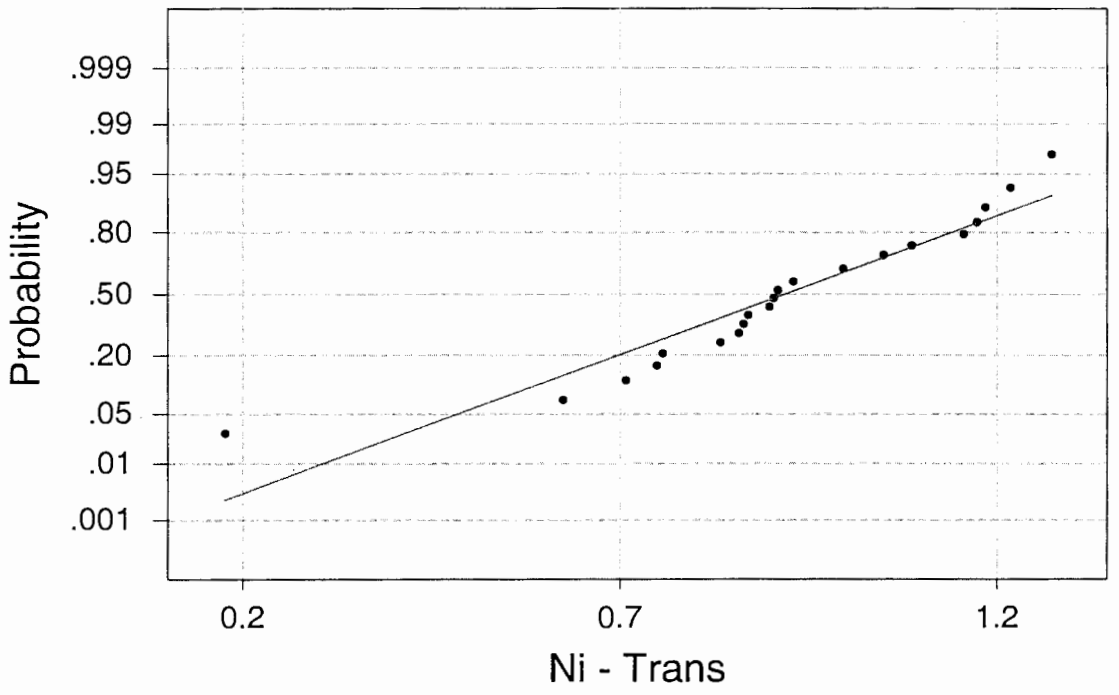
Normal Probability Plot



Average: 0.918244
StDev: 0.240931
N: 22

W-test for Normality
R: 0.9478
P-Value (approx): 0.0377

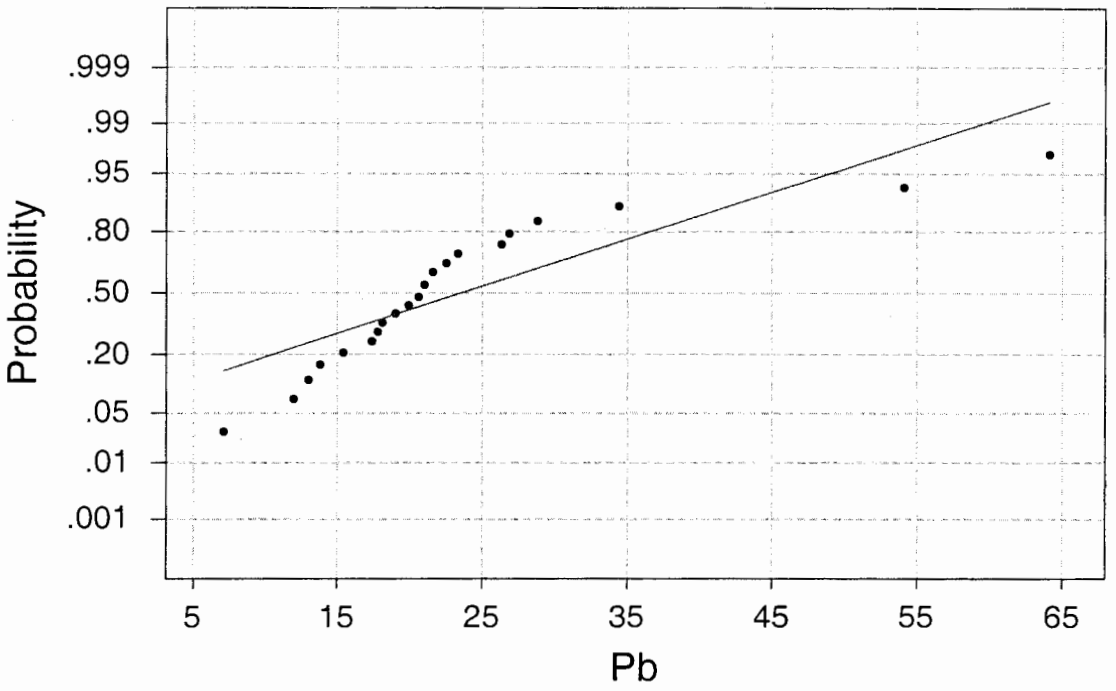
Normal Probability Plot



Average: 0.918244
StDev: 0.240931
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.072 D-: 0.134 D : 0.134
Approximate P-Value > 0.15

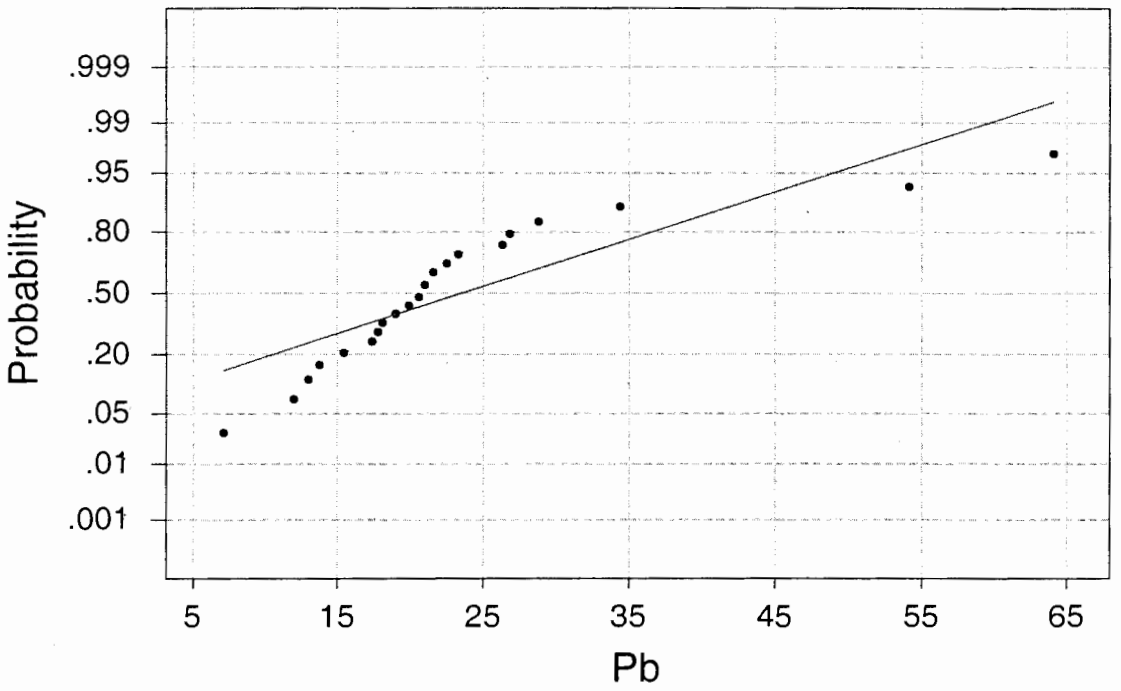
Normal Probability Plot



Average: 23.5455
StDev: 13.0550
N: 22

W-test for Normality
R: 0.8726
P-Value (approx): < 0.0100

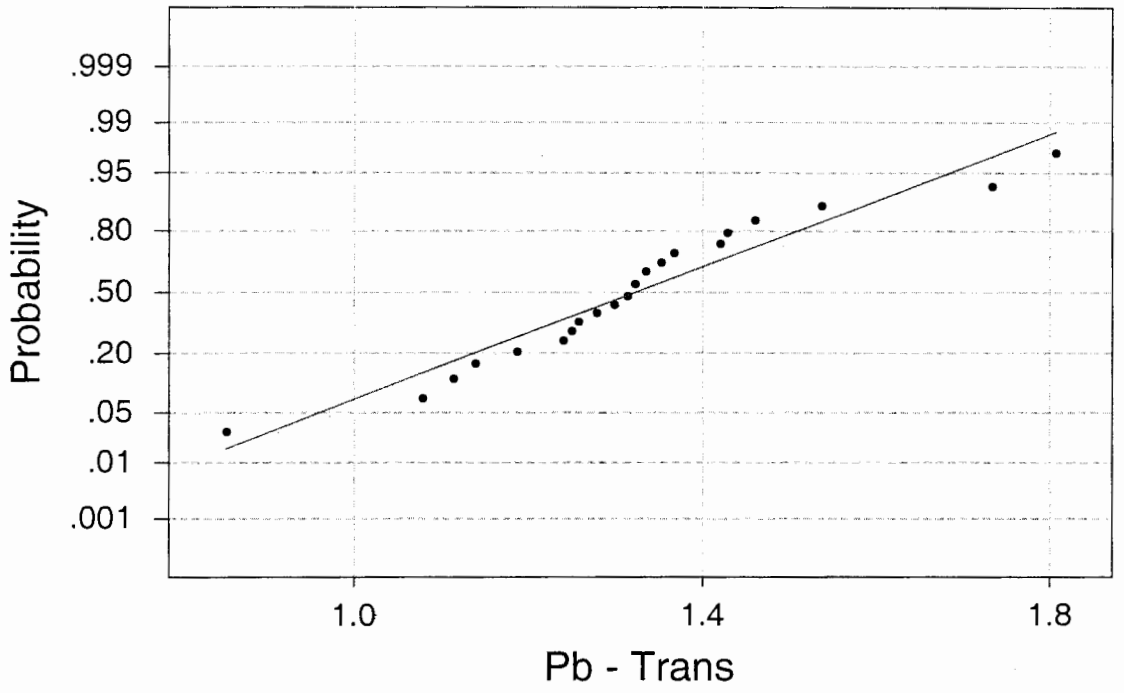
Normal Probability Plot



Average: 23.5455
StDev: 13.0550
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.235 D-: 0.143 D : 0.235
Approximate P-Value < 0.01

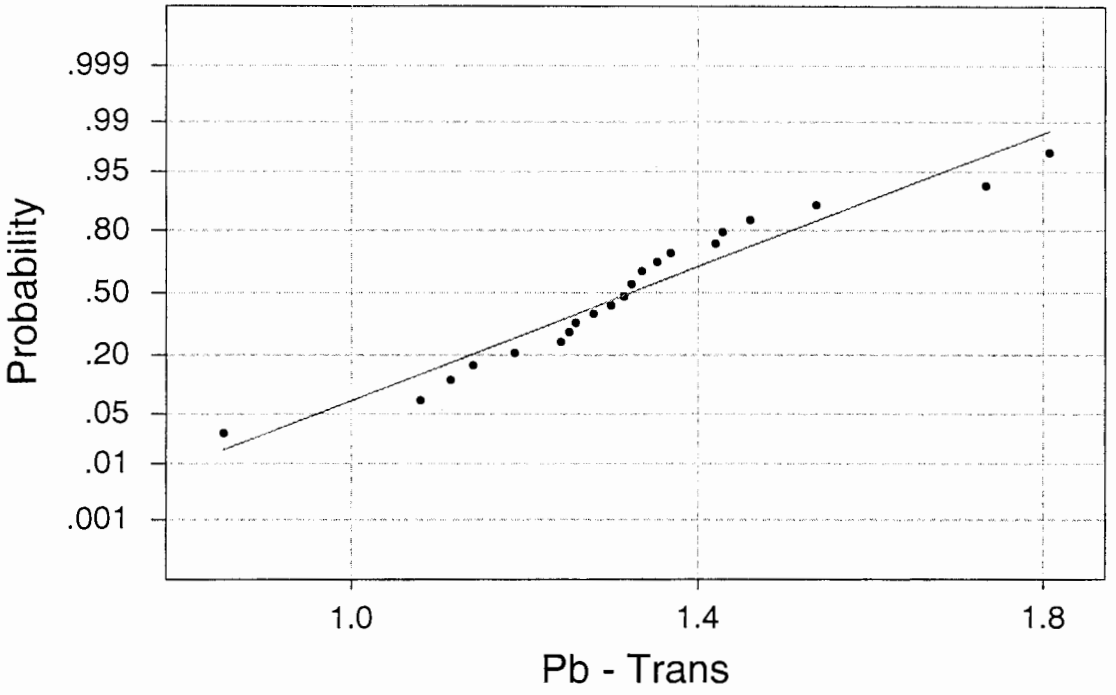
Normal Probability Plot



Average: 1.32247
StDev: 0.205464
N: 22

W-test for Normality
R: 0.9663
P-Value (approx): > 0.1000

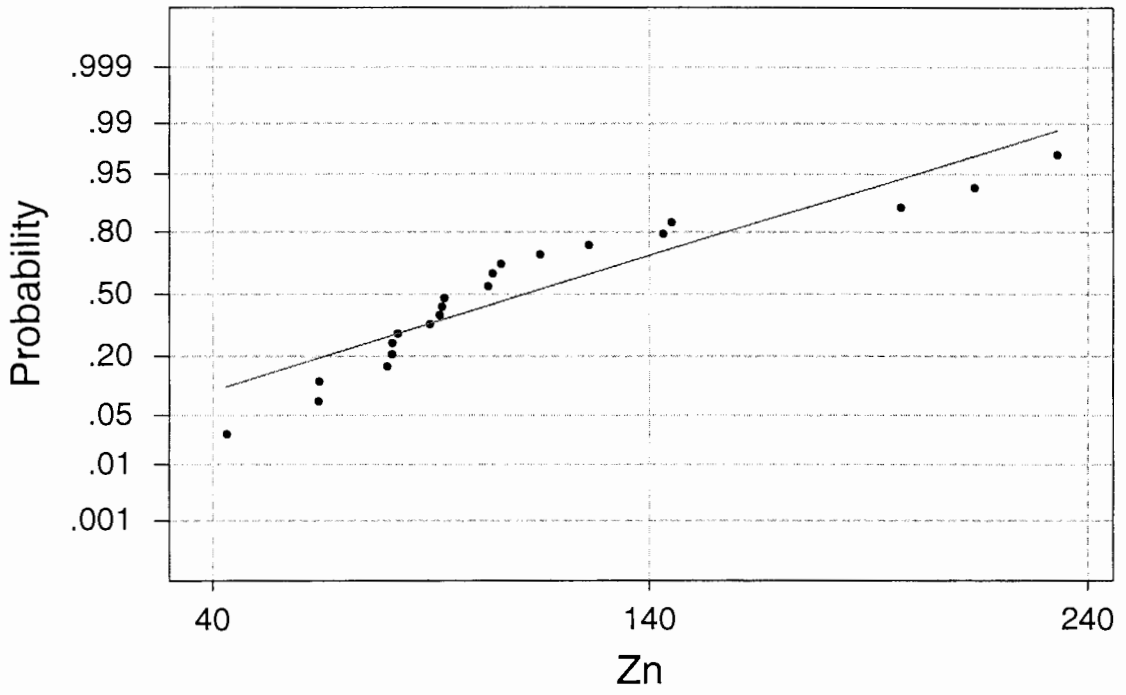
Normal Probability Plot



Average: 1.32247
StDev: 0.205464
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.141 D-: 0.118 D : 0.141
Approximate P-Value > 0.15

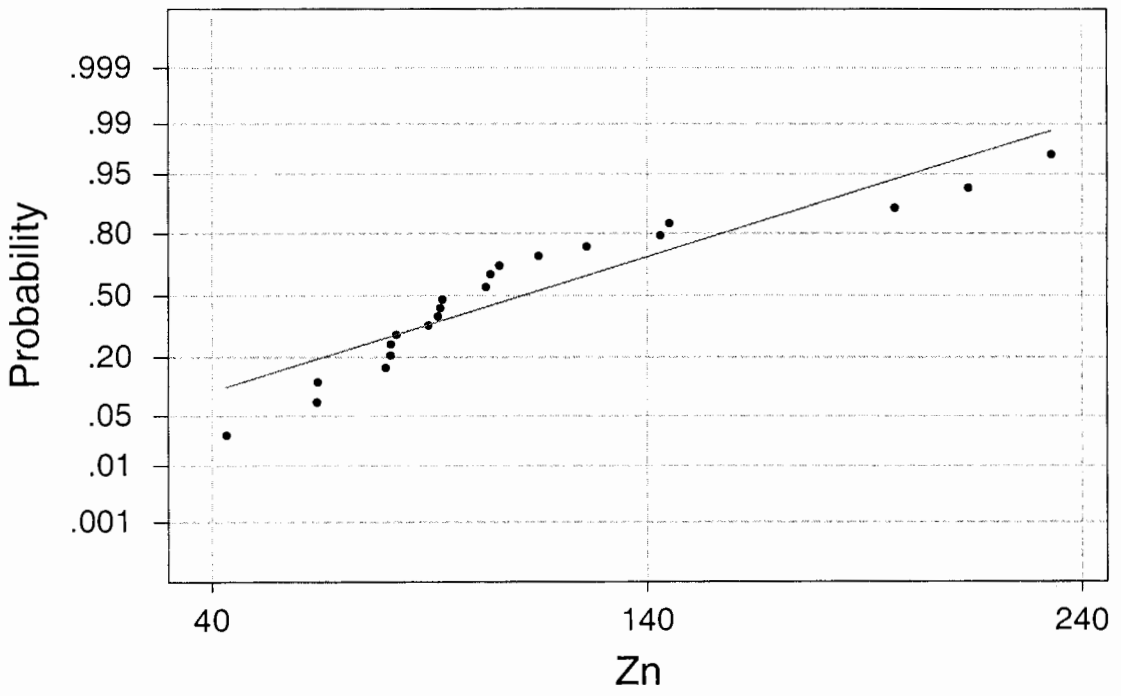
Normal Probability Plot



Average: 111.491
StDev: 48.5519
N: 22

W-test for Normality
R: 0.9253
P-Value (approx): < 0.0100

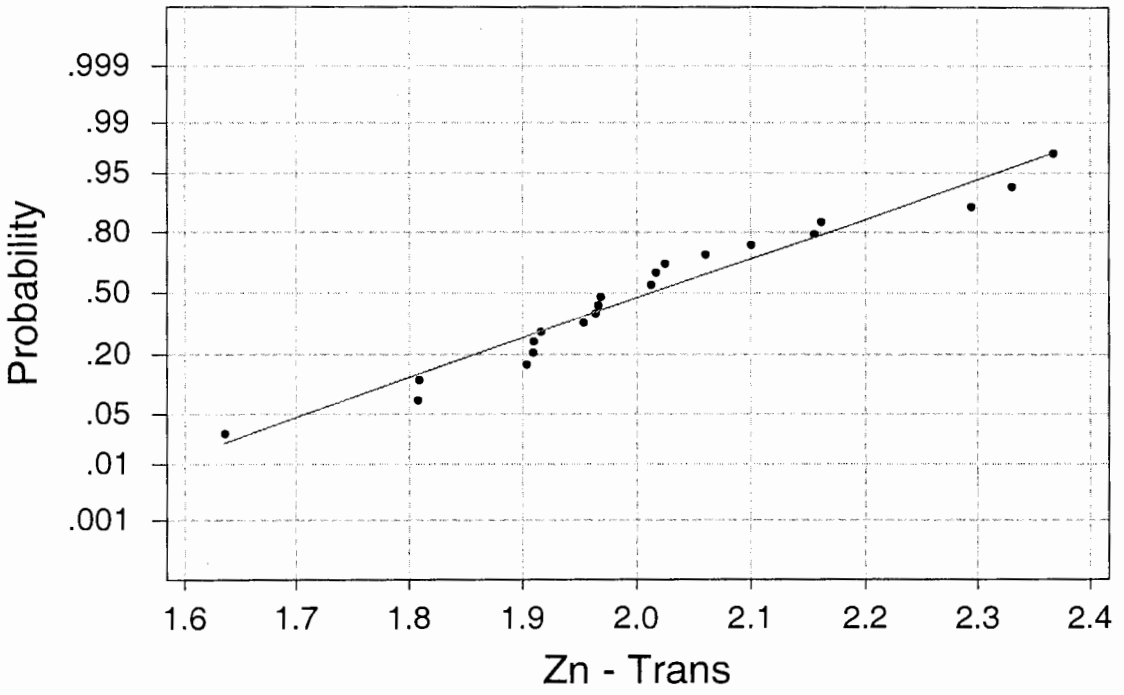
Normal Probability Plot



Average: 111.491
StDev: 48.5519
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.227 D-: 0.122 D : 0.227
Approximate P-Value < 0.01

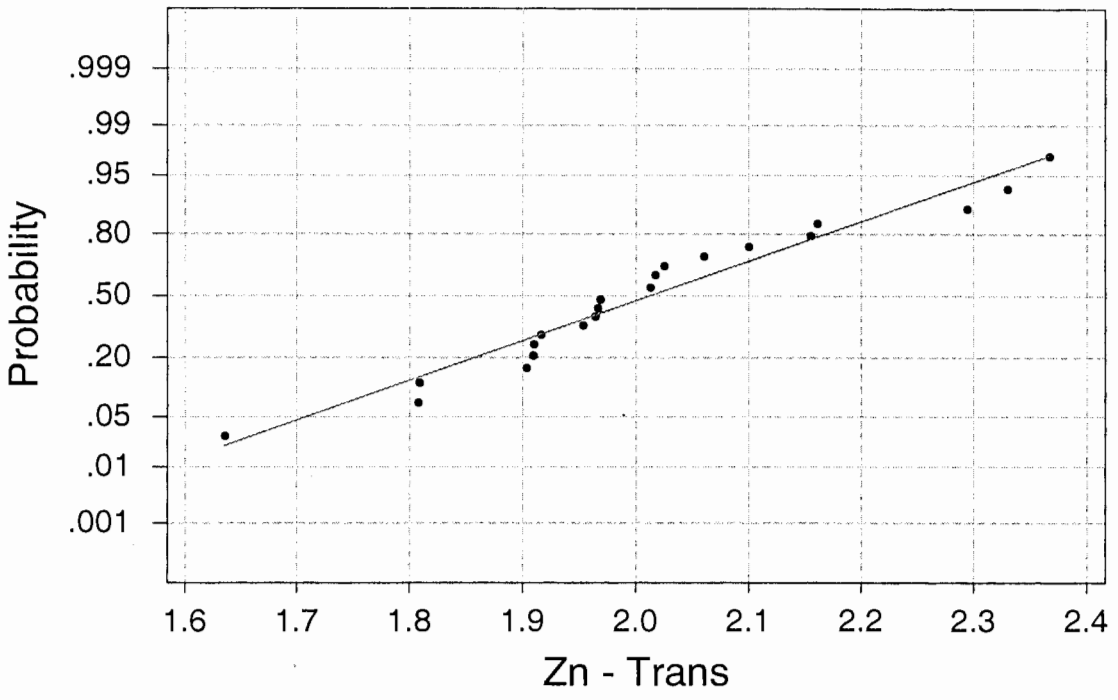
Normal Probability Plot



Average: 2.01269
StDev: 0.174229
N: 22

W-test for Normality
R: 0.9753
P-Value (approx): > 0.1000

Normal Probability Plot

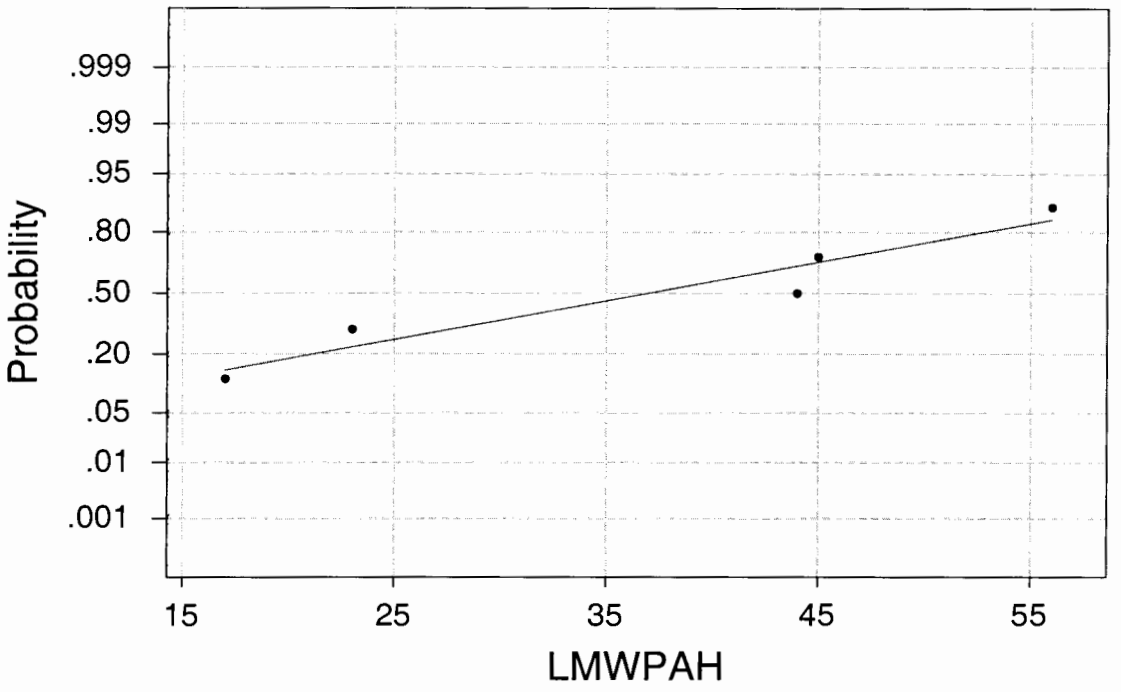


Average: 2.01269
StDev: 0.174229
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.153 D-: 0.128 D : 0.153
Approximate P-Value > 0.15

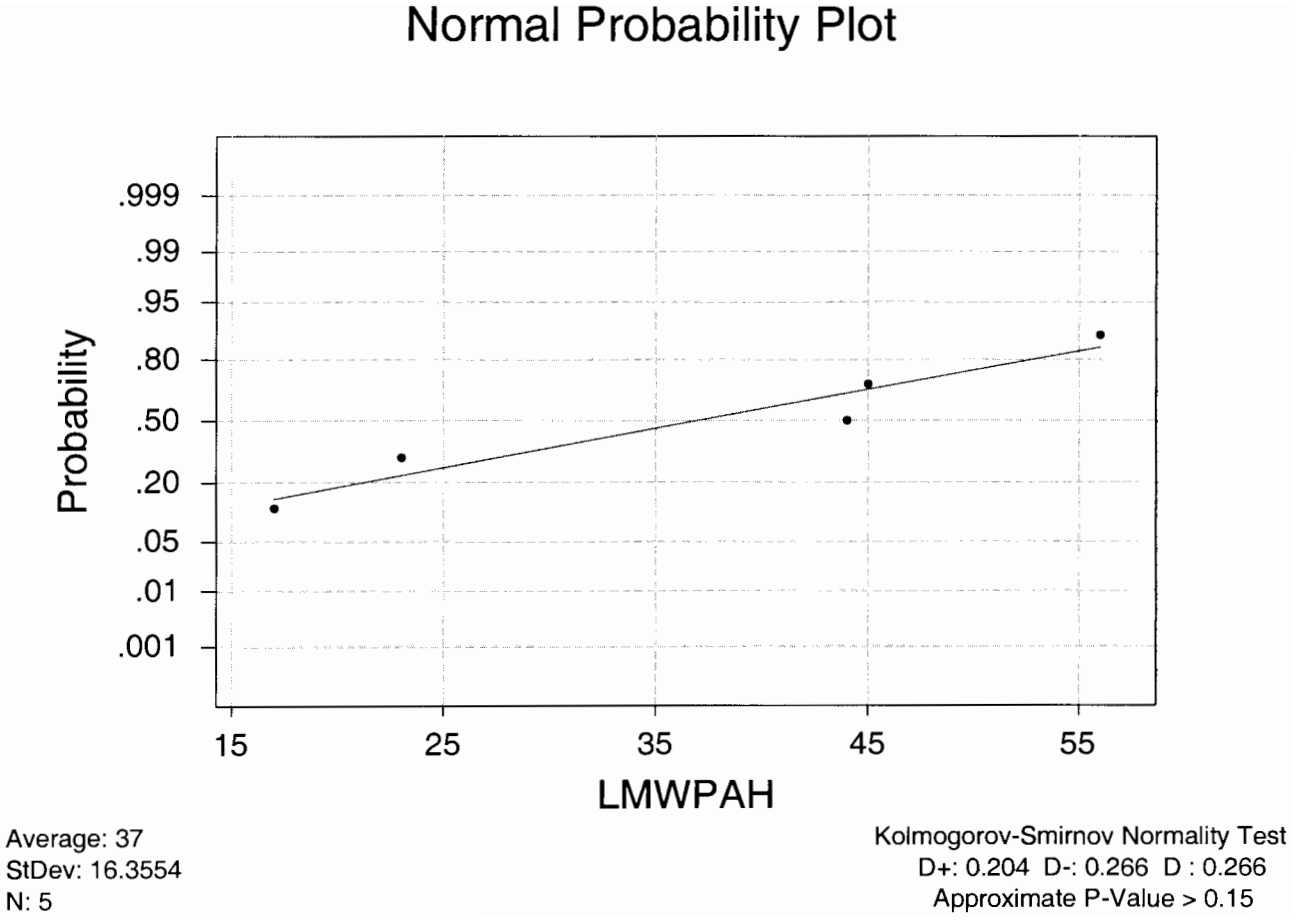
Sediment
Chemistry
PAH

Normal Probability Plot



Average: 37
StDev: 16.3554
N: 5

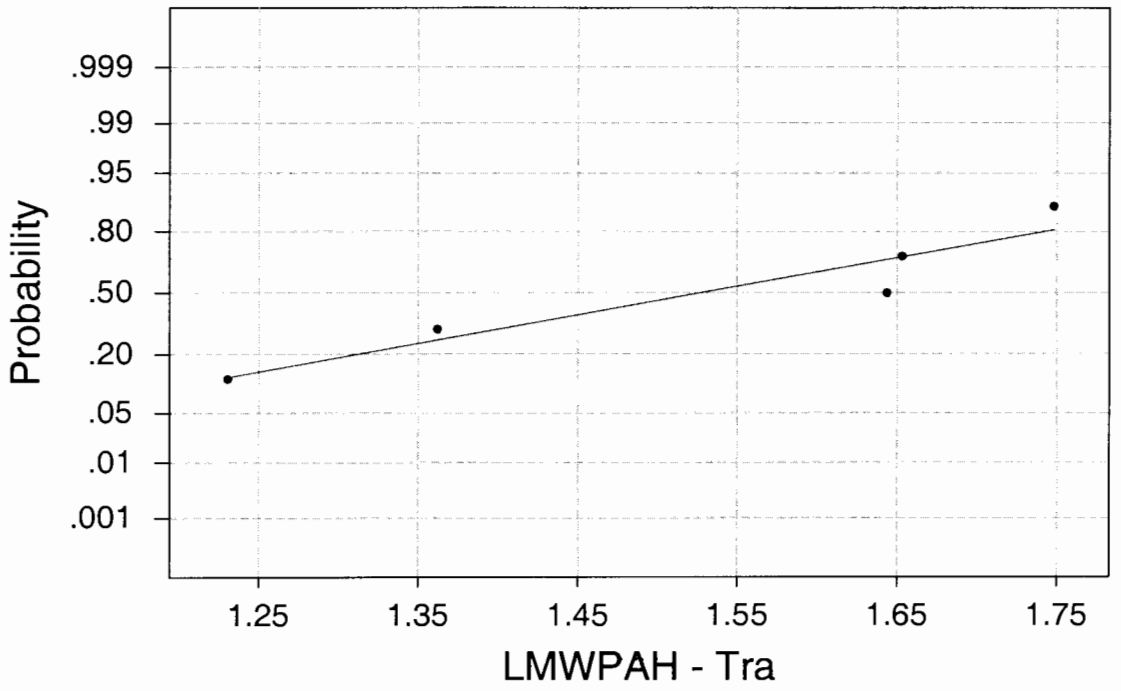
W-test for Normality
R: 0.9616
P-Value (approx): > 0.1000



Average: 37
StDev: 16.3554
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.204 D-: 0.266 D : 0.266
Approximate P-Value > 0.15

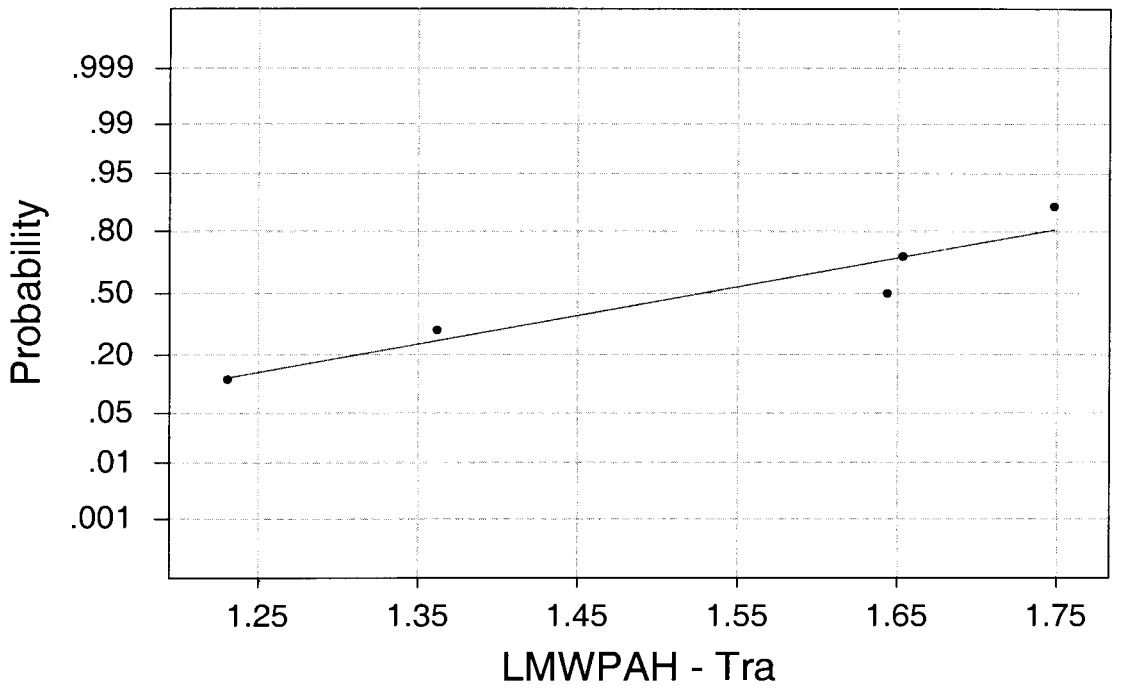
Normal Probability Plot



Average: 1.52741
StDev: 0.220041
N: 5

W-test for Normality
R: 0.9485
P-Value (approx): > 0.1000

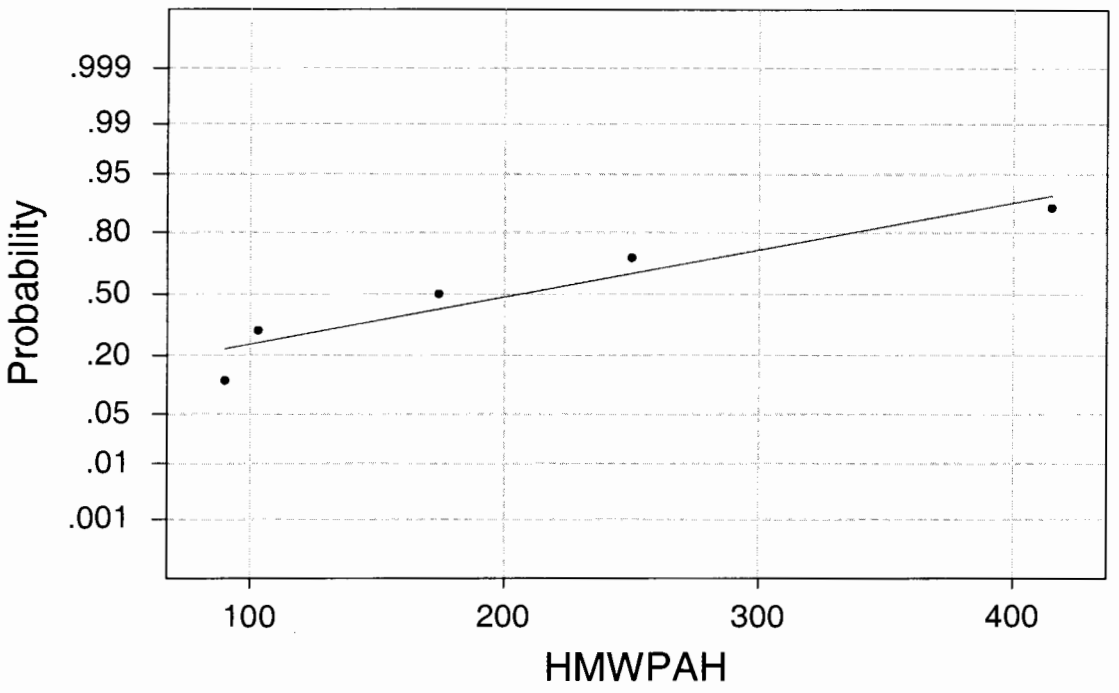
Normal Probability Plot



Average: 1.52741
StDev: 0.220041
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.174 D-: 0.301 D : 0.301
Approximate P-Value: 0.139

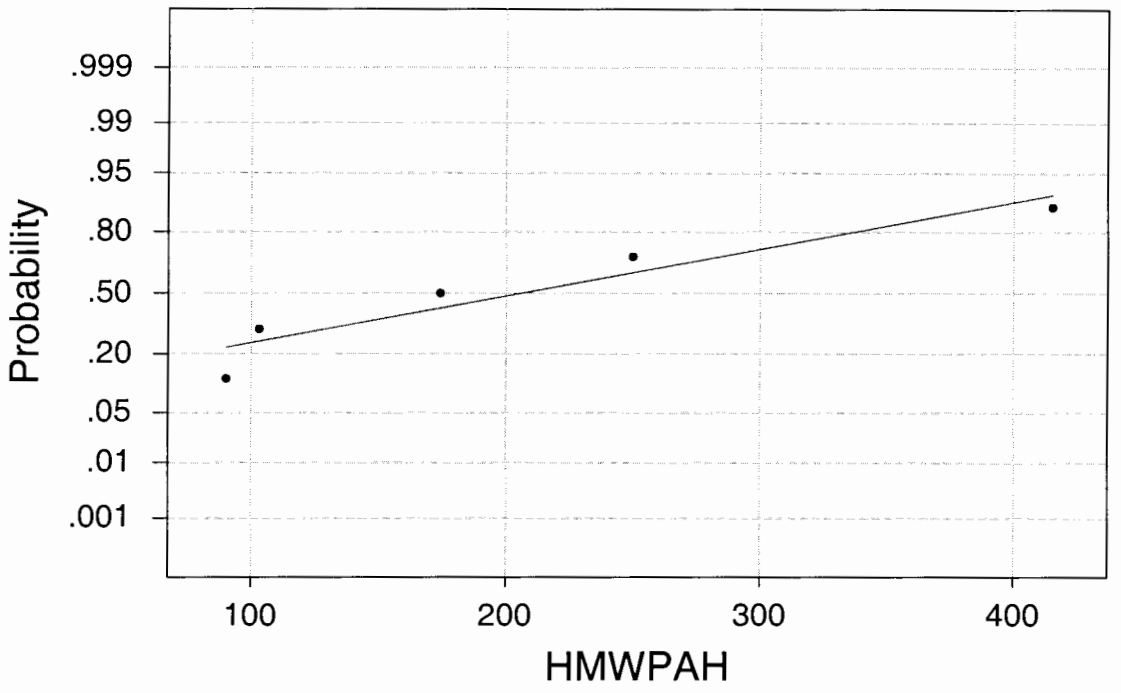
Normal Probability Plot



Average: 206.4
StDev: 132.952
N: 5

W-test for Normality
R: 0.9482
P-Value (approx): > 0.1000

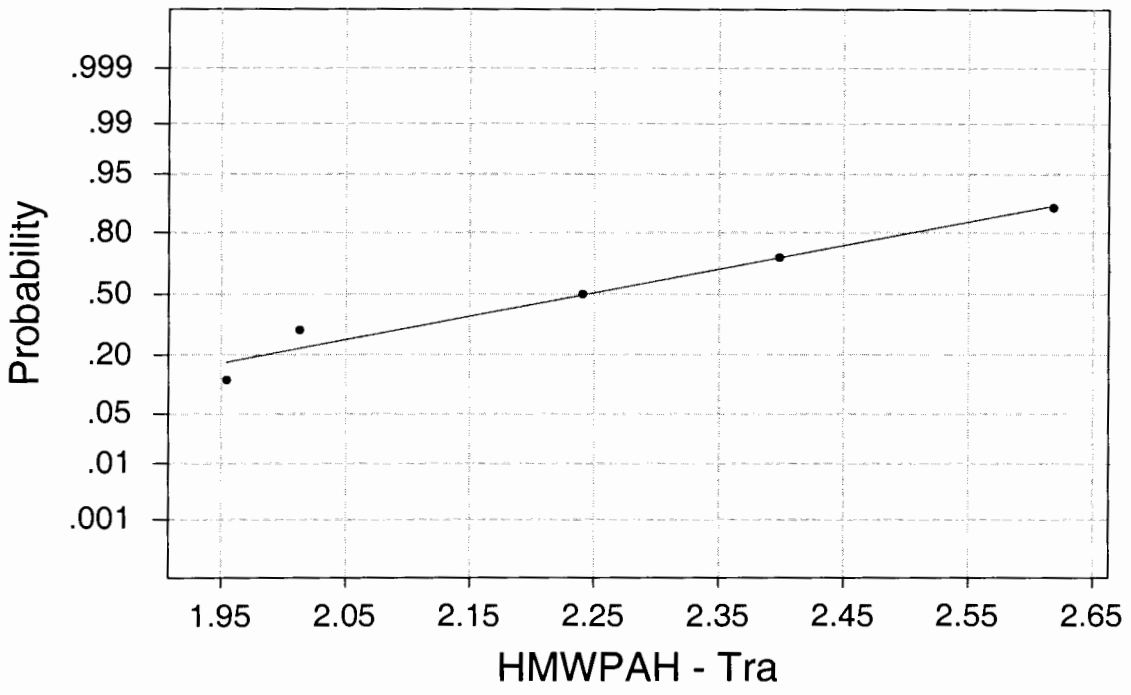
Normal Probability Plot



Average: 206.4
StDev: 132.952
N: 5

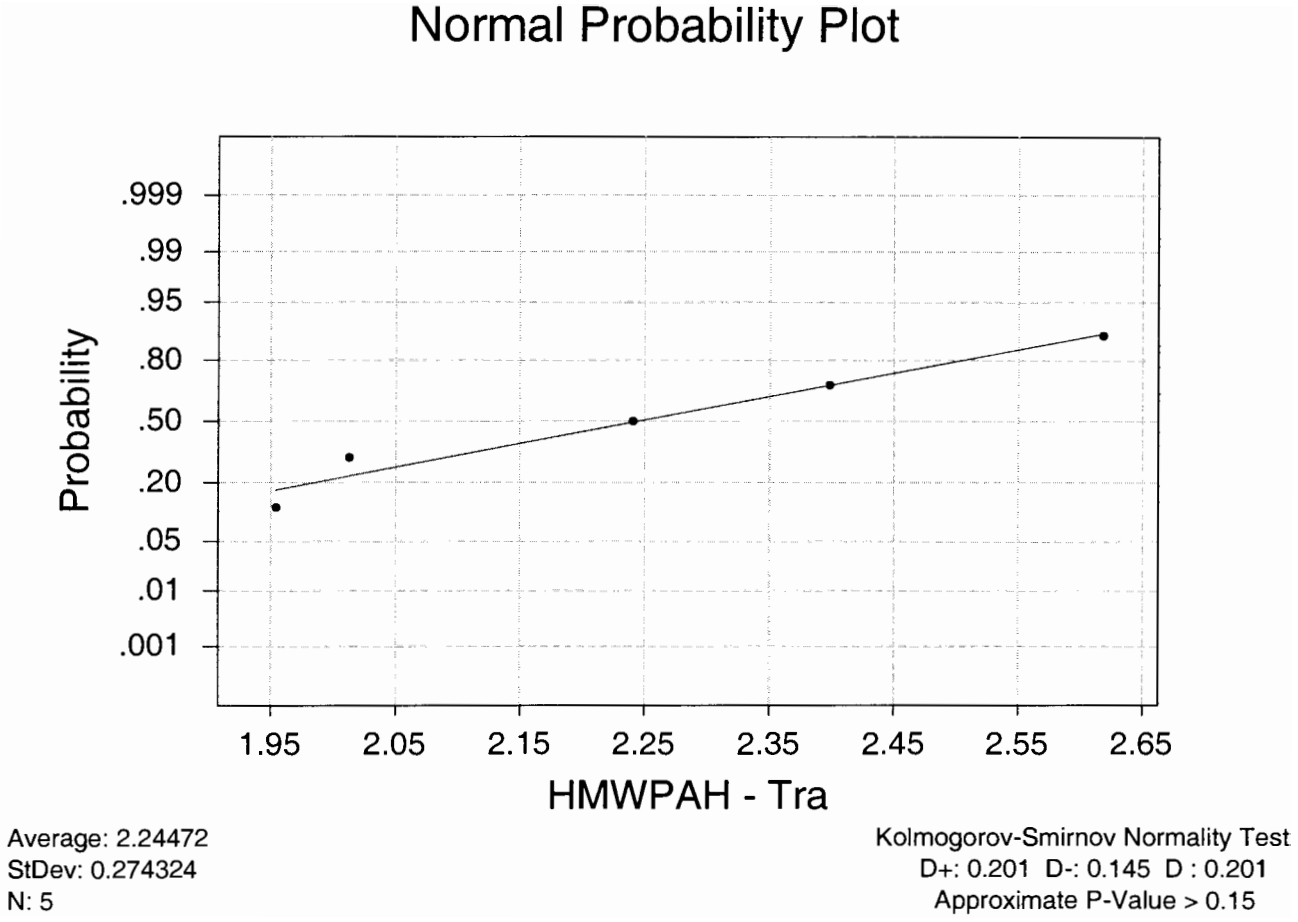
Kolmogorov-Smirnov Normality Test
D+: 0.196 D-: 0.191 D : 0.196
Approximate P-Value > 0.15

Normal Probability Plot



Average: 2.24472
StDev: 0.274324
N: 5

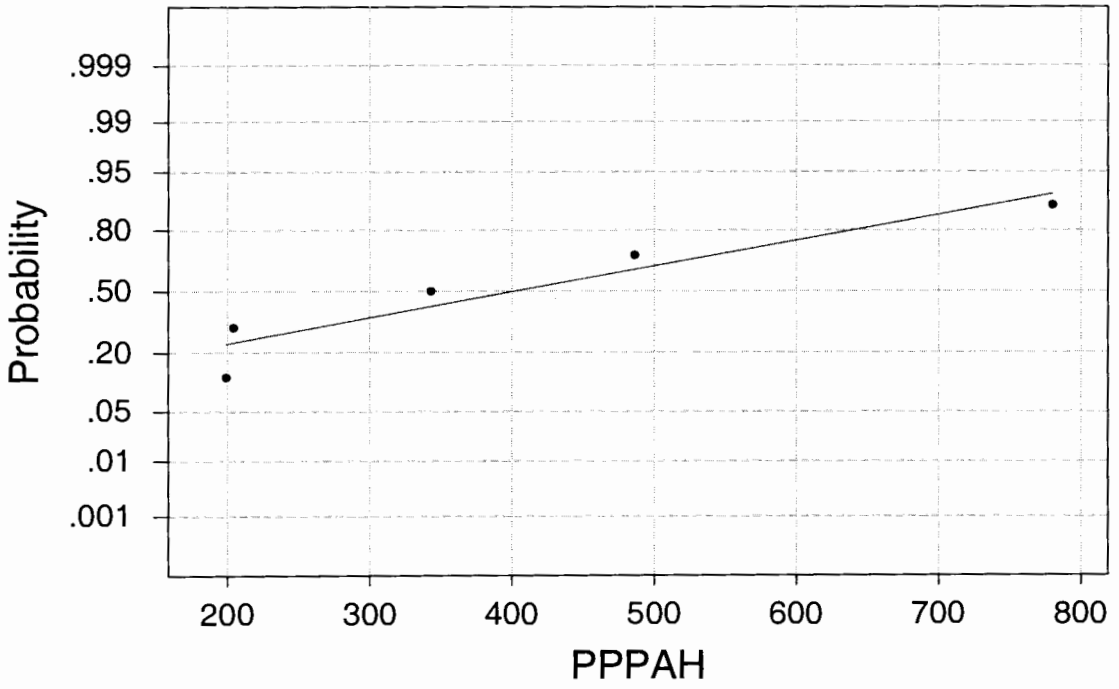
W-test for Normality
R: 0.9811
P-Value (approx): > 0.1000



Average: 2.24472
StDev: 0.274324
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.201 D-: 0.145 D : 0.201
Approximate P-Value > 0.15

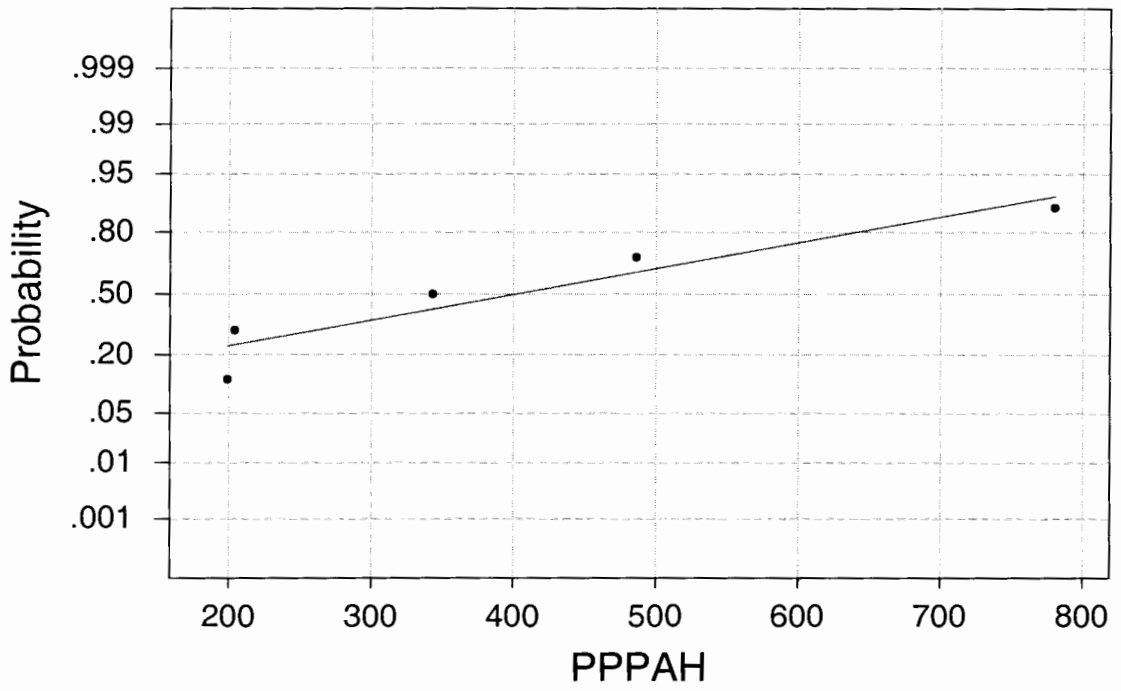
Normal Probability Plot



Average: 402.4
StDev: 241.782
N: 5

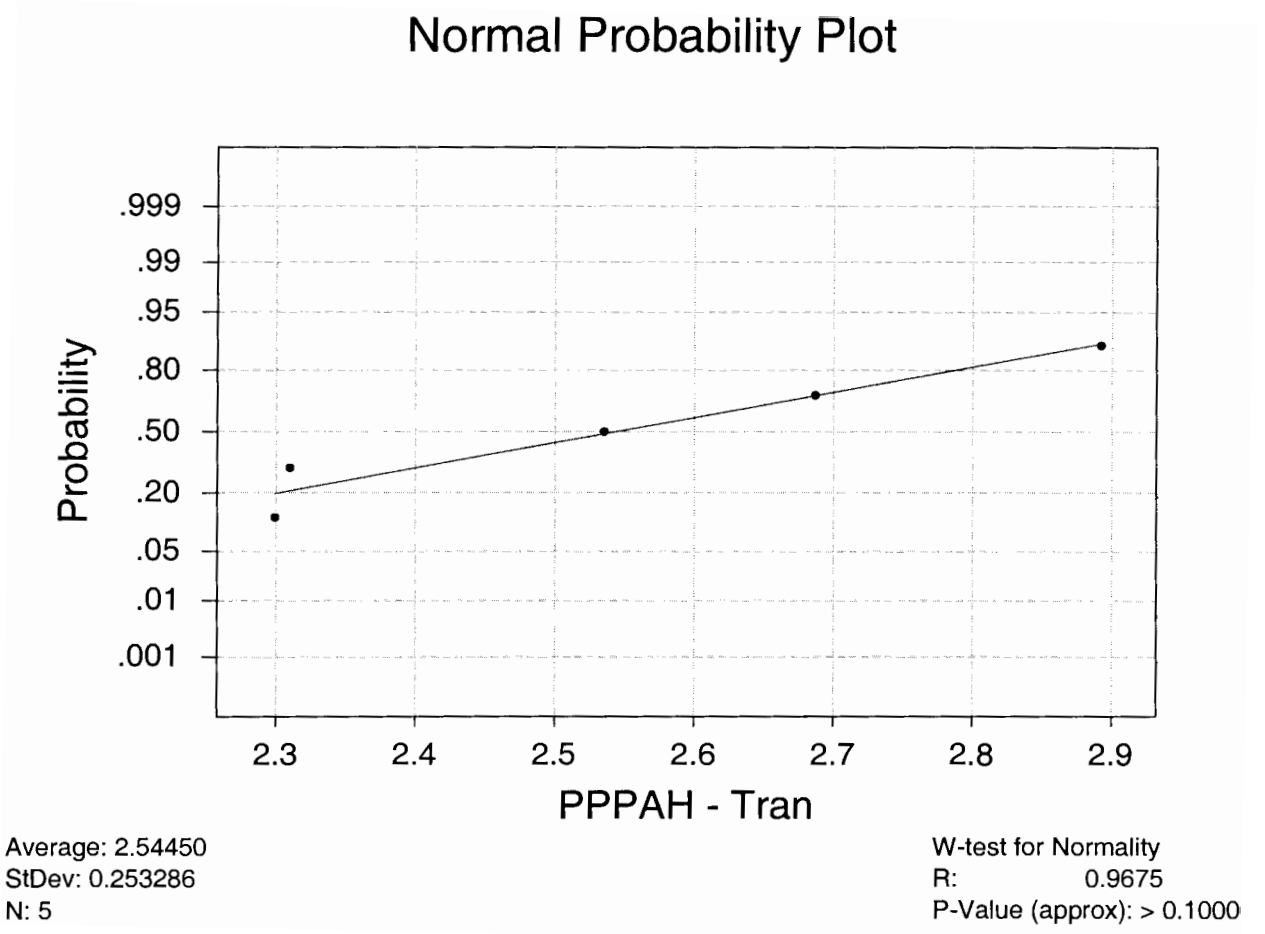
W-test for Normality
R: 0.9430
P-Value (approx): > 0.1000

Normal Probability Plot



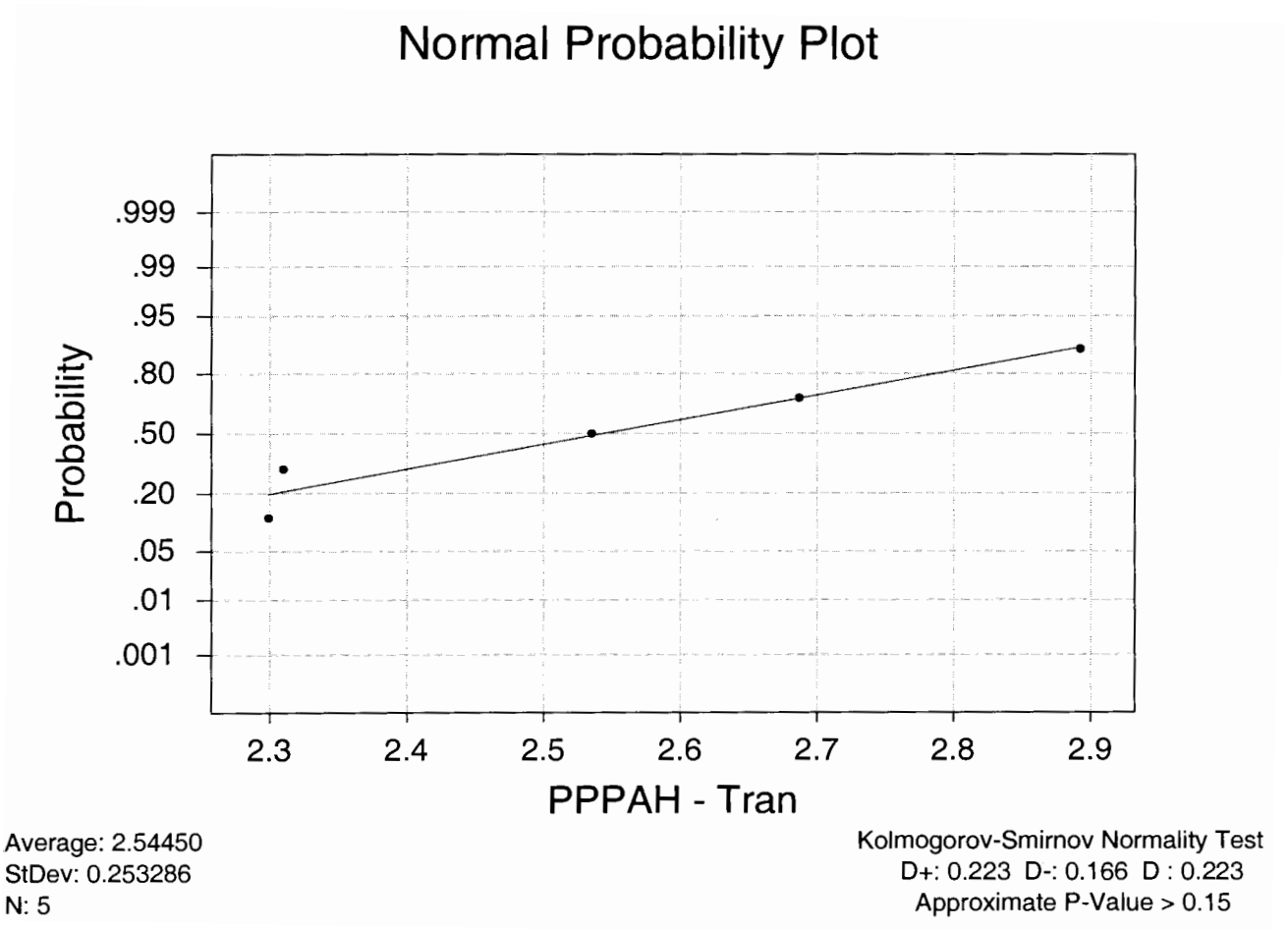
Average: 402.4
StDev: 241.782
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.197 D-: 0.200 D : 0.200
Approximate P-Value > 0.15



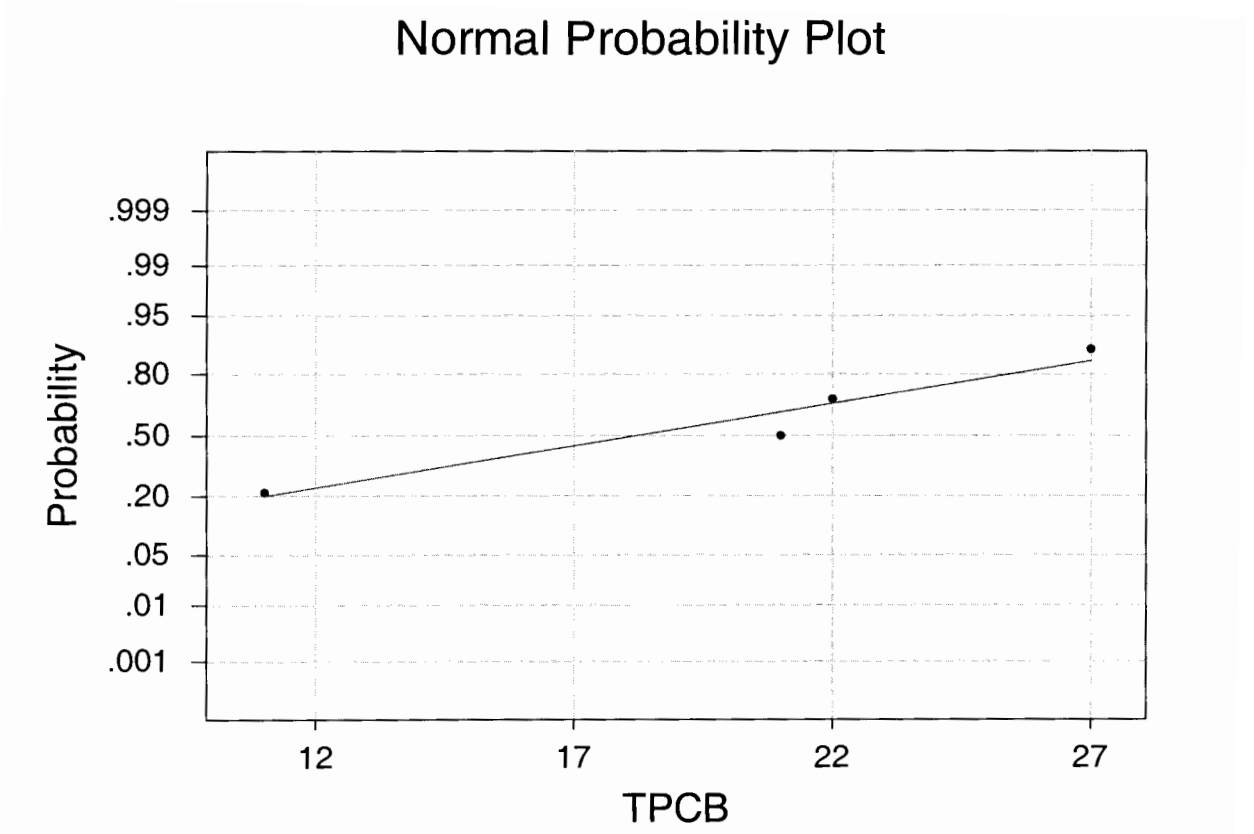
Average: 2.54450
StDev: 0.253286
N: 5

W-test for Normality
R: 0.9675
P-Value (approx): > 0.1000



Average: 2.54450
StDev: 0.253286
N: 5

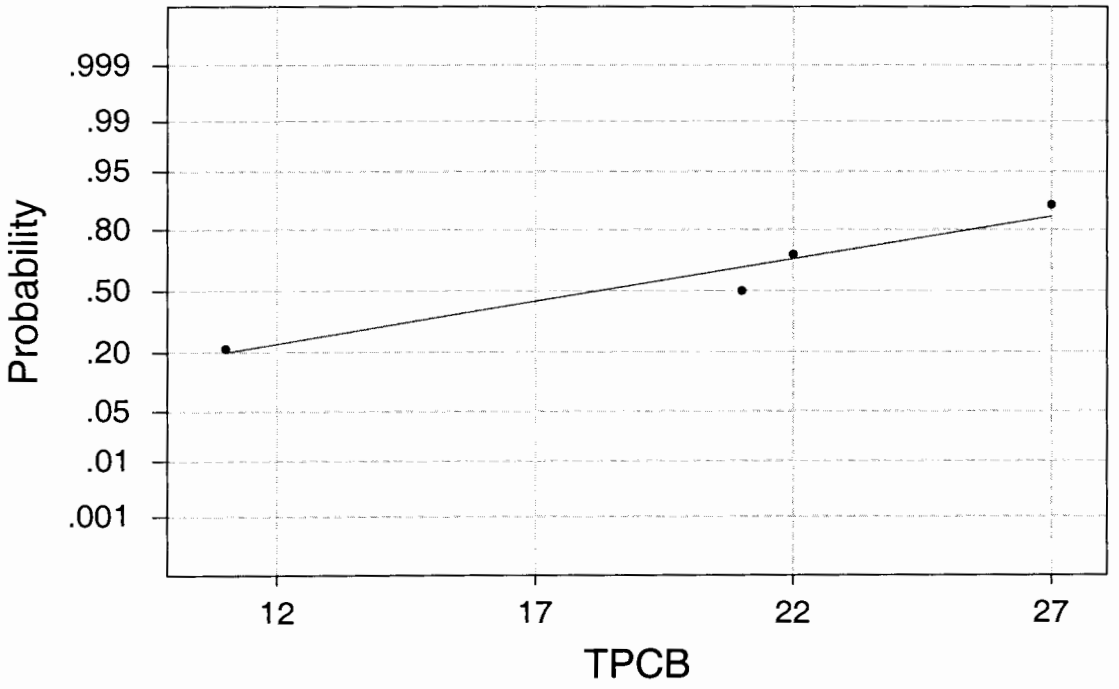
Kolmogorov-Smirnov Normality Test
D+: 0.223 D-: 0.166 D : 0.223
Approximate P-Value > 0.15



Average: 18.4
StDev: 7.12741
N: 5

W-test for Normality
R: 0.9759
P-Value (approx): > 0.1000

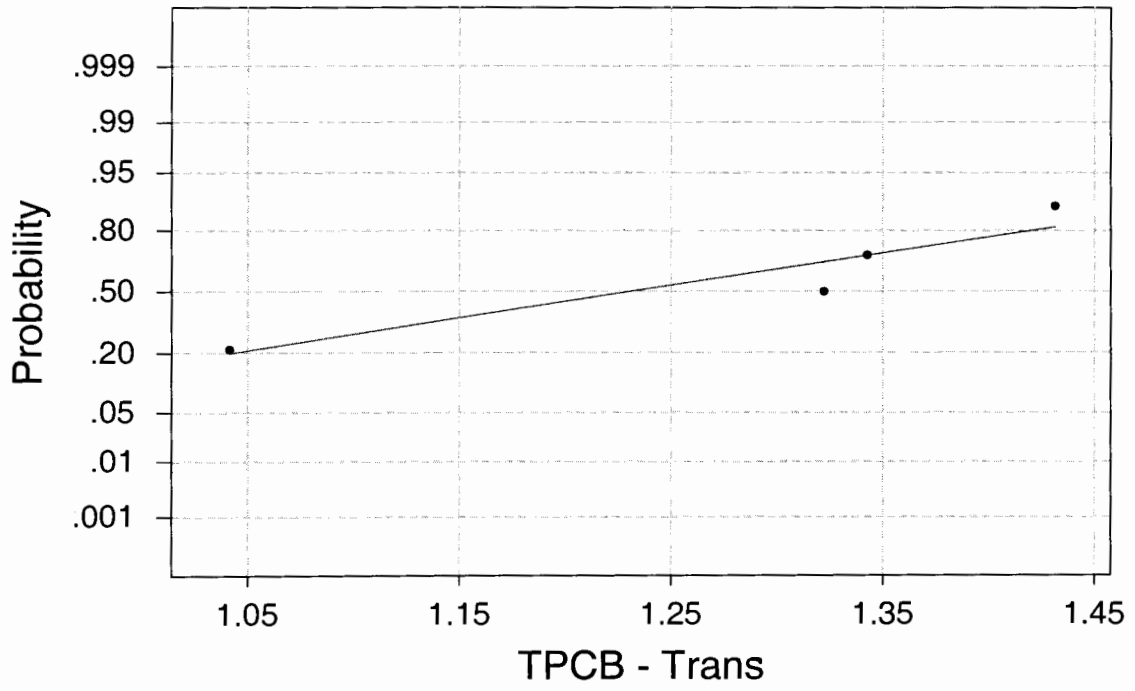
Normal Probability Plot



Average: 18.4
StDev: 7.12741
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.150 D-: 0.242 D : 0.242
Approximate P-Value > 0.15

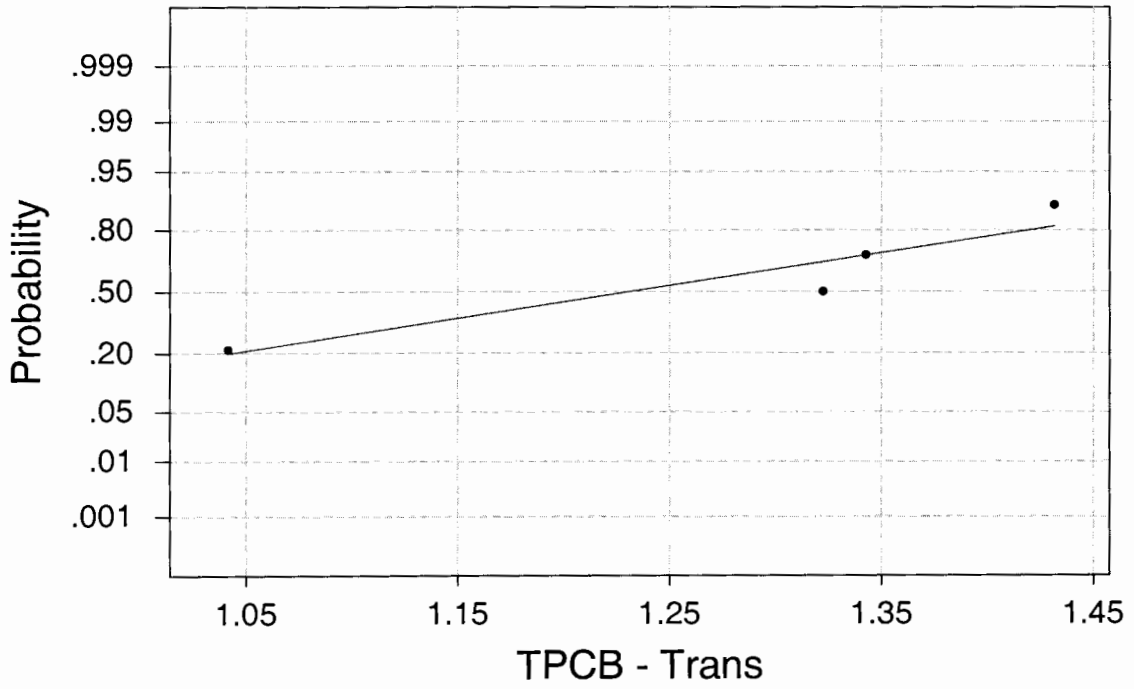
Normal Probability Plot



Average: 1.23576
StDev: 0.182120
N: 5

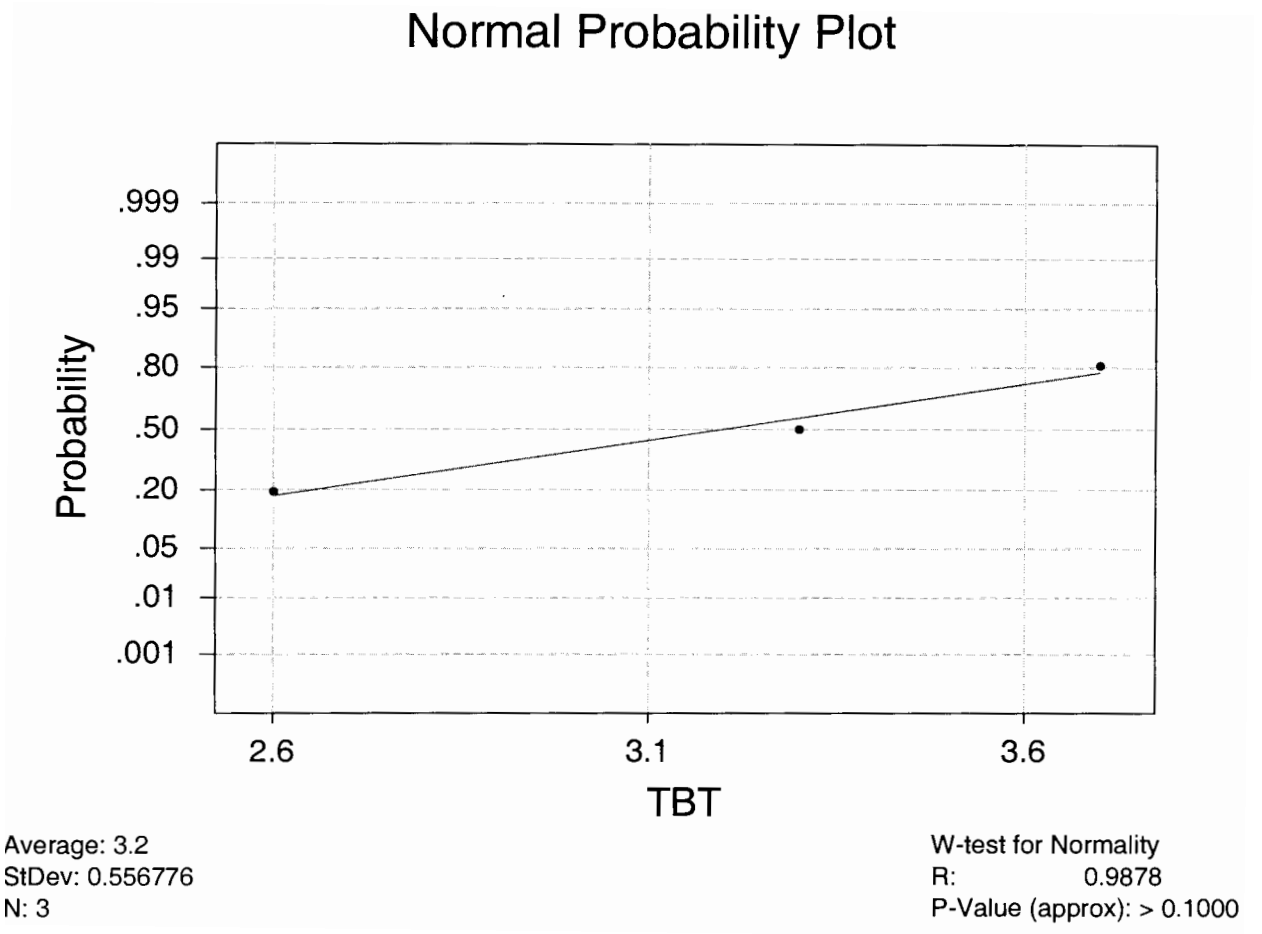
W-test for Normality
R: 0.9552
P-Value (approx): > 0.1000

Normal Probability Plot

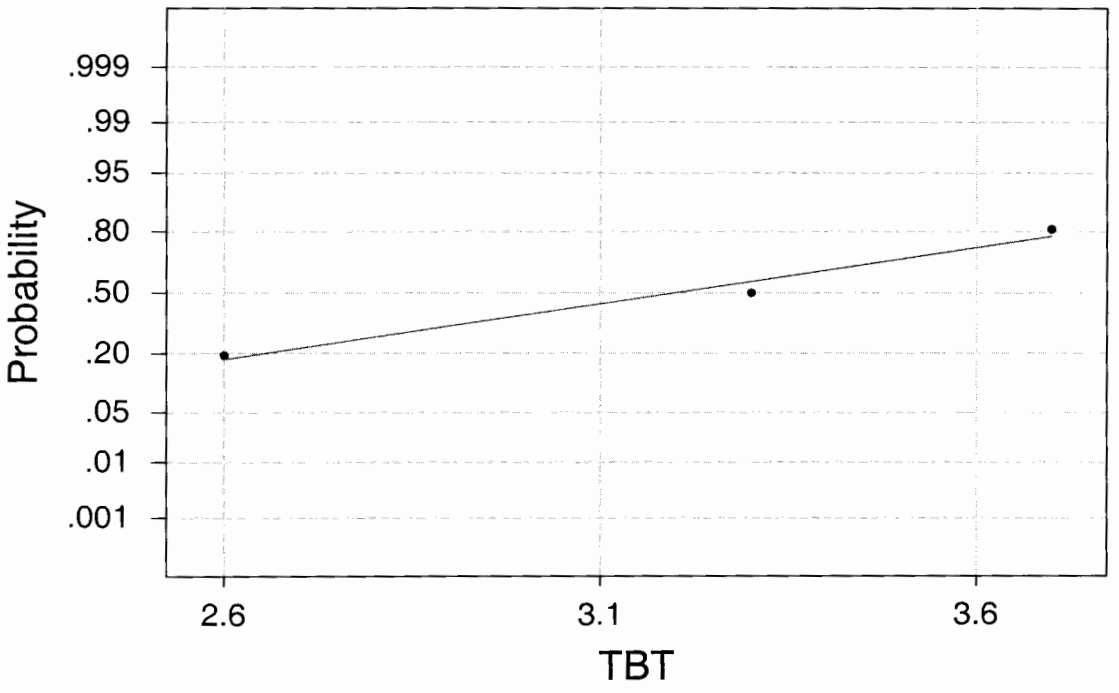


Average: 1.23576
StDev: 0.182120
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.157 D-: 0.283 D : 0.283
Approximate P-Value > 0.15

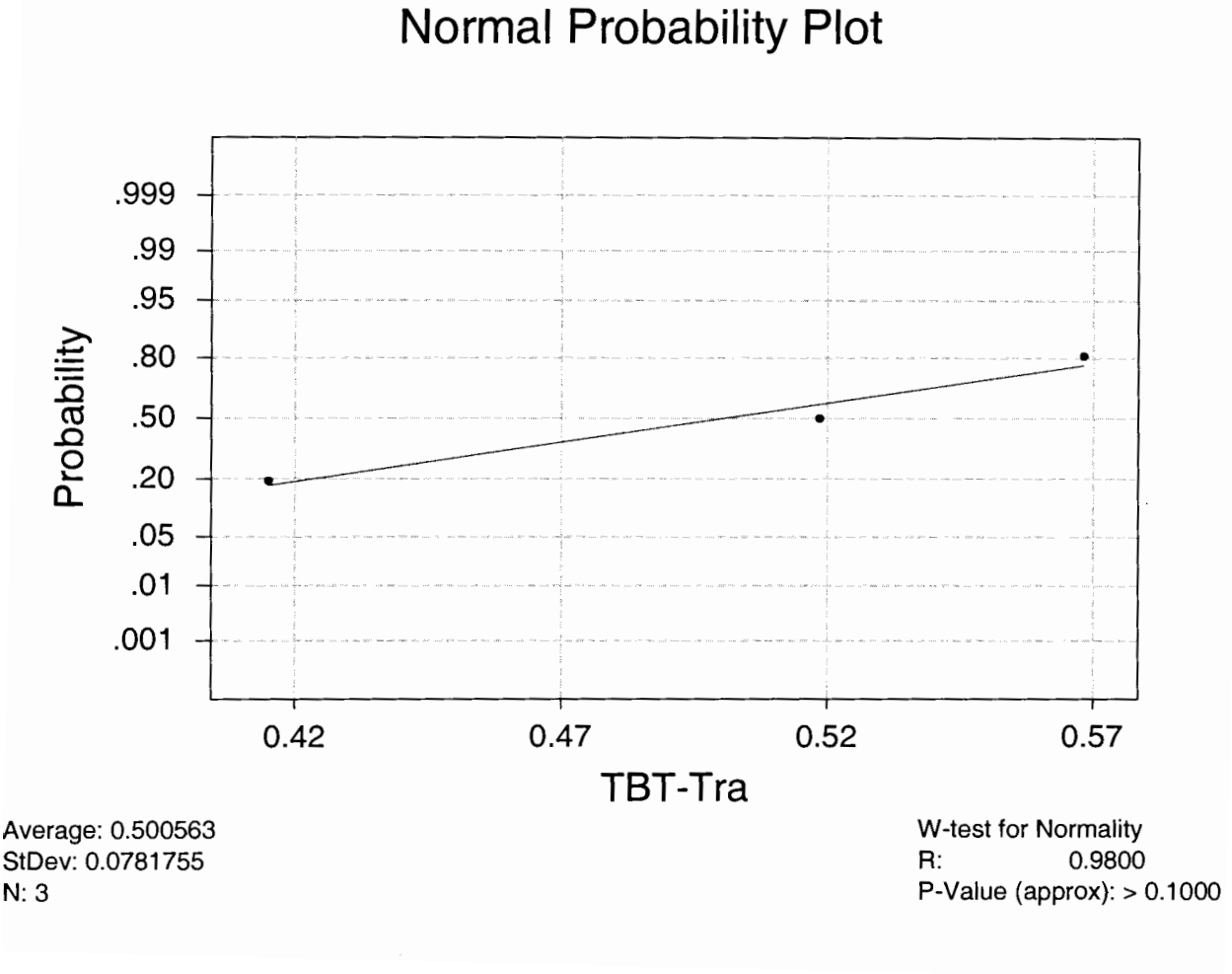

Normal Probability Plot
Probability
.999
.99
.95
.80
.50
.20
.05
.01
.001
2.6
3.1
3.6
TBT
Average: 3.2
StDev: 0.556776
N: 3
W-test for Normality
R: 0.9878
P-Value (approx): > 0.1000

Normal Probability Plot



Average: 3.2
StDev: 0.556776
N: 3

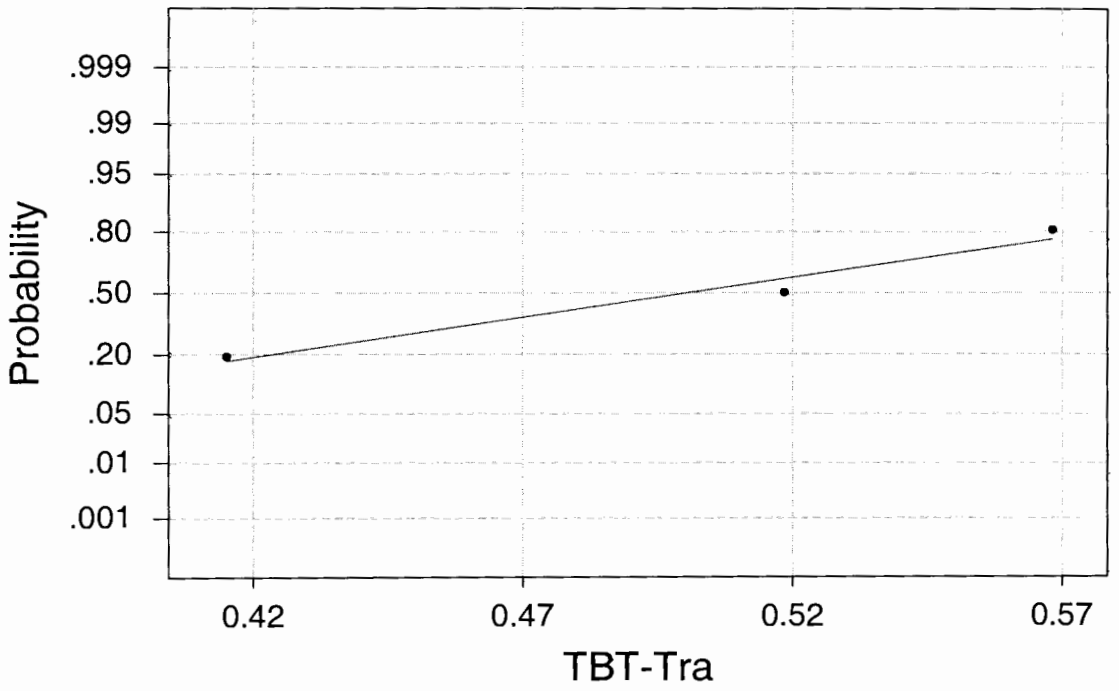
Kolmogorov-Smirnov Normality Test
D+: 0.193 D-: 0.238 D : 0.238
Approximate P-Value > 0.15



Average: 0.500563
StDev: 0.0781755
N: 3

W-test for Normality
R: 0.9800
P-Value (approx): > 0.1000

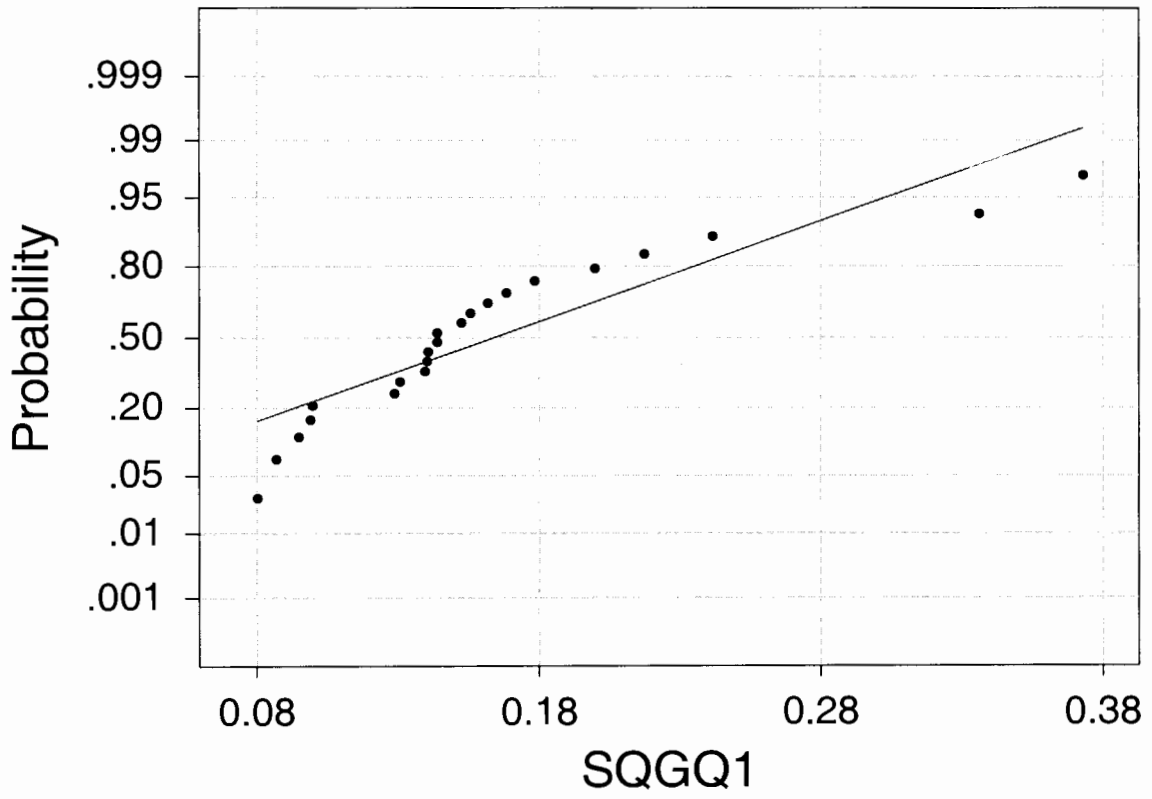
Normal Probability Plot



Average: 0.500563
StDev: 0.0781755
N: 3

Kolmogorov-Smirnov Normality Test
D+: 0.197 D-: 0.257 D : 0.257
Approximate P-Value > 0.15

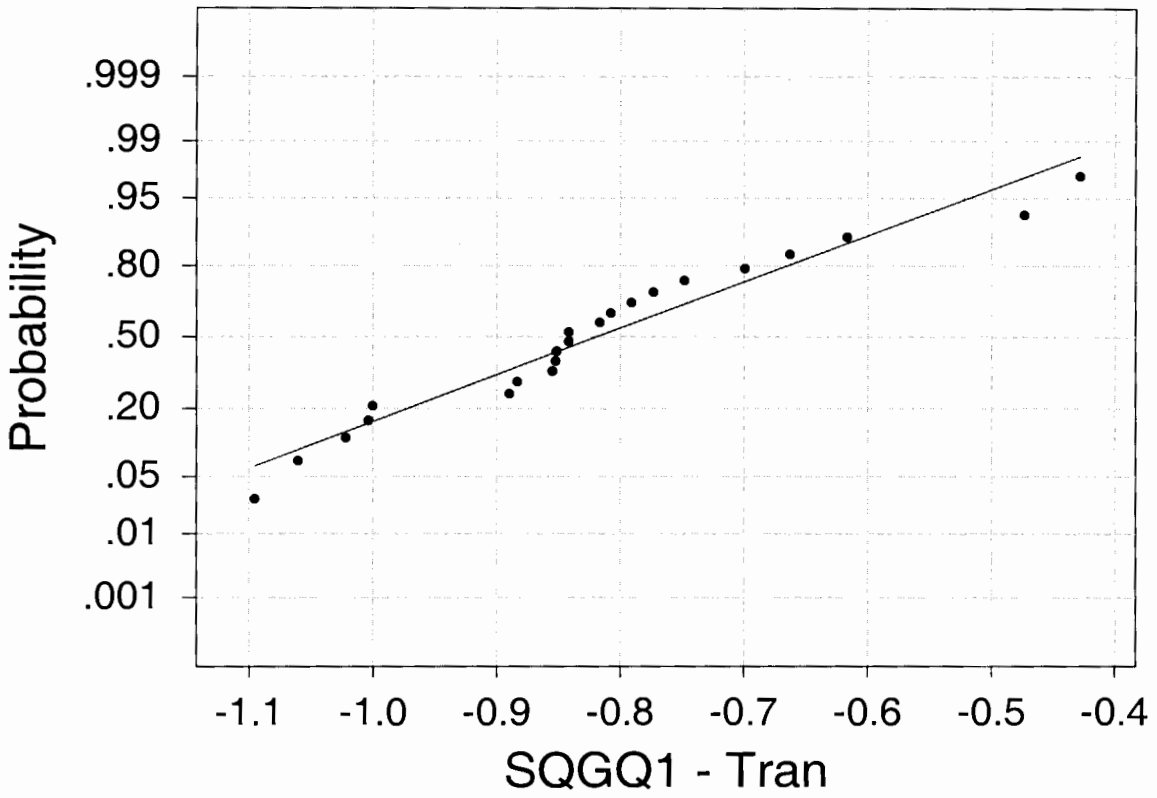
Normal Probability Plot



Average: 0.164281
StDev: 0.0739522
N: 22

W-test for Normality
R: 0.9077
P-Value (approx): < 0.0100

Normal Probability Plot

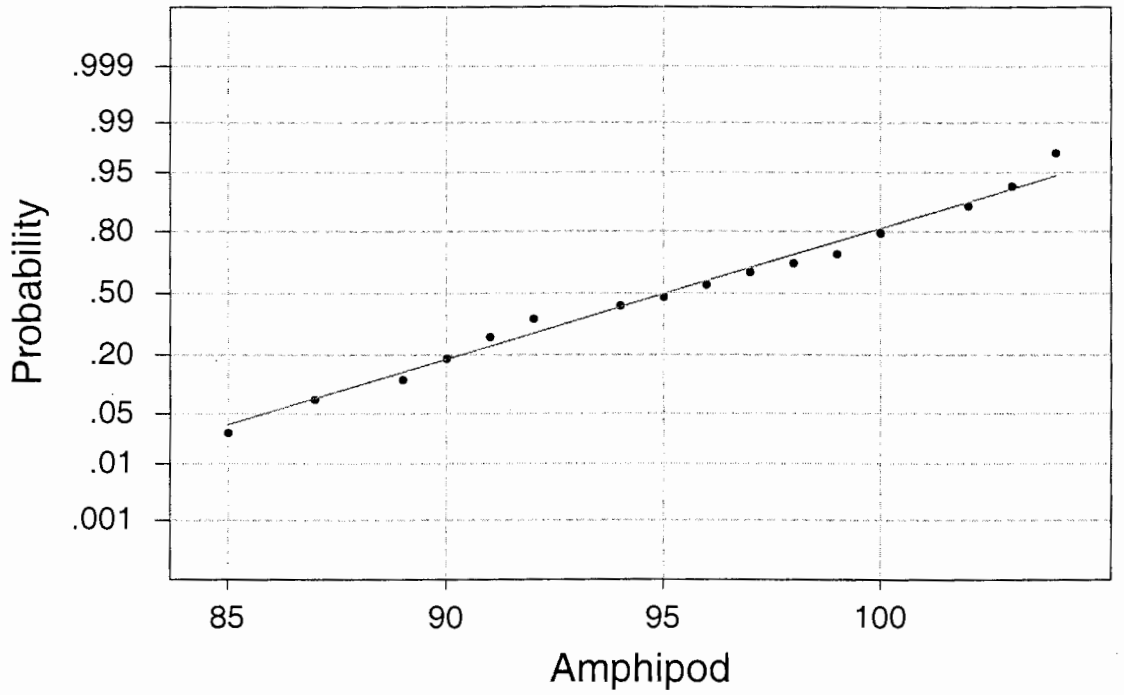


Average: -0.819020
StDev: 0.171440
N: 22

W-test for Normality
R: 0.9742
P-Value (approx): > 0.1000

TOXICITY

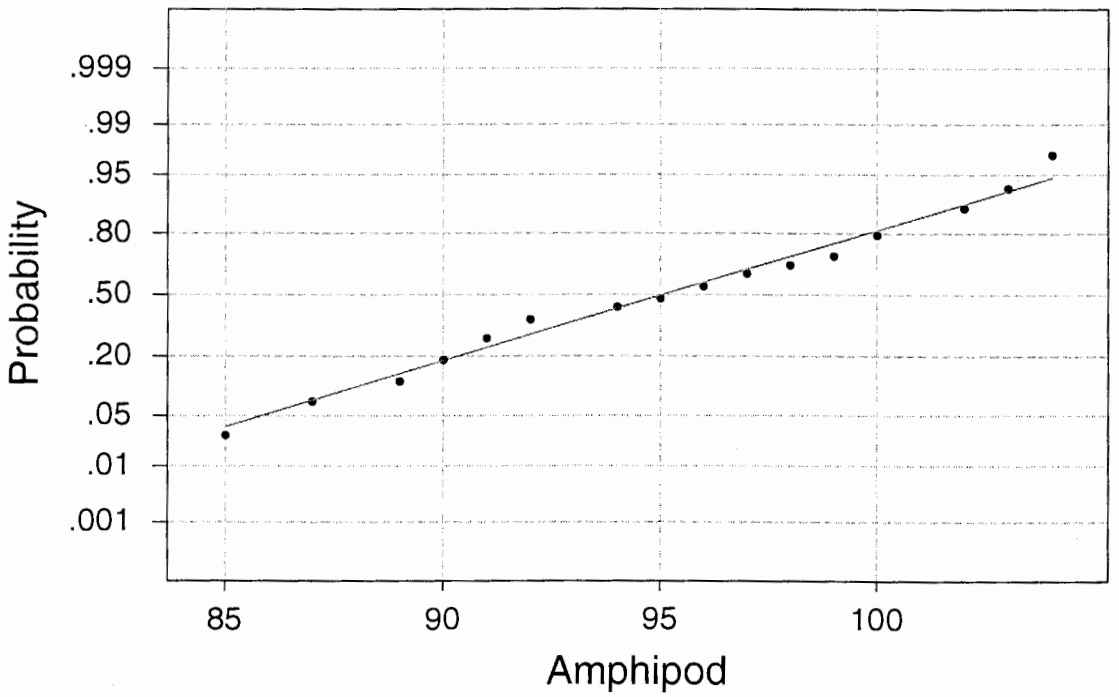
Normal Probability Plot



Average: 95.0455
StDev: 5.34948
N: 22

W-test for Normality
R: 0.9920
P-Value (approx): > 0.1000

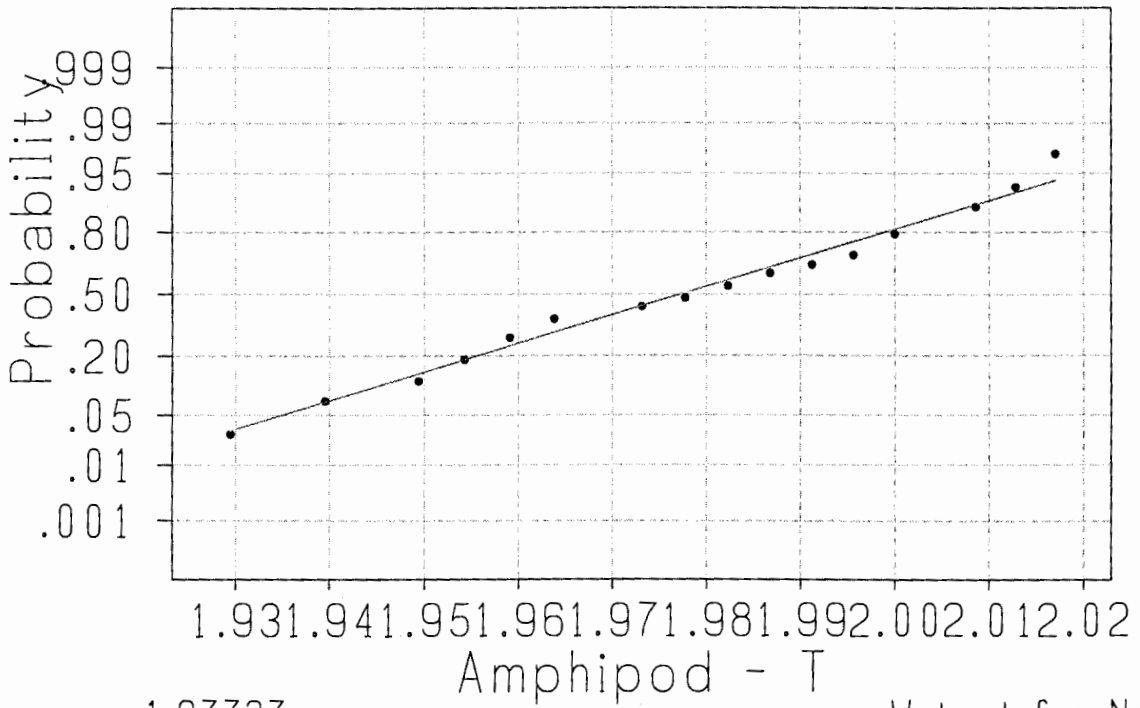
Normal Probability Plot



Average: 95.0455
StDev: 5.34948
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.102 D-: 0.088 D : 0.102
Approximate P-Value > 0.15

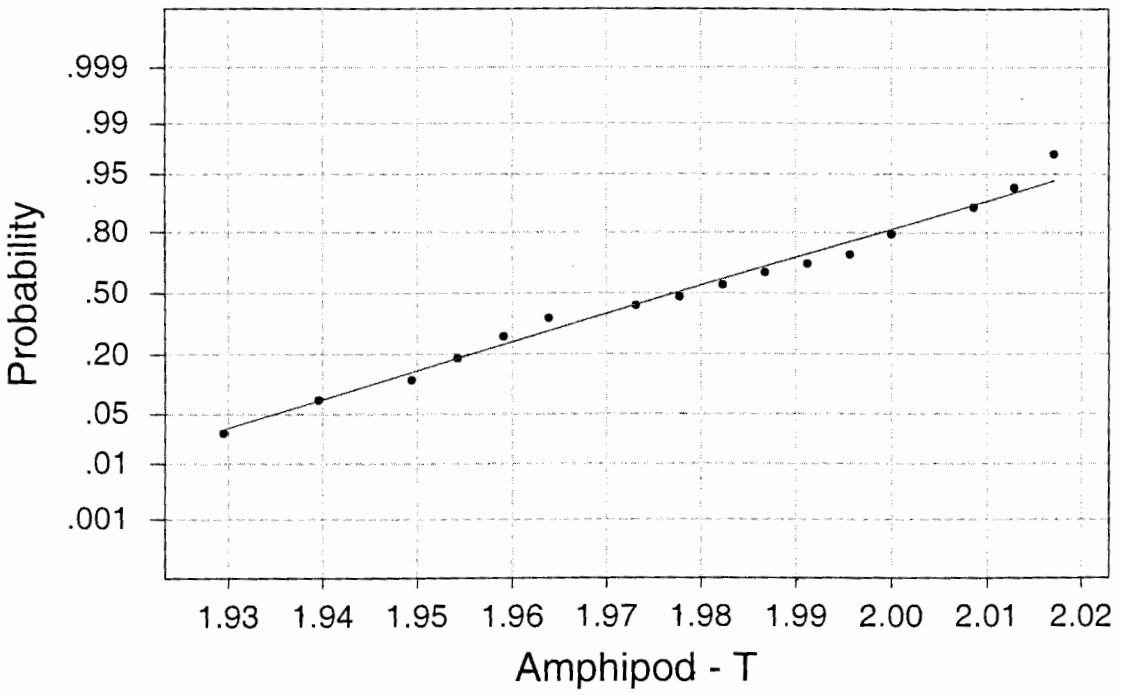
Normal Probability Plot



Average: 1.97727
StDev: 0.0245417
N: 22

W-test for Normality
R: 0.9914
P-Value (approx): > 0.1

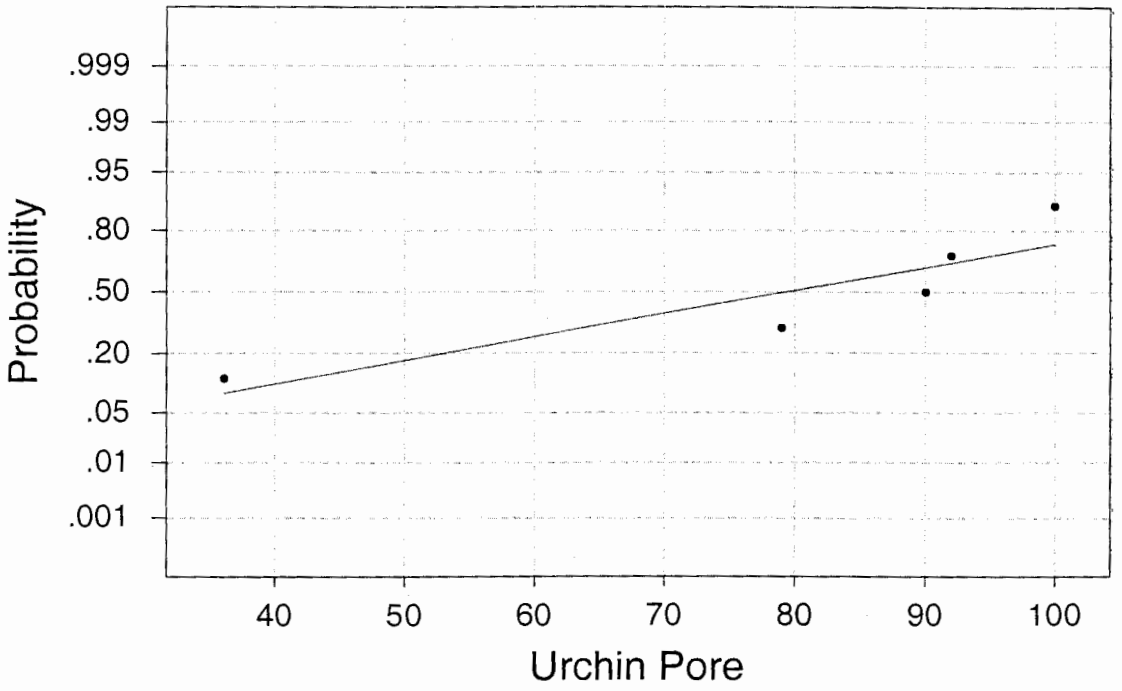
Normal Probability Plot



Average: 1.97727
StDev: 0.0245417
N: 22

Kolmogorov-Smirnov Normality Test
D+: 0.095 D-: 0.091 D : 0.095
Approximate P-Value > 0.15

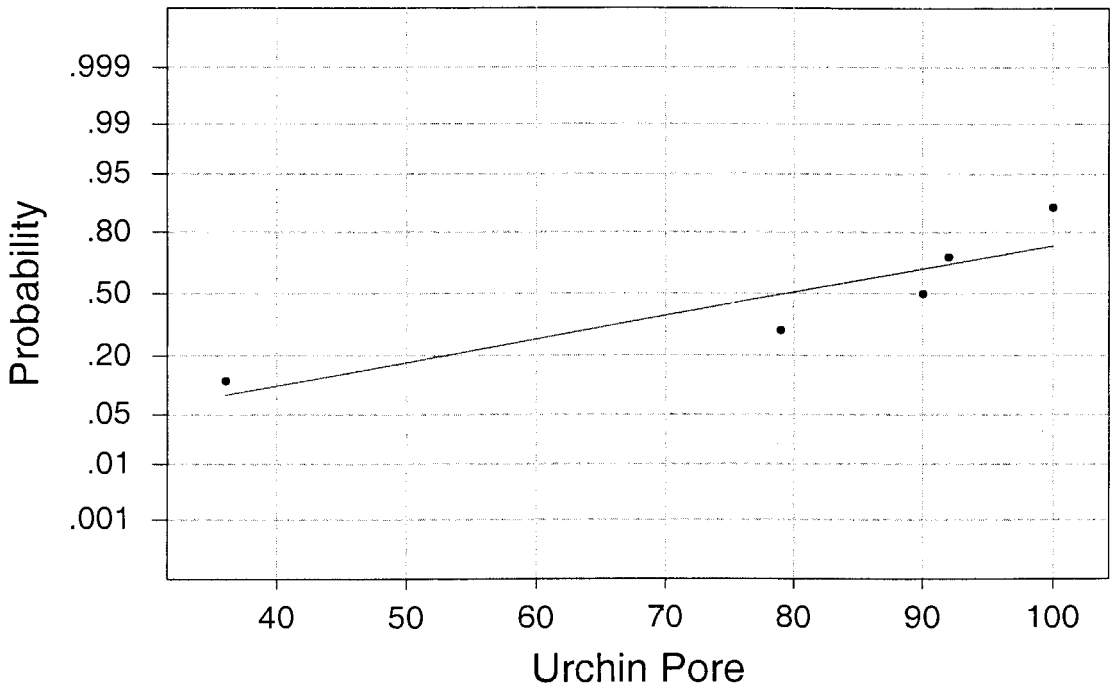
Normal Probability Plot



Average: 79.4
StDev: 25.3929
N: 5

W-test for Normality
R: 0.8914
P-Value (approx): 0.0742

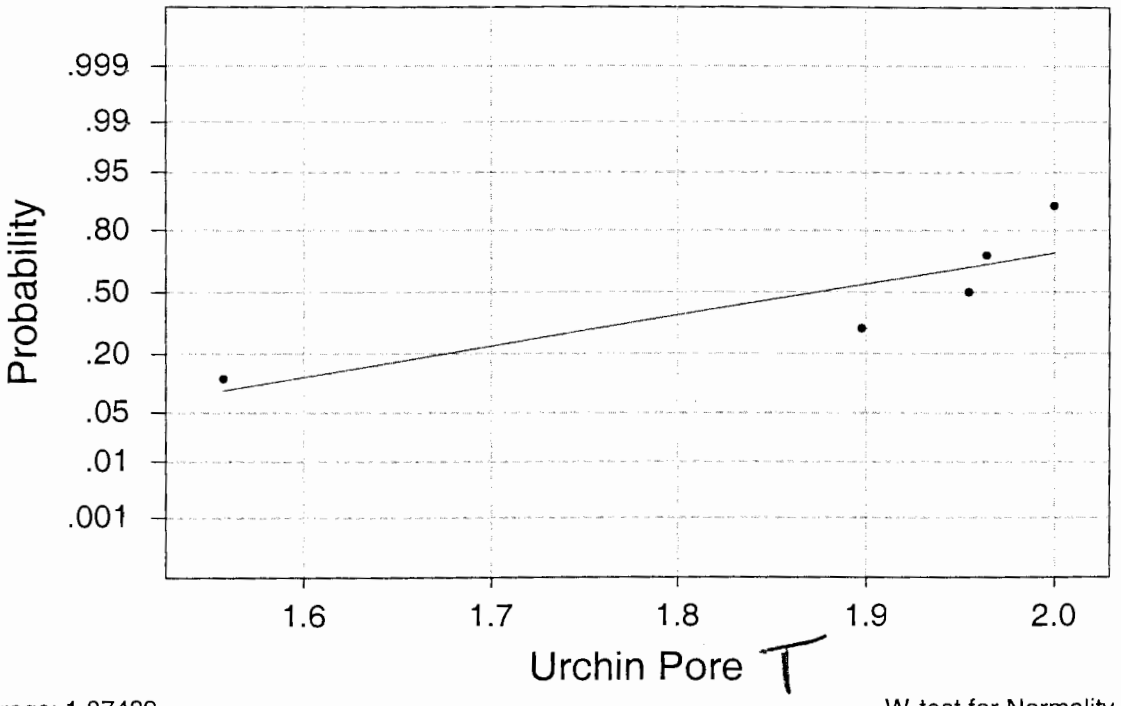
Normal Probability Plot



Average: 79.4
StDev: 25.3929
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.209 D-: 0.294 D : 0.294
Approximate P-Value > 0.15

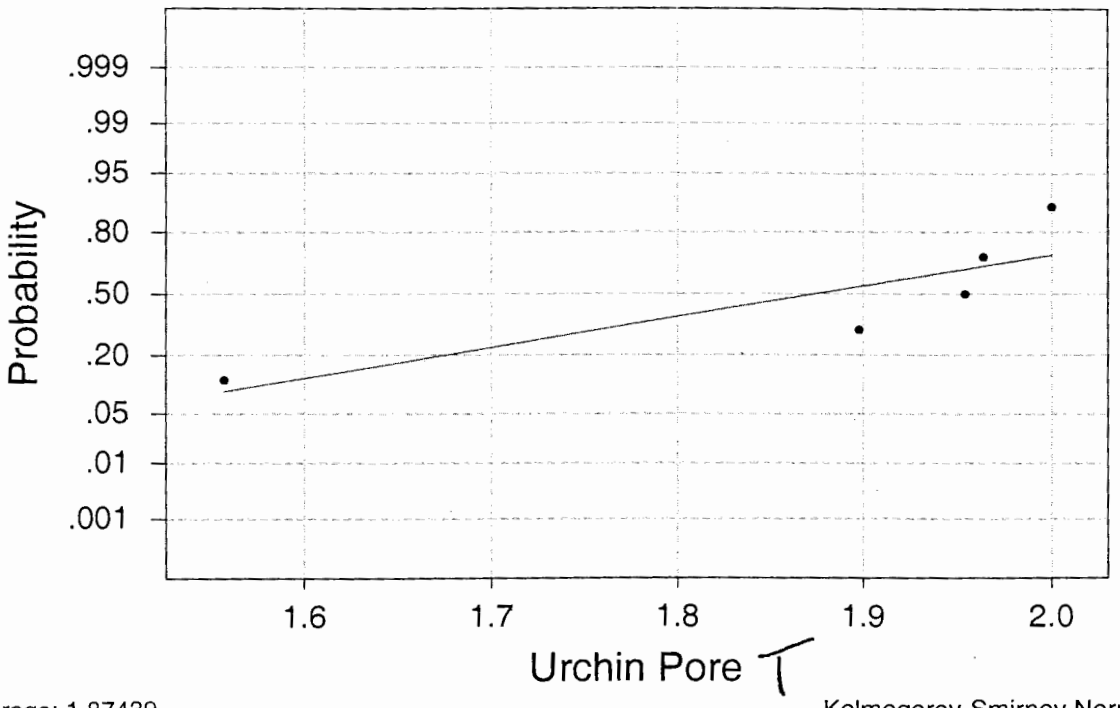
Normal Probability Plot



Average: 1.87439
StDev: 0.181567
N: 5

W-test for Normality
R: 0.8462
P-Value (approx): 0.0218

Normal Probability Plot

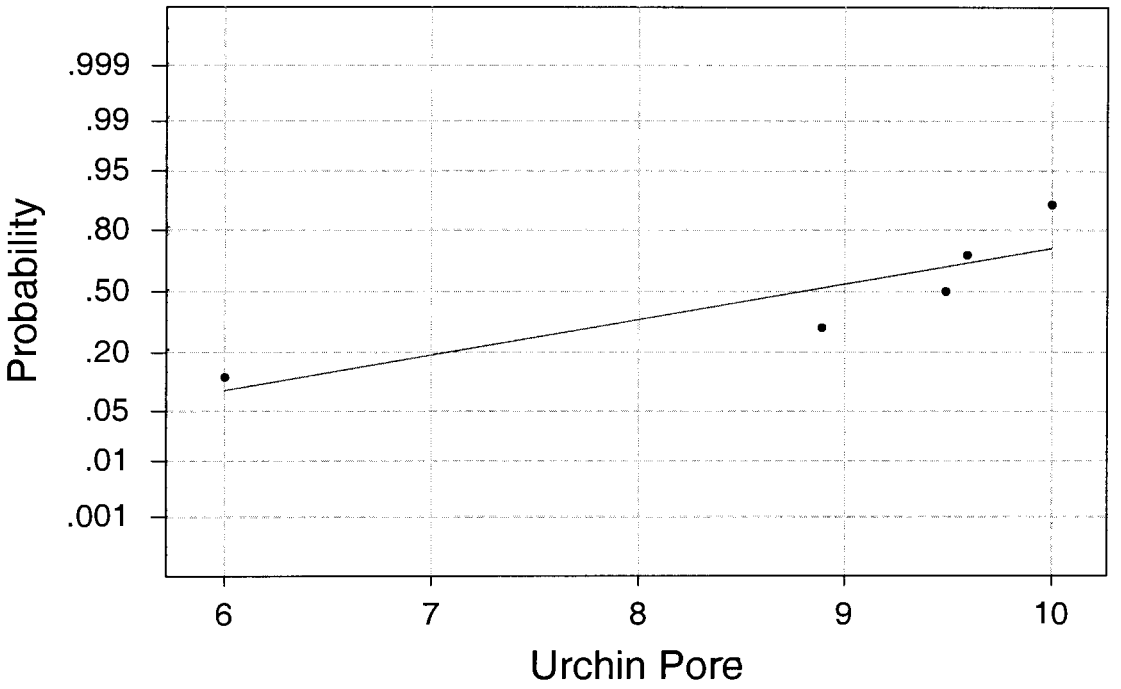


Average: 1.87439
StDev: 0.181567
N: 5

Kolmogorov-Smirnov Normality Test
D+: 0.245 D-: 0.351 D : 0.351
Approximate P-Value: 0.045

Final
Pool

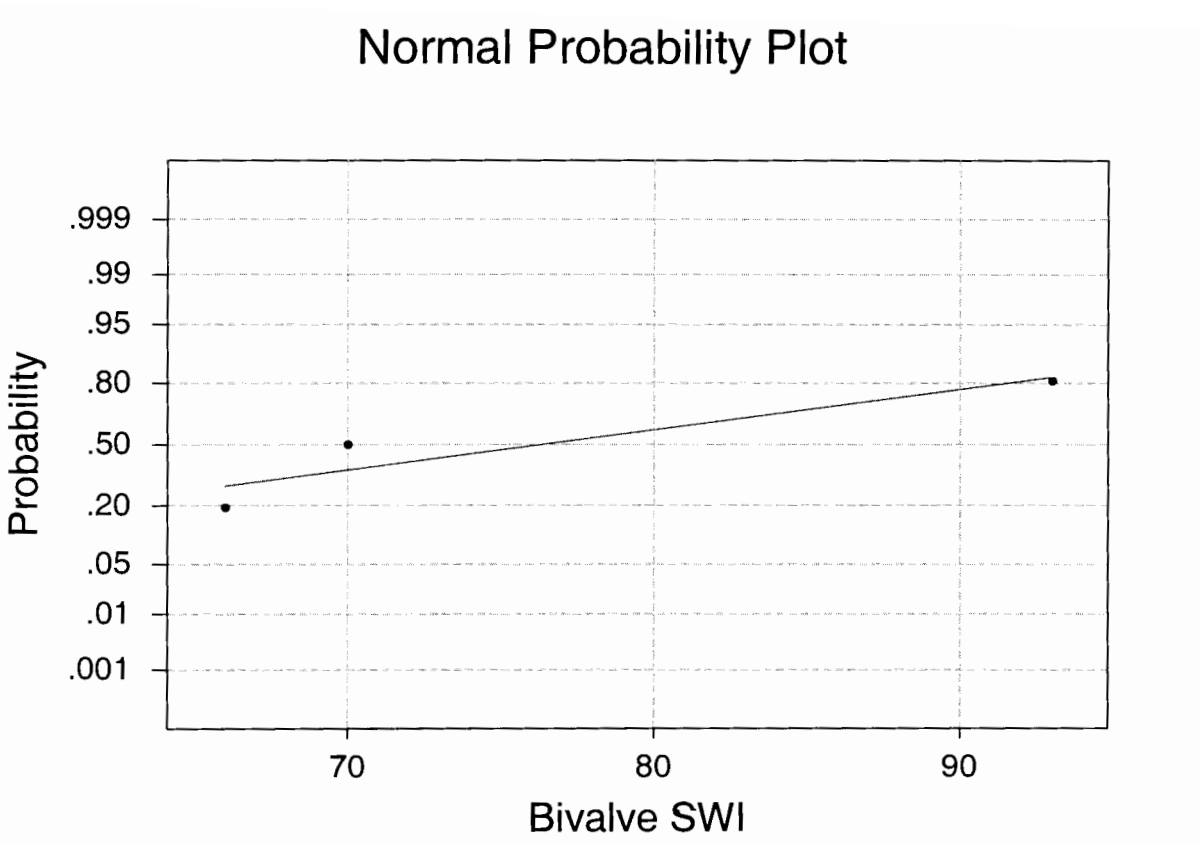
Normal Probability Plot



Average: 8.79334
StDev: 1.61137
N: 5

SG RT

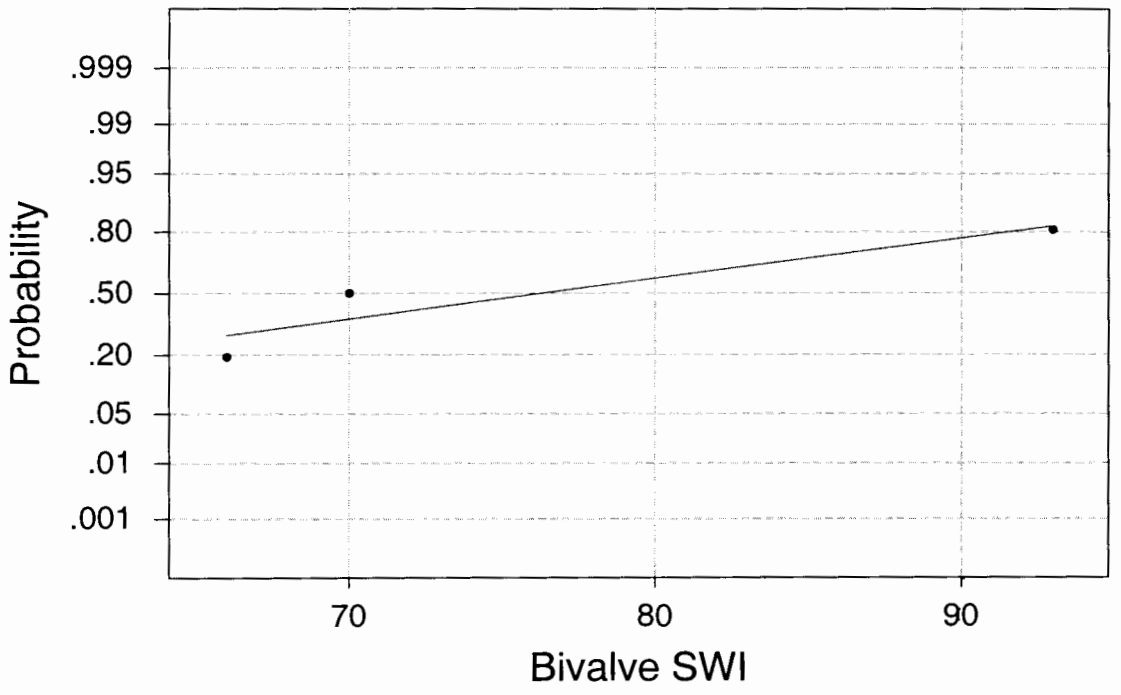
W-test for Normality
R: 0.8687
P-Value (approx): 0.0404



Average: 76.3333
StDev: 14.5717
N: 3

W-test for Normality
R: 0.9265
P-Value (approx): > 0.1000

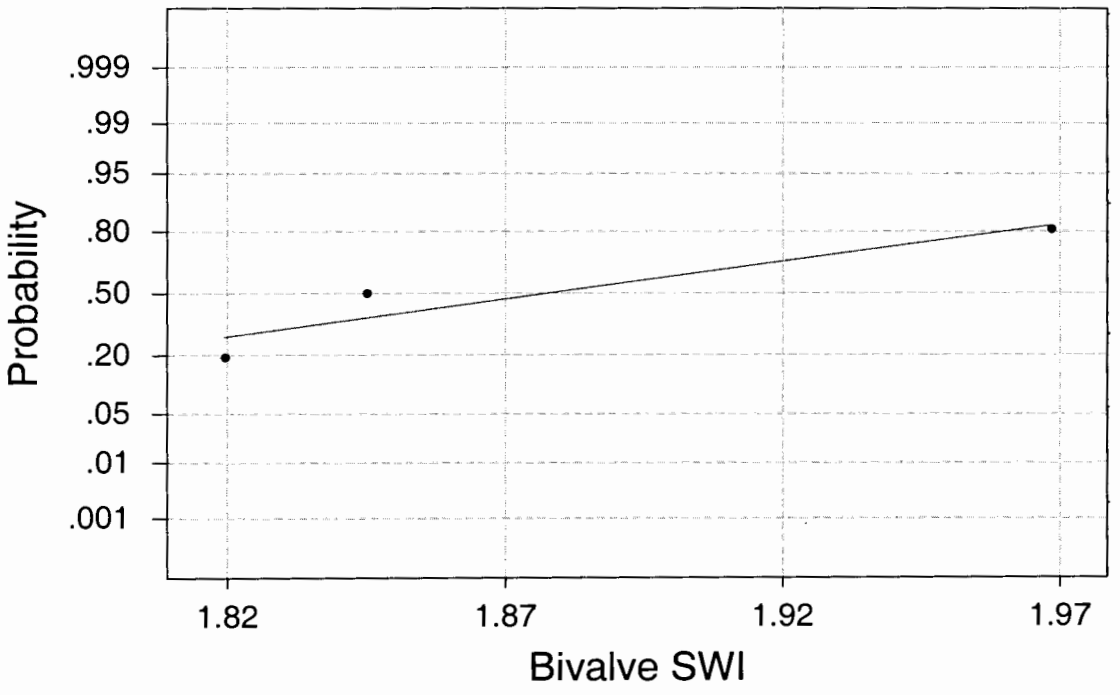
Normal Probability Plot



Average: 76.3333
StDev: 14.5717
N: 3

Kolmogorov-Smirnov Normality Test
D+: 0.335 D-: 0.239 D : 0.335
Approximate P-Value > 0.15

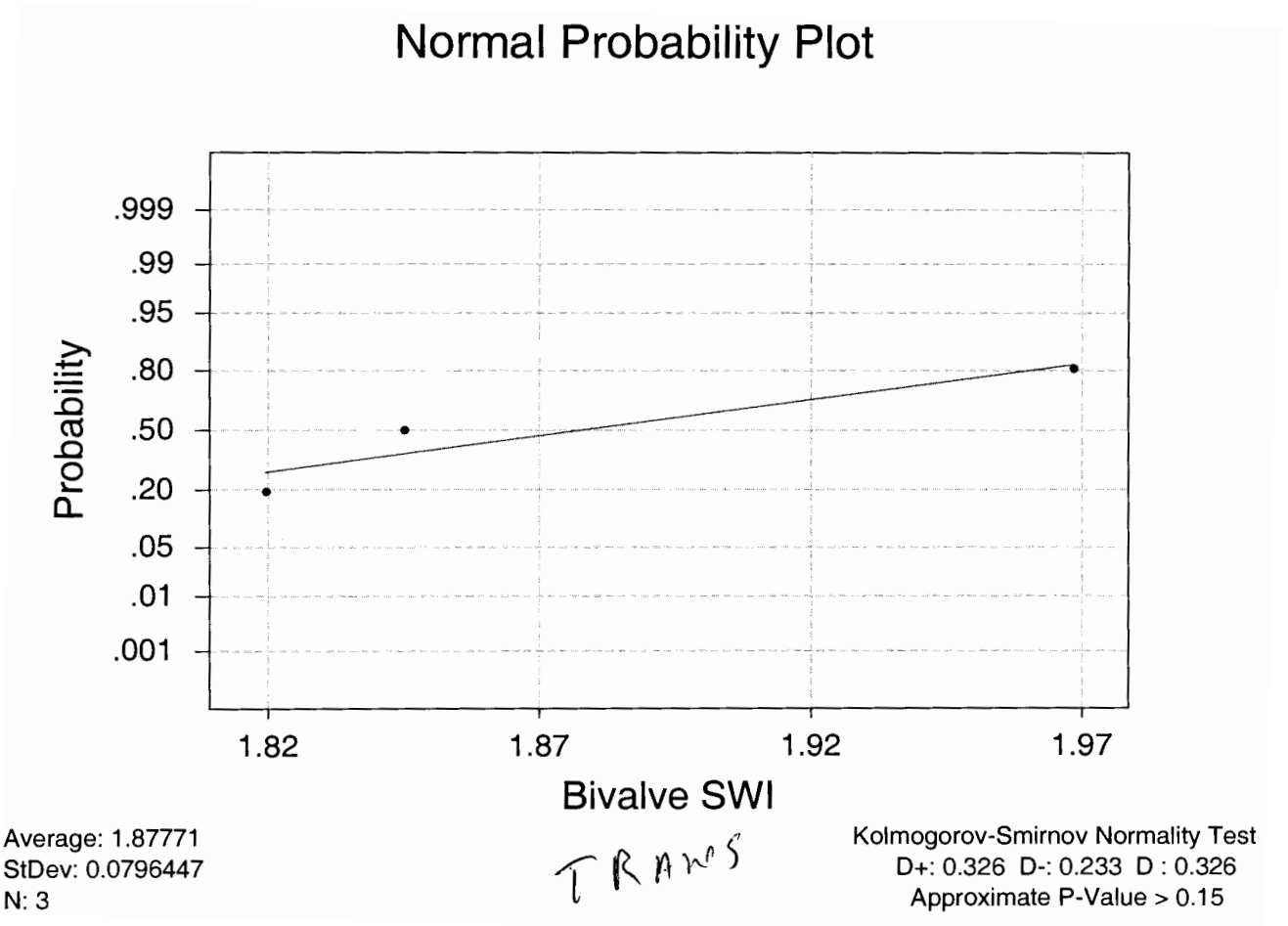
Normal Probability Plot



Average: 1.87771
StDev: 0.0796447
N: 3

TRANS

W-test for Normality
R: 0.9350
P-Value (approx): > 0.1000



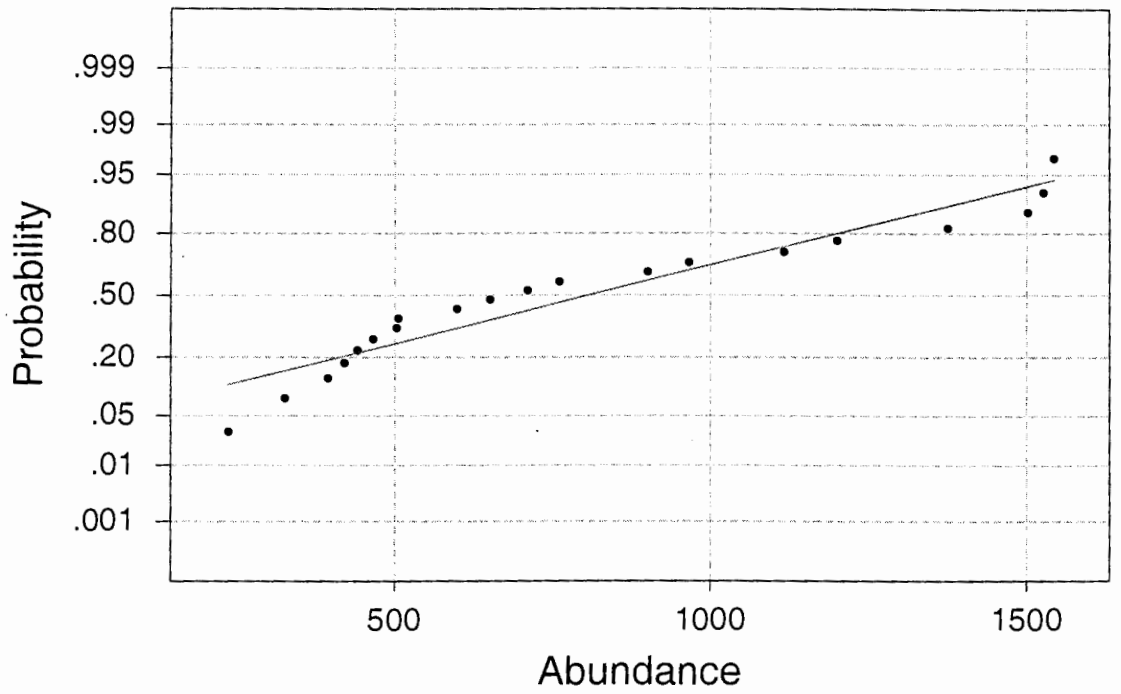
Average: 1.87771
StDev: 0.0796447
N: 3

TRANS

Kolmogorov-Smirnov Normality Test
D+: 0.326 D-: 0.233 D : 0.326
Approximate P-Value > 0.15

BENTHOS

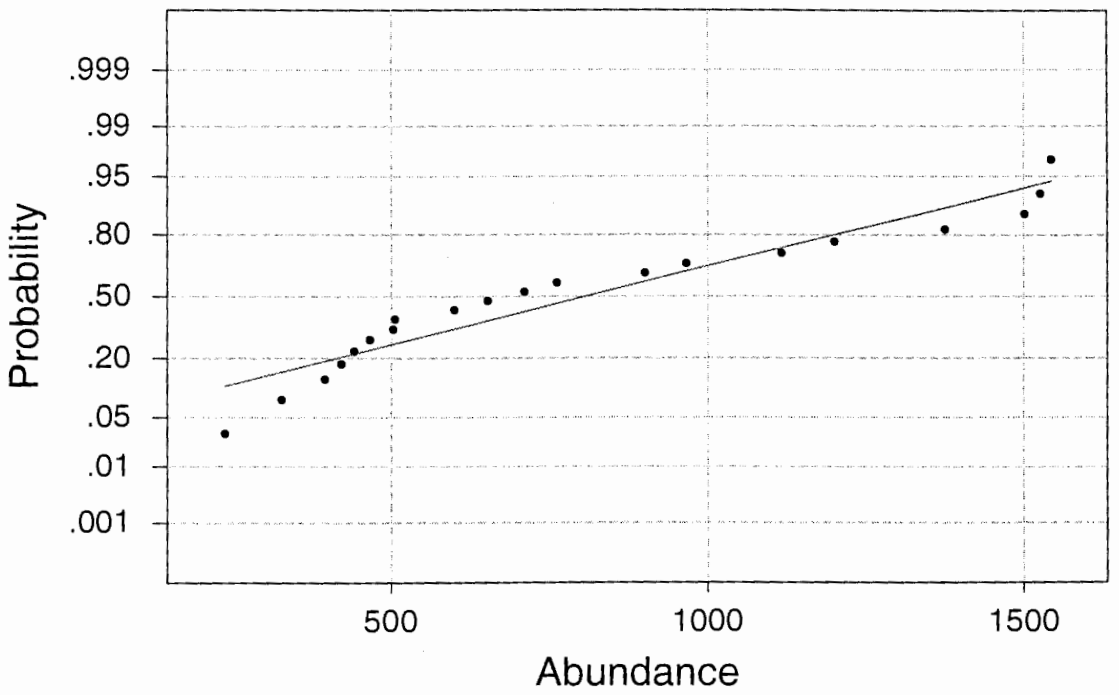
Normal Probability Plot



Average: 807.3
StDev: 431.485
N: 20

W-test for Normality
R: 0.9576
P-Value (approx): 0.0880

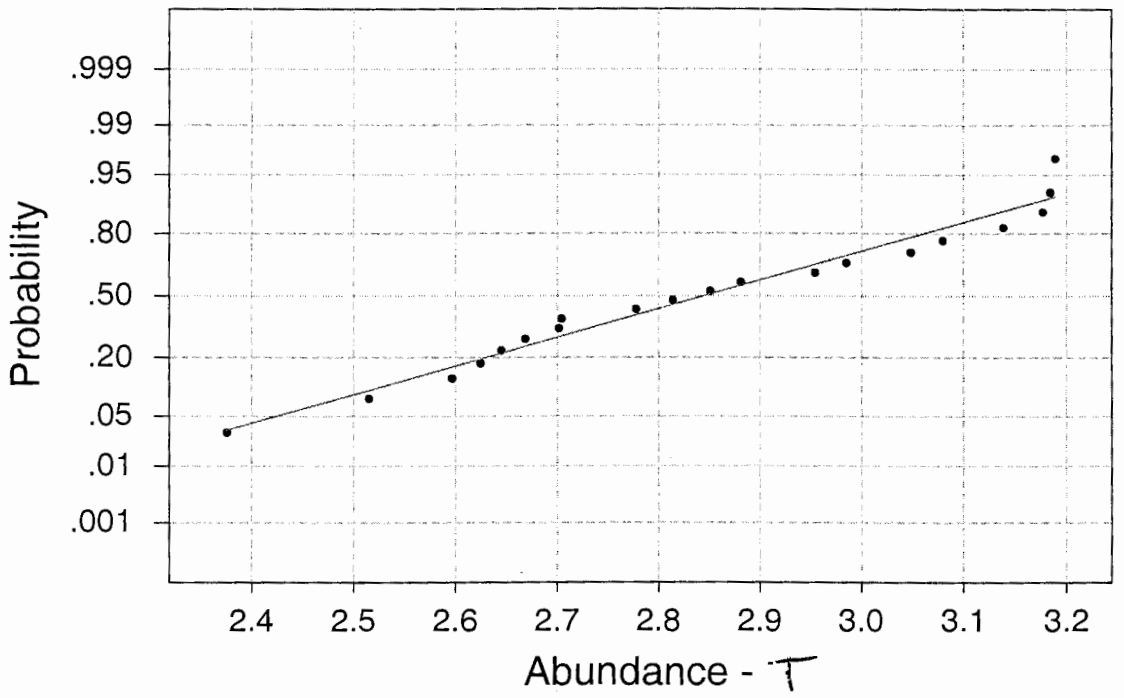
Normal Probability Plot



Average: 807.3
StDev: 431.485
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.158 D-: 0.106 D : 0.158
Approximate P-Value > 0.15

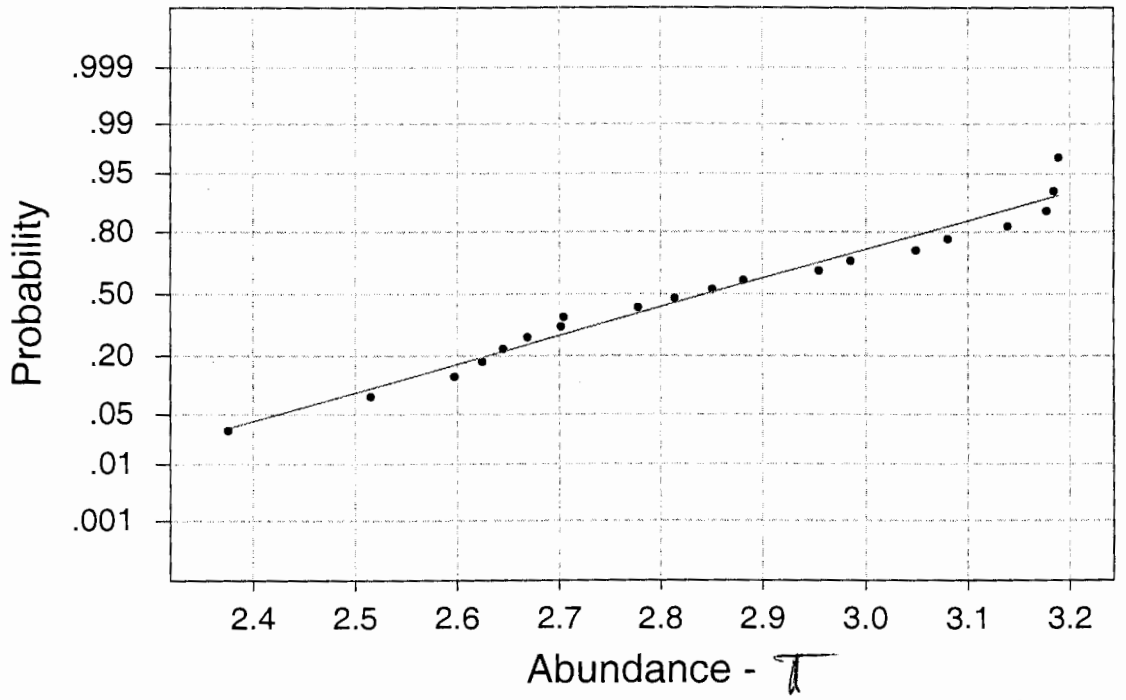
Normal Probability Plot



Average: 2.84526
StDev: 0.242352
N: 20

W-test for Normality
R: 0.9831
P-Value (approx): > 0.1000

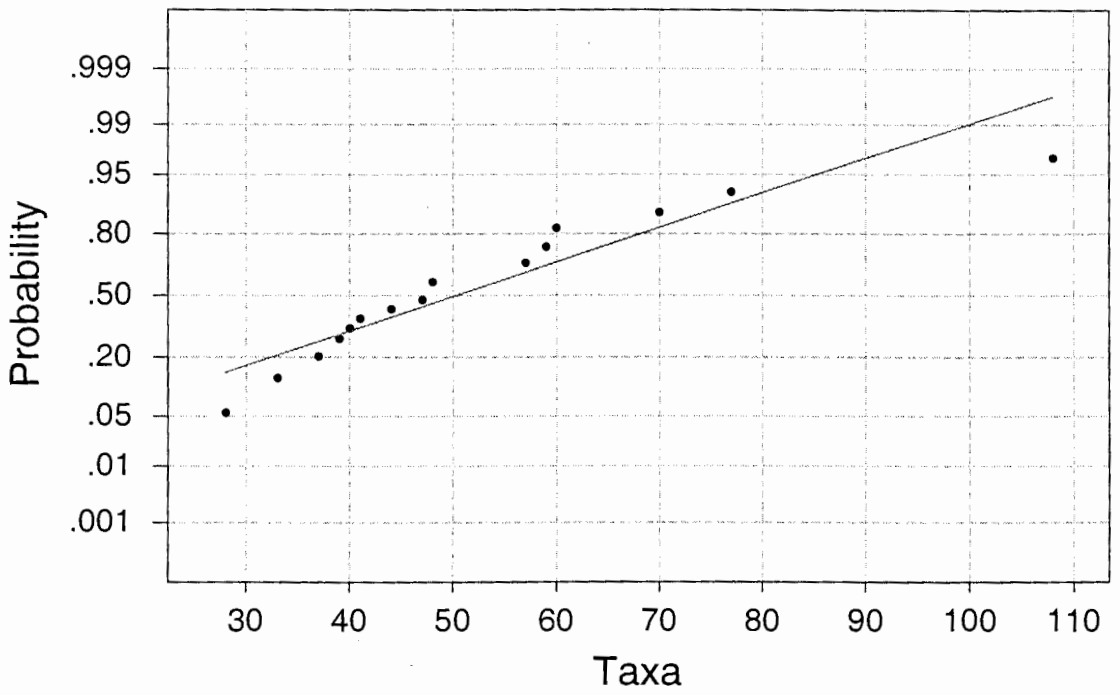
Normal Probability Plot



Average: 2.84526
StDev: 0.242352
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.120 D-: 0.099 D : 0.120
Approximate P-Value > 0.15

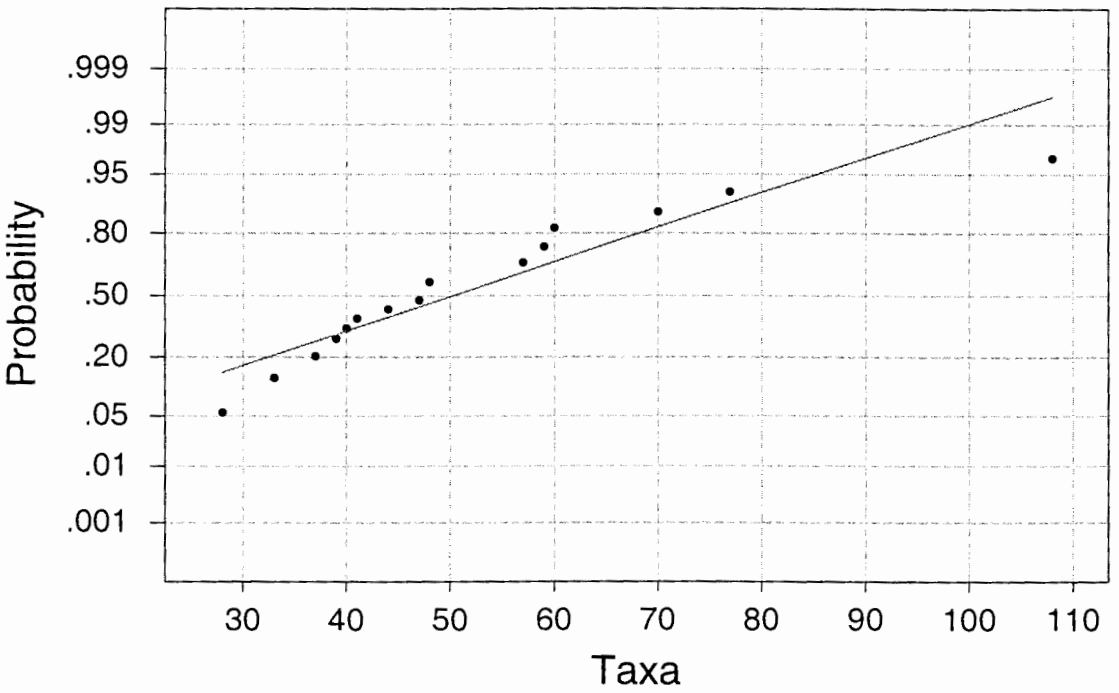
Normal Probability Plot



Average: 50.4
StDev: 18.8551
N: 20

W-test for Normality
R: 0.9333
P-Value (approx): 0.0180

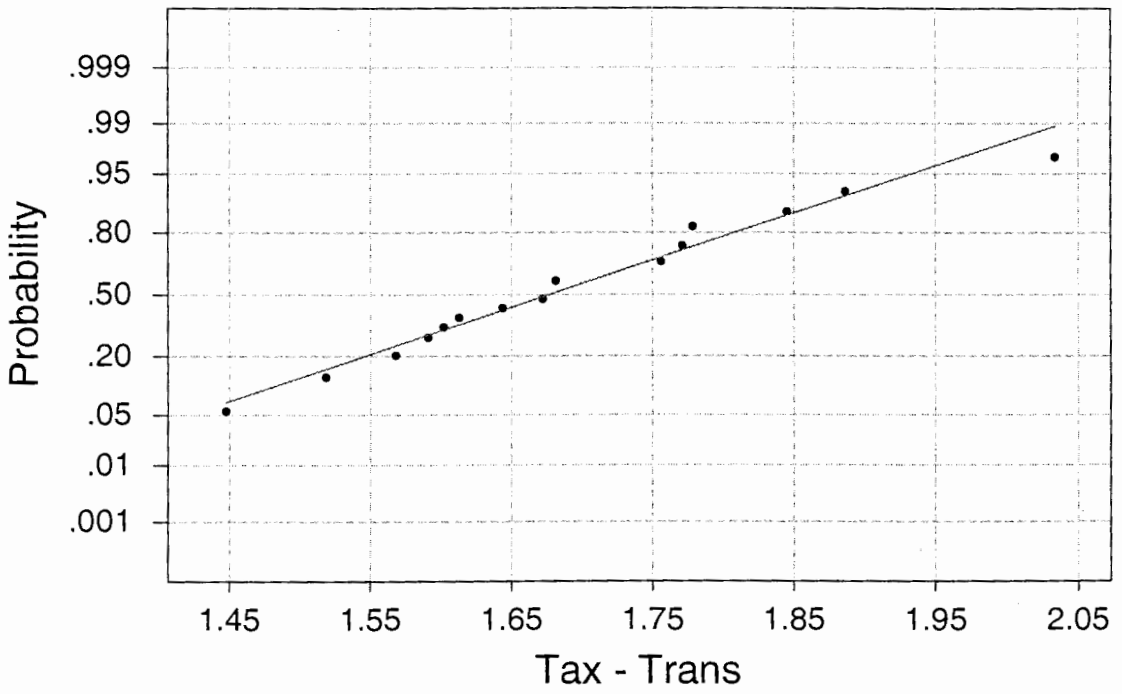
Normal Probability Plot



Average: 50.4
StDev: 18.8551
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.155 D-: 0.092 D : 0.155
Approximate P-Value > 0.15

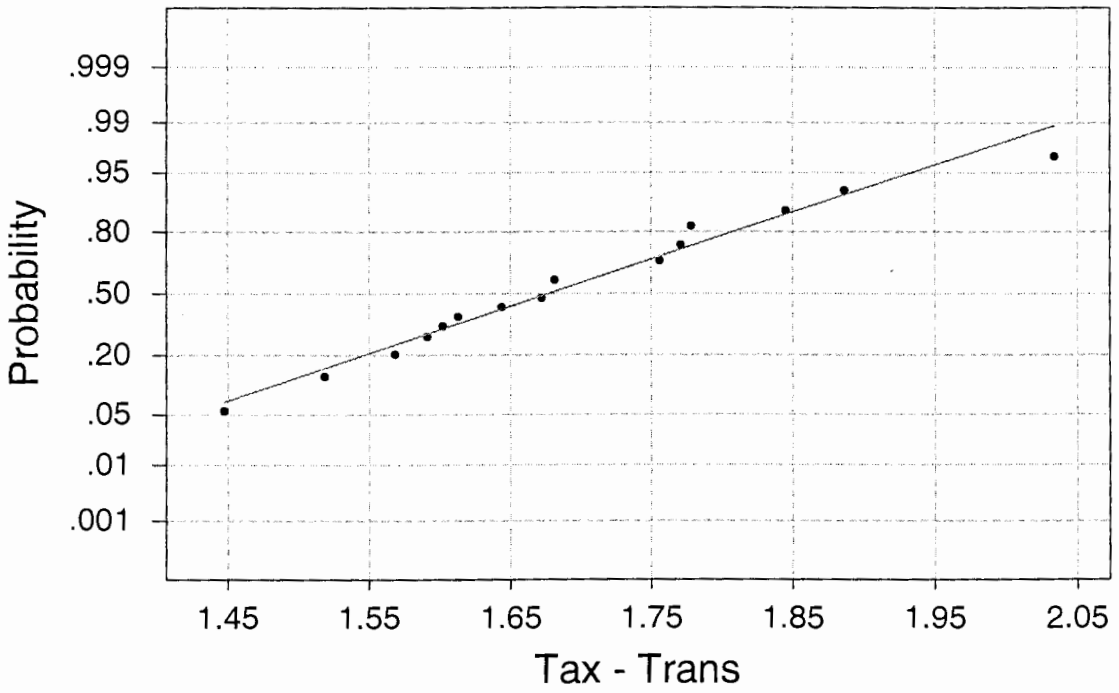
Normal Probability Plot



Average: 1.67776
StDev: 0.146182
N: 20

W-test for Normality
R: 0.9874
P-Value (approx): > 0.1000

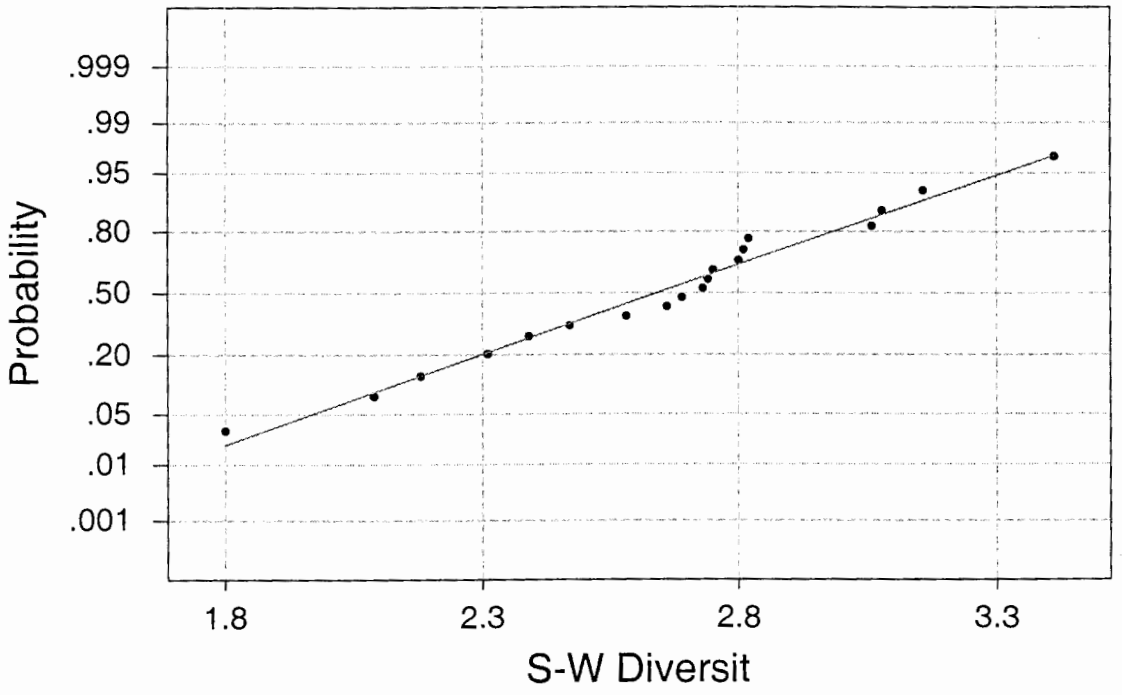
Normal Probability Plot



Average: 1.67776
StDev: 0.146182
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.096 D-: 0.053 D : 0.096
Approximate P-Value > 0.15

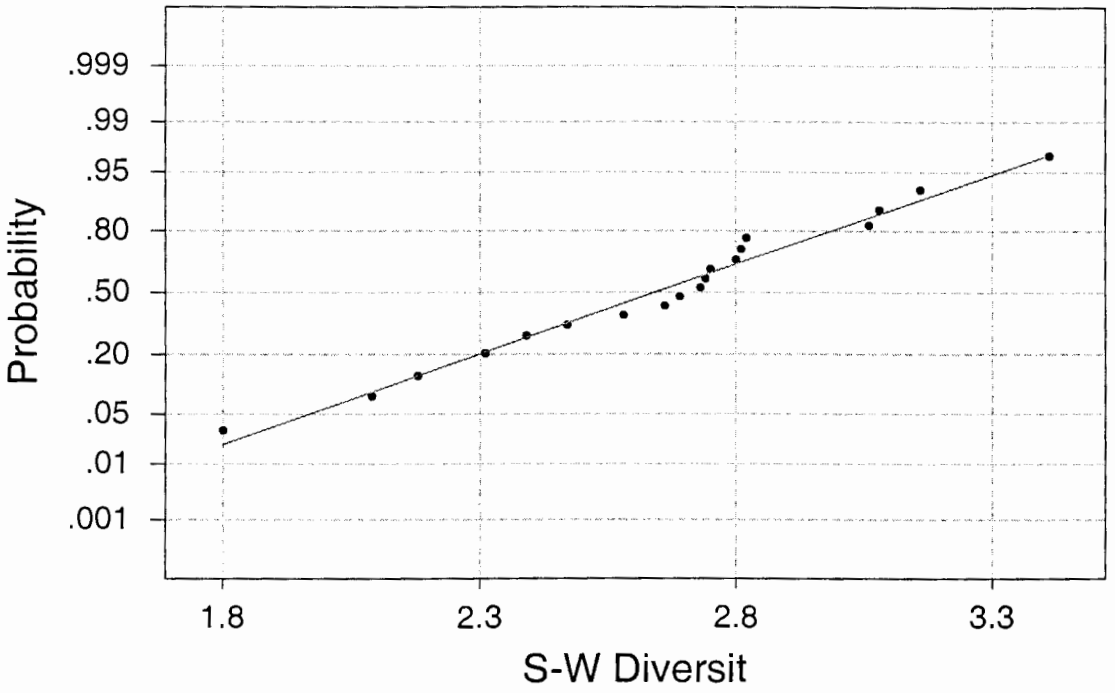
Normal Probability Plot



Average: 2.642
StDev: 0.389718
N: 20

W-test for Normality
R: 0.9901
P-Value (approx): > 0.1000

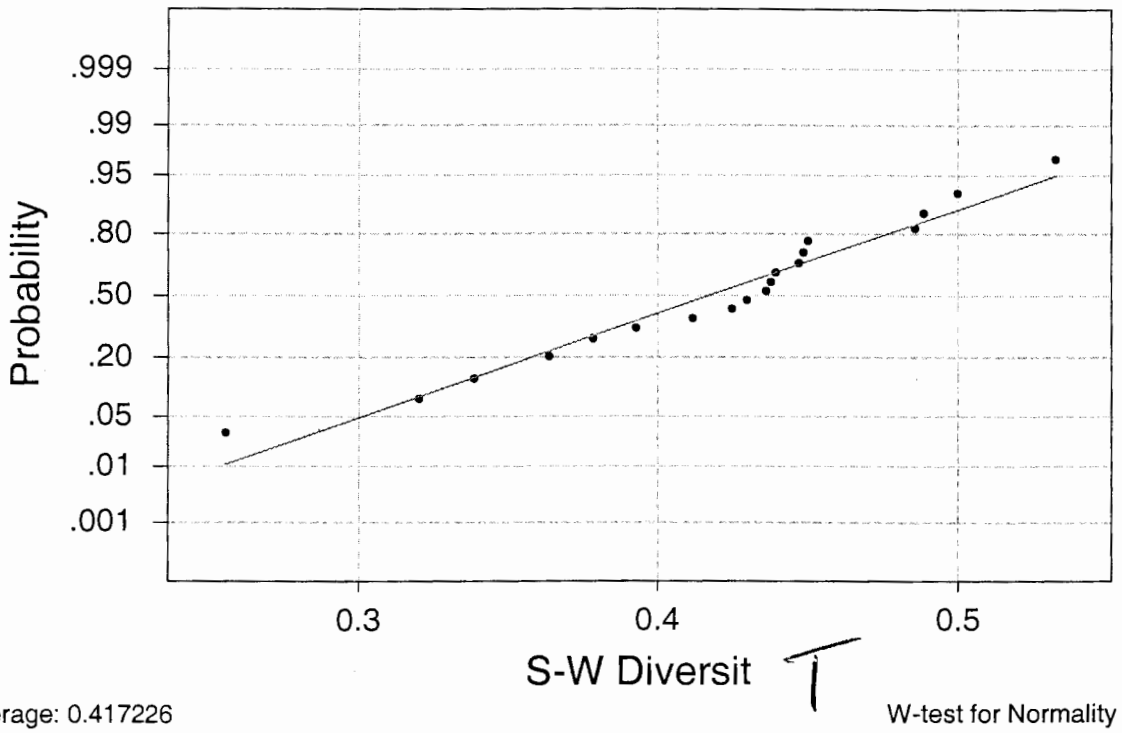
Normal Probability Plot



Average: 2.642
StDev: 0.389718
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.124 D-: 0.118 D : 0.124
Approximate P-Value > 0.15

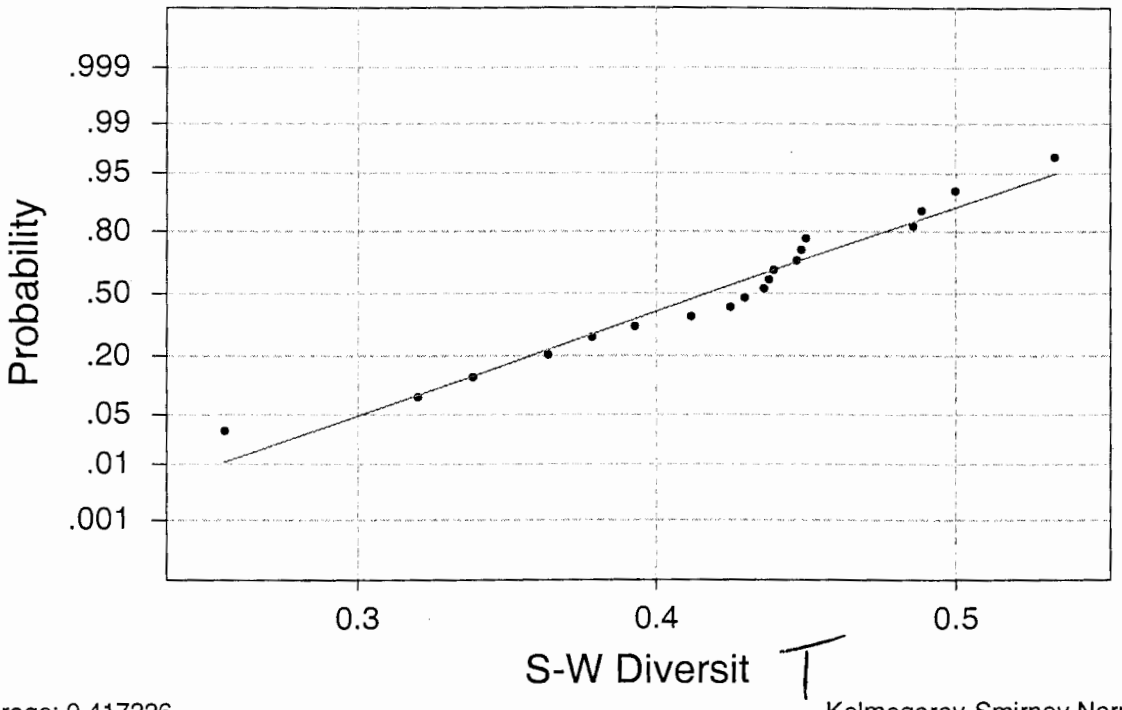
Normal Probability Plot



Average: 0.417226
StDev: 0.0665443
N: 20

W-test for Normality
R: 0.9805
P-Value (approx): > 0.1000

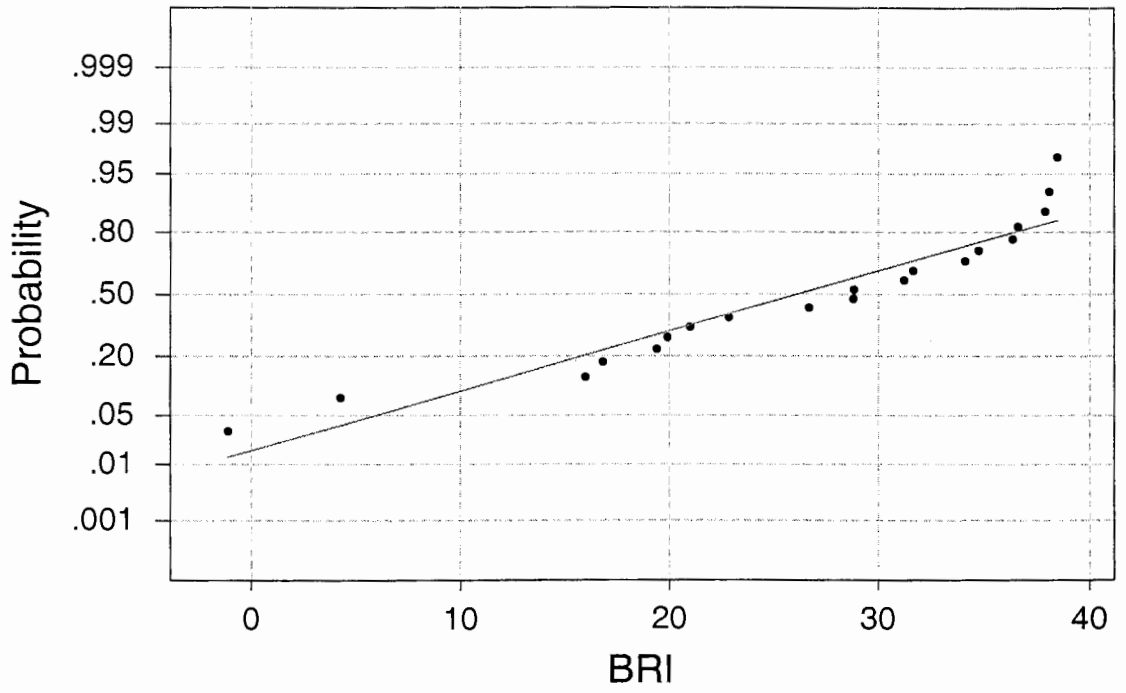
Normal Probability Plot



Average: 0.417226
StDev: 0.0665443
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.110 D-: 0.146 D : 0.146
Approximate P-Value > 0.15

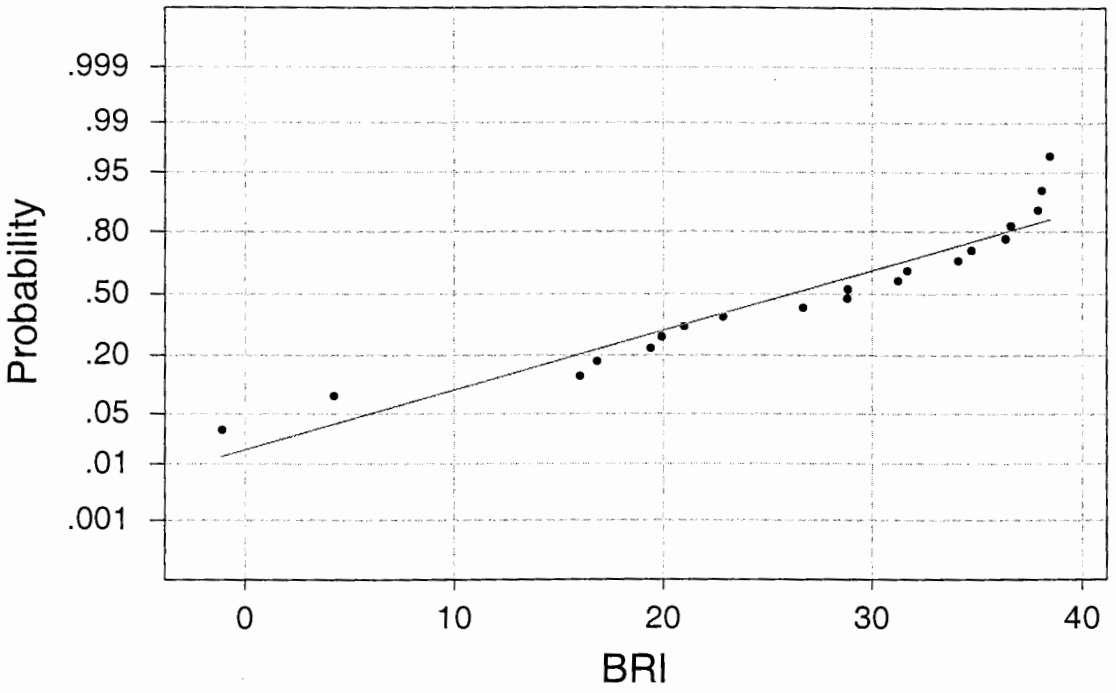
Normal Probability Plot



Average: 26.1275
StDev: 11.2159
N: 20

W-test for Normality
R: 0.9512
P-Value (approx): 0.0549

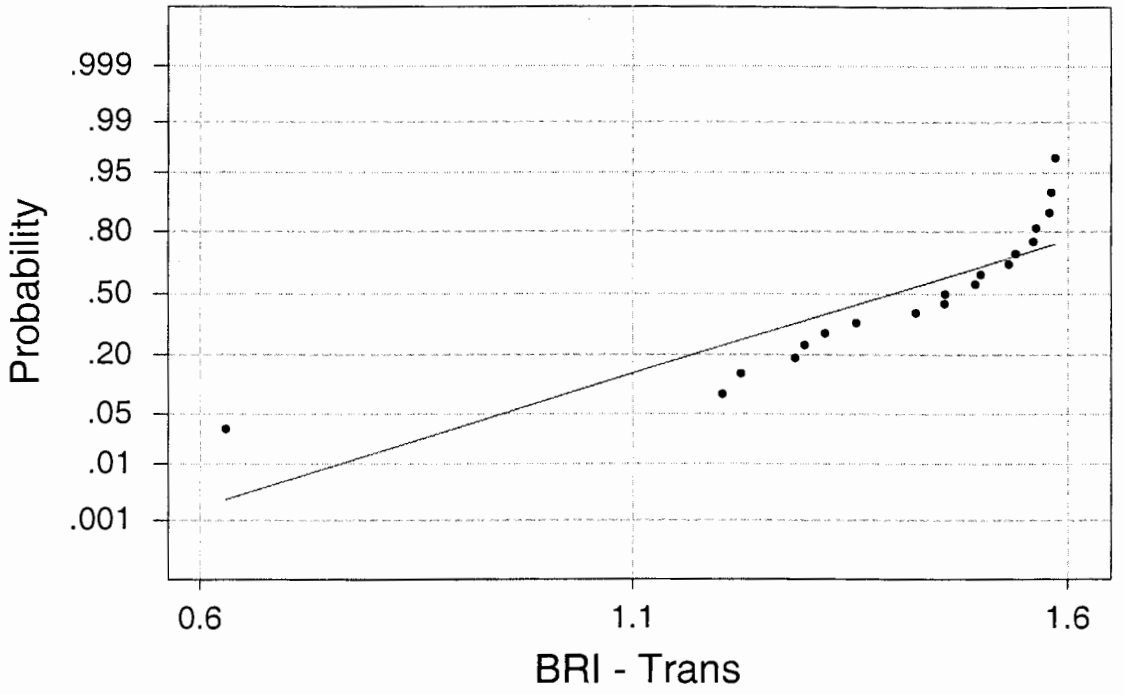
Normal Probability Plot



Average: 26.1275
StDev: 11.2159
N: 20

Kolmogorov-Smirnov Normality Test
D+: 0.135 D-: 0.145 D : 0.145
Approximate P-Value > 0.15

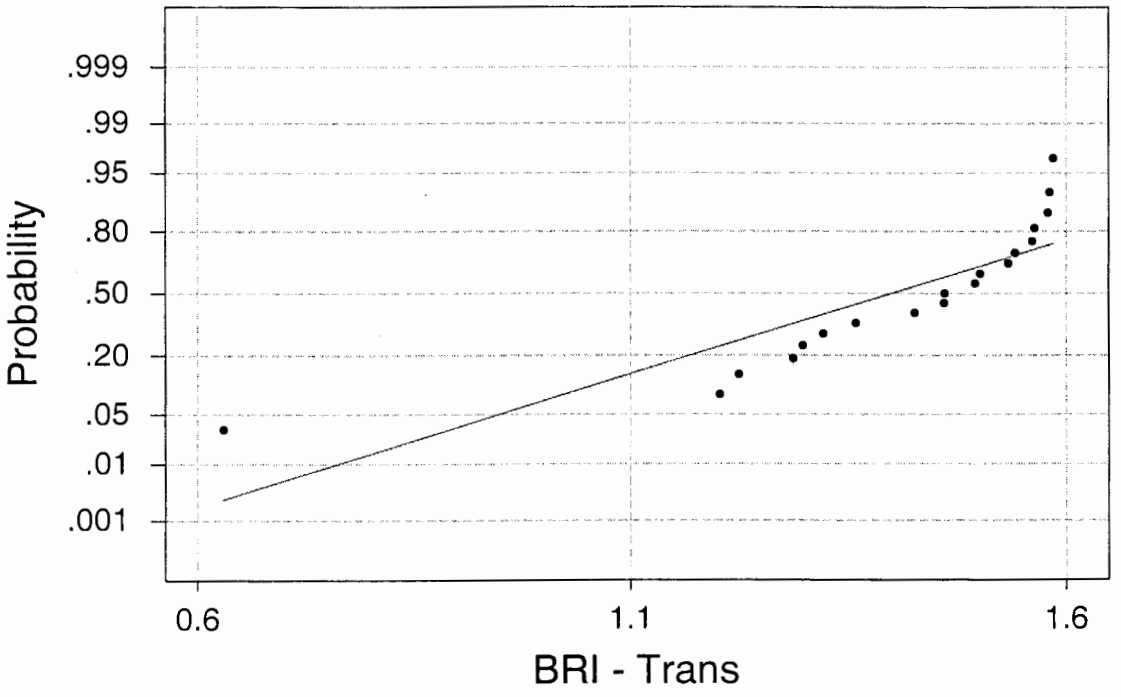
Normal Probability Plot



Average: 1.40045
StDev: 0.224793
N: 19

W-test for Normality
R: 0.8513
P-Value (approx): < 0.0100

Normal Probability Plot

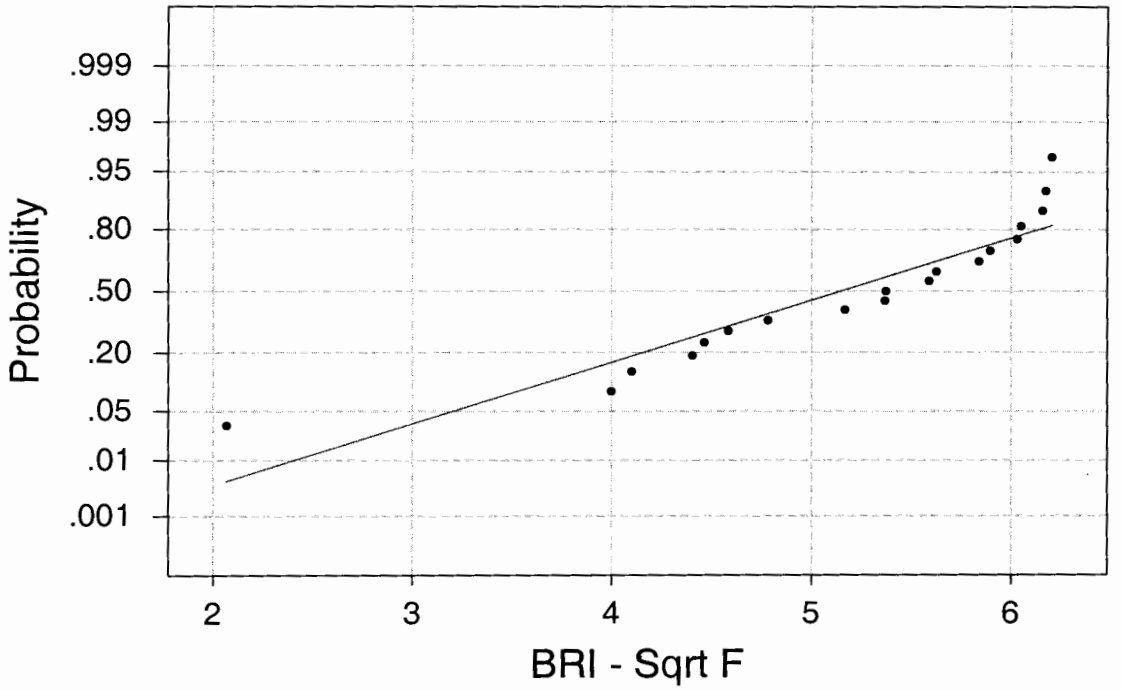


Average: 1.40045
StDev: 0.224793
N: 19

Kolmogorov-Smirnov Normality Test
D+: 0.206 D-: 0.183 D : 0.206
Approximate P-Value: 0.040

FINAL POOL

Normal Probability Plot



Average: 5.14990
StDev: 1.04753
N: 19

W-test for Normality
R: 0.9234
P-Value (approx): < 0.0100

National Oceanic Atmospheric Administration Recommended Reference Pool

An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations

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January 16, 2003

Introduction

NOAA, along with other scientists, and natural resource trustees, is participating in a San Diego Regional Water Quality Control Board-sponsored process to determine whether reference data collected during two different site investigations are appropriate to use for site evaluation. In 1998, the Southern California Coastal Water Research Project (SCCWRP) sampled San Diego Bay (Bight '98 study) and identified 10 locations within the Bay that could serve as reference sites. A sub-set of these suggested reference locations were sampled during the 2001 site investigations for the NASSCO and Southwest Marine Shipyards, and the Chollas and Paleta Creeks TMDL study. Variability between the data collected in the 2001 sampling effort and the data collected during the1998 Bight study has lead to the reevaluation of whether these stations should be used as reference locations for the evaluation of the site-specific data.

NOAA has reviewed the Bight '98 data set, and based on specific criteria, has selected fourteen locations for a reference pool for San Diego Bay. This reference pool is proposed as a tool to assist the RWQCB in evaluating the applicability of the Chollas/Paleta and Shipyard reference sites.

Approach

I. Bight 98 Reference Pool Station Selection Process

The following criteria were applied to the 46 San Diego stations in the Bight '98 data set. These criteria were applied in sequential order to further refine the number of stations that would qualify for a reference pool.

1. Toxicity: Stations with greater than 90% control adjusted survival were selected. Please refer to Slide no. 1 in the attached Power Point file to see the location of the Bight '98 stations, and the range of the data for the control-adjusted (CA) survival. Eight stations had CA survival less that 80%, and 14 stations had CA survival between 80 and 89.9%. Twenty-three out of the 46 stations had CA survival greater than 90%.

2. Fines: Stations with 23.9% to 84.5% fines were selected out of the subset of 23 stations. Please refer to Slide no. 2 in the attached Power Point file to see the distribution of the % fines for the San Diego Bight '98 data set. Three stations were eliminated from the subset of 23.

3. Total Organic Carbon (TOC): The remaining twenty stations were screened using a criterion of 0.3% to 3.5% TOC. Please refer to Slide no. 3 in the attached Power Point file for the distribution of TOC in the San Diego Bay stations. All 20 stations met this criterion.

4. Effects Range Median Quotient (ERMQ): Stations with an ERM quotient of less than 0.2, when non-detects are treated as zero, were selected. Please refer to Slide no. 4 in the attached Power Point file to see the range of ERMQs. Fifteen stations out of 20 had an ERMQ of less than 0.2.

   The ERMQ selected by NOAA was calculated based on the same contaminant suite used by Steve Bay, et al, in "Evaluation of Reference Station Data Obtained During the Shipyard or Chollas/Paleta Spatial Surveys", dated 11/08/02. An ERMQ of 0.12 was suggested by Bay, et al, based on using half the detection limit for non-detected constituents. However, when the Bay et al ERMQ was recalculated using zero for non-detects, the ERMQ changed from 0.12 to 0.19. Using zero for non-detects reveals a similar ERMQ for the 10 stations suggested by Bay and the 14 stations used in this approach.

5. Graphical Analysis: To test whether the population of each constituent was similar for the subset of 15 stations, data for each constituent was analyzed graphically. One station (2259) had significantly higher concentrations for copper, lead, zinc, HMWPAH, and total PAH. The location of the station was identifies on the map and found to be located in an area known to have elevated levels of contamination. Station 2259 was removed from the pool of stations leaving a total of 14 stations.

The 14 Bight '98 stations selected for the San Diego Bay Reference Pool are listed below. Please refer to Slide no. 5 in the attached Power Point file to see the location of these stations.

2224	2229
2239	2433
2436	2227
2231	2242
2434	2440
2228	2233
2243	2435

II. Bight 98 Reference Pool Station Analysis

To determine whether the reference data collected as part of the investigation of the Chollas/Paleta Creeks, and the NASSCO and SW Marine Shipyards are appropriate to use as reference, NOAA calculated the concentrations of certain contaminants for the reference pool, and the descriptive statistics for each constituent in the reference pool.

Polyaromatic Hydrocarbons (PAHs)

Low Molecular Weight PAHs (LMWPAHs), High Molecular Weight PAHs (HMWPAHs), and Total PAHs were determined for both the reference pool, and the Chollas/Paleta and Shipyard reference stations. The following 23 PAHs were summed, using half the detection limit for non-detects. Half the detection limit was used because it is a more conservative approach when determining sums of a set of contaminants (in this case the detection limits were sufficiently low to have little effect on the total).

1-Methylnaphthalene	1-Methylphenanthrene
1,6,7 Trimethylnaphthalene	2-Methylnaphthalene
2,6 Dimethylnaphthalene	Acenaphthene
Acenaphthylene	Anthracene
Biphenyl	Fluorene
Napthalene	Phenanthrene
Benzo(a)anthracene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(e)pyrene
Benzo(g,h,I)perylene	Benzo(k)fluoranthene
Chrysene	Dibenzo(a,h)anthracene
Fluoranthene	Ideno(1,2,3-c,d)pyrene
Pyrene	

Polychlorinated Biphenyls (PCBs)

The vast majority of the acceptable Bight ‘98 stations had non-detects for all measured PCB congeners. To develop a total PCB number for these specific comparison purposes, the Bight 98 data were evaluated to determine which congeners were detected at any Bight ‘98 station in San Diego Bay. Once the congeners were identified in the larger database, those congeners were summed (using half the detection limit values for non-detects) for each of the 14 reference envelope stations. The same 14 congeners were summed for the Chollas/Paleta data and the Shipyard data. The summed congeners are listed below:

PCB044	PCB052
PCB066	PCB070
PCB087	PCB099
PCB101	PCB105
PCB110	PCB118
PCB138	PCB149
PCB151	PCB187

DDT

The vast majority of the acceptable Bight 98 stations had non-detects for total DDT. To develop a total DDT number for these specific comparison purposes, the Bight 98 data were evaluated to determine which DDT isomers were detected at any Bight 98 station in San Diego Bay. Evaluation of the Bight '98 data identified detections of ppDDE, ppDDD and ppDDT. These isomers were summed for each of the 14 reference envelope stations, using half the detection limit values for non-detects. The same isomers were summed for the Chollas/Paleta data and the shipyard data.

ERM Quotient (ERMQ)

To calculate the ERMQ the following constituents were used:

Arsenic	Fluorene
Cadmium	Phenanthrene
Chromium	2 Methylnaphthalene
Copper	Acenaphthylene
Lead	Benzo(a)anthracene
Mercury	Chrysene
Nickel	Fluoranthene
Silver	Napthalene
Zinc	Pyrene
Acenaphthene	
Anthracene	Total DDT
Benzo(a)pyrene	Total PCB
Dibenzo(a,h)anthracene	

Each constituent's concentration was divided by the corresponding ERM value. These ratios were added together and divided by the number of constituents to determine the ERMQ. If a constituent was not detected at the reference pool station, the non-detect was set to zero, and the constituent was not included in the count of chemicals used to calculate the ERM Quotient for that station.

Amphipod Toxicity Tests

The amphipod survival data for the Chollas/Paleta Creeks reference stations were highly variable. At two Chollas/Paleta reference locations, there was extremely low survival among the replicates, including survival in the control series. For comparison and discussion purposes, the survival means were calculated including and excluding these highly variable replicates. Table 1 presents the two survival calculations for the Chollas/Paleta data. The standard deviation was calculated for each of these survival means and is presented in parentheses next to the survival mean. Before a final decision is made as to whether these Chollas/Paleta toxicity data are usable, a full analysis of the laboratory procedures is recommended to evaluate the possible cause of the replicate variability.

Statistics

After the reference pool selection process was complete, the following descriptive statistics were calculated for the pool:

Mean
Standard Deviation
Maximum Value
Minimum Value
Mean plus 2 Standard Deviations (minus 2 SD for amphipod survival)
1-tailed 95% Upper Confidence Limit (Lower CL for amphipod survival)

Please refer to Table 1 for the summary statistics and concentrations of constituents for each station. It should be noted here that there are other statistical approaches that may be useful in combination with the statistics that NOAA has chosen to use for this evaluation. In September 2002, EPA released a guidance document on selecting background for soils that may also have statistical approaches that may be appropriate to consider in evaluating the applicability of the Chollas/Paleta, and Shipyard reference sites.

III. Chollas/Paleta and NASSCO/SWM Reference Site Evaluation

The Chollas/Paleta and NASSCO/SWM reference station data were compared to the Maximum Value, Mean plus 2 Standard Deviations (minus 2 SD for amphipod survival) and 1-tailed 95% Upper Confidence Limit (Lower CL for amphipod survival) for the San Diego Bay Reference Pool (see Table 1). The three studies utilized different station identification designations. To facilitate discussion and analysis, a new combined designation has been assigned to simplify the station identification process. The table below indicates the new designation and the identifying nomenclature for the individual locations.

New	Chollas/Paleta	NASSCO/SWM	Bight 98
R1c-R4n-2231	R01	R04	2231
R2c-R5n-2243	R02	R05	2243
R3c-R2n-2433	R03	R02	2433
R4c-R3n-2440	R04	R03	2440
R5c-R1n-2441	R05	R01	2441
R6c-__n-2238	R06		2238

Application/Discussion

I. Retention of site reference stations

Comparisons between the San Diego Bay Reference Pool Mean plus 2 standard deviations, and the site reference data for the Chollas/Paleta Creeks, and the Shipyards, resulted in the following recommendations for the retention of site reference areas.

Station R1c-R4n-2231 has few chemical exceedences, however, the biological parameters indicate this station is quite different from the other reference stations. Since this difference in the biological parameters cannot be explained, NOAA recommends that both data sets for this station be excluded as a reference station.

Both stations R2c-R5n-2243 and R3c-R2n-2433 had NASSCO exceedences for selenium but both were based on below detection limit values. Station R3c-R2n-2433 had a very slight exceedence for cadmium for both Chollas and NASSCO. Considering all the other data for these sites, these exceedances should not compromise the usefulness of this location as a reference site. NOAA recommends that both data sets for these sites are appropriate for use as reference stations

Station R4c-R3n-2440 has a number of significant chemical exceedences, particularly for the organics. NOAA does not recommend this station as a reference station.

Station R5c-R1n-2441 has 2 slight exceedances for selenium and cadmium in the NASSCO data set, and 10 moderate exceedences for the Chollas data. Based on the additional differences in TOC and grain size for these stations, NOAA recommends that the NASSCO data be retained for use as a reference site and the Chollas data be rejected.

Station R6c-__n-2238 had slight exceedences for arsenic, chromium, nickel and zinc. It also had a higher percent fines than the reference pool guideline values which might account the metal exceedences. Because the vast majority of chemicals had no exceedences, and the few exceedences were slight and are most likely attributable to the higher percent fines, NOAA recommends that Station R6c-__n-2238 be accepted as a reference station.

To summarize, NOAA recommends that stations R2c-R5n-2243, R3c-R2n-2433, and R6c-__n-2238 be accepted as reference stations, and that only the NASSCO data for R5c-R1n-2441 be used as reference.

II. Chollas/Paleta and NASSCO/SWM Site Data Evaluation

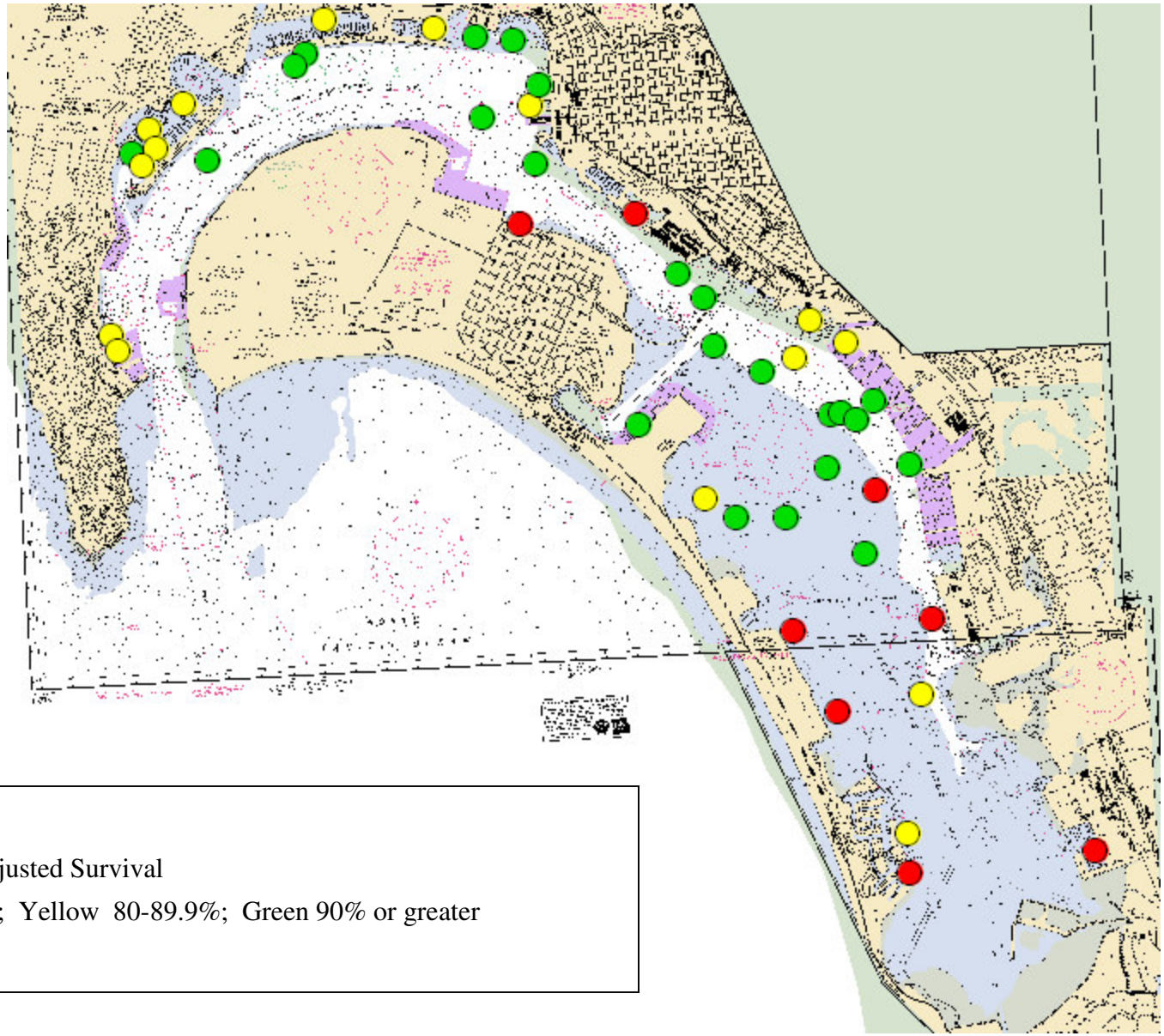
The San Diego RWQCB has not made a determination on how the reference envelope will be used to evaluate the site data for Chollas/Paleta, and the Shipyards. To assist the RWQCB in their decision-making process, NOAA supports a thorough scientific discussion on the appropriate use of a reference pool approach.

A possible use of the reference pool would involve a two-step process. First, the data from the acceptable Chollas/Paleta and Shipyard reference stations would be added to the database that makes up the San Diego Bay Reference Envelope. It must be noted that it is only appropriate to add those parameters that correspond to the data in the San Diego Bay reference envelope. The second step in the process would compare the Chollas/Paleta and Shipyard site data to either the expanded Reference Envelope mean + 2 standard deviations, the one-tailed 95% confidence limit, or another appropriate statistic.

To address constituents that are not part of the San Diego Bay Reference Envelope, but are contaminants of concern for the Chollas/Paleta and NASSCO/SWM sites, other San Diego Bay data sets could be selectively used, or other data from the Chollas/Paleta and

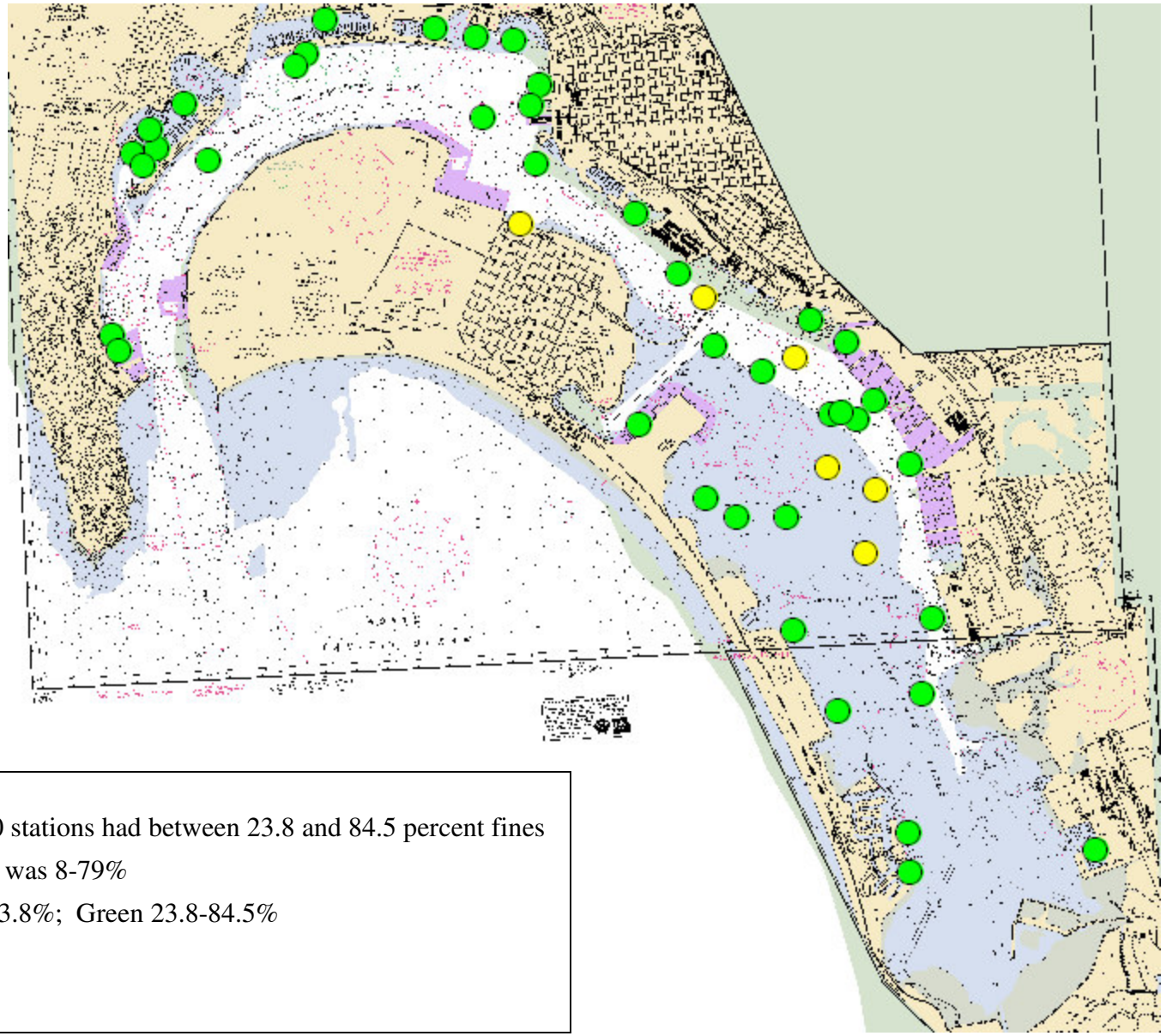
NASSCO/SWM reference data could be used to evaluate the study areas. Since reference stations for Chollas/Paleta and NASSCO/SWM have been judged appropriate based on the comparison of numerous parameters, they may also contain low ambient concentrations of other constituents of concern. However, because of the limited size of the Chollas/Paleta and shipyard data sets, using the one-tailed 95% confidence limits would not be appropriate and would result in the low power of the statistic, especially for parameters that were only measured in one of the studies. A more conservative guideline would need to be determined, possibly, using the range of the reference data.

The procedure for evaluating contaminants of concern/constituents not found in the San Diego Bay Reference Envelope data set is an issue that warrants further discussion among the scientific workgroup.

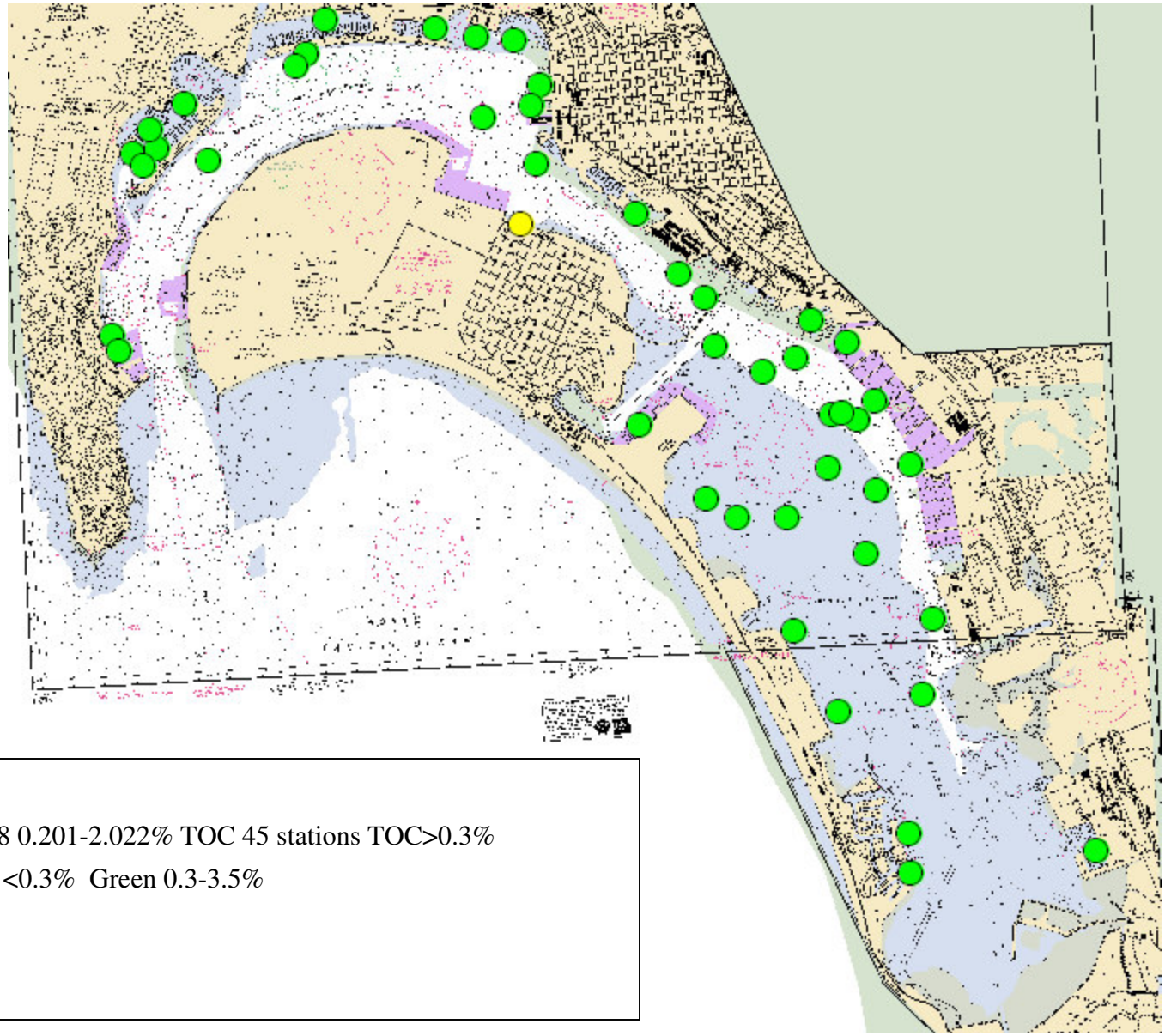


Control Adjusted Survival

Red < 80%; Yellow 80-89.9%; Green 90% or greater

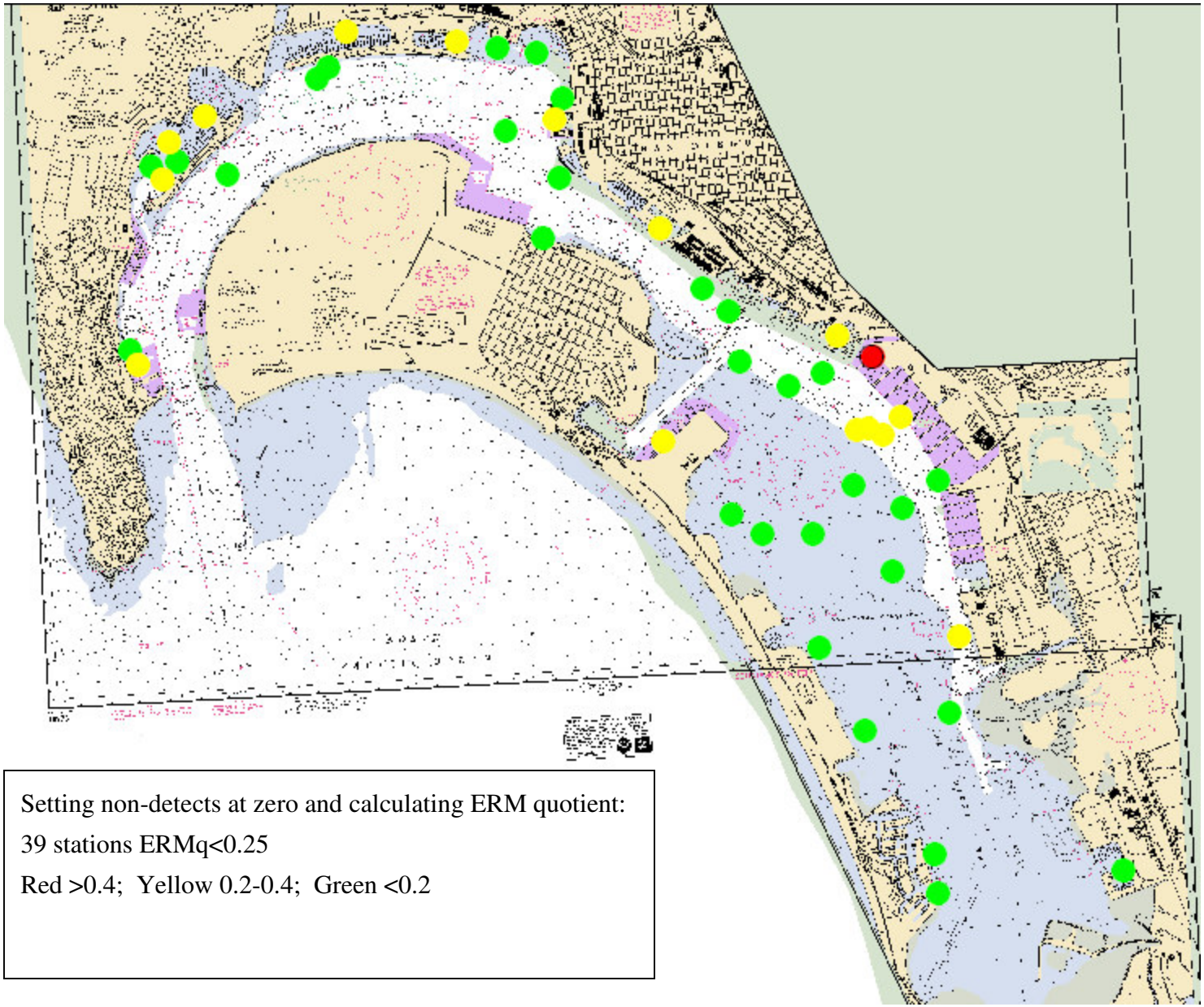


Bight 98 40 stations had between 23.8 and 84.5 percent fines
total range was 8-79%
Yellow < 23.8%; Green 23.8-84.5%



Bight 98 0.201-2.022% TOC 45 stations TOC>0.3%

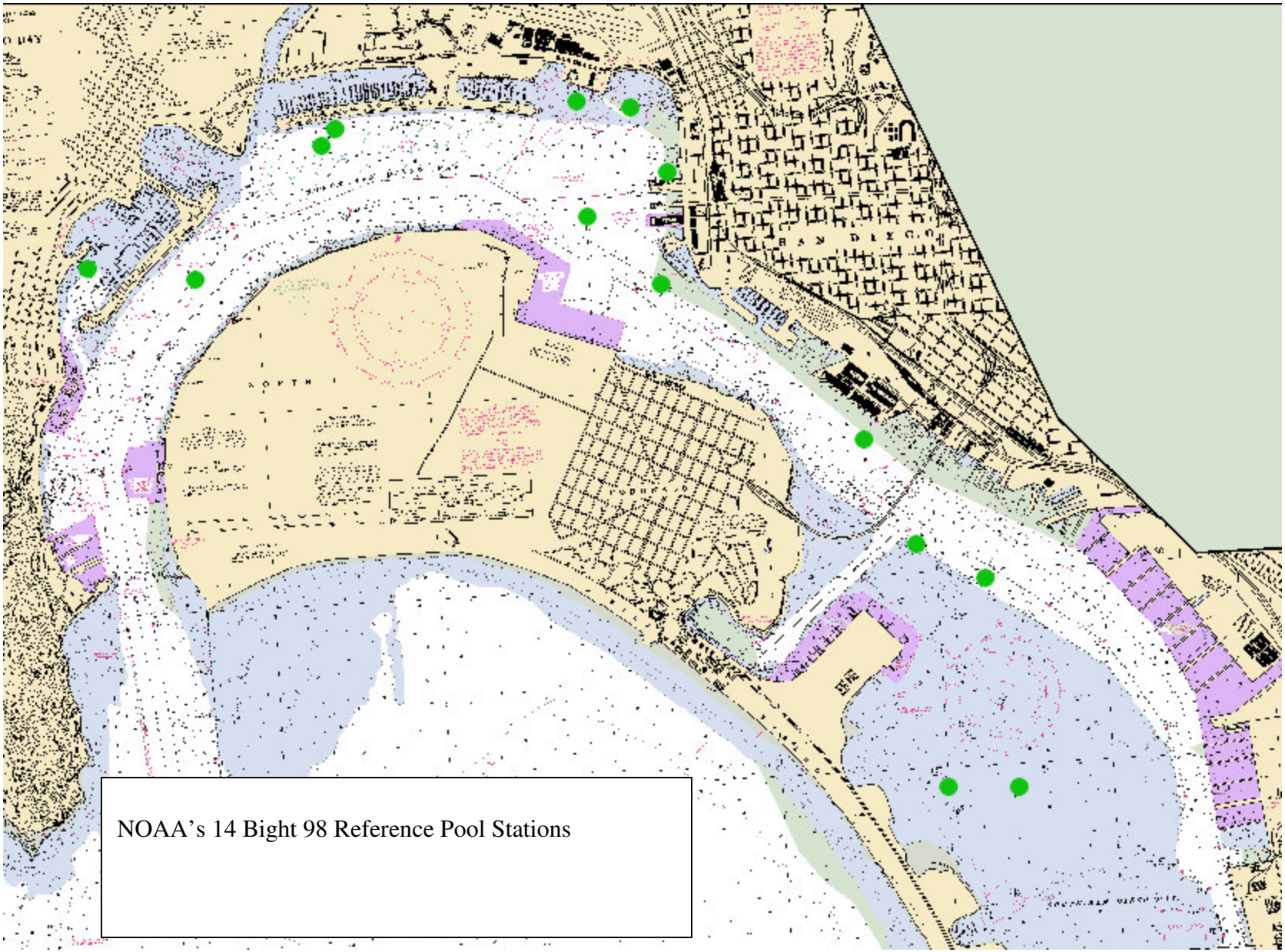
Yellow <0.3% Green 0.3-3.5%



Setting non-detects at zero and calculating ERM quotient:

39 stations ERMq<0.25

Red >0.4; Yellow 0.2-0.4; Green <0.2



NOAA's 14 Bight 98 Reference Pool Stations

Parameter	R1c-R4n-2231† Chollas	R1c-R4n-2231† NAASCO	R2c-R5n-2243 Chollas	R2c-R5n-2243 NAASCO	R3c-R2n-2433 Chollas	R3c-R2n-2433 NAASCO	R4c-R3n-2440 Chollas	R4c-R3n-2440 NAASCO	R5c-R1n-2441 Chollas	R5c-R1n-2441 NAASCO	R6c-__n-2238 Chollas	Maximum Value Bight 98	Mean + 2 StDev Bight 98	95% Upper Confidence Limit Bight 99	Mean Bight 98
Amphipod Survival[a]	**38.5(37.9) 44.3(37.5)**	**84.0(6.5)**	**55.0(47.0) 84.4(16.1)**	**89.9(8.2)**	**91.2(13.0) 89.9(2.5)**	93.9(2.7)	**89.0(28.8) 94.9(4.8)**	98.0(2.7)	**78.0(25.8) 82.3(13.8)**	95.0(6.1)	**90.4(7.9) 90.4(7.9)**	**91.8***	92.0**	92.8***	98.40
Sea urchin Fert.[a]	65.7 (13.0)	99.2 (4.5)	97.4 (2.1)	85.4 (4.1)	99.5 (2.6)	79.0 (6.0)	85.0 (3.8)	99.5 (2.1)	102.5 (1.7)	90.1 (4.1)	35.7 (8.8)				
Abundance	6343	6232	691	987	421	440	918	639	476	505	419				
Number of Taxa	88	64	41	39	57	35	66	39	66	48	32				
Shannon-Wiener Diversity	1.58		3.38		4.07		4.16		4.22		3.70				
fines (%)	41.2	45.3	30.3	28.0	38.4	41.2	26.4	31.6	**82.6**	40.8	**69.0**	**59.0**	54.7	52.6	36.0
TOC (%)	1.00	**1.30**	0.56	0.51	0.53	0.67	1.04	**1.62**	**1.82**	1.10	1.01	**1.36**	1.28	1.22	0.76
ERMQ	0.11	0.14	0.08	0.09	0.08	0.08	**0.36**	0.16	0.12	0.07	0.09	**0.19**	**0.19**	0.18	0.13
Arsenic (mg/kg)	**7.78**	**8.3**	5.94	4.3	5.55	4.55	4.65	4.3	**8.82**	5.4	**7.8**	**8.32**	7.67	7.39	5.25
Cadmium (mg/kg)	0.03	0.095	0.14	0.12	**0.29**	**0.29**	**0.31**	**0.33**	**0.41**	**0.29**	0.13	0.25	**0.28**	0.26	0.12
Chromium (mg/kg)	46.6	36.5	40.2	22.6	42.15	24.4	38.1	25.5	**54**	22	**59.2**	51.90	**52.42**	50.00	31.29
Copper (mg/kg)	71.1	81.7	56.4	47.3	43.3	39.8	44.4	48	78.4	37.2	71	**92**	91	88	58
Lead (mg/kg)	**40.3**	**41.6**	30.7	20.8	23.25	18.9	**63.8**	**76.6**	26.7	13.1	28.79	37	**41**	39	23
Mercury (total)	0.364	0.425	0.332	0.25	0.2505	0.21	0.262	0.29	0.238	0.16	0.262	**0.62**	0.58	0.55	0.29
Nickel (mg/kg)	11.5	10.4	10.2	5.6	11.15	7.35	8.72	7.1	**17.5**	9.9	**16.46**	**16.40**	16.06	15.35	9.84
Selenium (mg/kg)	0.228	**0.45**	0.095	**0.55**	0.18	**0.55**	0.144	0.23	**0.546**	**1**	0.234	**0.27**	**0.27**	0.25	0.14
Silver (mg/kg)	0.288	0.255	0.651	0.56	0.3845	0.39	0.385	0.46	0.388	0.24	0.51	0.79	**0.87**	0.82	0.41
Zinc (mg/kg)	129	121	125	93	115	92	115	122	143	80	**214**	152	**155**	149	105
TPAH (µg/kg)	1208	782	306	245	886	549	**5958**	**3253**	**2388**	393	224	**1535**	1508	1419	735
LMWPAH (µg/kg)	119	99	29	47	87	68	**1279**	**411**	307	72	24	**489**	386	370	246
HMWPAH (µg/kg)	1089	683	277	198	799	481	**4679**	**2842**	**2081**	321	200	1126	**1182**	1103	489
Ttl 14PCB (µg/kg)	**20.36**	**40.75**	9.98	11.80	13.41	11.47	**162.50**	**68.33**	15.32	6.16	6.68	**21.71**	17.63	16.92	11.41
Total PCB (µg/kg)	**42.40**	**82.46**	20.54	23.82	26.91	22.31	**282.80**	**126.01**	33.30	11.37	11.32				
Total Chlordane (µg/kg	**0.91**		0.205		0.57		**16.2**		**0.83**		0.183	0.60	0.60	0.60	0.60
Ttl 4,4'DDT (µg/kg)	**9.7**		1.08		1.55		**16.4**		**2.52**		1.011	1.15	1.15	1.15	1.15
Total DDT (µg/kg)	**10.825**		1.54		2.095		**21.565**		**3.785**		1.295				
Tetrabutyltin (µg/kg)		1.2		0.8		0.8		0.8		0.9					
Tributyltin (µg/kg)		15		2.6		3.3		31		3.7					
Dibutyltin (µg/kg)		15		5.3		9.4		28		5.2					
Butyltin(µg/kg)		9.6		2.7		3.5		4.2		0.9					

† R1c-R4n-2231 indicates Ref. Station 01 Chollas/Paleta Creek, Ref. Station 04 NAASCO/SWM, Bight 98 Station 2231

[a] Numbers in ()are standard deviations. Second set of numbers for Chollas amphipod survival data are recalculations after

* Minimum amphipod survival for Bight 98 pool

** Mean minus 2 standard deviations of amphipod survival for Bight 98 pool

*** Lower 95% confidence limit of amphipod survival for Bight 98 pool

Bold red indicates exceedence of any of the three Bight 98 reference values (mean is not meant as a reference value)

Bold red shaded indicates exceedence of the highest Bight 98 reference value

Bold blue indicates higlue, except amphipod test--indicates lowest

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NOAA Recommended Reference Pool for NASSCO and BAE Systems (Formerly Southwest Marine) Sediment Investigation.[1]

Study	Station
2001 Chollas/Paleta	2243
	2433
	2243
2001 NASSCO/BAE SYSTEMS (Formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2224
	2227
	2228
	2229
	2231
	2233
	2239
	2242
	2243
	2433
	2434
	2435
	2436
	2440

(1) NOAA - Donald MacDonald and Denise Klimas. "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations (January 16, 2003)."

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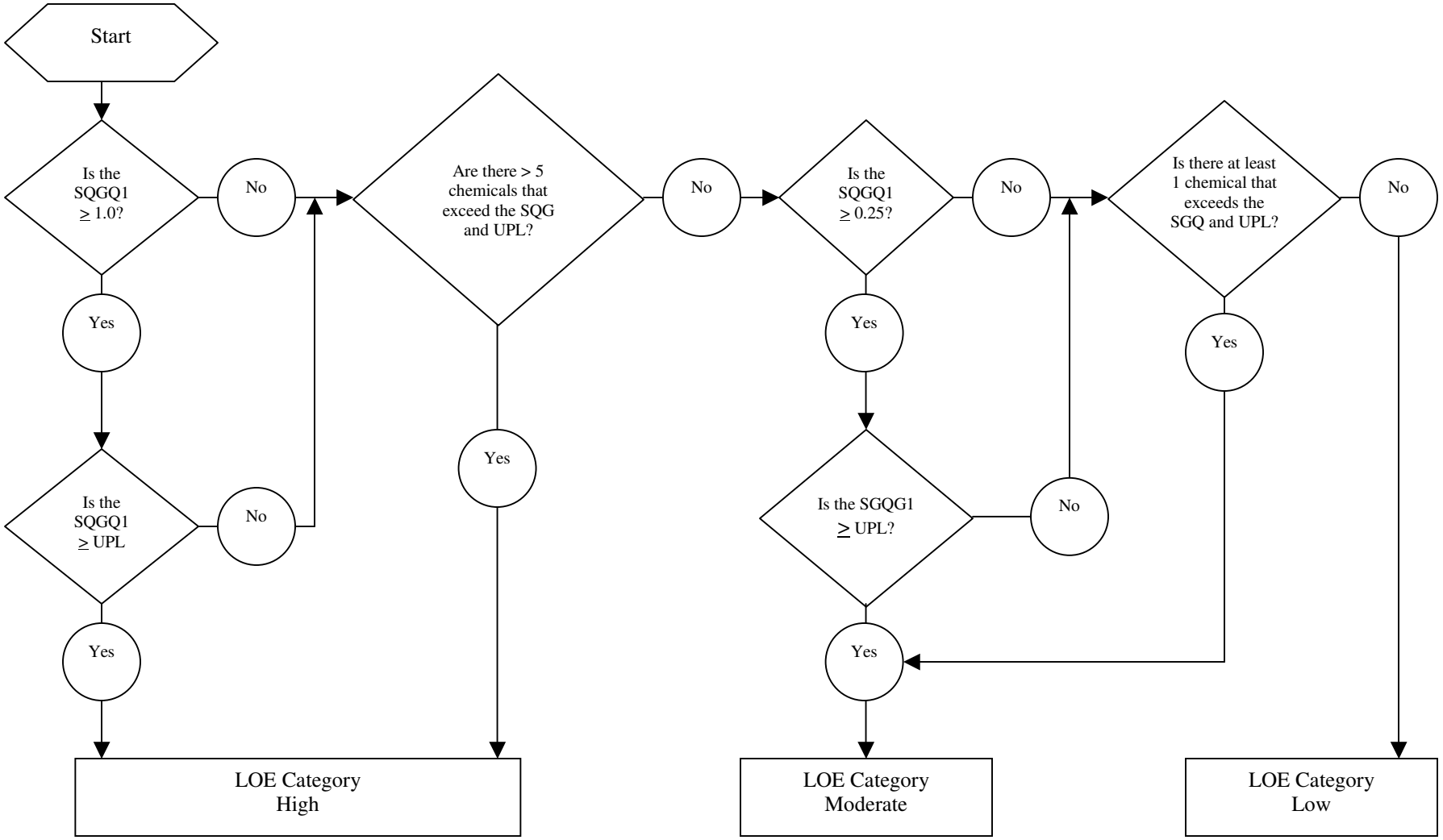
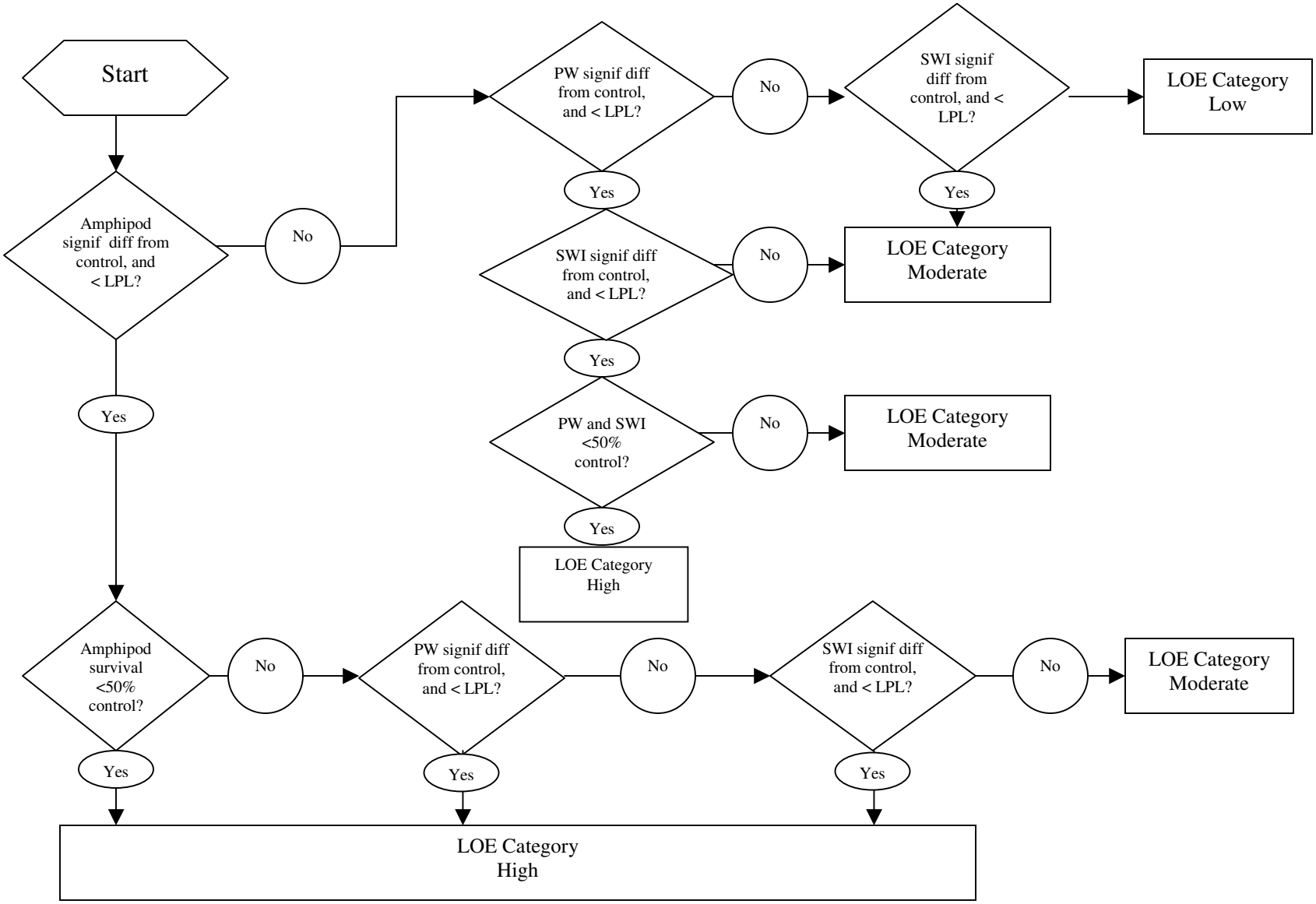
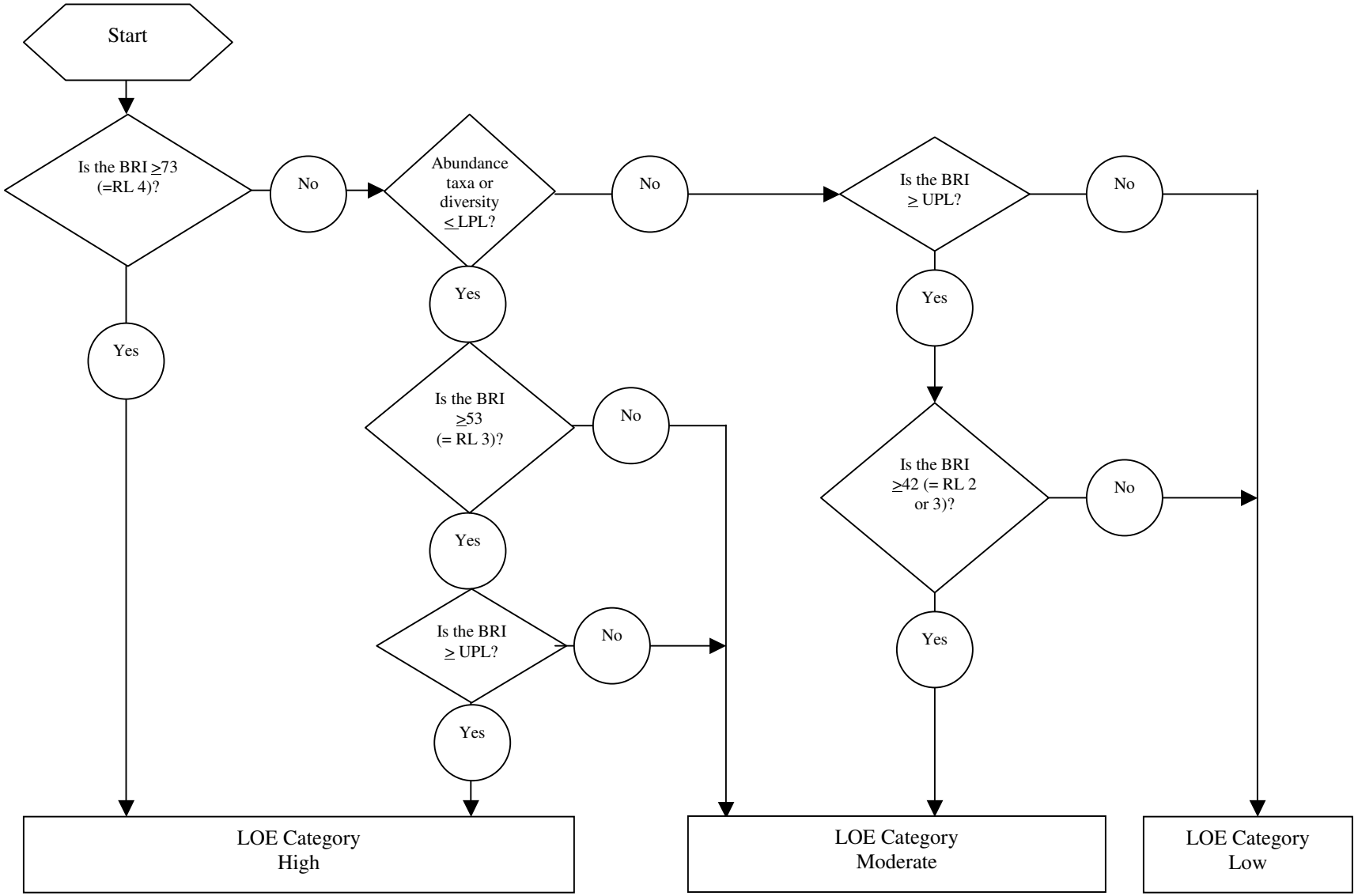


Flow Diagram for the Sediment Chemistry Line of Evidence using NOAA's Reference Pool



Flow Diagram for the Toxicity Line of Evidence using NOAA's Reference Pool



Flow Diagram for the Benthic Community Line of Evidence using NOAA's Reference Pool

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Results of the Sediment Quality Triad Approach using the NOAA Reference Pool

Site	Station	Sediment Chemistry[1]	Toxicity[2]	Benthic Community[3]	Weight-of-Evidence Category[4]
NASSCO	NA01	High	Moderate	Low	Likely
	NA03	High	Moderate	Low	Likely
	NA04	High	Moderate	Low	Likely
	NA05	High	Low	Low	Possible
	NA06	High	Moderate	Moderate	Likely
	NA07	High	Moderate	Low	Likely
	NA09	High	Moderate	Low	Likely
	NA11	High	Moderate	Low	Likely
	NA12	High	High	Low	Likely
	NA15	High	Low	Low	Possible
	NA16	High	Moderate	Low	Likely
	NA17	High	Low	Moderate	Likely
	NA19	High	Moderate	Low	Likely
	NA20	Moderate	Low	Moderate	Possible
	NA22	High	Moderate	Moderate	Likely
BAE Systems (SW Marine)	SW02	High	Low	Low	Possible
	SW03	High	Low	Low	Possible
	SW04	High	Low	Moderate	Likely
	SW08	High	Low	Low	Possible
	SW09	High	Low	Low	Possible
	SW11	High	Moderate	Low	Likely
	SW13	High	Low	Low	Possible
	SW15	High	Moderate	Low	Likely
	SW17	High	Moderate	Low	Likely
	SW18	High	Moderate	Low	Likely
	SW21	High	Low	Low	Possible
	SW22	High	Moderate	Moderate	Likely
	SW23	High	Moderate	Low	Likely
	SW25	High	Moderate	Low	Likely
	SW27	High	High	Low	Likely

[1] Relative likelihood that the chemicals present in the sediment is adversely impacting organisms living in or on the sediment (i.e., benthic community).
[2] Relative likelihood of toxic effects based on the combined toxic response from three tests: amphipod survival, sea urchin fertilization, and bivalve development.
[3] Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
[4] Relative likelihood (likely, possible, or unlikely) that the health of the benthic community is adversely impacted based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

Sediment Chemistry Line-of-Evidence Results Using the NOAA Reference Pool

Site	Station	SQGQ1			SQGQ1 ≥ UPL	# Chemicals > SQG and UPL	LOE Category
		< 0.25	0.25 to 1.0	> 1.0			
NASSCO	NA01		X		Yes	9	**High**
	NA03		X		Yes	9	**High**
	NA04		X		Yes	9	**High**
	NA05		X		Yes	7	**High**
	NA06		X		Yes	11	**High**
	NA07		X		Yes	10	**High**
	NA09		X		Yes	10	**High**
	NA11		X		Yes	8	**High**
	NA12		X		Yes	7	**High**
	NA15		X		Yes	9	**High**
	NA16		X		Yes	11	**High**
	NA17			X	Yes	13	**High**
	NA19			X	Yes	12	**High**
	NA20		X		Yes	5	**Moderate**
	NA22		X		Yes	6	**High**
BAE Systems (SWM)	SW02			X	Yes	14	**High**
	SW03		X		Yes	10	**High**
	SW04			X	Yes	14	**High**
	SW08			X	Yes	14	**High**
	SW09			X	Yes	13	**High**
	SW11		X		Yes	9	**High**
	SW13			X	Yes	13	**High**
	SW15		X		Yes	10	**High**
	SW17		X		Yes	12	**High**
	SW18		X		Yes	11	**High**
	SW21			X	Yes	10	**High**
	SW22			X	Yes	11	**High**
	SW23			X	Yes	12	**High**
	SW25		X		Yes	10	**High**
	SW27		X		Yes	8	**High**

Comparison of NASSCO and BAE Systems Toxicity Data to the NOAA Reference Pool 95 Percent Lower Prediction Limit (LPL)

Site	Station	Amphipod Survival (95% LPL = 87.9%)	Urchin Fertilization (95% LPL = 27.2%)	Bivalve Development (95% LPL = 30.5%)
NASSCO	NA01	**80**	86	49
	NA03	**84**	84	94
	NA04	**80**	88	84
	NA05	89	95	94
	NA06	**78**	103	74
	NA07	**74**	102	88
	NA09	88	99	**1**
	NA11	**70**	101	80
	NA12	**82**	89	**15**
	NA15	97	88	93
	NA16	90	84	**3**
	NA17	95	88	80
	NA19	89	72	**2**
	NA20	90	78	80
	NA22	95	111	**2**
BAE Systems (formerly Southwest Marine)	SW02	88	103	85
	SW03	92	103	88
	SW04	94	108	63
	SW08	91	103	93
	SW09	88	100	85
	SW11	**77**	89	83
	SW13	92	99	**28**
	SW15	92	103	**9**
	SW17	95	96	**16**
	SW18	**74**	83	64
	SW21	91	102	67
	SW22	90	104	**1**
	SW23	91	107	**16**
	SW25	**86**	103	**10**
	SW27	**73**	91	**22**

NOTES: Toxicity values less than the 95% lower prediction limit values are bold faced and shaded.

Toxicity Line-of-Evidence Results using the NOAA Reference Pool

Station	Amphipod Survival			Urchin Fertilization			Bivalve Development			LOE Category
	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	
NA01	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA03	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA04	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
NA05	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA06	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA07	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA09	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA11	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	**Moderate**
NA12	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**High**
NA15	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA16	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA17	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA19	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
NA20	**Yes**	No	No	**Yes**	No	No	**Yes**	No	No	**Low**
NA22	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW02	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW03	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW04	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW08	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW09	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW11	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
SW13	**Yes**	No	No	**Yes**	No	No	**Yes**	No	**Yes**	**Low**
SW15	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW17	**Yes**	No	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW18	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	No	No	**Moderate**
SW21	**Yes**	No	No	No	No	No	**Yes**	No	No	**Low**
SW22	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW23	**Yes**	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW25	**Yes**	**Yes**	No	No	No	No	**Yes**	**Yes**	**Yes**	**Moderate**
SW27	**Yes**	**Yes**	No	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**High**

Comparison of Benthic Community Metrics Data from NASSCO and BAE Systems Stations to the Reference Pool 95 Percent Prediction Limits

Site	Station	BRI (95% UPL = 53.9)	Abundance* (95% LPL = 131)	# Taxa* (95% LPL = 19)	S-W Diversity (95% LPL = 1.9)
NASSCO	NA01	42.2	447	33	2.8
	NA03	45.5	492	40	3.0
	NA04	49.6	285	25	2.5
	NA05	44.4	569	35	2.4
	NA06	**54.4**	611	37	2.7
	NA07	44.6	475	43	3.0
	NA09	51.1	862	44	2.6
	NA11	46.0	604	33	2.4
	NA12	42.6	538	37	2.7
	NA15	51.0	306	26	2.3
	NA16	48.0	522	33	2.6
	NA17	**55.3**	418	33	2.7
	NA19	46.7	828	43	2.7
	NA20	**54.0**	412	22	2.3
	NA22	51.6	**107**	**15**	2.2
BAE Systems (formerly Southwest Marine)	SW02	52.1	976	39	2.4
	SW03	49.9	361	31	2.8
	SW04	41.1	3,175	36	**1.6**
	SW08	41.5	2,457	41	2.4
	SW09	53.2	572	39	2.7
	SW11	42.4	777	44	2.9
	SW13	43.6	742	53	3.2
	SW15	37.8	806	59	3.1
	SW17	45.7	621	30	2.4
	SW18	39.5	829	42	2.8
	SW21	53.2	315	24	2.4
	SW22	**55.1**	363	26	2.4
	SW23	50.0	316	27	2.6
	SW25	41.3	611	40	2.8
	SW27	42.9	927	48	2.9

NOTES:

95% upper prediction limit values presented below each constituent in ( ).

* Values were derived from natural log transformed data.

For the BRI, concentrations greater than the 95% upper prediction limit value are bold faced and shaded.

For the abundance, # taxa, and S-W diversity metrics, concentrations lower than their respective 95% upper prediction limit values are bold faced and s haded.

Benthic Community Line-of-Evidence Results Using the Reference Condition Comparison

Station	Benthic Response Index				Abundance	# Taxa	S-W Diversity	LOE Category
	≥ 73	≥ 53	≥ 42	≥ 95% UPL	≤ 95% LPL	≤ 95% LPL	≤ 95% LPL	
NA01	No	No	**Yes**	No	No	No	No	**Low**
NA03	No	No	**Yes**	No	No	No	No	**Low**
NA04	No	No	**Yes**	No	No	No	No	**Low**
NA05	No	No	**Yes**	No	No	No	No	**Low**
NA06	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA07	No	No	**Yes**	No	No	No	No	**Low**
NA09	No	No	**Yes**	No	No	No	No	**Low**
NA11	No	No	**Yes**	No	No	No	No	**Low**
NA12	No	No	**Yes**	No	No	No	No	**Low**
NA15	No	No	**Yes**	No	No	No	No	**Low**
NA16	No	No	**Yes**	No	No	No	No	**Low**
NA17	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA19	No	No	**Yes**	No	No	No	No	**Low**
NA20	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA22	No	No	**Yes**	No	**Yes**	**Yes**	No	**Moderate**
SW02	No	No	**Yes**	No	No	No	No	**Low**
SW03	No	No	**Yes**	No	No	No	No	**Low**
SW04	No	No	No	No	No	No	**Yes**	**Moderate**
SW08	No	No	No	No	No	No	No	**Low**
SW09	No	**Yes**	**Yes**	No	No	No	No	**Low**
SW11	No	No	**Yes**	No	No	No	No	**Low**
SW13	No	No	**Yes**	No	No	No	No	**Low**
SW15	No	No	No	No	No	No	No	**Low**
SW17	No	No	**Yes**	No	No	No	No	**Low**
SW18	No	No	No	No	No	No	No	**Low**
SW21	No	**Yes**	**Yes**	No	No	No	No	**Low**
SW22	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
SW23	No	No	**Yes**	No	No	No	No	**Low**
SW25	No	No	No	No	No	No	No	**Low**
SW27	No	No	**Yes**	No	No	No	No	**Low**

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NOAA'S REFERENCE POOL
(Sediment Chemistry - Metals)

	Ag	Ag - Trans	As	As - Trans	Cd	Cd - Trans	Cr	Cr - Trans	Cu	Cu - Trans
CP 2238	0.51	-0.292429824	7.8	0.892094603	0.13	-0.886056648	59.2	1.772321707	71	1.851258349
CP 2243	0.65	-0.187086643	5.9	0.770852012	0.14	-0.853871964	40.2	1.604226053	56	1.748188027
CP 2433	0.38	-0.420216403	5.55	0.744292983	0.29	-0.537602002	42.2	1.625312451	43.3	1.636487896
SY 2243	0.56	-0.251811973	4.3	0.633468456	0.12	-0.920818754	23	1.361727836	47	1.672097858
SY 2433	0.39	-0.408935393	4.6	0.662757832	0.29	-0.537602002	24	1.380211242	40	1.602059991
SY 2441	0.24	-0.619788758	5.4	0.73239376	0.29	-0.537602002	22	1.342422681	37	1.568201724
2224	0.305	-0.515700161	4.12	0.614897216	0.076	-1.119186408	18.2	1.260071388	58.3	1.765668555
2227	0.456	-0.341035157	5.65	0.752048448	0.2	-0.698970004	27.4	1.437750563	53.9	1.731588765
2228	0.7895	-0.102647866	5.6	0.748188027	0.231	-0.63638802	42.8	1.631443769	68.8	1.837588438
2229	0.413	-0.384049948	5.36	0.72916479	0.085	-1.070581074	31.6	1.499687083	58.9	1.770115295
2231	0.3	-0.522878745	4.73	0.674861141	0.04	-1.397940009	26.7	1.426511261	58.1	1.764176132
2233	0.01	-2	4.26	0.629409599	0.01	-2	28.5	1.45484486	52	1.716003344
2239	0.508	-0.294136288	4.76	0.677606953	0.081	-1.091514981	35.5	1.550228353	75.1	1.875639937
2242	0.49	-0.30980392	4.27	0.630427875	0.1	-1	25.4	1.404833717	42	1.62324929
2243	0.5	-0.301029996	3.66	0.563481085	0.1	-1	20.8	1.318063335	38.8	1.588831726
2433	0.5	-0.301029996	8.32	0.920123326	0.25	-0.602059991	34.5	1.537819095	71.6	1.854913022
2434	0.64	-0.193820026	6.22	0.793790385	0.171	-0.76700389	49.8	1.697229343	68.9	1.838219222
2435	0.19	-0.721246399	5.06	0.704150517	0.14	-0.853871964	20.6	1.31386722	28.4	1.45331834
2436	0.62	-0.207608311	8.62	0.935507266	0.21	-0.677780705	48.4	1.684845362	85.8	1.933487288
2440	0.01	-2	4.84	0.684845362	0.04	-1.397940009	24.3	1.385606274	41.8	1.621176282
Average	**0.423075**	**-0.51876279**	**5.451**	**0.724718082**	**0.1497**	**-0.929339521**	**32.255**	**1.48445118**	**54.835**	**1.722613474**
t-stat	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729
Std. Dev.	0.20	0.53	1.38	0.10	0.09	0.36	11.44	0.15	15.18	0.12
N	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	0.7829097	**0.417661164**	**7.890815**	**0.903837703**	**0.3053582**	**-0.288335694**	**52.52123**	**1.743837341**	**81.72676**	**1.943024409**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
		2.616141104		**8.013785309**		**0.514830545**		**55.44180242**		**87.70501125**
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.9795	R: 0.7712	R: 0.9330	R: 0.9667	R: 0.9864	R: 0.9456	R: 0.9577	R: 0.9825	R: 0.9861	R:
Test	P: > 0.10	P: < 0.01	P: 0.0175	P: > 0.10	P: > 0.10	P: 0.0412	P: 0.0885	P: > 0.10	P: > 0.10	P:

NOAA'S REFERENCE POOL
(Sediment Chemistry - Metals)

	Hg	Hg - Trans	Ni	Ni - Trans	Pb	Pb - Trans	Zn	Zn - Trans
CP 2238	0.262	-0.581698709	16.5	1.217483944	28.8	1.459392488	214	2.330413773
CP 2243	0.33	-0.48148606	10.2	1.008600172	30.7	1.487138375	125	2.096910013
CP 2433	0.251	-0.600326279	11.2	1.049218023	23.3	1.367355921	115	2.06069784
SY 2243	0.25	-0.602059991	5.6	0.748188027	21	1.322219295	93	1.968482949
SY 2433	0.21	-0.677780705	7.4	0.86923172	19	1.278753601	92	1.963787827
SY 2441	0.16	-0.795880017	9.9	0.995635195	13	1.113943352	80	1.903089987
2224	0.402	-0.395773947	7.9	0.897627091	12.9	1.11058971	82.6	1.916980047
2227	0.234	-0.630784143	11.1	1.045322979	17.9	1.252853031	112	2.049218023
2228	0.4545	-0.342466112	11.5	1.06069784	36.7	1.564666064	131	2.117271296
2229	0.3155	-0.501000636	9.3	0.968482949	24.5	1.389166084	99.3	1.996949248
2231	0.224	-0.649751982	8	0.903089987	21.6	1.334453751	92.5	1.966141733
2233	0.316	-0.500312917	7.9	0.897627091	26.8	1.428134794	106	2.025305865
2239	0.4215	-0.375202421	10.1	1.004321374	34	1.531478917	121	2.08278537
2242	0.3	-0.522878745	6.8	0.832508913	17.8	1.250420002	89.8	1.953276337
2243	0.239	-0.621602099	5.1	0.707570176	19.9	1.298853076	81.2	1.909556029
2433	0.263	-0.580044252	14.9	1.173186268	21	1.322219295	126	2.100370545
2434	0.0015	-2.823908741	11.6	1.064457989	31.6	1.499687083	132	2.120573931
2435	0.123	-0.910094889	9.9	0.995635195	7.1	0.851258349	64.4	1.808885867
2436	0.517	-0.286509457	15.3	1.184691431	34.4	1.536558443	145	2.161368002
2440	0.235	-0.628932138	7.2	0.857332496	20.6	1.31386722	81.1	1.909020854
Average	**0.27545**	**-0.675424712**	**9.87**	**0.974045443**	**23.13**	**1.335650443**	**109.145**	**2.022054277**
t-stat	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.729
Std. Dev.	0.12	0.53	3.10	0.14	7.85	0.17	32.80	0.12
N	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
	0.482459	**0.258061568**	**15.36936**	**1.216612695**	**37.03993**	**1.640557503**	**167.2481**	**2.230003432**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
		1.811596895		**16.4669321**		**43.70765461**		**169.8257071**
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.9751	R: 0.6809	R: 0.9749	R: 0.9892	R: 0.9879	R: 0.9533	R: 0.9179	R: 0.9716
Test	P: > 0.10	P: < 0.01	P: > 0.10	P: > 0.10	P: > 0.10	P: 0.0656	P: < 0.01	P: > 0.10

NOAA'S REFERENCE POOL
(Sediment Chemistry - Organics)

	LMWPAH	LMWPAH - Trans	HMWPAH	HMWPAH - Trans	PPPAH	PPPAH - Trans	TPCB
CP 2238	17	1.230448921	103	2.012837225	199	2.298853076	11
CP 2243	20	1.301029996	118	2.071882007	779.7	2.891927534	20.715
CP 2433	56	1.748188027	415	2.618048097	780	2.892094603	27
SY 2243	23	1.361727836	90	1.954242509	204	2.309630167	22
SY 2433	44	1.643452676	250	2.397940009	486	2.686636269	21
SY 2441	45	1.653212514	174	2.240549248	343	2.53529412	11
2224		#NUM!		#NUM!	234	2.369215857	50.53
2227		#NUM!		#NUM!	659.4	2.819148943	50.53
2228		#NUM!		#NUM!	857.9	2.933436668	64.585
2229		#NUM!		#NUM!	1339.3	3.126877869	50.53
2231	111	2.045322979	271	2.432969291	604	2.781036939	51
2233	111	2.045322979	80	1.903089987	237	2.374748346	51
2239		#NUM!		#NUM!	720.4	2.857573704	50.53
2242	111	2.045322979	127	2.103803721	359	2.555094449	51
2243	111	2.045322979	77	1.886490725	234	2.369215857	51
2433	111	2.045322979	283	2.451786436	574	2.758911892	51
2434		#NUM!		#NUM!	1133.3	3.054344889	55.93
2435	111	2.045322979	77	1.886490725	234	2.369215857	51
2436	111	2.045322979	268	2.428134794	565	2.752048448	51
2440	111	2.045322979	77	1.886490725	234	2.369215857	51
Average	**34.16666667**	**1.489676662**	**191.6666667**	**2.215916516**	**465.2833333**	**2.602405962**	**18.785833**
t-stat	2.015	2.015	2.015	2.015	2.015	2.015	2.015
Std. Dev.	16.19	0.22	124.27	0.26	265.50	0.27	6.44
N	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	69.40677067 UPL	**1.962899538 UPL**	**462.1377514 UPL**	**2.771580169 UPL**	**1043.139788 UPL**	**3.184135344 UPL**	**32.812232 UPL**
		91.81201911 (Untr UPL)		**590.9900504 (Untr UPL)**		**1528.042186 (Untr UPL)**	
Wilk-Shapiro Test	R: 0.9482 P: > 0.10	R: 0.9511 P: > 0.10	R: 0.9179 P: > 0.10	R: 0.9687 P: > 0.10	R: 0.9408 P: > 0.10	R: 0.9522 P: > 0.10	R: 0.9563 P: > 0.10

NOAA'S REFERENCE POOL
(Sediment Chemistry - Organics)

	TPCB - Trans	TCHLOR	TCHLOR - Trans	TDDT	TDDT - Trans	TBT	TBT - Trans
CP 2238	1.041392685	0.18	-0.744727495	1.3	0.113943352	NA	NA
CP 2243	1.316284938	0.205	-0.688246139	1.54	0.187520721	NA	NA
CP 2433	1.431363764	0.57	-0.244125144	2.1	0.322219295	NA	NA
SY 2243	1.342422681	NA	NA	NA	NA	2.6	0.414973348
SY 2433	1.322219295	NA	NA	NA	NA	3.3	0.51851394
SY 2441	1.041392685	NA	NA	NA	NA	3.7	0.568201724
2224	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2227	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2228	1.810131664	0.595	-0.225483034	1.08	0.033423755	NA	NA
2229	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2231	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2233	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2239	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2242	1.707570176	0.6	-0.22184875	3.3	0.51851394	NA	NA
2243	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2433	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2434	1.747644819	0.595	-0.225483034	1.08	0.033423755	NA	NA
2435	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2436	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2440	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
Average	**1.249179341**	**0.318333**	**-0.559032926**	**1.646667**	**0.207894456**	**3.2**	**0.500563004**
t-stat	2.015	2.92	2.92	2.92	2.92	2.92	2.92
Std. Dev.	0.17	0.22	0.27	0.41	0.11	0.56	0.08
N	6.00	3.00	3.00	3.00	3.00	3.00	3.00
	1.610855186 UPL	**1.054408 UPL**	**0.365414781 UPL**	**3.030855 UPL**	**0.564023285 UPL**	**5.077297 UPL**	**0.764149381 UPL**
	40.81832568 (Untr UPL)		**2.319608979 (Untr UPL)**		**3.664572219 (Untr UPL)**		**5.809642136 (Untr UPL)**
Wilk-Shapiro Test	R: P:	R: 0.8932 P: > 0.10	R: 0.9129 P: > 0.10	R: 0.9744 P: > 0.10	R: 0.9859 P: > 0.10	R: 0.9878 P: > 0.10	R: 0.9800 P: > 0.10

NOAA'S REFERENCE POOL
(Sediment Chemistry - SQGQ1)

	SQGQ1	SQGQ1 - Trans
CP 2238	0.199832	-0.699334899
CP 2243	0.1800765	-0.744542887
CP 2433	0.1525395	-0.816617818
SY 2243	0.1439174	-0.841886626
SY 2433	0.1307197	-0.883658979
SY 2441	0.0990993	-1.00392929
2224	0.1237	-0.907514455
2227	0.1569	-0.804397785
2228	0.2313	-0.635801809
2229	0.1617	-0.791201019
2231	0.1407	-0.851734156
2233	0.2417	-0.616768929
2239	0.1938	-0.712665567
2242	0.1404	-0.852683073
2243	0.1395	-0.855294839
2433	0.1786	-0.748151489
2434	0.2108	-0.676186044
2435	0.0870	-1.06064387
2436	0.2174	-0.66271371
2440	0.0998	-1.000759736
Average	**0.1614751**	**-0.808324349**
t-stat	1.729	1.729
Std. Dev.	0.04	0.12
N	20.00	20.00
	0.2400832	**-0.587236322**
	UPL	**UPL**
		0.258680492
		(Untr UPL)
Wilk-Shapiro	R: 0.9899	R: 0.9861
Test	P: > 0.10	P: > 0.10

NOAA'S REFERENCE POOL
(Toxicity)

	Amphipod	Amphipod - Trans	Bivalve SWI	Bivalve SWI - Trans	Urchin Pore Water	Urchin Pore Water - Trans
CP 2238	90	1.954242509	NA	NA	36	1.556302501
CP 2243	84	1.924279286	NA	NA	97	1.986771734
CP 2433	91	1.959041392	NA	NA	100	2
SY 2243	92	1.963787827	70	1.84509804	92	1.963787827
SY 2433	96	1.982271233	66	1.819543936	79	1.897627091
SY 2441	95	1.977723605	93	1.968482949	90	1.954242509
2224	97	1.986771734	NA	NA	NA	NA
2227	98	1.991226076	NA	NA	NA	NA
2228	101	2.004321374	NA	NA	NA	NA
2229	98	1.991226076	NA	NA	NA	NA
2231	94	1.973127854	NA	NA	NA	NA
2233	99	1.995635195	NA	NA	NA	NA
2239	100	2	NA	NA	NA	NA
2242	92	1.963787827	NA	NA	NA	NA
2243	96	1.982271233	NA	NA	NA	NA
2433	97	1.986771734	NA	NA	NA	NA
2434	101	2.004321374	NA	NA	NA	NA
2435	102	2.008600172	NA	NA	NA	NA
2436	100	2	NA	NA	NA	NA
2440	103	2.012837225	NA	NA	NA	NA
Average	**96.3**	**1.983112186**	**76.33333333**	**1.877708308**	**82.33333333**	**1.893121944**
t-stat	1.729	1.729	2.92	2.92	2.015	2.015
Std. Dev.	4.74	0.02	14.57	0.08	23.82	0.17
N	20.00	20.00	3.00	3.00	6.00	6.00
	87.90888709 LPL	**1.944403373 LPL**	**27.20168795 LPL**	**1.609168208 LPL**	**30.48693129 LPL**	**1.525836655 LPL**
		87.98393328 (Untr UPL)		**40.66007804 (Untr UPL)**		**33.56113619 (Untr UPL)**
Wilk-Shapiro Test	R: 0.9730 P: > 0.10	R: 0.9656 P: > 0.10	R: 0.9265 P: > 0.10	R: 0.9350 P: > 0.10	R: 0.8617 P: 0.0272	R: 0.8125 P: < 0.01

NOAA'S REFERENCE POOL
(Toxicity)

	Urchin Pore Water - Sqrt
CP 2238	6
CP 2243	9.848857802
CP 2433	10
SY 2243	9.591663047
SY 2433	8.888194417
SY 2441	9.486832981
2224	NA
2227	NA
2228	NA
2229	NA
2231	NA
2233	NA
2239	NA
2242	NA
2243	NA
2433	NA
2434	NA
2435	NA
2436	NA
2440	NA
Average	**8.969258041**
t-stat	2.015
Std. Dev.	1.50
N	6.00
	5.69524518
	LPL
	46.75
	(95 lower percentile)
Wilk-Shapiro	R:
Test	P:

NOAA'S REFERENCE POOL
(Benthic Community)

	Abundance	Abundance - Trans	# Taxa	# Tax - Trans	S-W Diversity	S-W Diversity - Trans	BRI	BRI - Trans
CP 2238	419	2.622214023	32	1.50514998	2.5617	0.40852827	60.3	1.780317
CP 2243	691	2.839478047	41	1.61278386	2.3414	0.36947561	55.1	1.741152
CP 2433	421	2.624282096	57	1.75587486	2.82	0.45024911	22.85	1.358886
SY 2243	989	2.995196292	78	1.8920946	2.5	0.39794001	45.1	1.654177
SY 2433	441	2.644438589	77	1.88649073	2.58	0.41161971	16.8	1.225309
SY 2441	506	2.704150517	108	2.03342376	2.8	0.44715803	19.9	1.298853
2224	383	2.583198774	41	1.61278386	4.1785	0.62102041	28.76	1.458789
2227	933	2.969881644	52	1.71600334	2.849	0.45469245	24.89	1.396025
2228	251	2.399673721	41	1.61278386	3.134	0.49609899	32.59	1.513084
2229	705	2.848189117	63	1.79934055	3.124	0.49471103	15.69	1.195623
2231	1502	3.176669933	70	1.84509804	2.75	0.43933269	15.97	1.203305
2233	395	2.596597096	39	1.59106461	2.73	0.43616265	28.81	1.459543
2239	1030	3.012837225	25	1.39794001	1.663	0.22089225	37.97	1.579441
2242	1117	3.048053173	28	1.44715803	1.8	0.25527251	36.61	1.5636
2243	966	2.984977126	47	1.67209786	2.74	0.43775056	36.36	1.560624
2433	709	2.850646235	59	1.77085201	3.08	0.48855072	20.99	1.322012
2434	576	2.760422483	50	1.69897	3.305	0.51917146	23.96	1.379487
2435	466	2.668385917	60	1.77815125	3.41	0.53275438	-1.11	NA
2436	599	2.777426822	48	1.68124124	3.06	0.48572143	19.38	1.287354
2440	651	2.813580989	59	1.77085201	3.16	0.49968708	31.66	1.500511
Average	**687.5**	**2.796014991**	**53.75**	**1.70400772**	**2.82933**	**0.44333947**	**28.629**	**1.446215**
t-stat	1.729	1.729	1.729	1.729	1.729	1.729	1.729	1.734
Std. Dev.	313.80	0.19	19.59	0.16	0.55	0.09	14.24	0.17
N	20.00	20.00	20.00	20.00	20.00	20.00	20.00	19.00
	131.53371 LPL	**2.451100629 LPL**	**19.046829 LPL**	**1.42775822 LPL**	**1.857707428 LPL**	**0.28454548 LPL**	**53.8553655 UPL**	**1.754871 UPL**
		282.5534592 (Untr LPL)		**26.7767722 (Untr LPL)**		**1.92550868 (Untr LPL)**		**56.86845 (Untr LPL)**
Wilk-Shapiro Test	R: 0.9574 P: 0.0867	R: 0.9880 P: > 0.10	R: 0.9656 P: > 0.10	R: 0.9926 P: > 0.10	R: 0.9640 P: > 0.10	R: 0.9479 P: 0.0455	R: 0.9746 P: > 0.10	R: 0.9877 P: > 0.10

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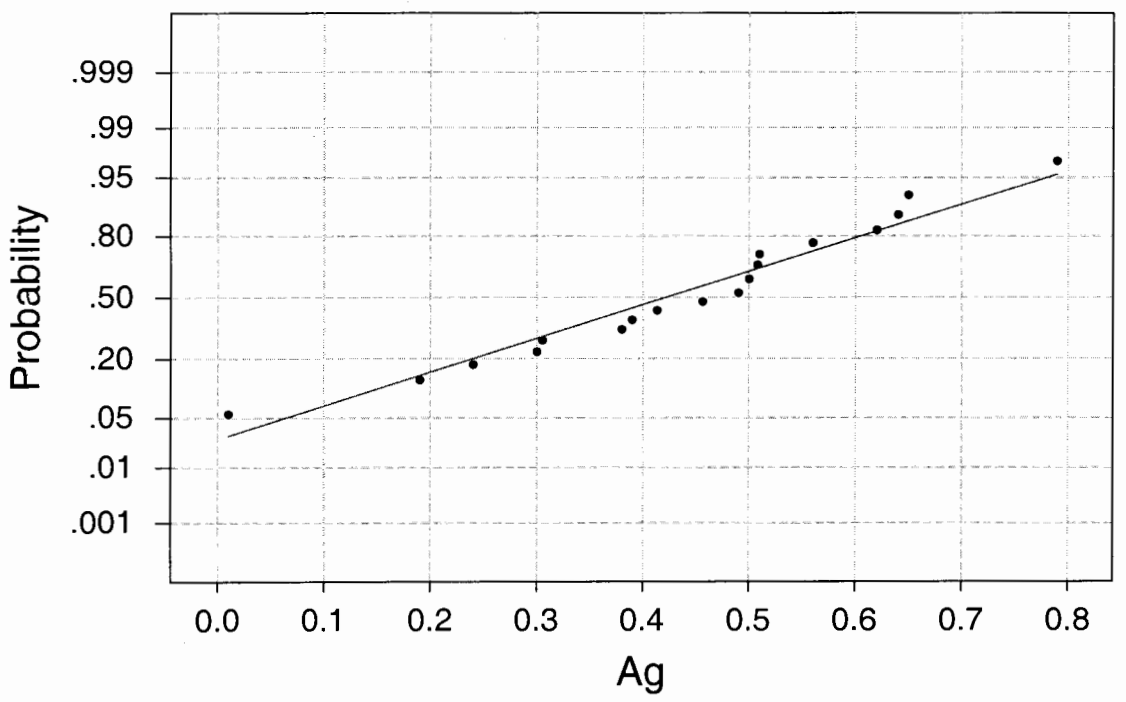
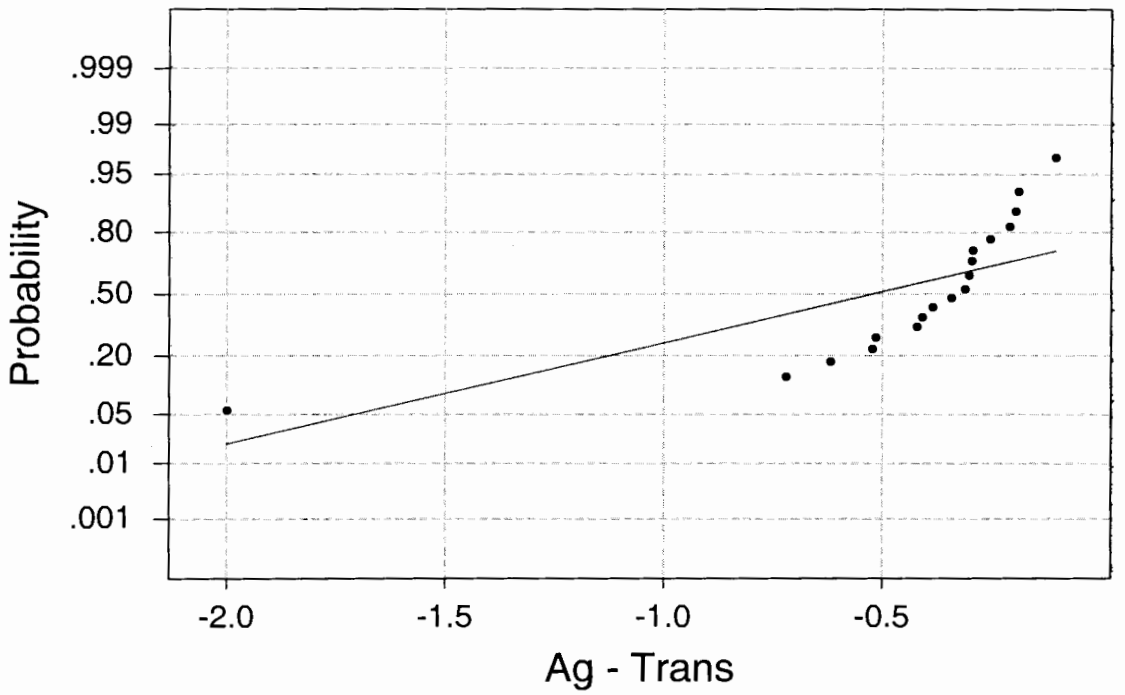
Normal Probability Plot



Average: 0.423075
StDev: 0.203102
N: 20

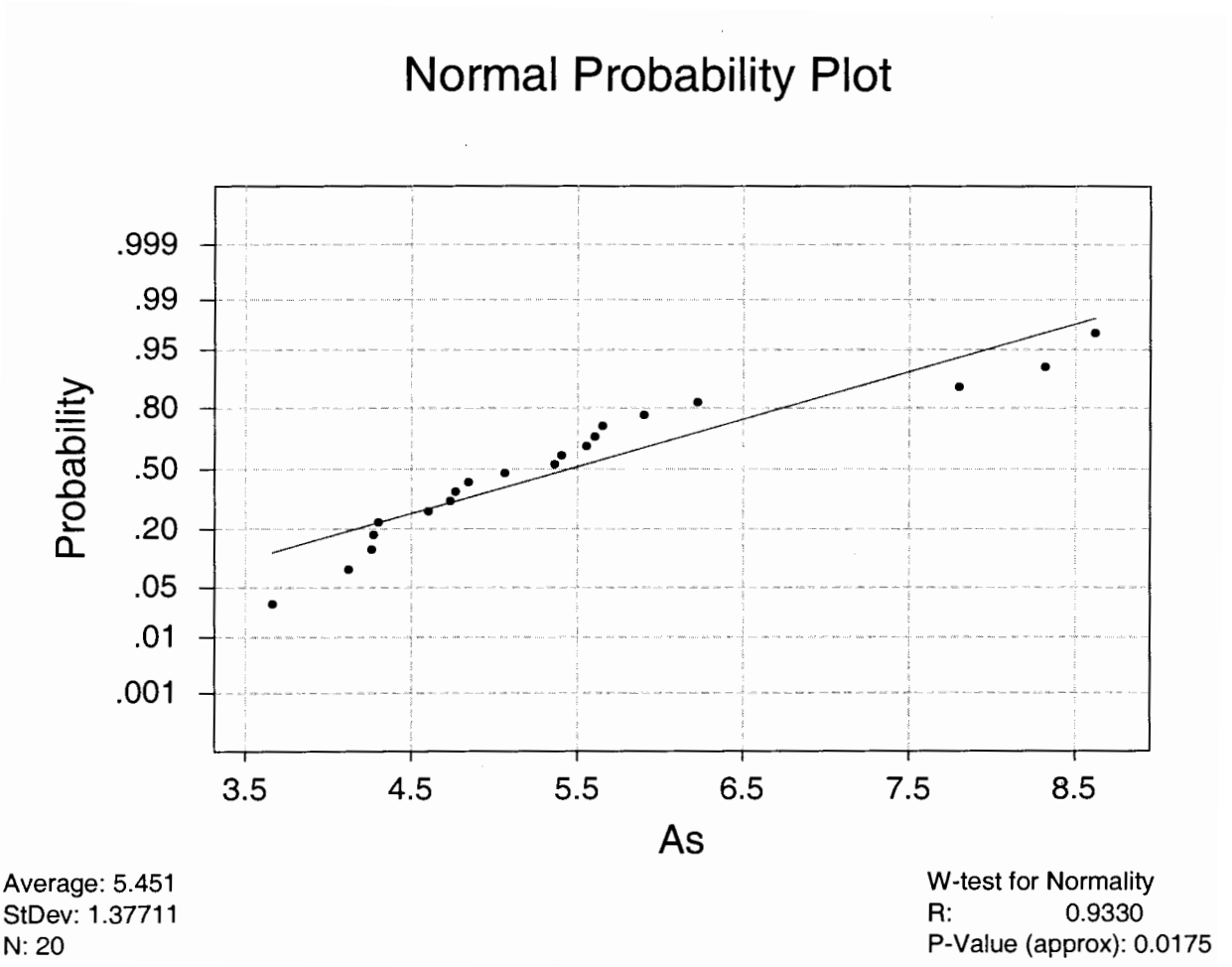
W-test for Normality
R: 0.9795
P-Value (approx): > 0.1000

Normal Probability Plot



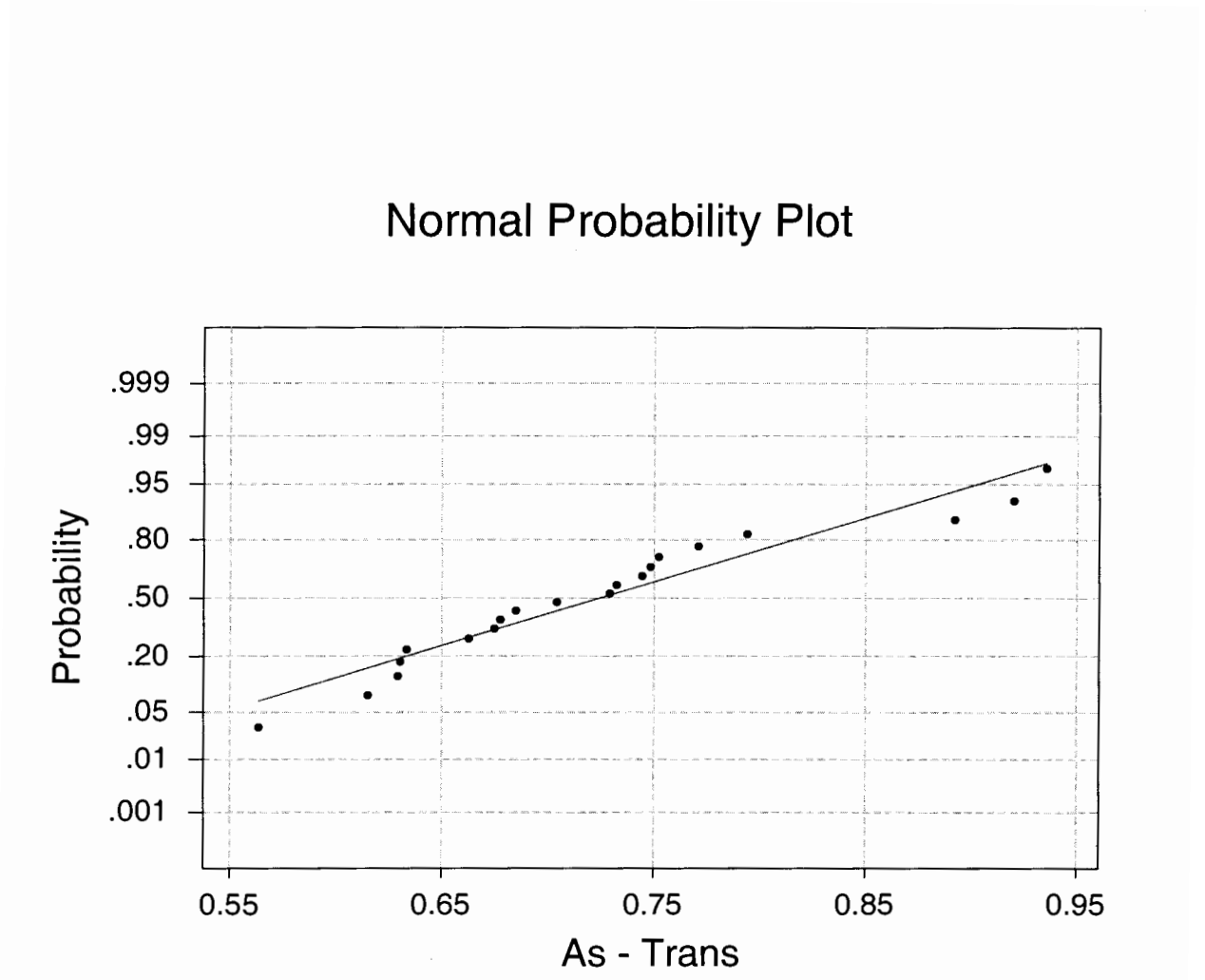
Average: -0.518763
StDev: 0.528546
N: 20

W-test for Normality
R: 0.7712
P-Value (approx): < 0.0100



Average: 5.451
StDev: 1.37711
N: 20

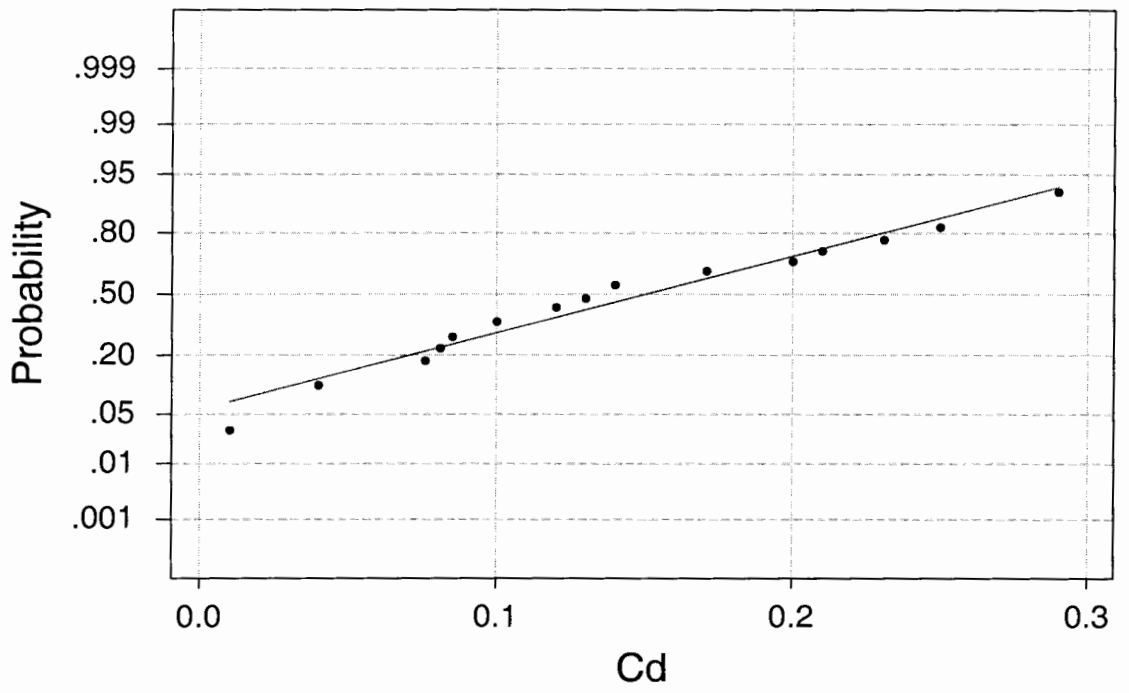
W-test for Normality
R: 0.9330
P-Value (approx): 0.0175



Average: 0.724718
StDev: 0.101101
N: 20

W-test for Normality
R: 0.9667
P-Value (approx): > 0.1000

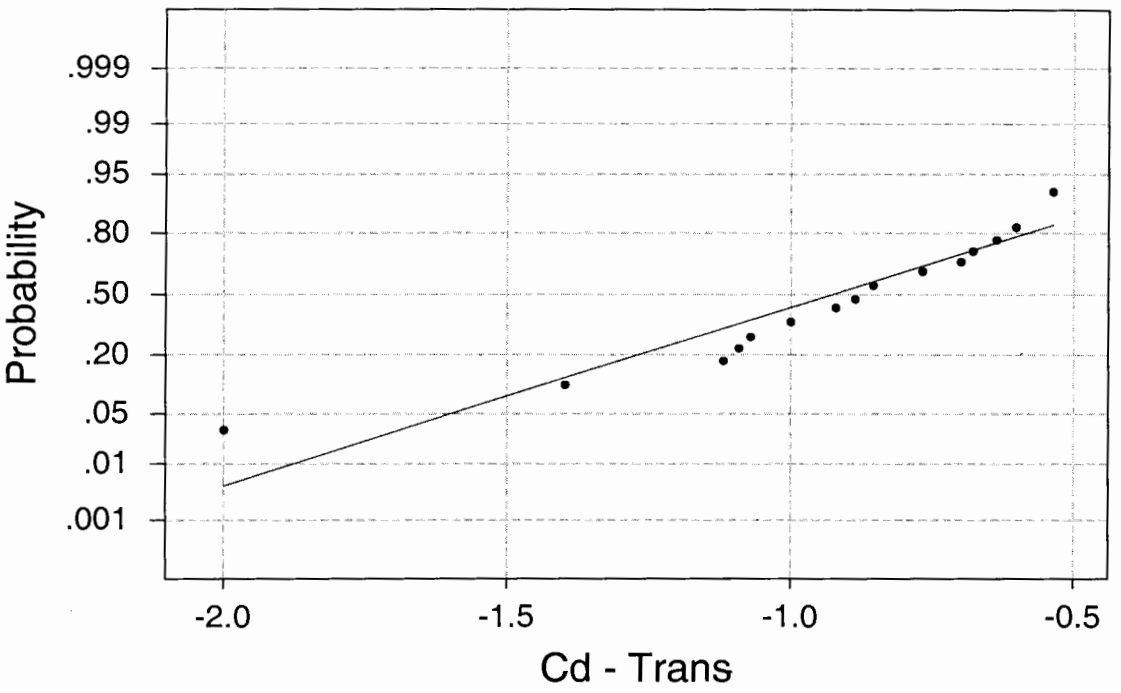
Normal Probability Plot



Average: 0.1497
StDev: 0.0878582
N: 20

W-test for Normality
R: 0.9864
P-Value (approx): > 0.1000

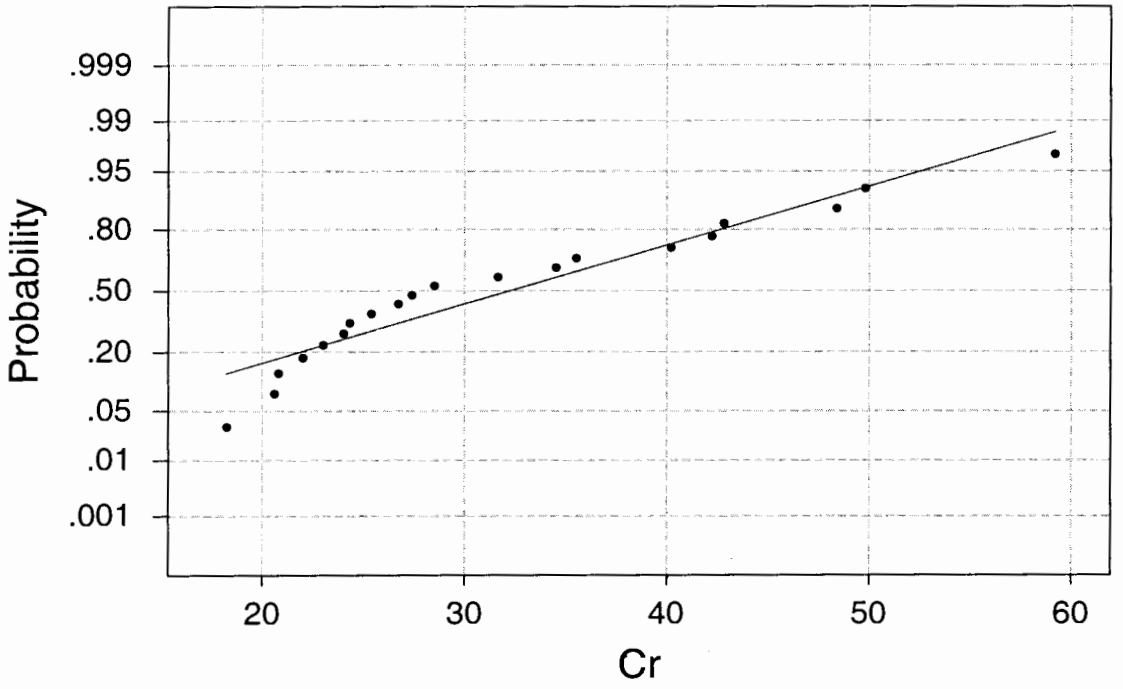
Normal Probability Plot



Average: -0.929340
StDev: 0.361802
N: 20

W-test for Normality
R: 0.9456
P-Value (approx): 0.0412

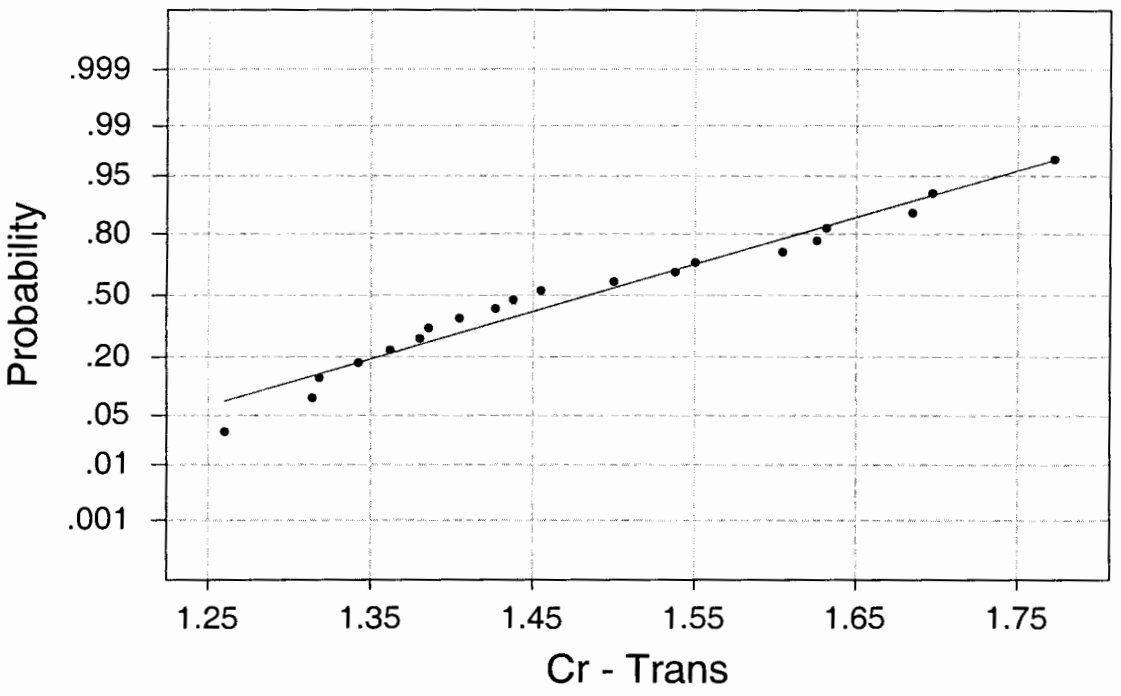
Normal Probability Plot



Average: 32.255
StDev: 11.4389
N: 20

W-test for Normality
R: 0.9577
P-Value (approx): 0.0885

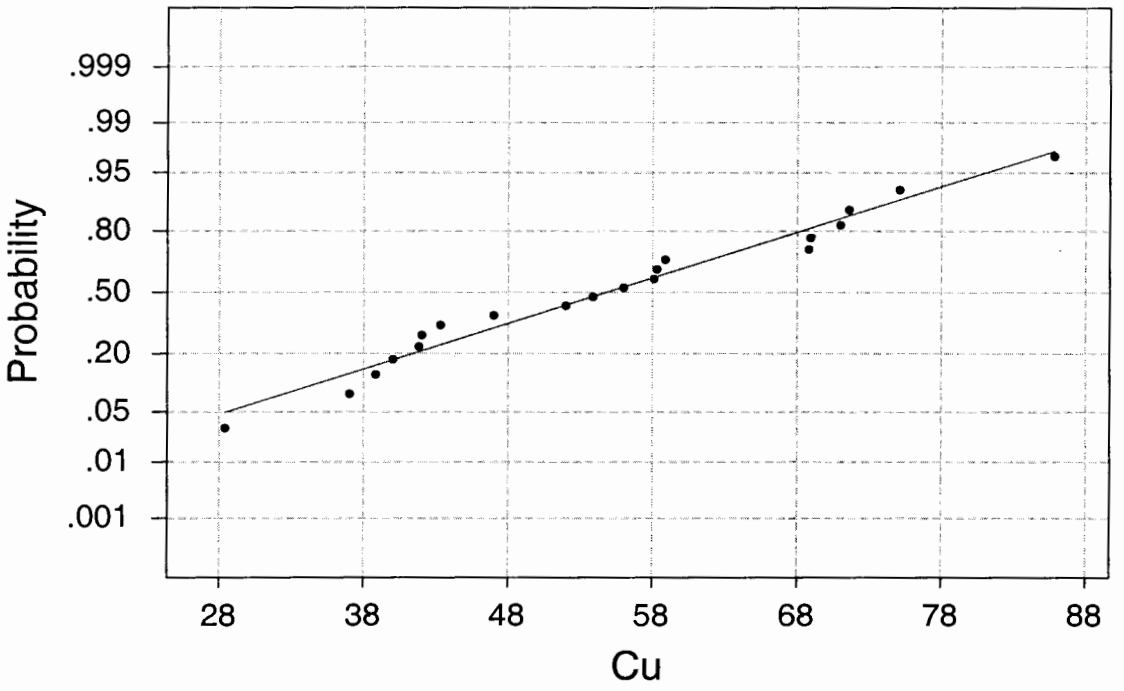
Normal Probability Plot



Average: 1.48445
StDev: 0.146405
N: 20

W-test for Normality
R: 0.9825
P-Value (approx): > 0.1000

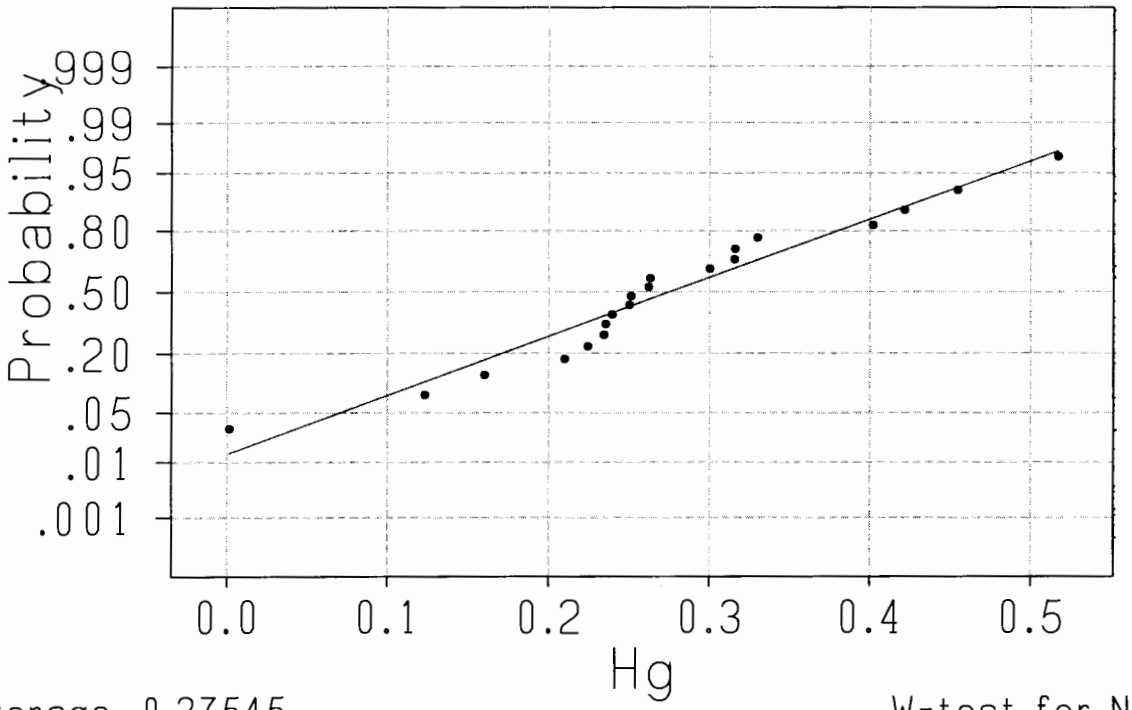
Normal Probability Plot



Average: 54.835
StDev: 15.1785
N: 20

W-test for Normality
R: 0.9861
P-Value (approx): > 0.1000

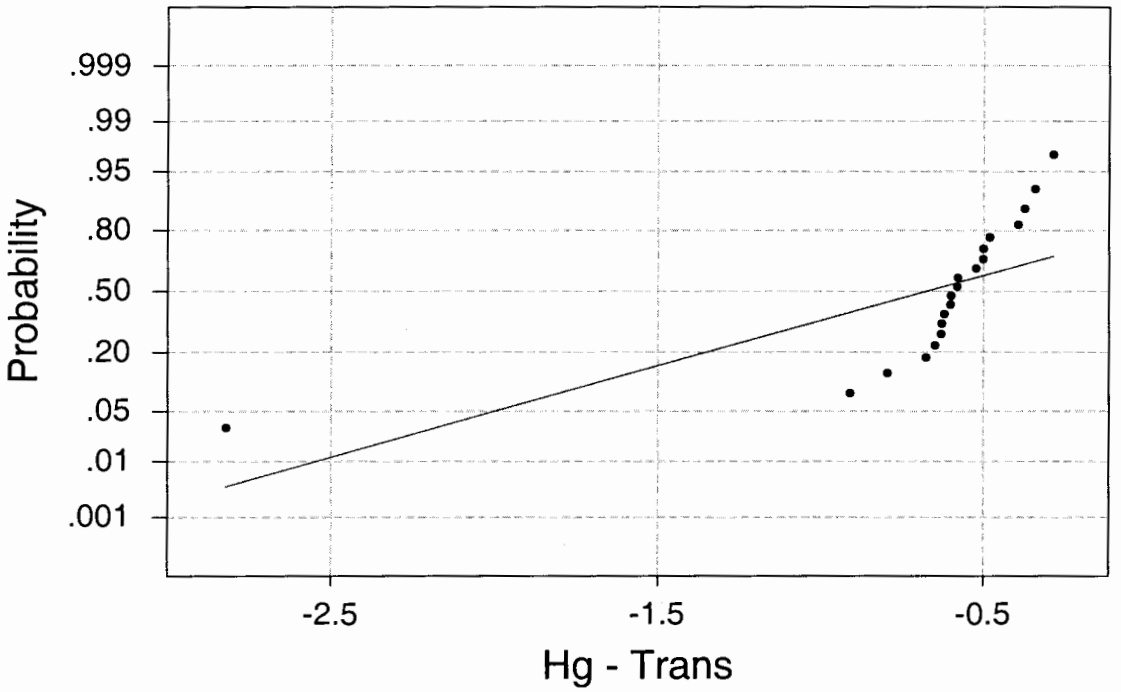
Normal Probability Plot



Average: 0.27545
StDev: 0.116842
N: 20

W-test for Normality
R: 0.9751
P-Value (approx): > 0.1

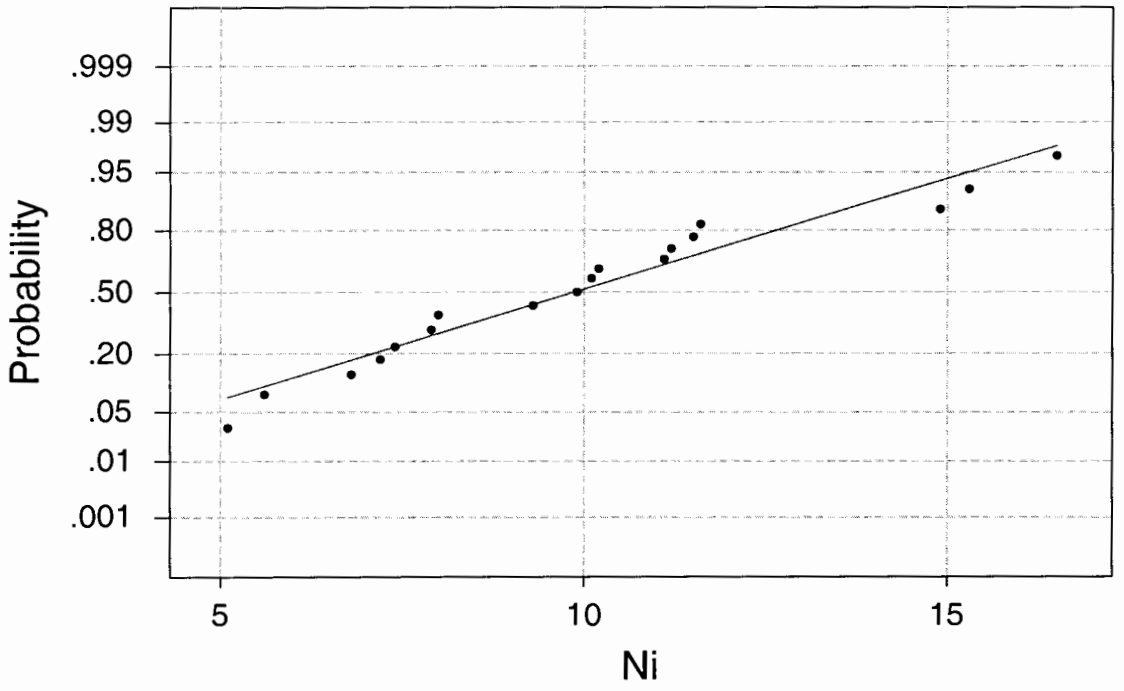
Normal Probability Plot



Average: -0.675425
StDev: 0.526888
N: 20

W-test for Normality
R: 0.6809
P-Value (approx): < 0.0100

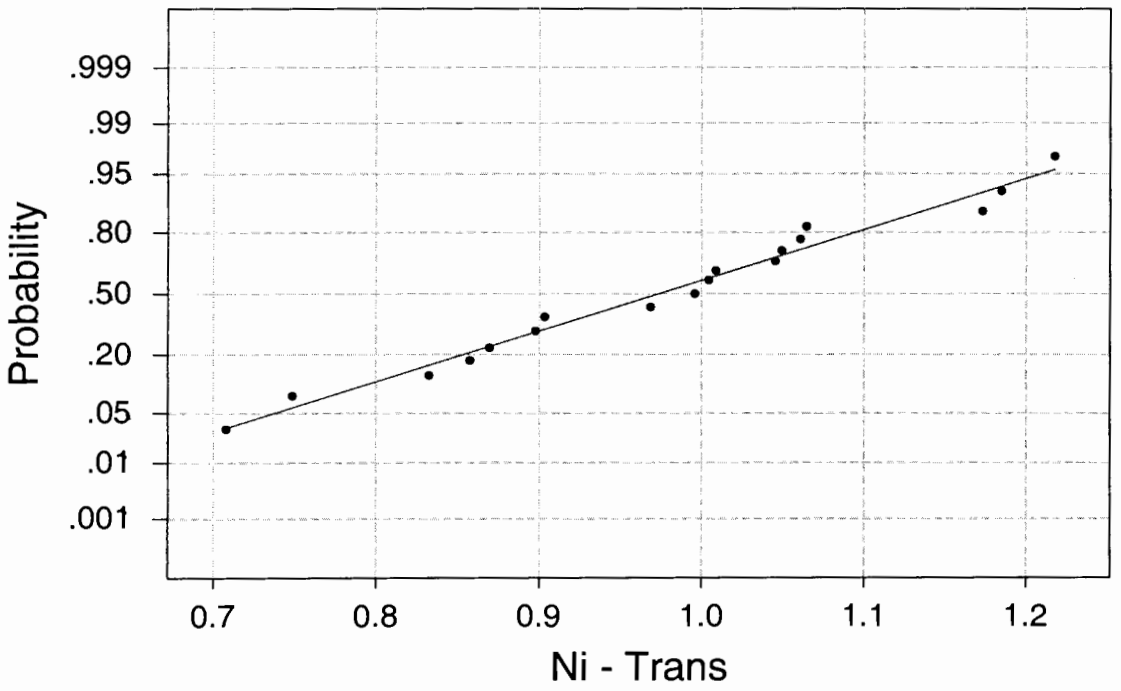
Normal Probability Plot



Average: 9.87
StDev: 3.10400
N: 20

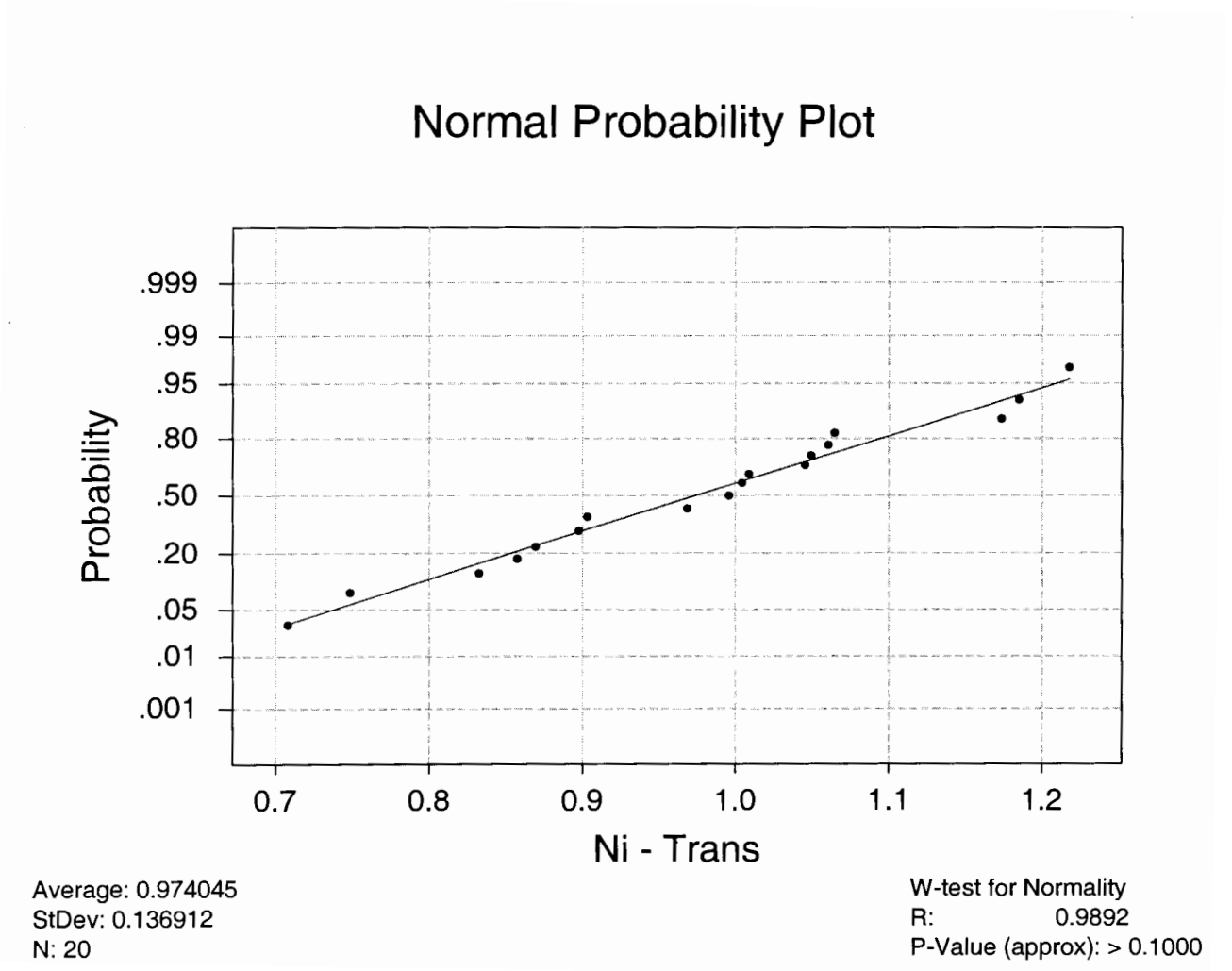
W-test for Normality
R: 0.9749
P-Value (approx): > 0.1000

Normal Probability Plot



Average: 0.974045
StDev: 0.136912
N: 20

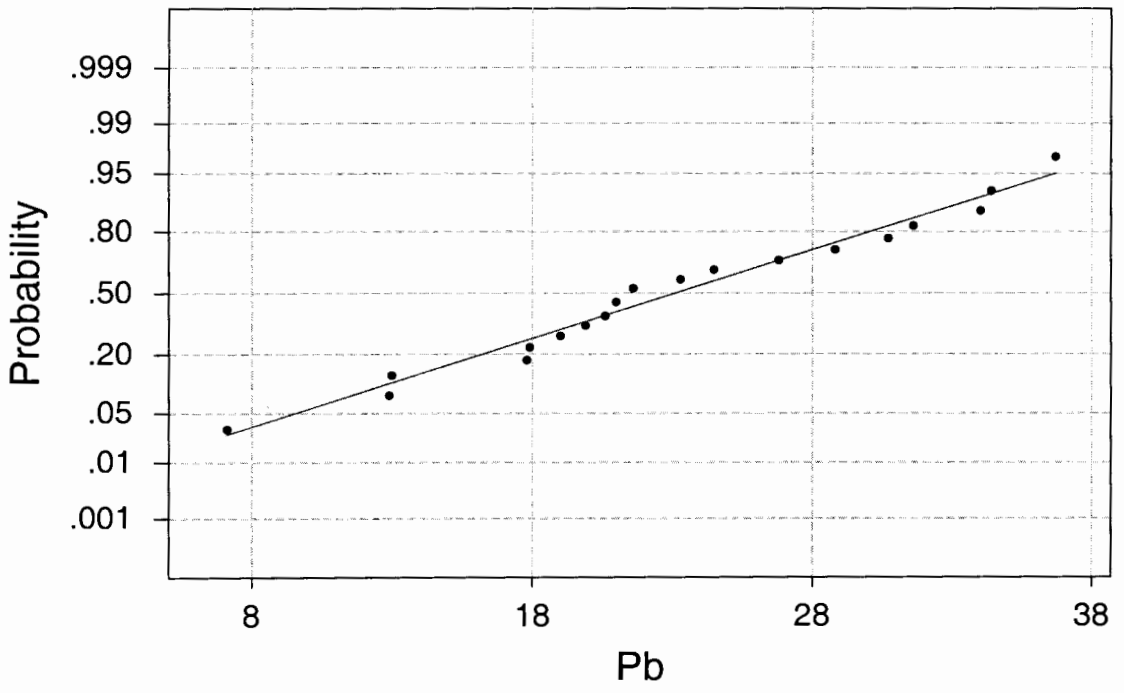
W-test for Normality
R: 0.9892
P-Value (approx): > 0.1000



Average: 0.974045
StDev: 0.136912
N: 20

W-test for Normality
R: 0.9892
P-Value (approx): > 0.1000

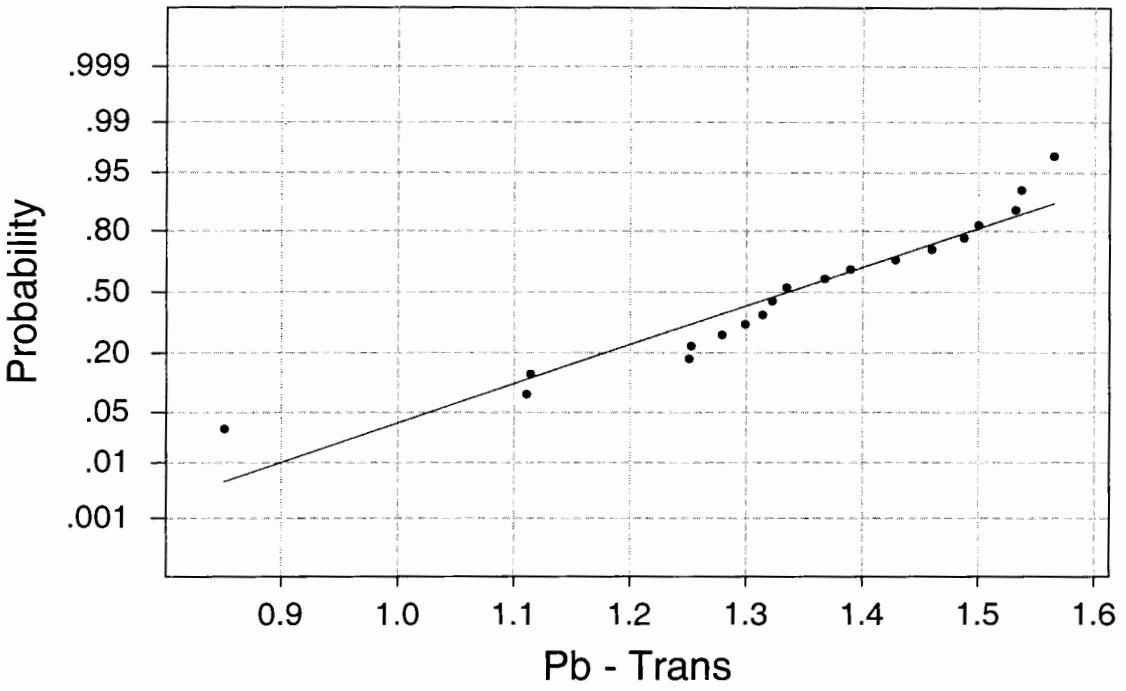
Normal Probability Plot



Average: 23.13
StDev: 7.85119
N: 20

W-test for Normality
R: 0.9879
P-Value (approx): > 0.1000

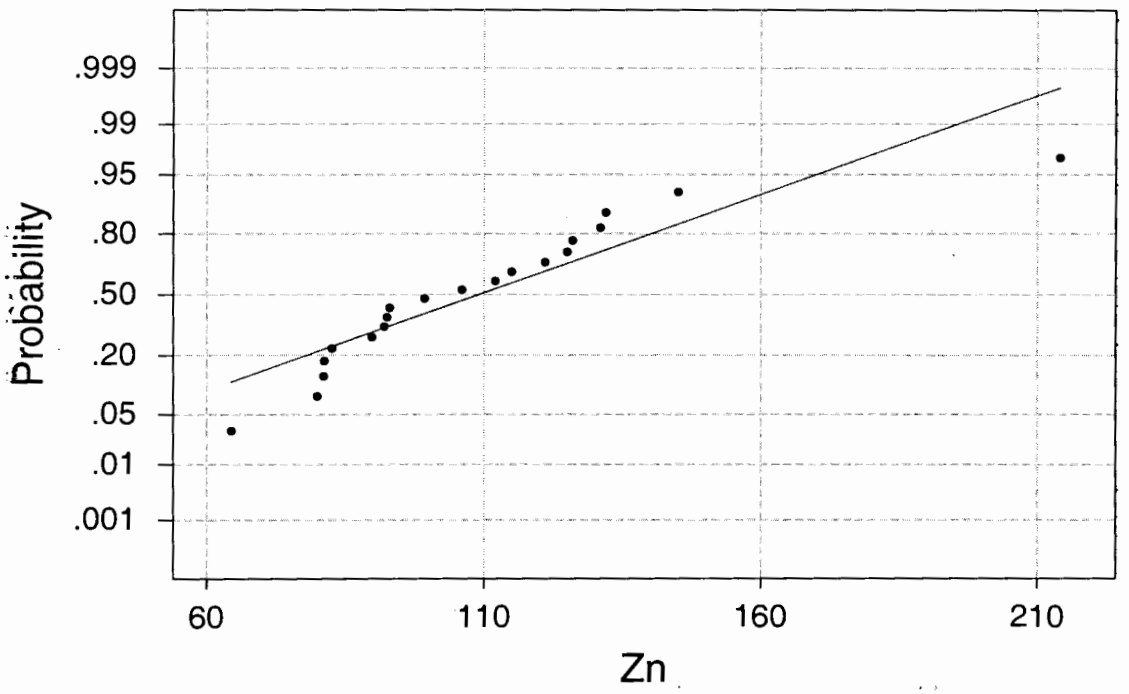
Normal Probability Plot



Average: 1.33565
StDev: 0.172099
N: 20

W-test for Normality
R: 0.9533
P-Value (approx): 0.0656

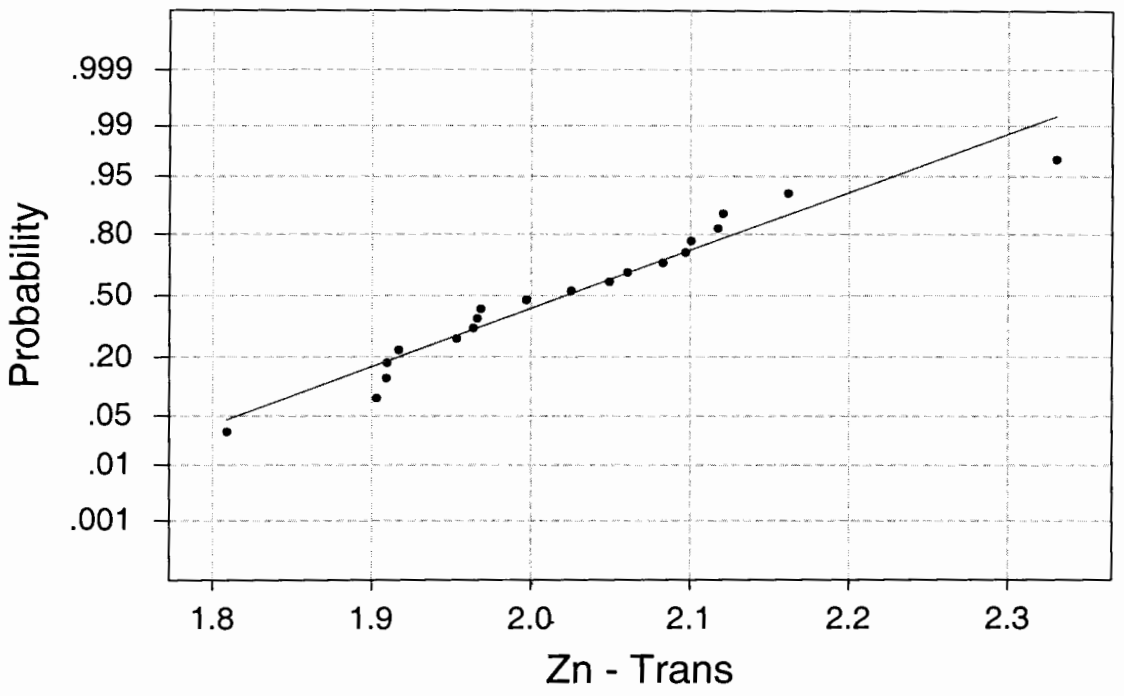
Normal Probability Plot



Average: 109.145
StDev: 32.7952
N: 20

W-test for Normality
R: 0.9179
P-Value (approx): < 0.0100

Normal Probability Plot



Average: 2.02205
StDev: 0.117373
N: 20

W-test for Normality
R: 0.9716
P-Value (approx): > 0.1000

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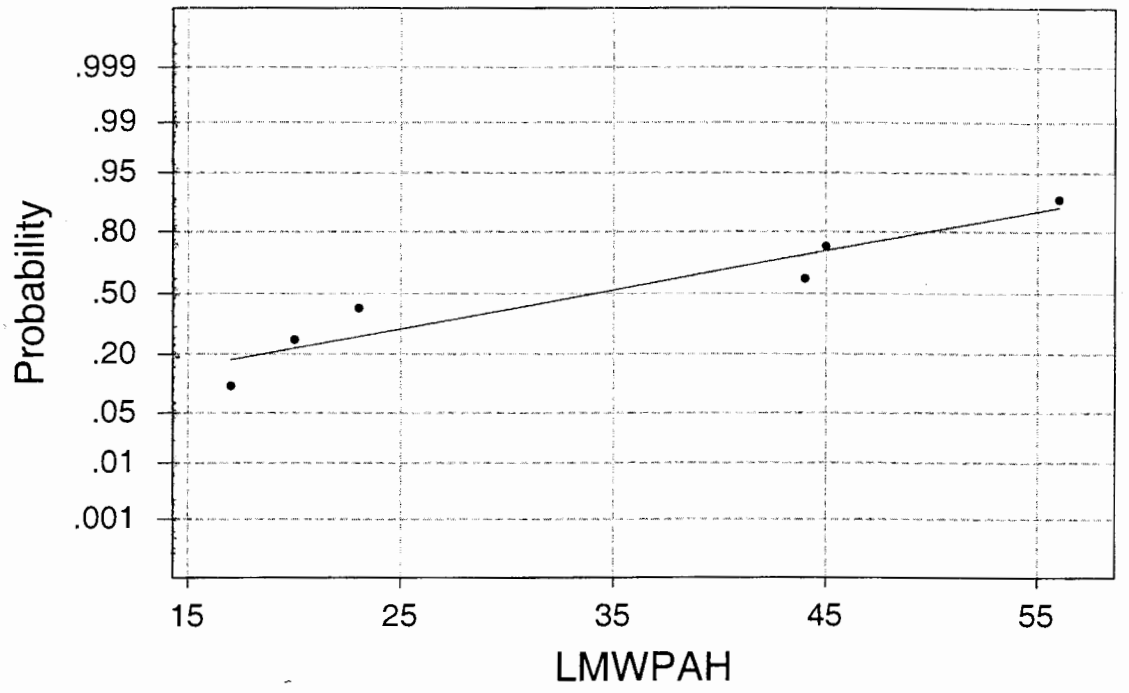
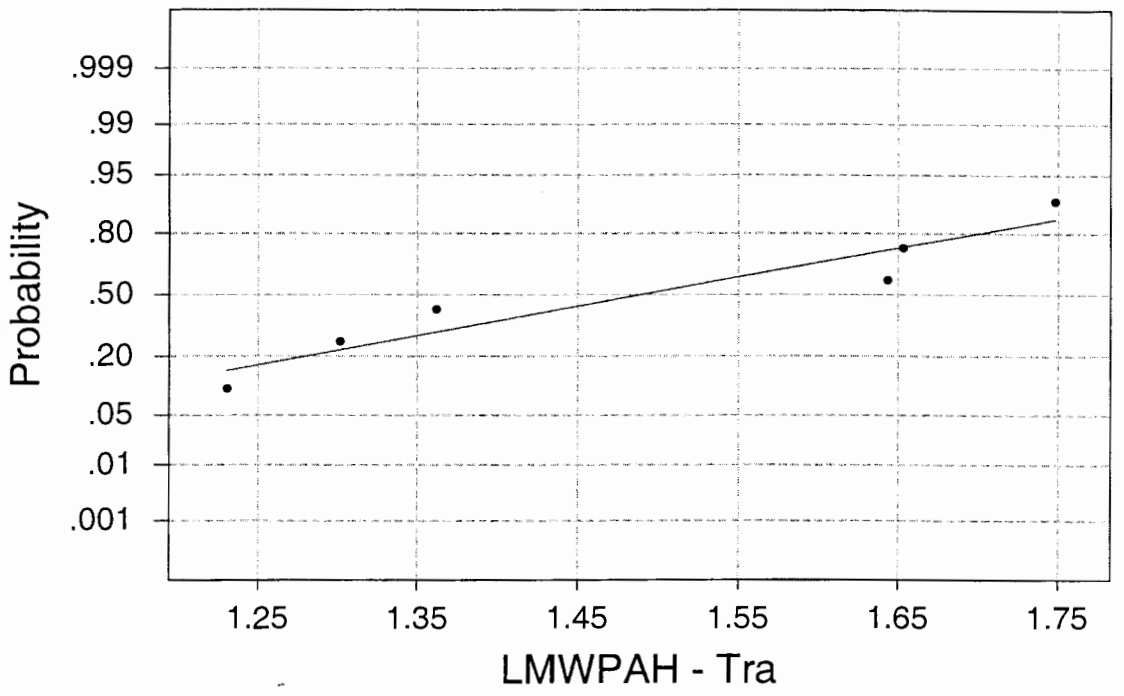
Normal Probability Plot



Average: 34.1667
StDev: 16.1916
N: 6

W-test for Normality
R: 0.9482
P-Value (approx): > 0.1000

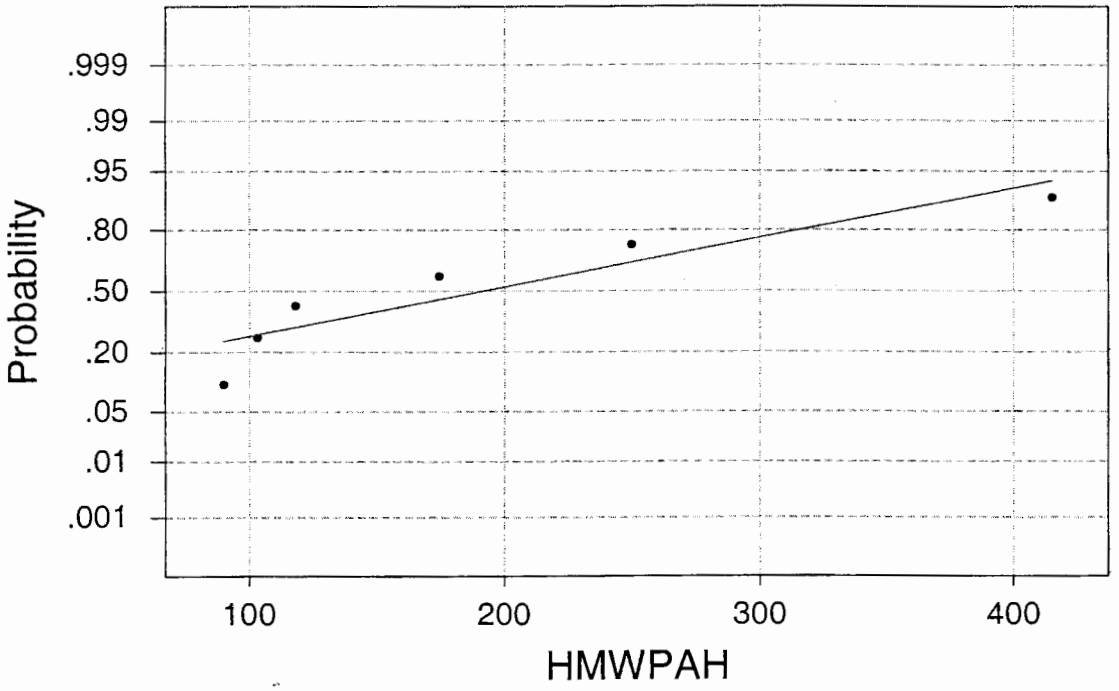
Normal Probability Plot



Average: 1.48968
StDev: 0.217429
N: 6

W-test for Normality
R: 0.9511
P-Value (approx): > 0.1000

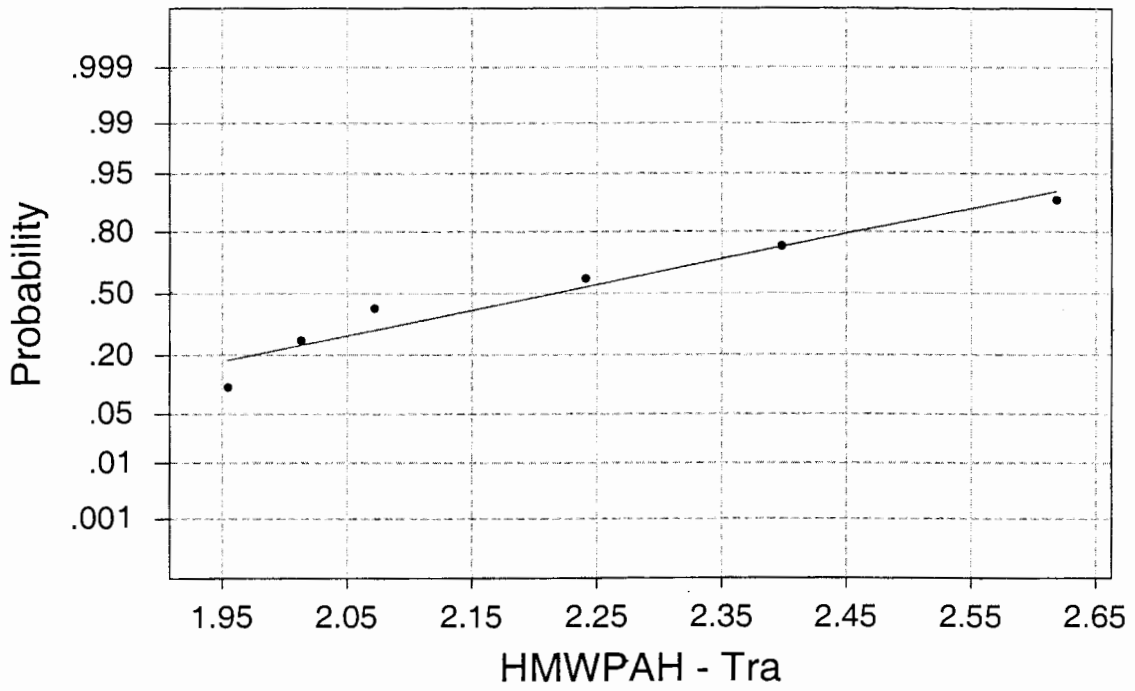
Normal Probability Plot



Average: 191.667
StDev: 124.272
N: 6

W-test for Normality
R: 0.9179
P-Value (approx): > 0.1000

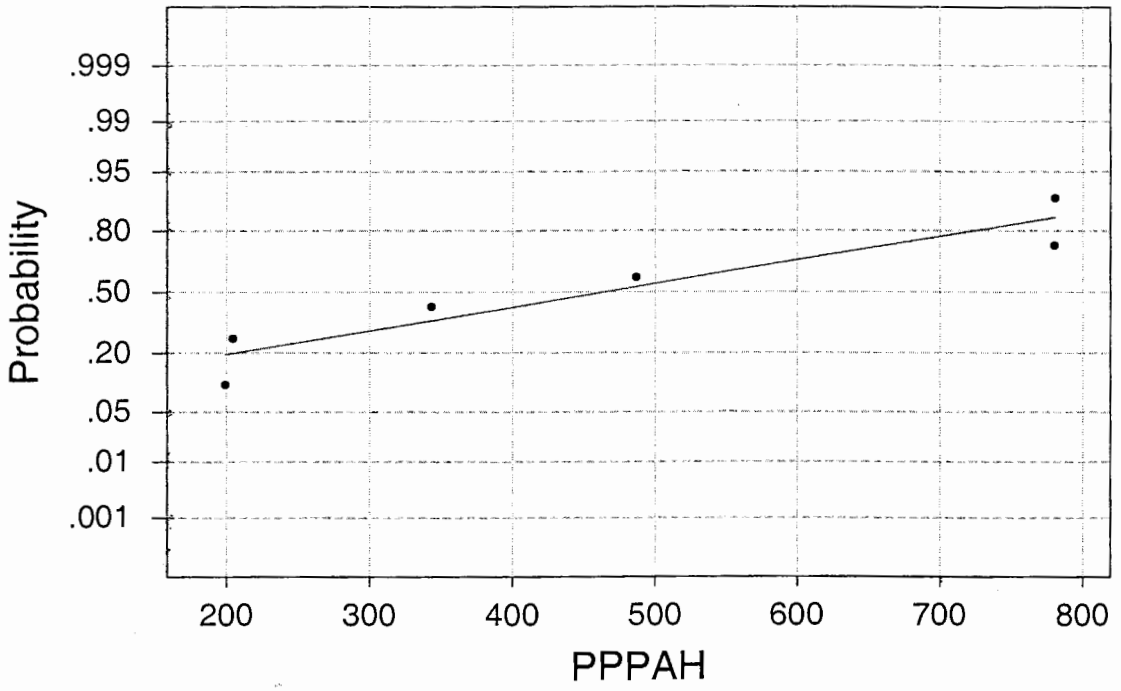
Normal Probability Plot



Average: 2.21592
StDev: 0.255307
N: 6

W-test for Normality
R: 0.9687
P-Value (approx): > 0.1000

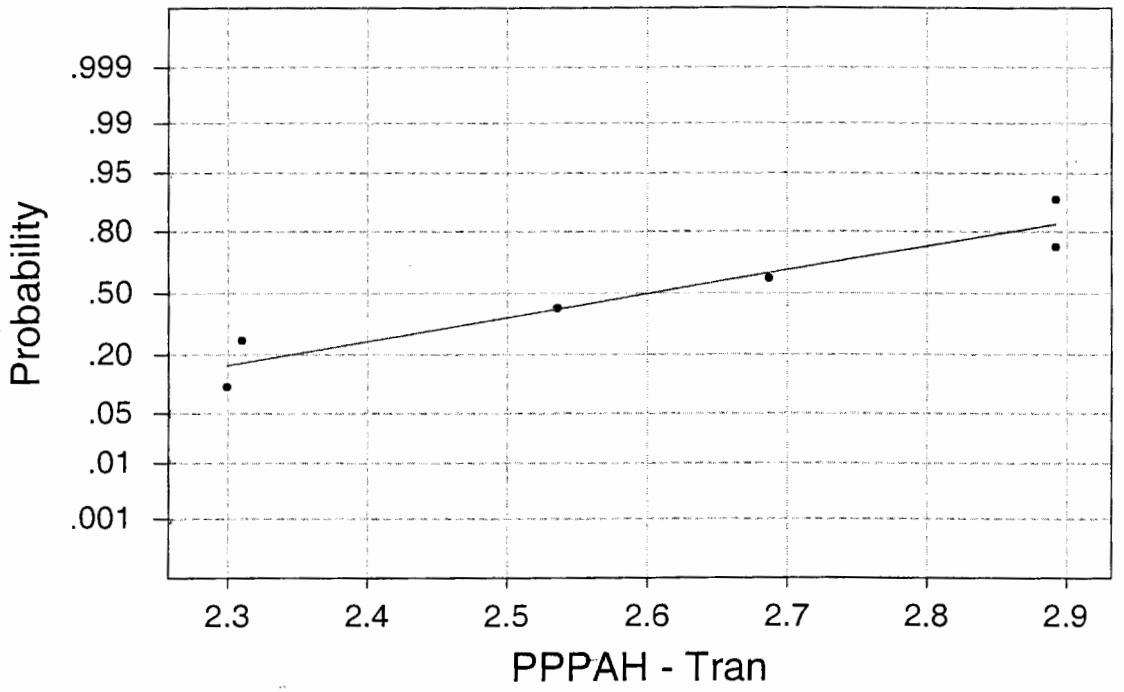
Normal Probability Plot



Average: 465.283
StDev: 265.504
N: 6

W-test for Normality
R: 0.9408
P-Value (approx): > 0.1000

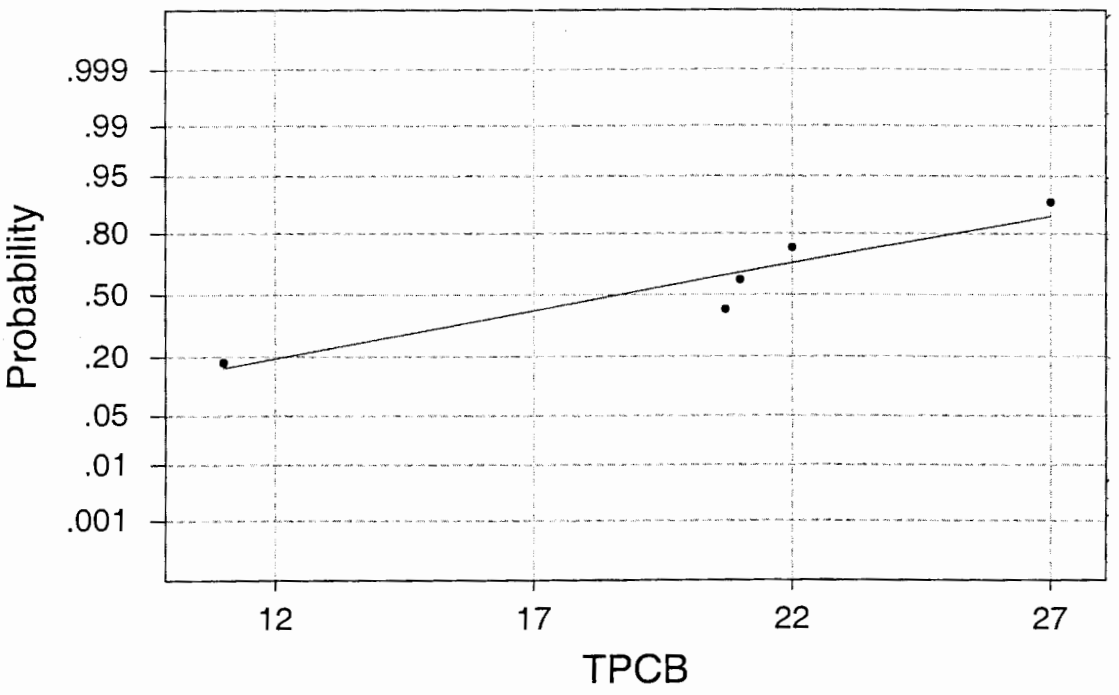
Normal Probability Plot



Average: 2.60241
StDev: 0.267284
N: 6

W-test for Normality
R: 0.9522
P-Value (approx): > 0.1000

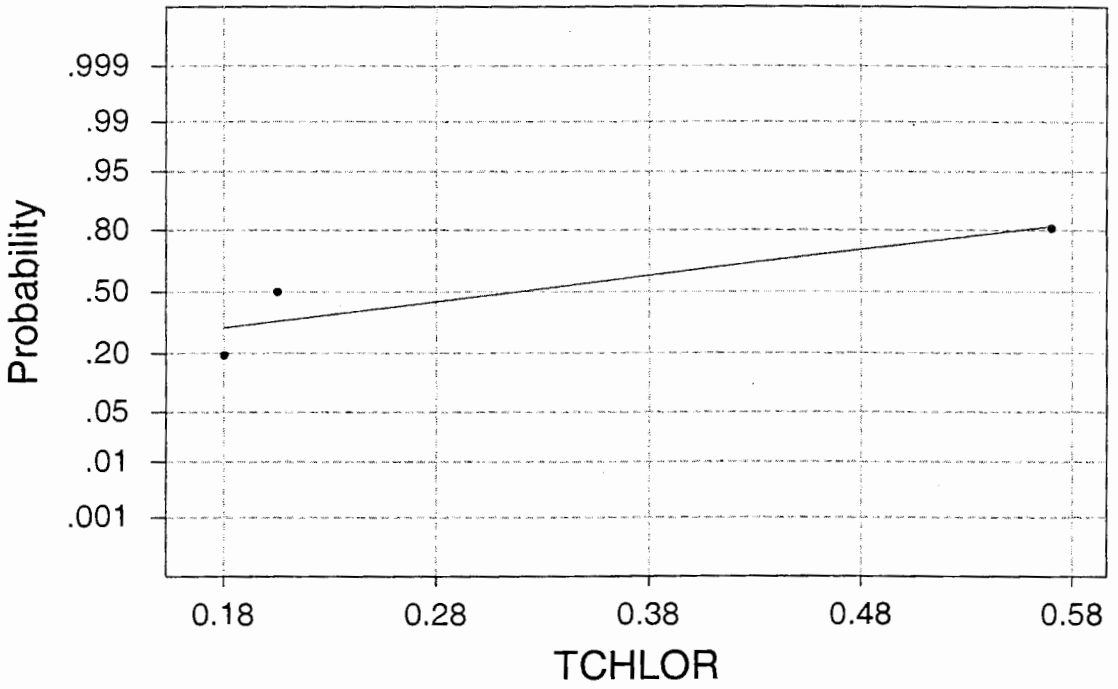
Normal Probability Plot



Average: 18.7858
StDev: 6.44463
N: 6

W-test for Normality
R: 0.9563
P-Value (approx): > 0.1000

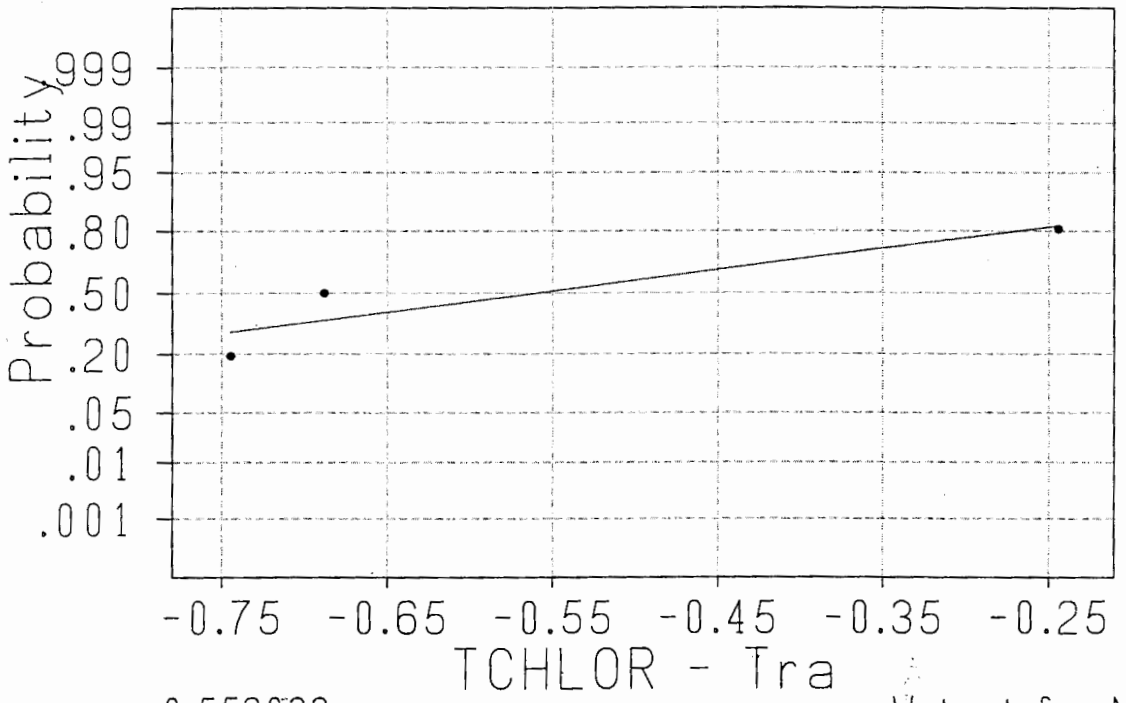
Normal Probability Plot



Average: 0.318333
StDev: 0.218308
N: 3

W-test for Normality
R: 0.8932
P-Value (approx): > 0.1000

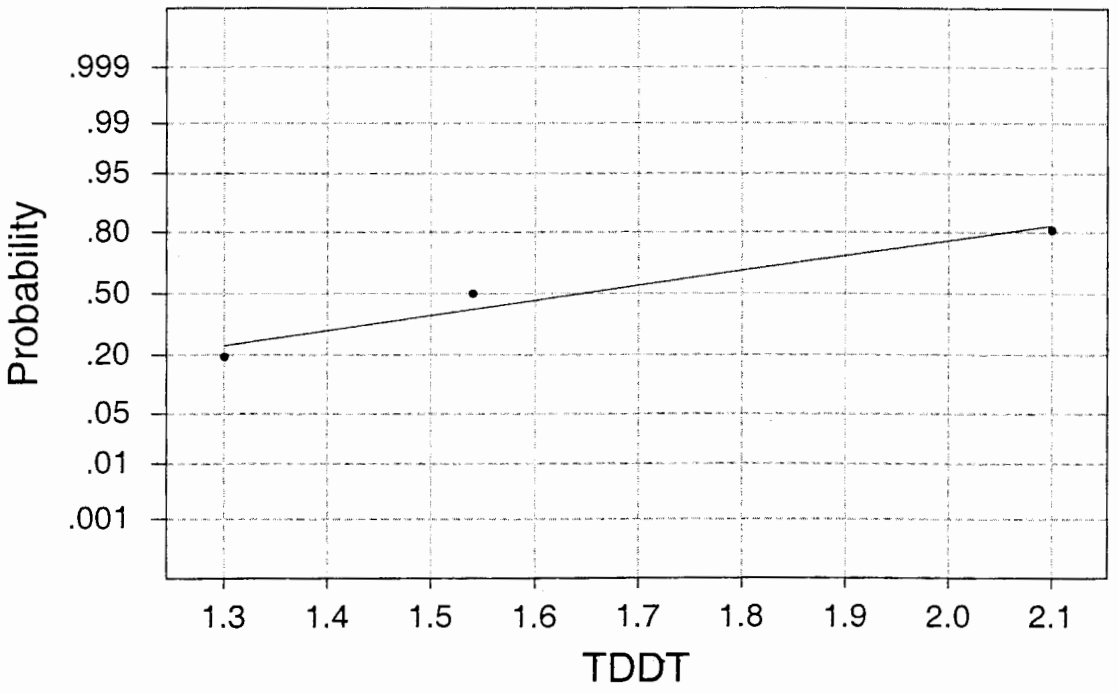
Normal Probability Plot



Average: -0.559033
StDev: 0.274176
N: 3

W-test for Normality
R: 0.9129
P-Value (approx): > 0.1

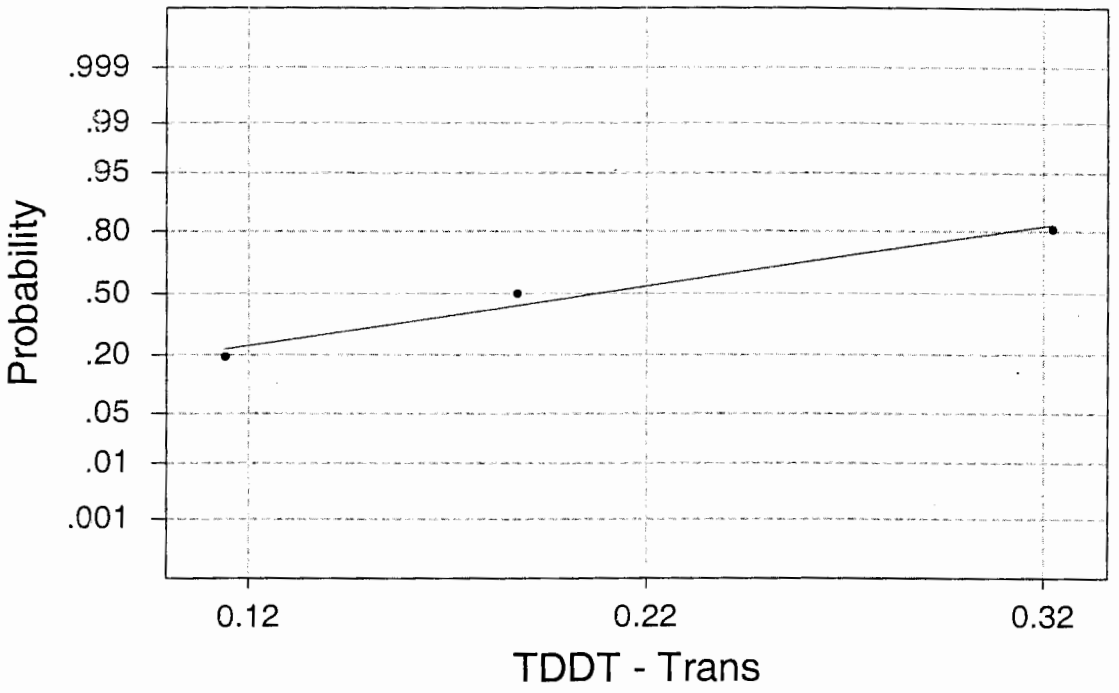
Normal Probability Plot



Average: 1.64667
StDev: 0.410528
N: 3

W-test for Normality
R: 0.9744
P-Value (approx): > 0.1000

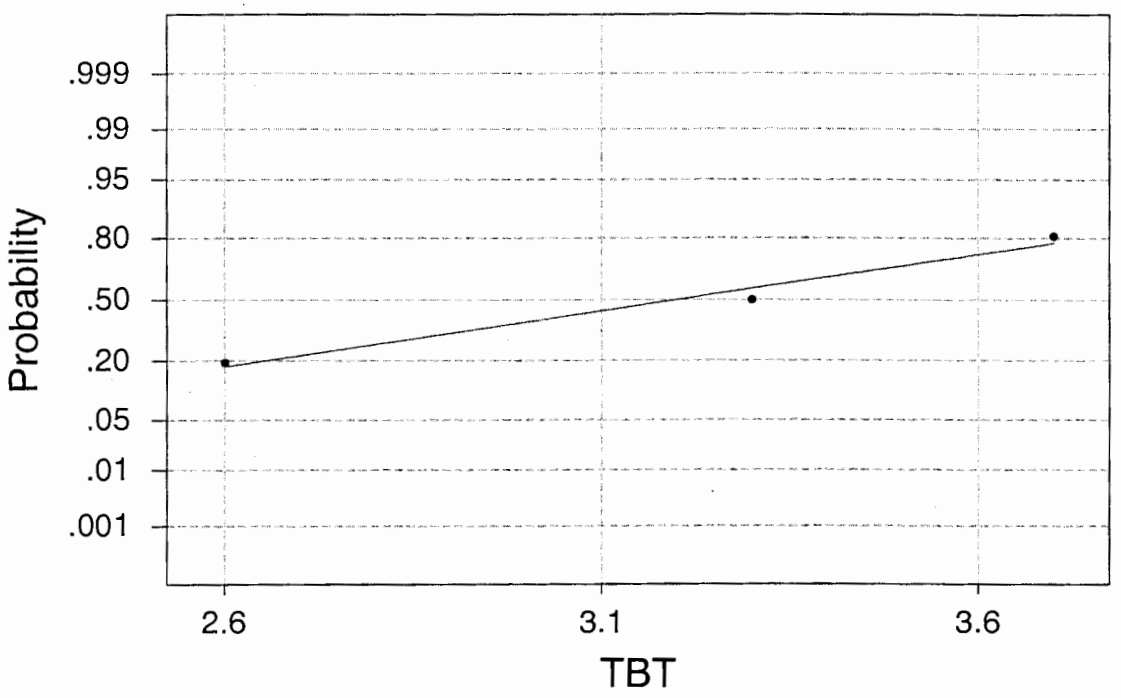
Normal Probability Plot



Average: 0.207894
StDev: 0.105622
N: 3

W-test for Normality
R: 0.9859
P-Value (approx): > 0.1000

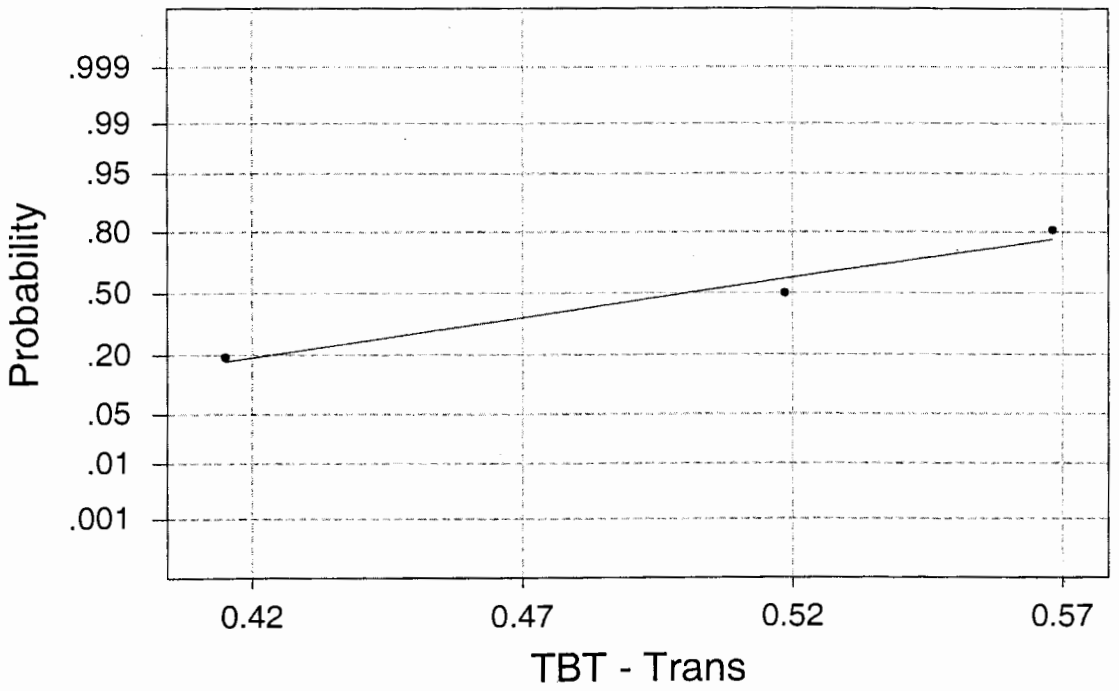
Normal Probability Plot



Average: 3.2
StDev: 0.556776
N: 3

W-test for Normality
R: 0.9878
P-Value (approx): > 0.1000

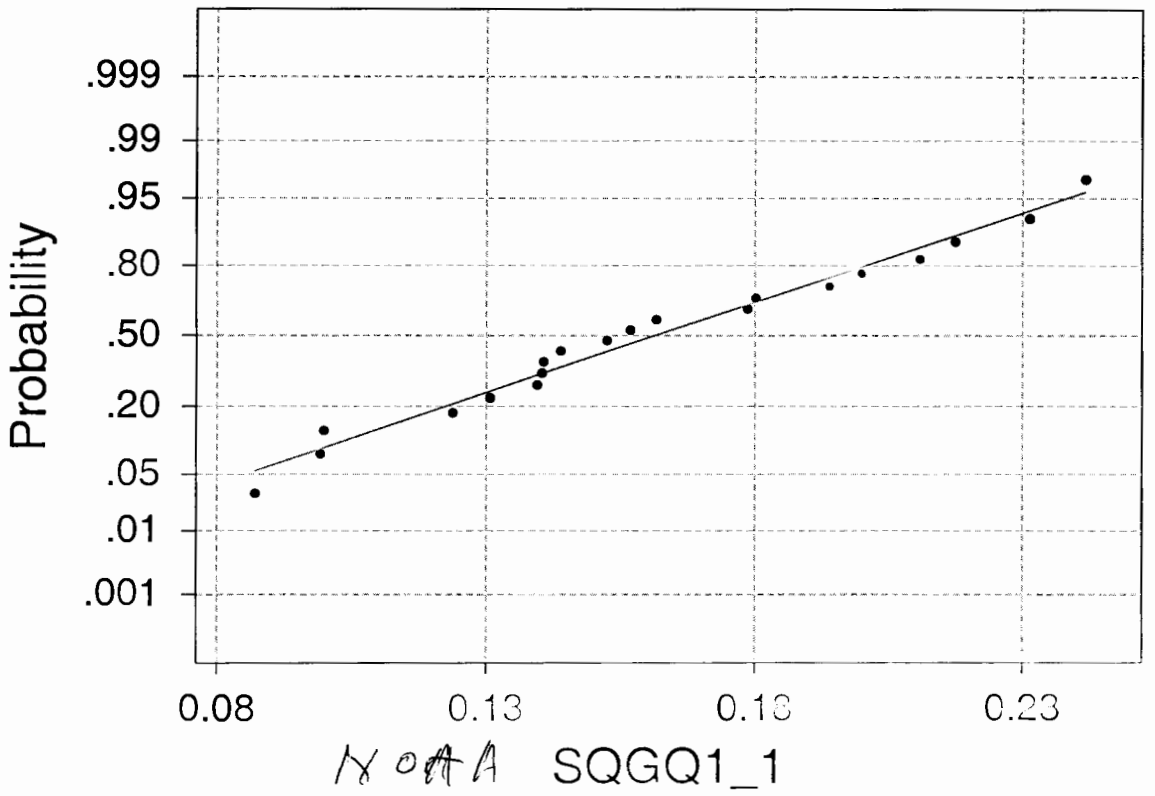
Normal Probability Plot



Average: 0.500563
StDev: 0.0781755
N: 3

W-test for Normality
R: 0.9800
P-Value (approx): > 0.1000

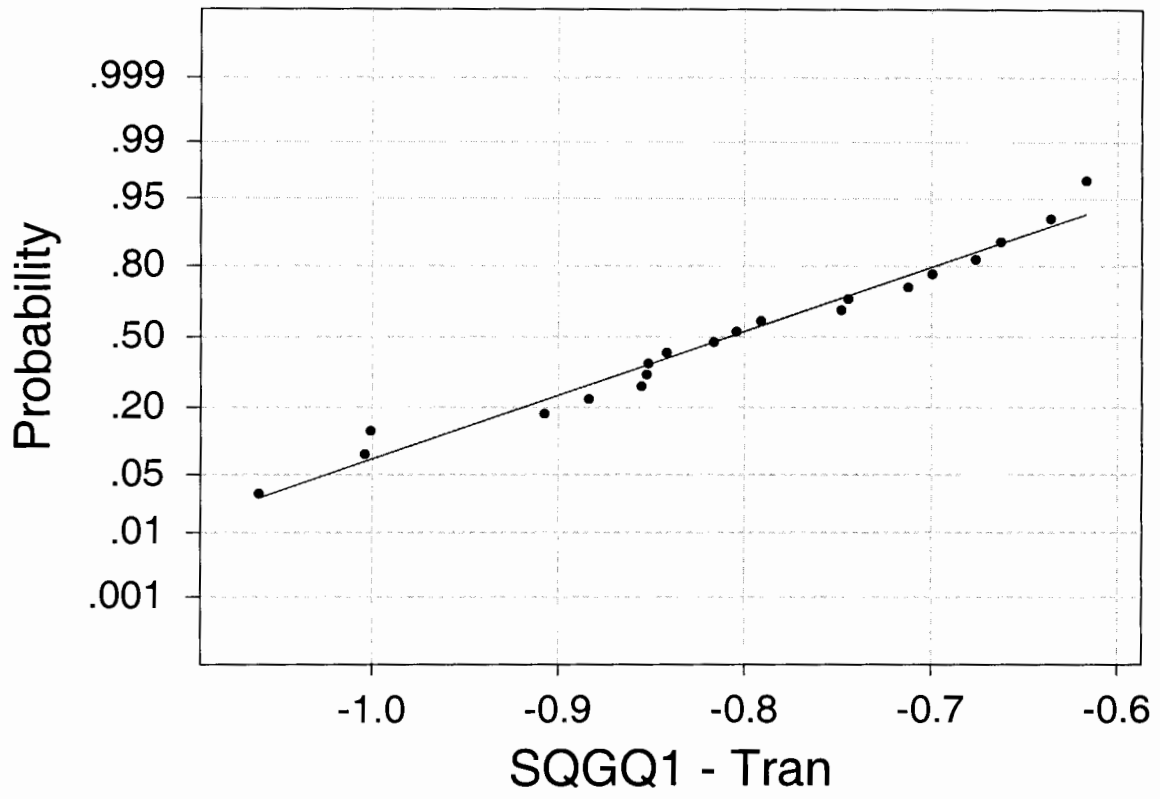
Normal Probability Plot



Average: 0.161474
StDev: 0.0443724
N: 20

Normality
0.9899
P-Value (approx): > 0.1000

Normal Probability Plot

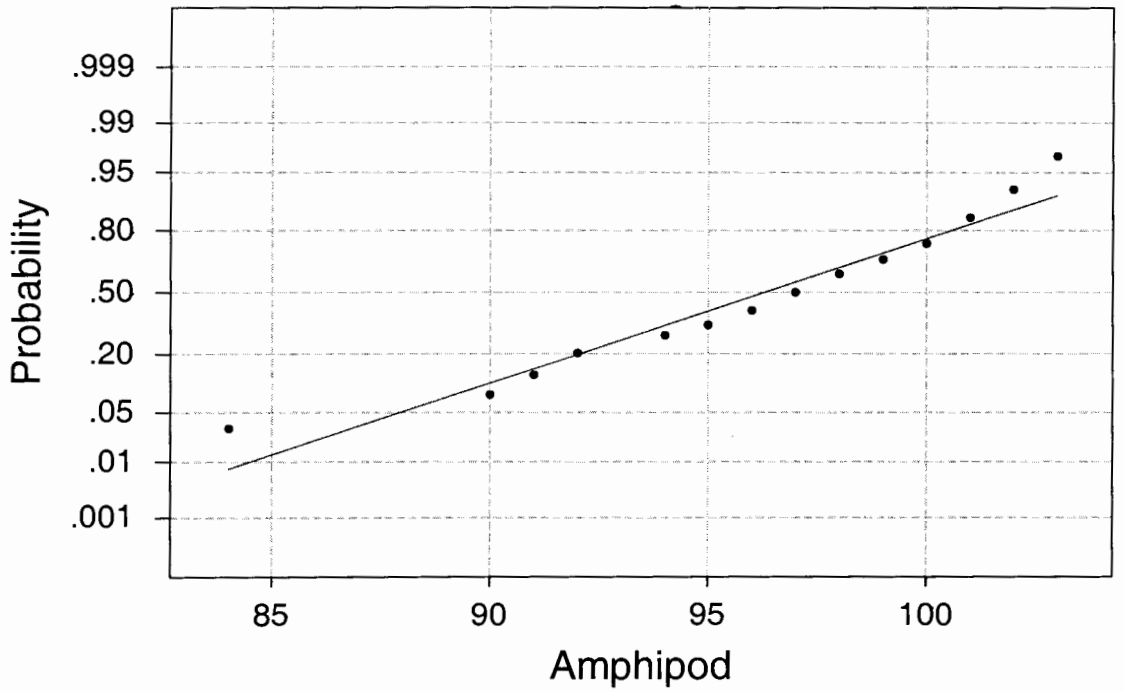


Average: -0.808324
StDev: 0.124789
N: 20

W-test for Normality
R: 0.9861
P-Value (approx): > 0.1000

NOAA

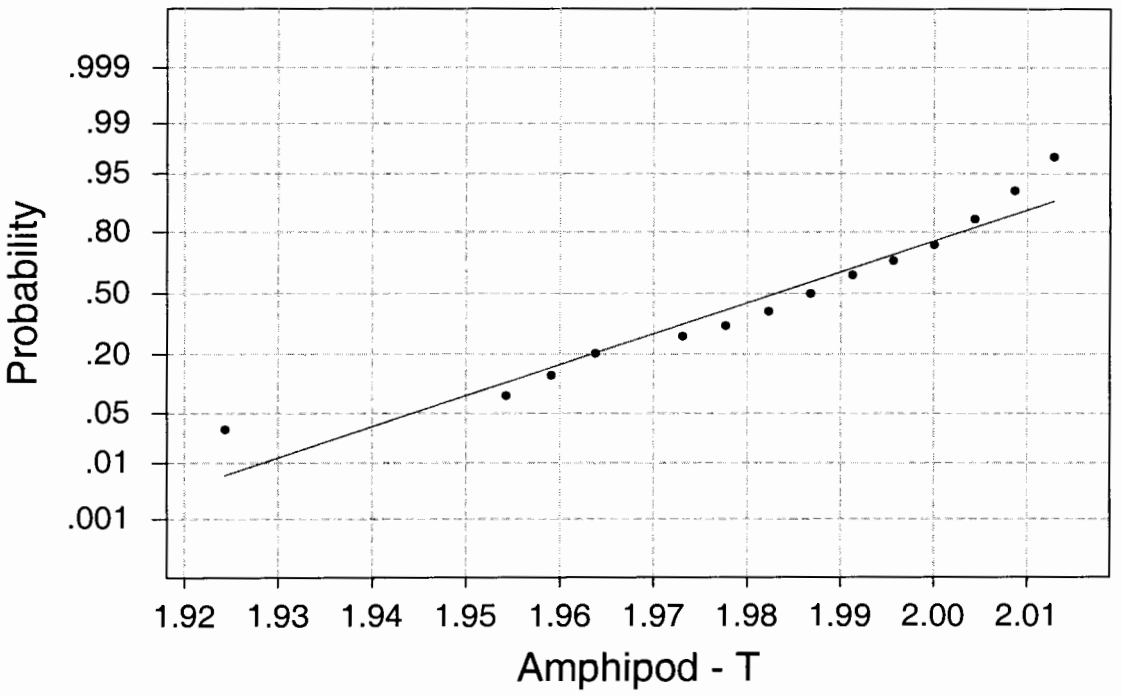
Normal Probability Plot



Average: 96.3
StDev: 4.73620
N: 20

W-test for Normality
R: 0.9730
P-Value (approx): > 0.1000

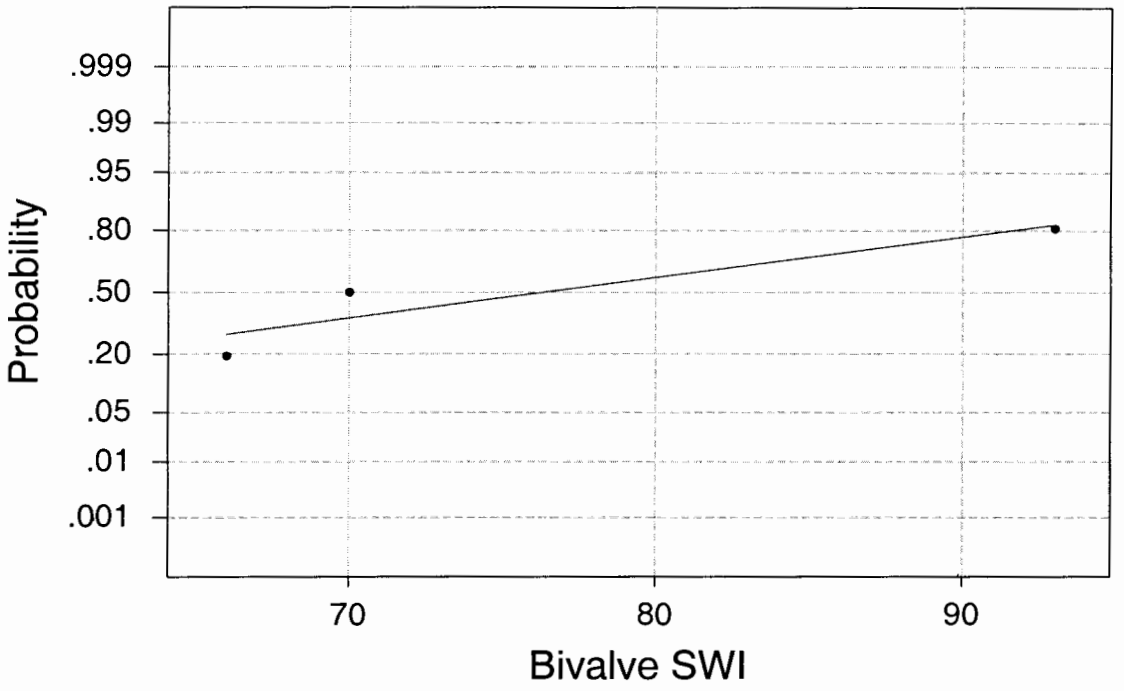
Normal Probability Plot



Average: 1.98311
StDev: 0.0218484
N: 20

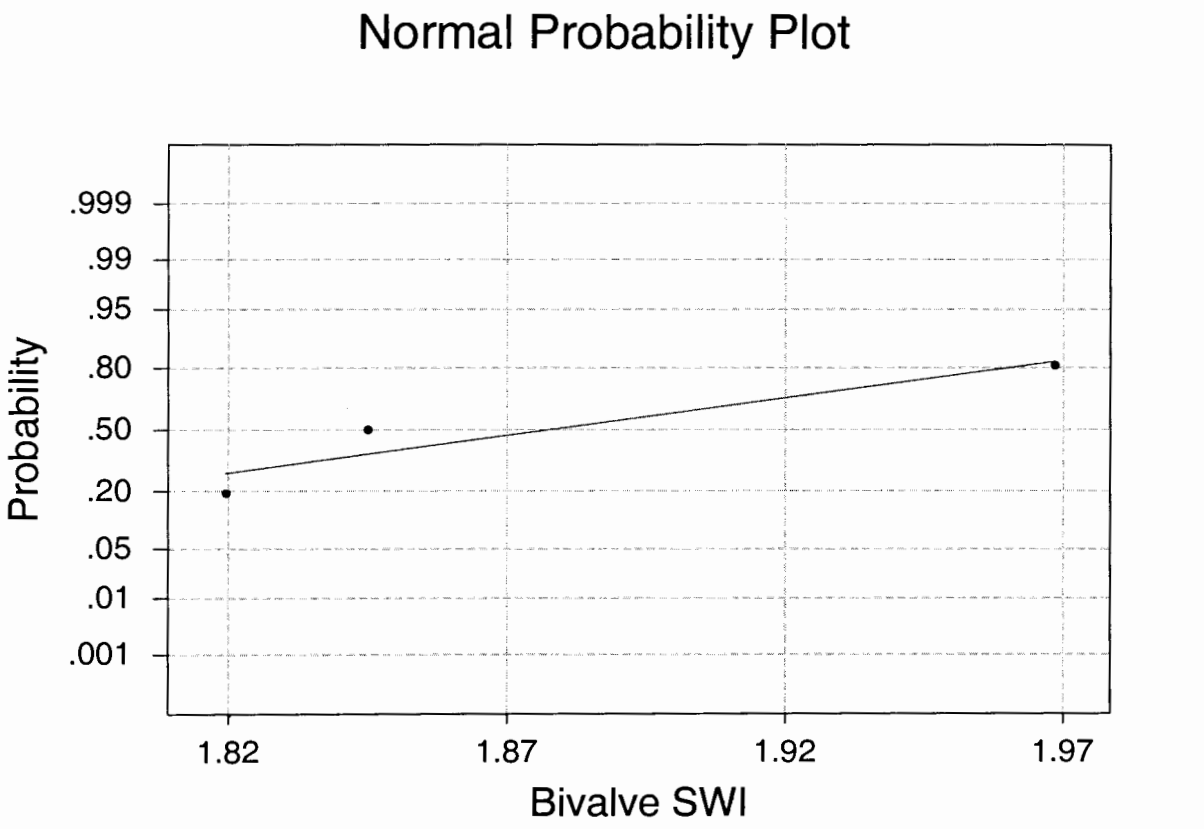
W-test for Normality
R: 0.9656
P-Value (approx): > 0.1000

Normal Probability Plot



Average: 76.3333
StDev: 14.5717
N: 3

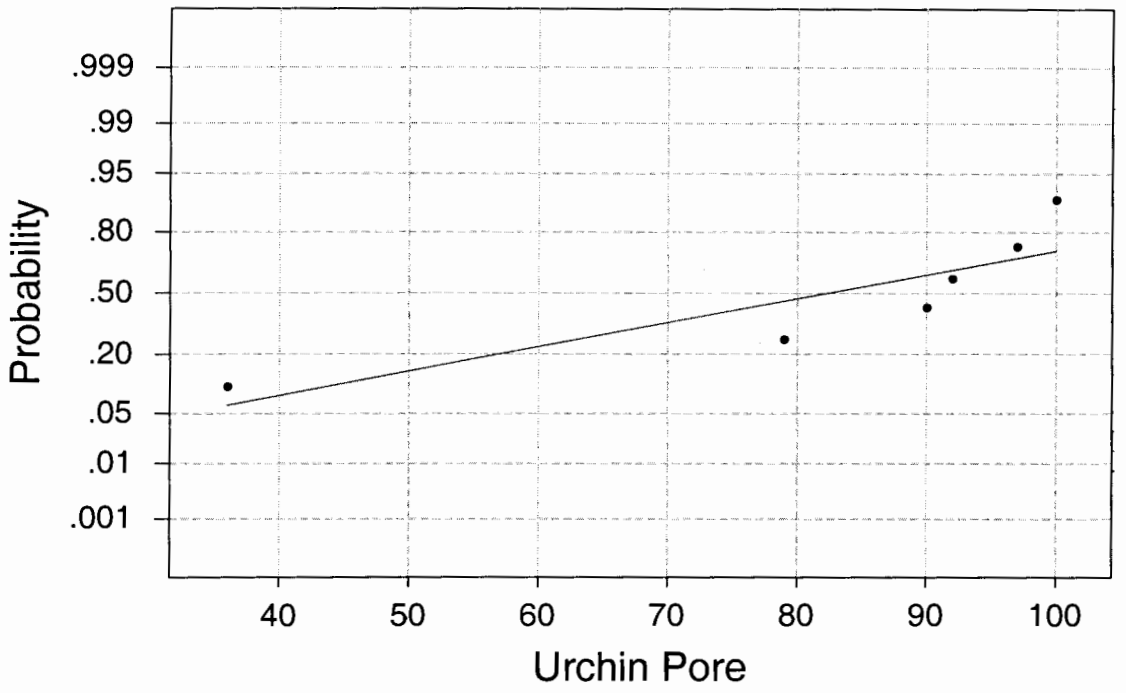
W-test for Normality
R: 0.9265
P-Value (approx): > 0.1000



Average: 1.87771
StDev: 0.0796447
N: 3

W-test for Normality
R: 0.9350
P-Value (approx): > 0.1000

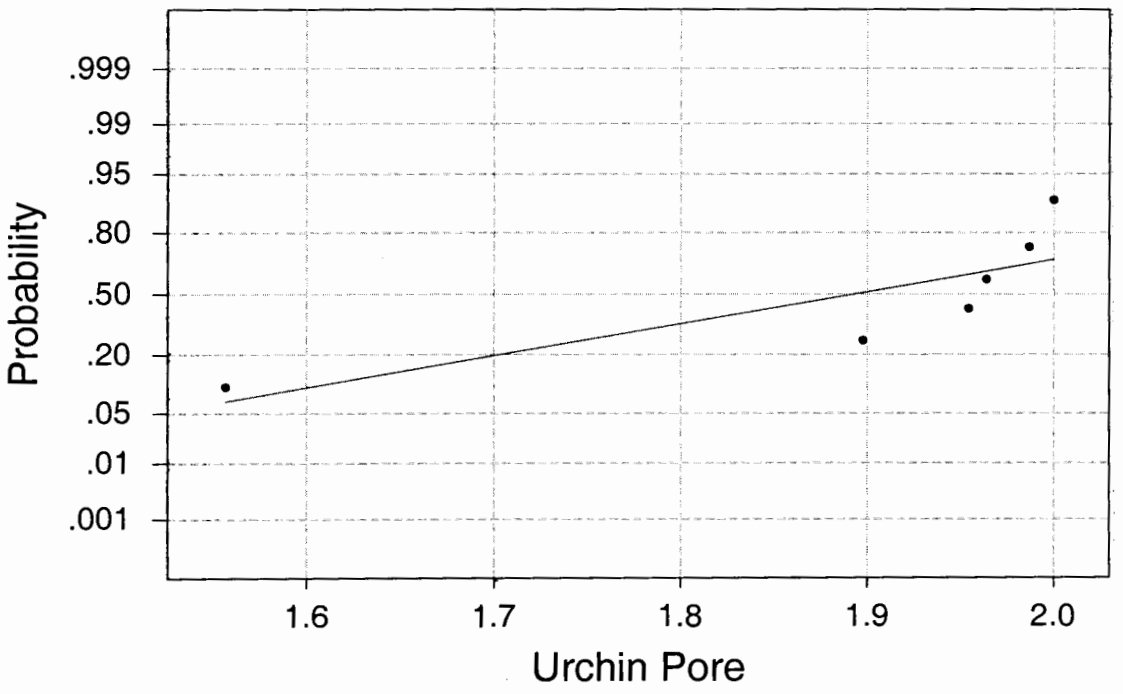
Normal Probability Plot



Average: 82.3333
StDev: 23.8216
N: 6

W-test for Normality
R: 0.8617
P-Value (approx): 0.0272

Normal Probability Plot

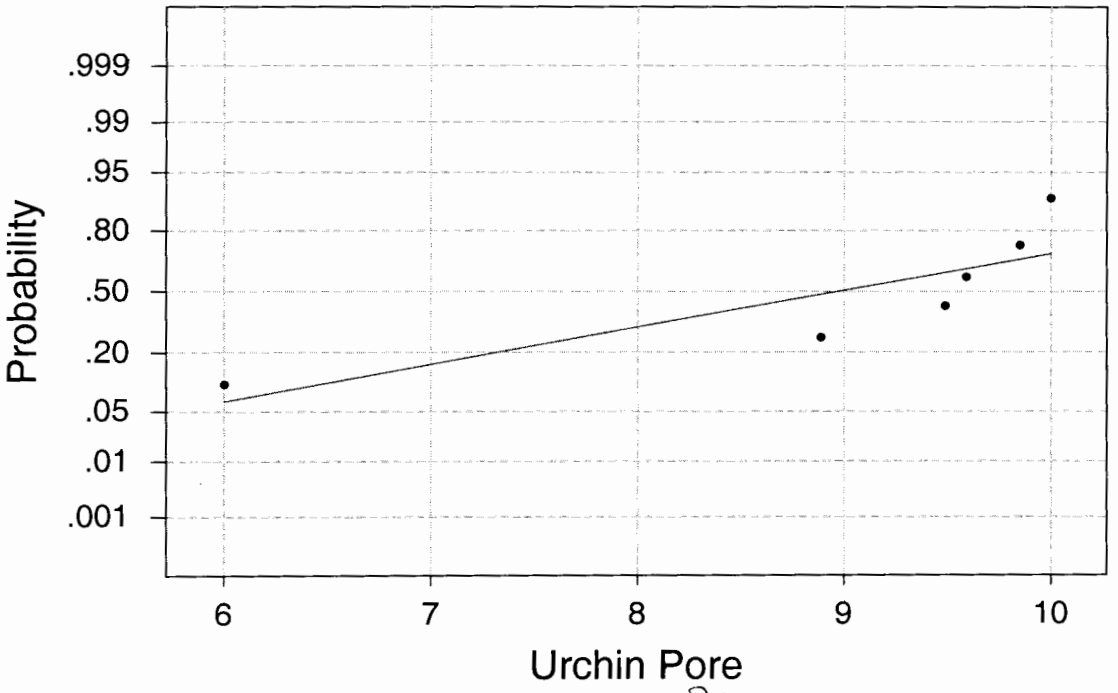


Average: 1.89312
StDev: 0.168754
N: 6

W-test for Normality
R: 0.8125
P-Value (approx): < 0.0100

NOAA

Normal Probability Plot

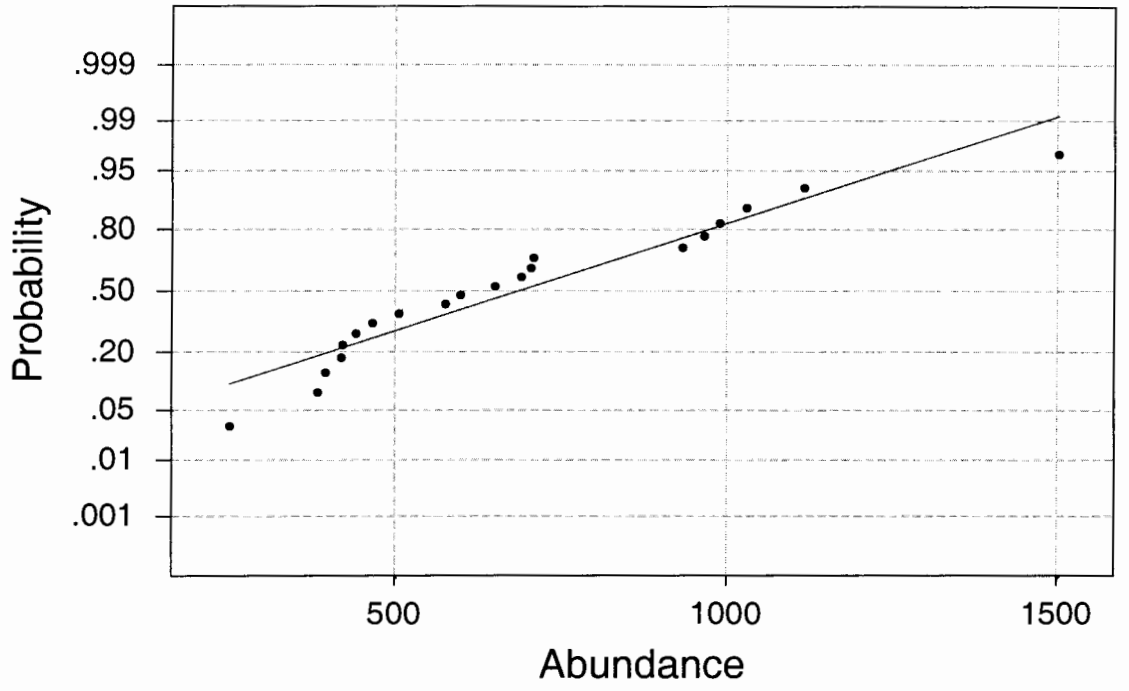


Average: 8.96926
StDev: 1.50429
N: 6

W-test for Normality
R: 0.8369
P-Value (approx): < 0.0100

NOAA

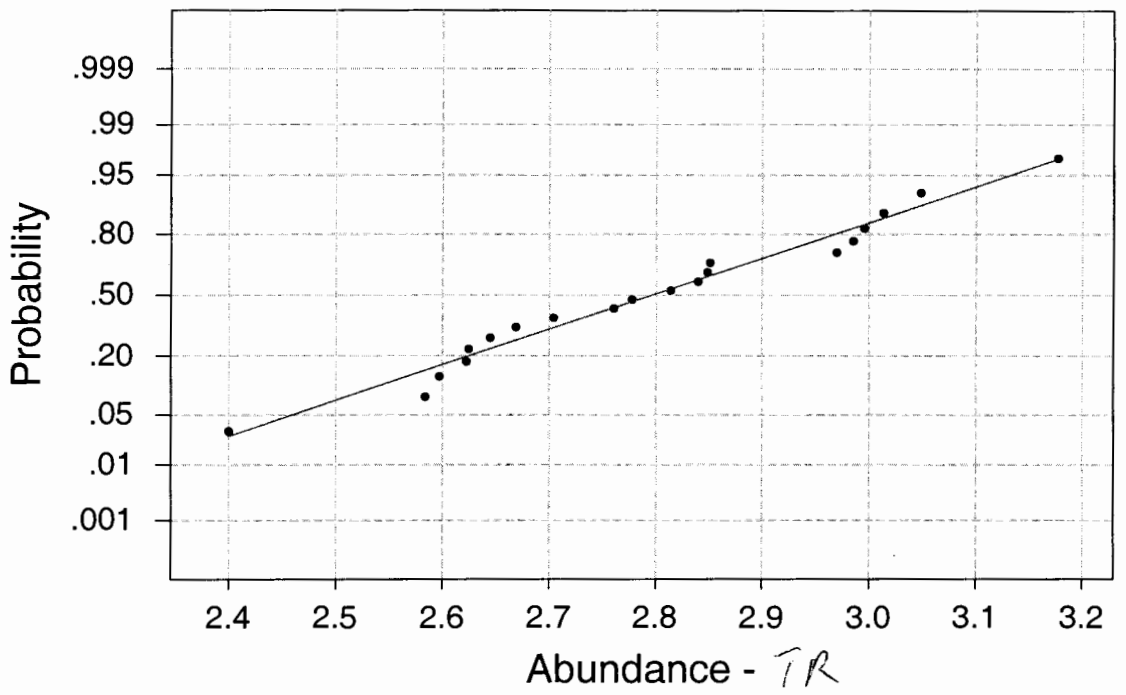
Normal Probability Plot



Average: 687.5
StDev: 313.804
N: 20

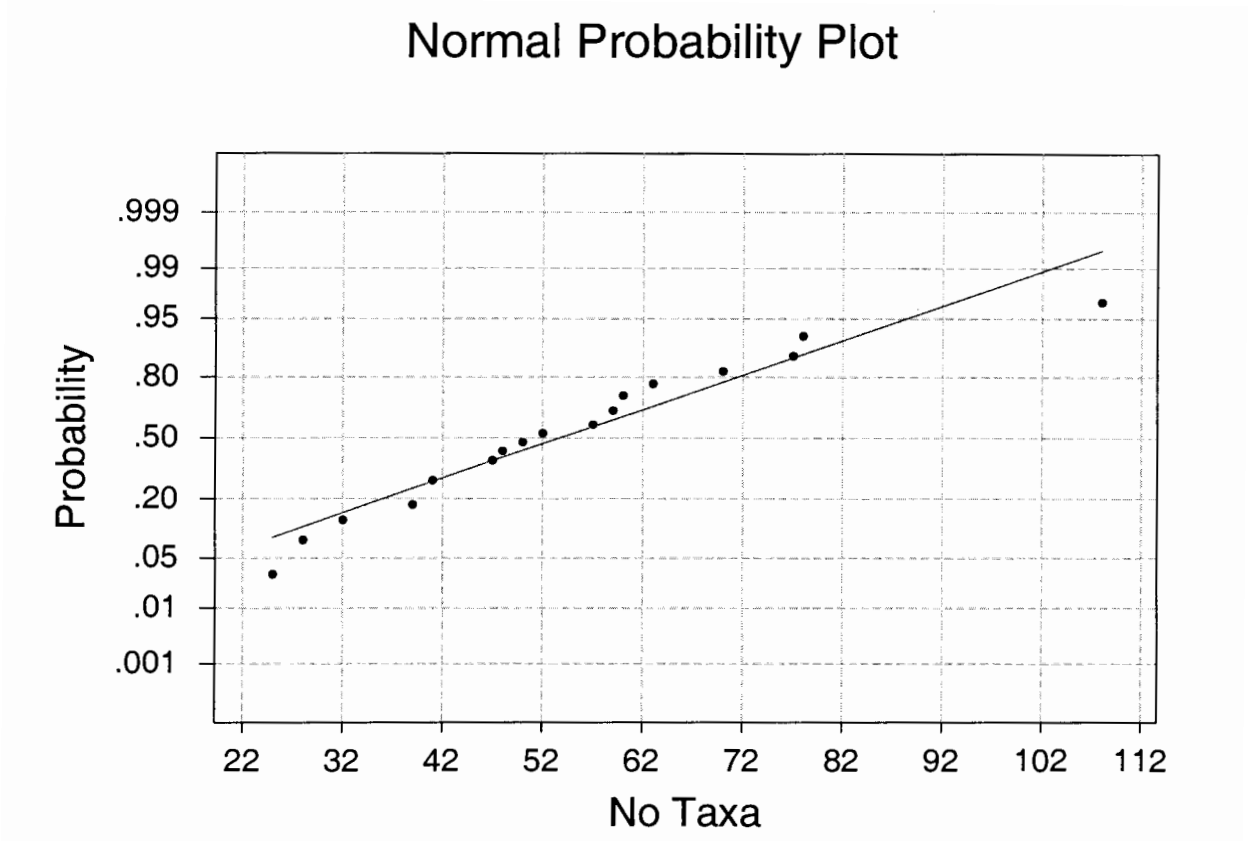
W-test for Normality
R: 0.9574
P-Value (approx): 0.0867

Normal Probability Plot



Average: 2.79601
StDev: 0.194680
N: 20

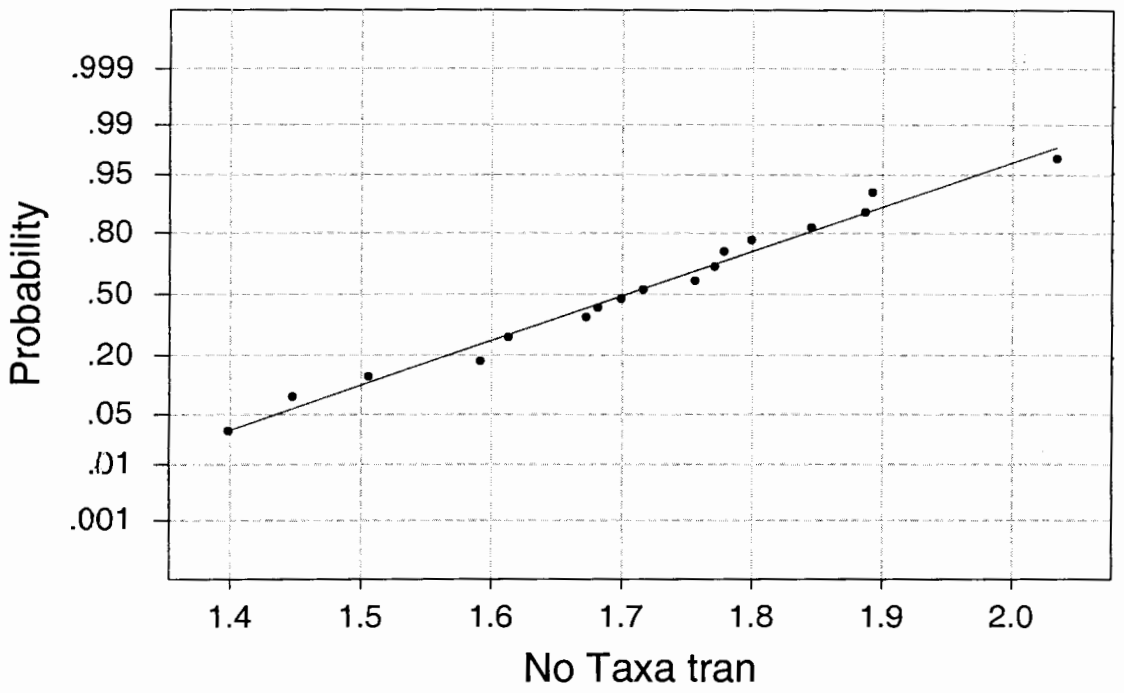
W-test for Normality
R: 0.9880
P-Value (approx): > 0.1000



Average: 53.75
StDev: 19.5875
N: 20

W-test for Normality
R: 0.9656
P-Value (approx): > 0.1000

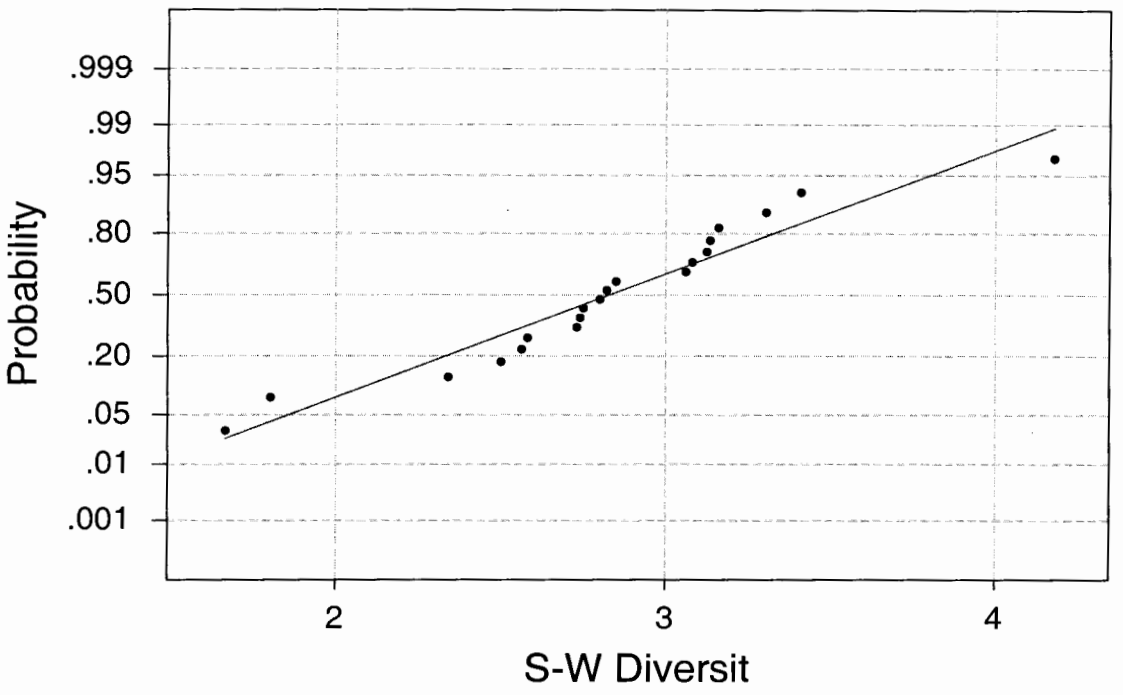
Normal Probability Plot



Average: 1.70401
StDev: 0.155924
N: 20

W-test for Normality
R: 0.9926
P-Value (approx): > 0.1000

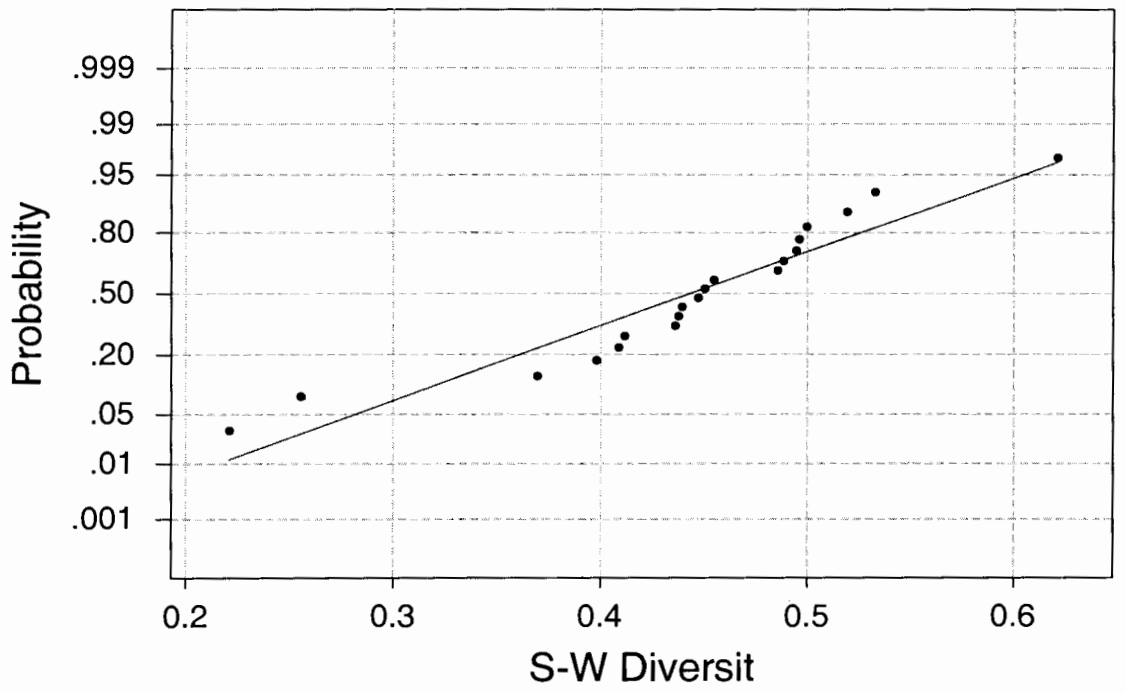
Normal Probability Plot



Average: 2.82933
StDev: 0.548413
N: 20

W-test for Normality
R: 0.9640
P-Value (approx): > 0.1000

Normal Probability Plot

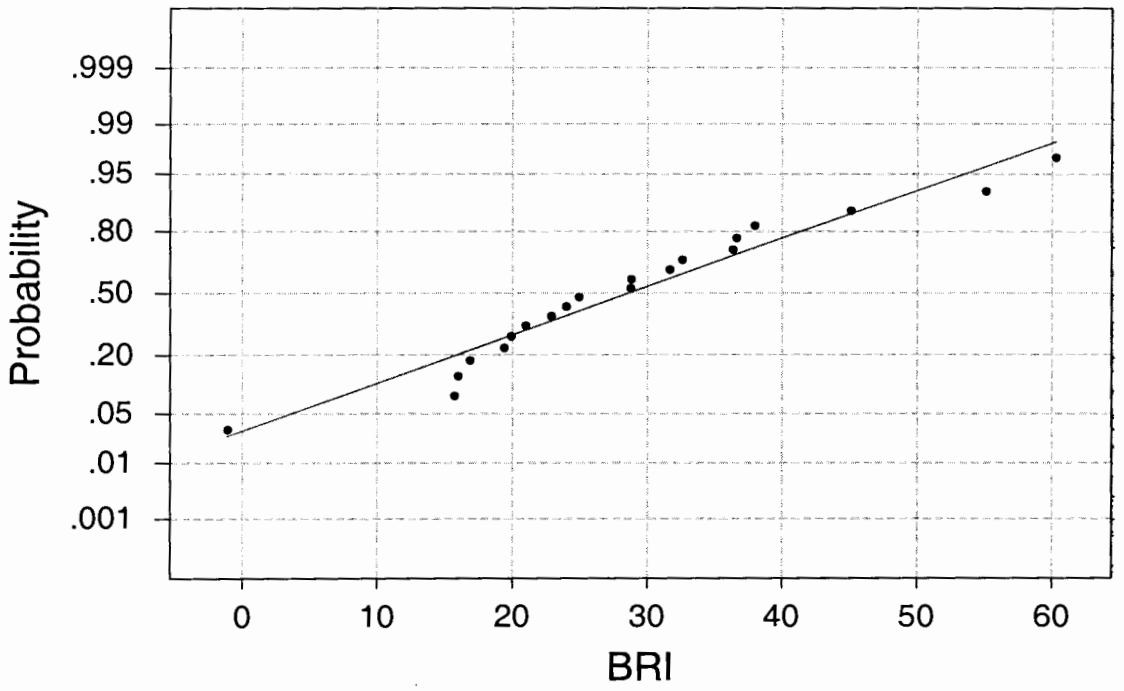


Average: 0.443339
StDev: 0.0896281
N: 20

TRANS

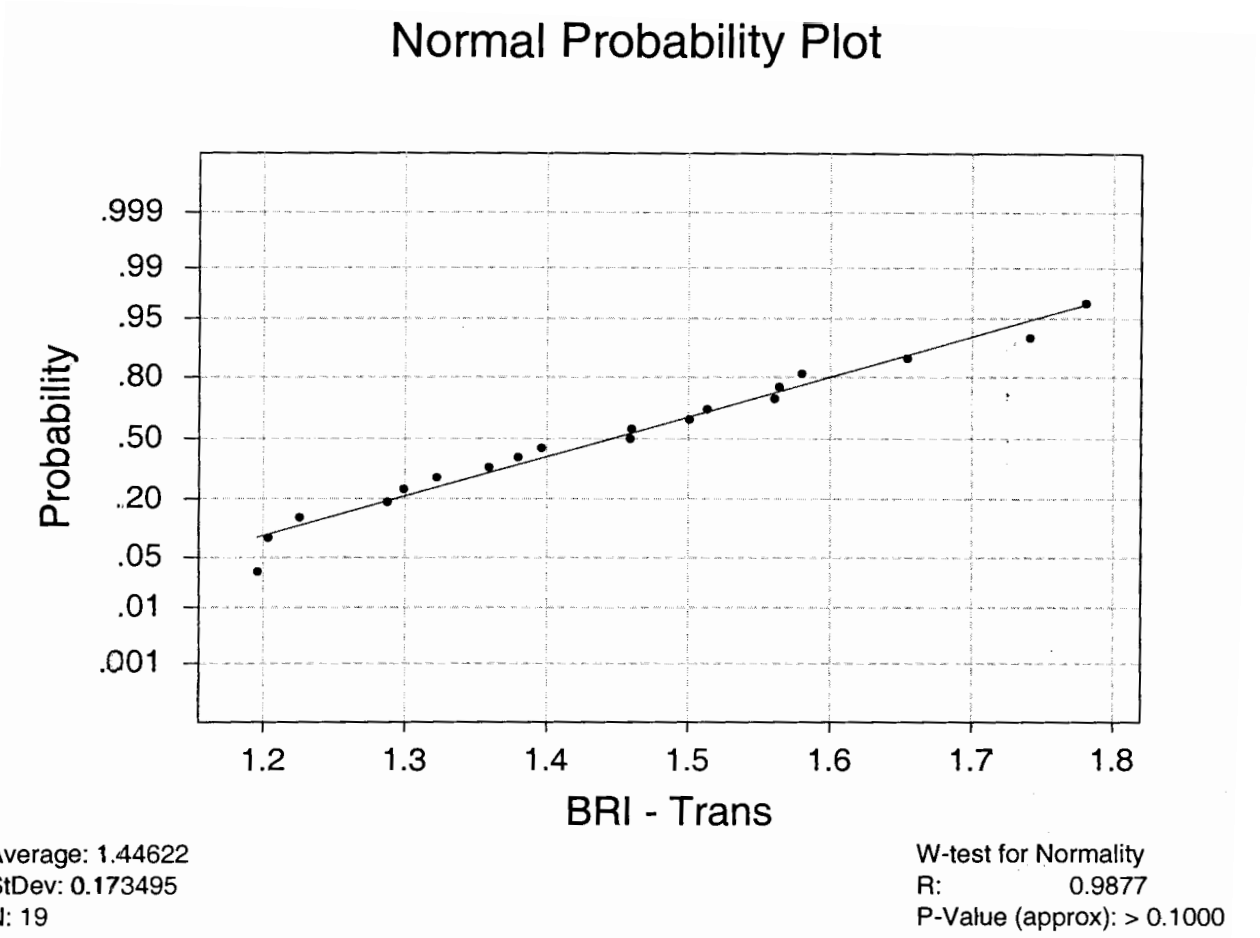
W-test for Normality
R: 0.9479
P-Value (approx): 0.0455

Normal Probability Plot



Average: 28.629
StDev: 14.2385
N: 20

W-test for Normality
R: 0.9746
P-Value (approx): > 0.1000



Average: 1.44622
StDev: 0.173495
N: 19

W-test for Normality
R: 0.9877
P-Value (approx): > 0.1000

San Diego Bay Council
Recommended Reference Pool

Selecting a Pool of Reference Stations for San Diego Bay

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Purposes:

- *Select a Pool of Reference Stations that will define background (ambient) conditions in San Diego Bay.*
- *This pool can be used for general assessments of whether areas of the Bay are degraded.*
- *This pool, or a subset of this Pool, can be used as reference for site-specific cleanups, including clean-up of the NASSCO and Southwest Marine Shipyards sites.*
- *Recommend that the stations that make up this pool be protected from degradation.*

Definition of Reference Conditions and Reference Sites

According to EPA:

> "Reference conditions are expectations of the status of biological communities in the absence of anthropogenic disturbances and pollution, and are usually based on the status of multiple reference sites."
>
> "Reference sites refer to locations within a [habitat] classification category at which data are collected to represent the most natural ambient conditions present."
>
> "The conditions at reference sites should represent the best range of minimally impaired conditions that can be achieved…"
>
> "The care that states use in selecting reference sites and developing reference condition parameters, together with their use of standard survey techniques, will directly influence the quality of the resulting water body assessment."
>
> "In practice, most reference sites will have some of these [human] impacts, however, the selection of reference sites is always made from those with the least anthropogenic influences."
>
> "Reference sites must be representative of the best quality of the estuaries and coastal marine waters under investigation; that is, they must exhibit conditions similar to what would be expected to be found in the region. They should not represent degraded conditions, even if such conditions are the most common."
>
> "It is advisable that the state make every effort, once reference sites are selected, to protect these areas from degradation."
>
> Source: U.S. Environmental Protection Agency, Office of Water. December 2000. *Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance*. EPA–822–B–00–024.

Selection of Reference Pool

Bight 98 Data Set

A pool of minimally impaired stations was selected from the 46 stations of the Bight 98 San Diego Bay sampling program. Two approaches were taken; the first approach looks first for healthiest benthos, the second approach looks first for lowest chemical contamination. Both approaches ultimately rely on all available data, including chemical concentrations, toxicity data, and benthic community analyses (i.e., on all three legs of the triad). According to the California Regional Water Quality Control Board, San Diego Region:

> "Collection of synoptic measurements of sediment chemistry, toxicity, and benthic infauna (triad approach) is essential to assess the relative quality of sediments and to determine whether impacts are related to chemical contamination. Each component of the triad complements the other two and together all three components provides an integrated assessment of the quality of the sediment." (March 6, 2002 letter with attachment from John H. Robertus to Mike Chee and Sandor Halvax, re: Background Reference Conditions for Assessment and Remediation of Contaminated Sediments at NASSCO and Southwest Marine Shipyards, p.8-9.)

First Approach

The first approach begins with considering the benthic data. The benthic community is the best indicator available of ecosystem health, or lack thereof – the protection of the benthic community and ecosystem health is, after all, our ultimate goal. Benthic community information also gives us our only information about the impacts of the chronic stress of pollutants on marine life. In contrast, toxicity testing measures only acute stress.

The Benthic Response Index (BRI) identifies 16 of the 46 stations as "*Reference*" stations based on a healthy or relatively healthy benthos. The remainder of the stations were found to have either a marginal, or a degraded, benthos. These 16 sites include 9 of the 14 reference stations recommended by the National Oceanic and Atmospheric Administration (NOAA). The benthic community data was unavailable when NOAA made its selection - 5 of the NOAA set of 14 have a marginal BRI rating.

In addition to the BRI, the various other benthic endpoints and indexes were assessed in order to look for any problems not reflected in the BRI, and to see if certain of the 16 stations stand out as having the overall "healthiest" benthos. Three of the 16 stations were eliminated based on these benthic endpoints (Stations 2224, 2233, and 2240), and a fourth station was eliminated based on an anomalous benthic community (2231, based on Exponent sampling).

Sediment chemistry was next considered for the remaining 12 stations. First, the Mean ERM Quotient (minus DDT) data was reviewed, and revealed that only 2 of the 12 stations had values over 0.2 (0.273 and 0.210). Next, the individual ERM Quotients for each metal used in the mean quotient (Ag, As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn) were reviewed for any values of 0.2 or above, i.e. for any metal concentrations that were 20 percent or more of the ERM value for that

chemical. For the organic chemicals, the PAH data was relied upon, because detection limit issues with the PCB data render this data basically unusable. A proposal for determining background levels for PCBs in light of this problem is offered below. PAH data requires further scrutiny in light of the number of nondetects.

Next, amphipod survival toxicity values were considered. These values are control-corrected. Four stations have percent survival values from 100 to 104. Three stations have percent survival values of 97 and 98. Four stations have values ranging from 81 to 88, and one station has a value of 66.

Reference stations were then selected based on all three legs of the triad, keeping in mind the need for a range of grain sizes, total organic carbon (TOC) values, and water depths representative of the various characteristics of the Bay. The following 7 stations provide a range of values for these physical characteristics, and represent the best available minimally-impaired sites from the Bight 98 data set, when all three legs of the triad are considered.

1 Station 2252. This station has a BRI of 4, a mean ERMQ of 0.067, chemistry is below 0.2 ERM for all nine metals, Total PAH (TPAH) is at 16 μg/kg (dry weight). Amphipod survival is 104%. Grain size, represented by the percent of fines, is16%.

(This station was not included NOAA's set of 14 sites because NOAA sorted for percent fines > 23.9%. Generally NOAA stays above 20% fines because normalization for grain size may result in high chemistry values (personal communication, D. MacDonald). For this station, chemistry is very low, so I have included it.)

2 Station 2435. This is a NOAA station, with a BRI of -1, and mean ERMQ of 0.077. Chemistry is below 0.2 ERM for all nine metals. TPAH is at 0 μg/kg. Amphipod survival is 102%. Percent fines is 49.

3 Station 2229, a NOAA station, has a BRI of 16, a mean ERMQ of 0.136, chemistry is above 0.2 ERM for Cu (0.218), Hg (0.444), and Zn (0.242). TPAH is at 687 μg/kg (ERL is 4022). Amphipod survival is 98%. Percent fines is 43.

4 Station 2433, a NOAA station and NASSCO/SWM Reference Station 2, has a BRI of 21 and a mean ERMQ of 0.155. Chemistry exceeds 0.2 ERM for Cu (0.265), Hg (0.370), Ni (0.289), and Zn (0.307). TPAH is at 284 μg/kg. Amphipod survival is at 97%. Percent fines is 71.

5 Station 2227, a NOAA station, has a BRI of 25 and a mean ERMQ of 0.128. Chemistry is equal to 0.2 ERM for Cu, and exceeds 0.2 ERM for Hg (0.333), Ni (0.215), and Zn (0.273). TPAH is at 305 μg/kg. Amphipod survival is 98%. Percent fines is 50.

6 Station 2434, a NOAA station, has a BRI of 24, and a mean ERMQ of 0.128. Chemistry exceeds 0.2 ERM for Cu (0.255), Ni (0.225), and Zn (0.322). TPAH is at 455 μg/kg. Amphipod survival is 101%. Percent fines is 45.

#7 Station 2441. This station has a BRI of 17, and a mean ERMQ of 0.144. Chemistry exceeds 0.2 ERM for Cu (0.266), Hg (0.268), Ni (0.322), and Zn (0.300). TPAH is at 1519 μg/kg. Amphipod survival is 88%. Percent fines is 79.

(This station is not included in the NOAA 14 because NOAA sorted for amphipod survival greater than 90%. To incorporate a higher-fines site, it was necessary to select this site even though the survival rate is significantly lower than the other selected stations. It is intended that this station be used as reference for similarly high-fines sites.)

These seven stations are located in Mid and North San Diego Bay. Grain size ranges from 16 percent fines to 79 percent fines. TOC values range from 0.6 to 2.0. Depths range from 3 to 16 meters.

Second Approach

The second approach begins with selection of the lowest chemical concentration sites. Fourteen sites were identified as having the lowest concentrations for several chemicals of concern and overall chemistry. The first two of these sites have concentrations for mercury, copper, zinc, the mean ERMQ, and total PAH that fall in the top 5 cleanest Bight stations. Amphipod survival rates are also in the top 5 highest survival rate stations. These are stations 2252 and 2435, two of the seven stations selected above, using the first approach.

The third site, 2265, also has concentrations for mercury, copper, zinc, mean ERMQ, and total PAH in the top 5, but amphipod survival is 85 percent. Thirty-three of the 46 Bight stations have higher than 85 percent survival. It would be appropriate to include this station based on its chemistry (and a healthy benthos rating), but not based on amphipod survival because this rate falls in the lower third of all sites, and suggests that an unknown factor is causing toxicity. As noted above, NOAA used 90 percent survival as its sorting criteria.

It is instructive to note at this point, if the reference pool is constructed based on chemistry alone, station 2265 (and other very low chemistry stations) would be selected, and background contaminant levels would be lower than those established by using all three legs of the triad

The fourth station, 2230, has two drawbacks. Despite very low chemistry for copper, zinc, and mean ERMQ, (and healthy benthos), mercury is at 0.5 ERM, and amphipod survival is very low, at 66 percent.

The next eight stations, 2243, 2244, 2440, 2260, 2247, 2231, 2242, and 2241, have disqualifying benthos, and four have amphipod survival rates that fall in the lower two thirds of the Bight stations. In addition, six of these stations have at least one chemical concentration for mercury, copper, zinc, mean ERMQ, or TPAH that falls below the top third of Bight stations for that chemical.

The last two of the 14 lowest overall chemical concentration sites each have at least two individual chemical concentrations that fall below the top third of stations for that chemical.

Both of these sites have a "reference" level BRI, but one site, 2240, was eliminated for other benthic endpoints. The second, 2229, was selected under the first approach, above.

Bay Protection and Toxic Cleanup Program Data Set

Description of Data Set

> This Data Set is part of the ongoing Bay Protection and Toxic Cleanup Program, a legislatively-mandated program with the mission of assessing chemical pollution and associated biological effects in California's bays and harbors. In the San Diego Bay region, 350 stations were sampled between October, 1992 and May, 1994.
>
> Random sampling of San Diego Bay was conducted as part of the Program. One hundred and twenty one (121) stations were randomly selected using a stratified sampling design. This stratified random design ensures that all areas of the Bay are covered in the sampling. Sampling designed to identify specific toxic hot spots was carried out at 229 additional stations.

Chemistry

For several chemicals of concern, the Bay Protection data set contains many stations with lower concentrations than the Bight data set. For example, the cleanest 10 percent of the Bay Protection stations for mercury – a total of 20 stations – have mercury ERM Quotients ranging from 0.053 to 0.156. The Bight data set contains only a few stations with ERM Quotients for mercury in this range.

As a result, if the reference pool is constructed using the cleanest stations when both data sets are considered, one would expect background levels to be lower, and possibly significantly lower, than those established using only the Bight data set. We propose that the cleanest 10 percent of the Bay Protection stations be considered for inclusion in the pool for at least two reasons: first, to comply with the guidance referenced above directing the selection of the least impaired sites for reference purposes; and second, to address the likelihood that chemical concentrations in the Bay have been increasing over time.

With the continuing loading of contaminants into the Bay environment from a variety of sources not yet controlled, and from known toxic hot spots and other contaminated areas of the Bay, chemical concentrations, toxicity and the degradation of benthos are expected to have increased over time. Thus, we find cleaner stations in the Bay Protection sampling time frame as compared to the Bight 98 sampling time frame. This increasing trend can only be expected to continue until these various sources of contamination are controlled or eliminated.

Approach to Determine Reference Concentrations for Total PCBs

A background level for PCBs should, in theory, be set at zero because there is no natural background level of this human-made contaminant. Because PCBs are pervasive in San Diego

Bay sediments, it may be necessary to set a background level slightly above zero, to represent PCB concentrations found in the cleanest parts of the Bay.

The PCB data from the Bight data set is basically unusable, due to detection limit issues. The set of PCB values from the 10 percent of the Bay Protection stations with the lowest PCB levels is proposed to be used to determine reference concentrations for PCBs. For total PCBs, these values range from 4.38 to 27.2 μg/kg.

This same approach can be used for other chemicals of concern that were not sampled in the Bight study, for example, the tributyltin chemicals, and PAHs depending on a final determination of the adequacy of the Bight 98 data for PAHs.

Background Values Based on Reference Station Pool

The average value for contaminants of concern was calculated using the proposed reference station pool. Non-detect values are treated as zero. Standard deviations and confidence intervals were also calculated (see Tables below, prepared by Ed Kimura).

Mean values calculated for the above 7 stations are relatively close to mean values for the 12 reference stations selected by the Regional Board to define background conditions for the NASSCO and Southwest Marine Shipyards Study (see March 2002 reference, above). In fact, results presented here confirm the overall robustness of the approach and results by Regional Board staff. Two different approaches, both relying on the best available triad data, produced comparable background values. As discussed above, if station 2265 (and other very low chemistry stations) are added to the pool, background contaminant levels would be even closer to the March 2002 values.

The following are the mean values for the 7 stations selected here (far left column), and for comparison purposes, the mean values for the 12 Regional Board stations selected in March, 2002 (second column). Also for comparison purposes, the third and fourth columns are the ERL and ERM values, respectively.

	PROPOSED POOL	RWQCB POOL	ERL	ERM	Units
Copper	55	46	34	270	(dry weight)
Zinc	103	87	150	410	mg/kg
Lead	20	19	46.7	218	
Mercury	0.18	0.20	0.15	0.71	
Arsenic	6.8	5.2	8.2	70	
Cadmium	0.16	0.08	1.2	9.6	
Chromium	32	25	81	370	
Nickel	11.1	7.9	20.9	51.6	
Silver	0.56	0.30	1.0	3.7	
Total PAH	467	240	4022	44792	μg/kg
Toxicity	98 %	89-96 %			

Selected Reference Stations:
Metals

StationID	STRATA	Units	Ag	ERMQ_Ag	As	ERMQ_As	Cd	ERMQ_Cd	Cr	ERMQ_Cr	Cu	ERMQ_Cu
2252	sdport	mg/kg	0.204	0.055	4.34	0.062	0.041	0.004	14.8	0.040	31.1	0.115
2435	sdother	mg/kg	0.185	0.050	5.06	0.072	0.136	0.014	20.6	0.056	28.4	0.105
2229	sdother	mg/kg	0.413	0.112	5.36	0.077	0.085	0.009	31.6	0.085	58.9	0.218
2433	sdother	mg/kg	0.499	0.135	8.32	0.119	0.245	0.026	34.5	0.093	71.6	0.265
2227	sdmari	mg/kg	0.456	0.123	5.65	0.081	0.200	0.021	27.4	0.074	53.9	0.200
2434	sdother	mg/kg	0.640	0.173	6.22	0.089	0.171	0.018	49.8	0.135	68.9	0.255
2441	sdport	mg/kg	1.500	0.405	12.4	0.177	0.250	0.026	43.9	0.119	71.8	0.266
Statistics for 7 Stations												
Average			0.557	0.150	6.76	0.097	0.161	0.017	31.8	0.086	54.9	0.203
Max			1.500	0.405	12.40	0.177	0.250	0.026	49.8	0.135	71.8	0.266
Min			0.185	0.050	4.34	0.062	0.041	0.004	14.8	0.040	28.4	0.105
Stdev			0.446	0.121	2.78	0.040	0.079	0.008	12.3	0.033	18.5	0.068
95% confidence			0.330	0.089	2.06	0.029	0.058	0.006	9.1	0.025	13.7	0.051
upper limit			0.887	0.240	8.83	0.126	0.220	0.023	40.9	0.111	68.6	0.254
lower limit			0.226	0.061	4.70	0.067	0.103	0.011	22.7	0.061	41.3	0.153
use 1 Stdev:												
upper limit			1.003	0.271	9.547	0.136	0.240	0.025	44.1	0.119	73.4	0.272
lower limit			0.111	0.030	3.981	0.057	0.082	0.009	19.5	0.053	36.5	0.135

Selected Reference Stations:
Metals

StationID	STRATA	Units	Hg	ERMQ_Hg	Ni	ERMQ_Ni	Pb	ERMQ_Pb	Zn	ERMQ_Zn
2252	sdport	mg/kg	0.113	0.158	4.2	0.081	13.8	0.063	64.2	0.157
2435	sdother	mg/kg	0.123	0.173	9.9	0.192	7.1	0.033	64.4	0.157
2229	sdother	mg/kg	0.316	0.444	9.3	0.180	24.5	0.112	99.3	0.242
2433	sdother	mg/kg	0.263	0.370	14.9	0.289	21	0.096	126.0	0.307
2227	sdmari	mg/kg	0.234	0.330	11.1	0.215	17.9	0.082	112.0	0.273
2434	sdother	mg/kg	0.015	0.021	11.6	0.225	31.6	0.145	132.0	0.322
2441	sdport	mg/kg	0.191	0.268	16.6	0.322	21.9	0.100	123.0	0.300
Statistics for 7 Stations										
Average			0.179	0.252	11.1	0.215	19.7	0.090	103.0	0.251
Max			0.316	0.444	16.6	0.322	31.6	0.145	132.0	0.322
Min			0.015	0.021	4.2	0.081	7.1	0.033	64.2	0.157
Stdev			0.103	0.145	4.0	0.078	7.8	0.036	28.5	0.069
95% confidence			0.076	0.107	3.0	0.058	5.8	0.027	21.1	0.051
upper limit			0.255	0.359	14.1	0.273	25.5	0.117	124.1	0.303
lower limit			0.103	0.145	8.1	0.157	13.9	0.064	81.9	0.200
use 1 Stdev										
upper limit			0.282	0.397	15.1	0.293	27.5	0.126	131.4	0.321
lower limit			0.076	0.108	7.1	0.137	11.9	0.054	74.5	0.182

Selected Reference Stations:
TPAH, % Fines and TOC

StationID	STRATA	Units	Total PAHs	ERMQ_PAH		%Fines	TOC
2252	sdport	ug/kg	16.0	0.000		16	0.59
2435	sdother	ug/kg	0.0	0.000		49	0.55
2229	sdother	ug/kg	686.6	0.015		43	0.92
2433	sdother	ug/kg	284.4	0.006		71	1.17
2227	sdmari	ug/kg	305.4	0.007		50	0.93
2434	sdother	ug/kg	455.4	0.010		45	0.71
2441	sdport	ug/kg	1518.6	0.034		79	1.97
Statistics for 7 Stations							
Average			466.6	0.010		50	0.98
Max			1518.6	0.034		79	1.97
Min			0.0	0.000		16	0.55
Stdev			522.0	0.012		20	0.49
95% confidence			387	0.009		15	0.36
upper limit			853	0.019		66	1.34
lower limit			80	0.002		35	0.62
Use 1 stdev							
upper limit			989	0.022		71	1.47
lower limit			<0	<0		30	0.49

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San Diego Bay Council Recommended Reference Pool for NASSCO and BAE Systems (Formerly Southwest Marine) Sediment Investigation.[1]

Study	Station
Bight'98	2227
	2229
	2252
	2433
	2434
	2435
	2441

(1) San Diego Bay Council – Elaine M. Carlin, Scientific Consultant. "Selecting a Pool of Reference Stations for San Diego Bay (May 2, 2003)."

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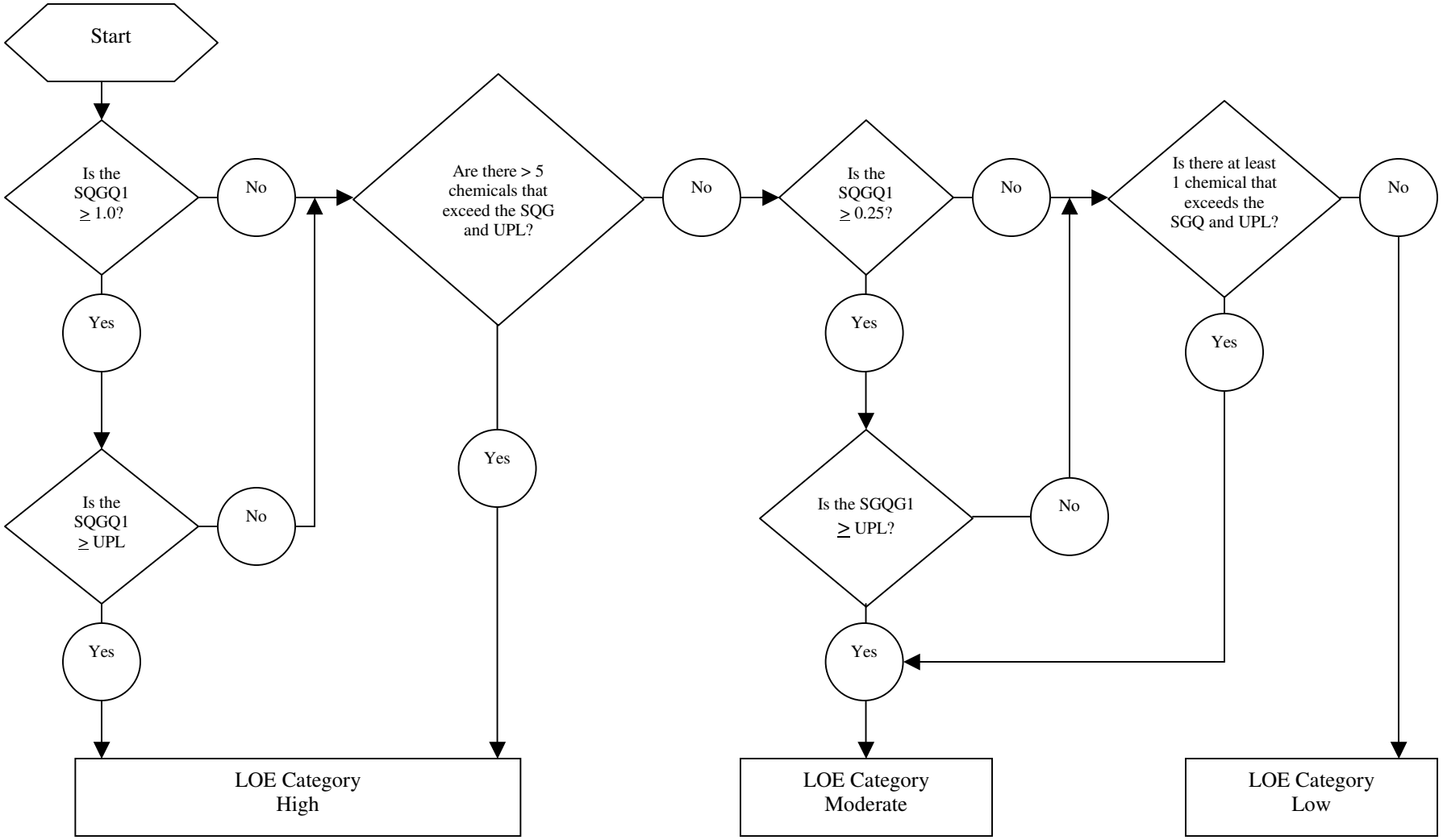
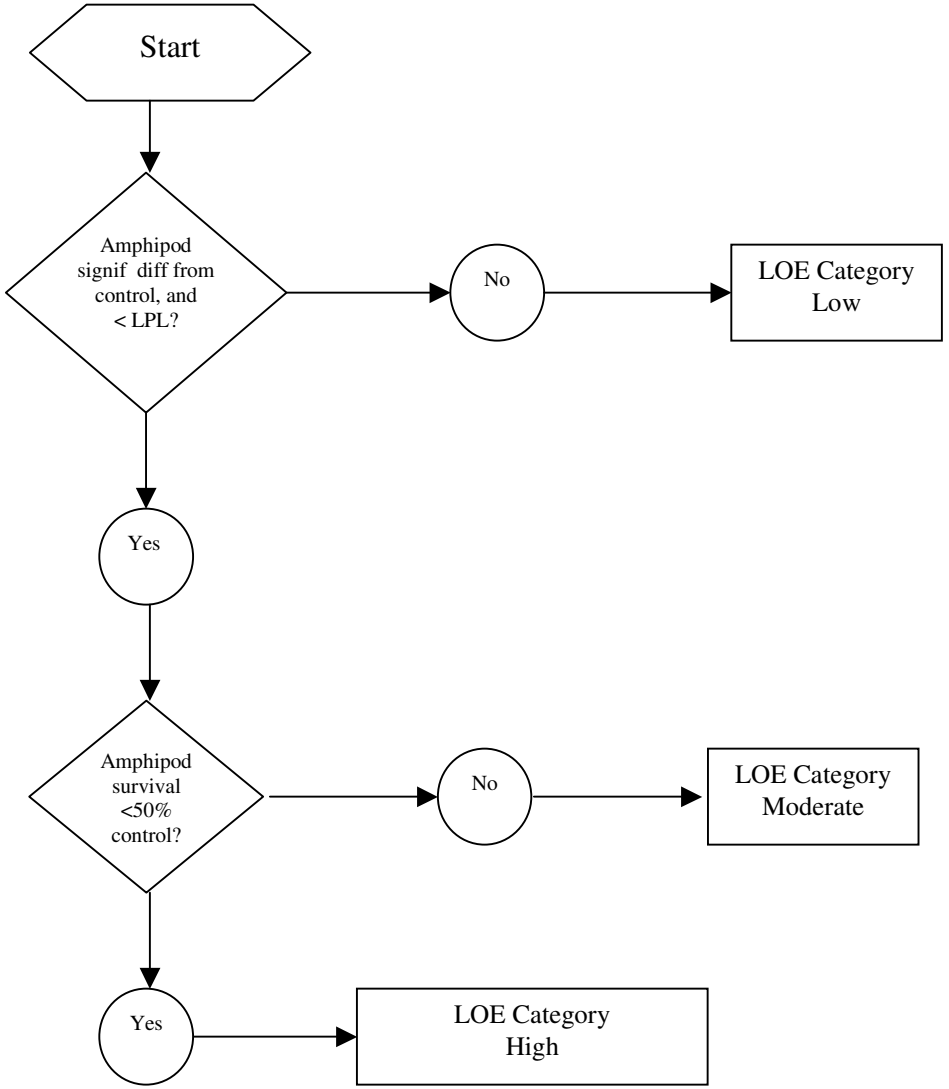
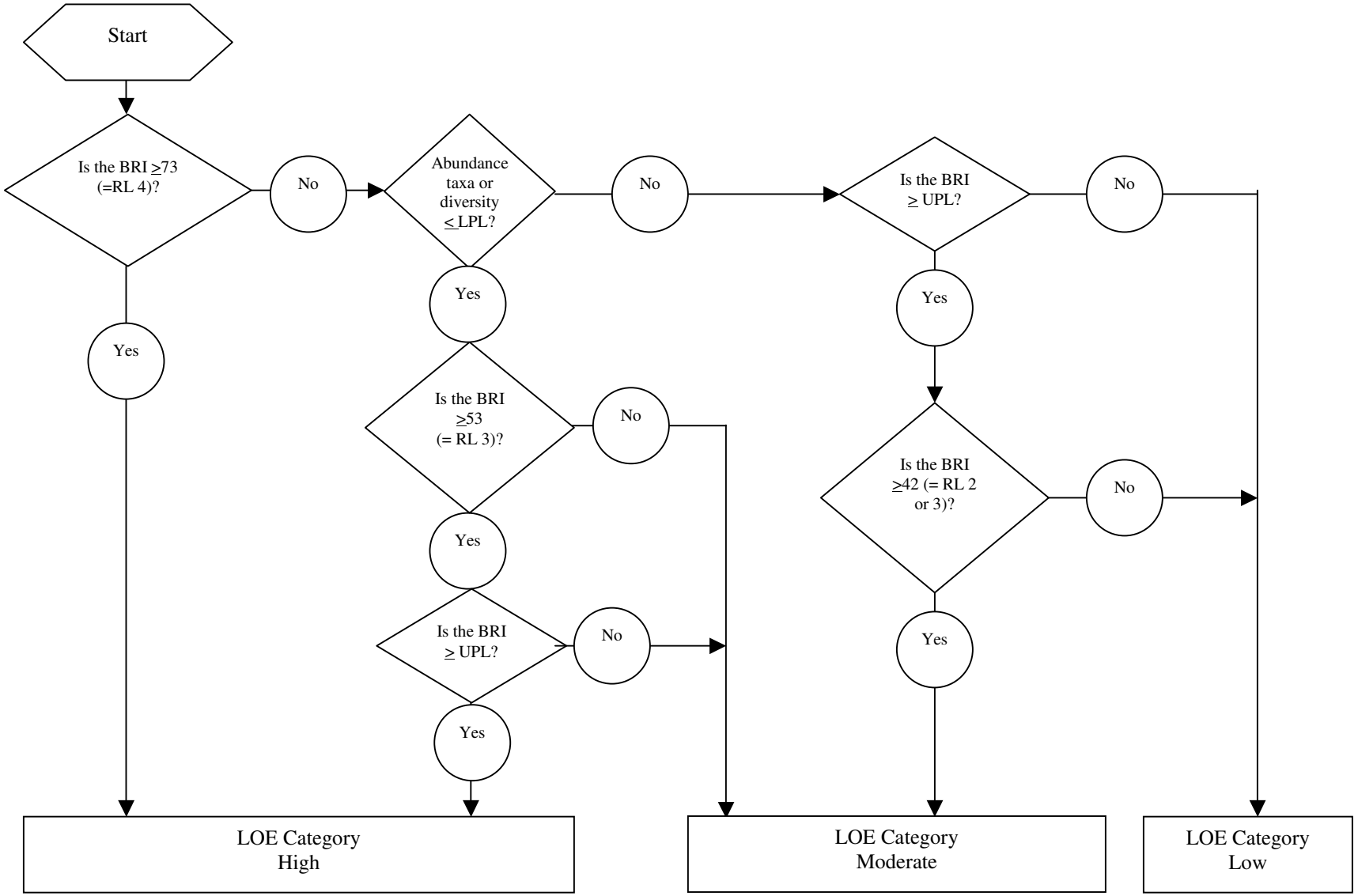


Flow Diagram for the Sediment Chemistry Line of Evidence using San Diego Bay Council's Reference Pool



Flow Diagram for the Toxicity Line of Evidence using San Diego Bay Council's Reference Pool



Flow Diagram for the Benthic Community Line of Evidence using San Diego Bay Council's Reference Pool

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Results of the Sediment Quality Triad Approach using the San Diego Bay Council's Reference Pool

Site	Station	Sediment Chemistry[(1)]	Toxicity[(2)]	Benthic Community[(3)]	Weight-of-Evidence Category[(4)]
NASSCO	NA01	High	Moderate	Moderate	Likely
	NA03	High	Moderate	Moderate	Likely
	NA04	High	Moderate	Moderate	Likely
	NA05	High	Moderate	Moderate	Likely
	NA06	High	Moderate	Moderate	Likely
	NA07	High	Moderate	Moderate	Likely
	NA09	Moderate	Moderate	Moderate	Likely
	NA11	Moderate	Moderate	Moderate	Likely
	NA12	Moderate	Moderate	Moderate	Likely
	NA15	High	Moderate	Moderate	Likely
	NA16	High	Moderate	Moderate	Likely
	NA17	High	Moderate	Moderate	Likely
	NA19	High	Moderate	Moderate	Likely
	NA20	Moderate	Moderate	High	Likely
	NA22	Moderate	Moderate	Moderate	Likely
BAE Systems (SW Marine)	SW02	High	Moderate	Moderate	Likely
	SW03	High	Moderate	Moderate	Likely
	SW04	High	Moderate	Moderate	Likely
	SW08	High	Moderate	Moderate	Likely
	SW09	High	Moderate	Moderate	Likely
	SW11	High	Moderate	Moderate	Likely
	SW13	High	Moderate	Moderate	Likely
	SW15	High	Moderate	Moderate	Likely
	SW17	High	Moderate	Moderate	Likely
	SW18	High	Moderate	Moderate	Likely
	SW21	High	Moderate	High	Likely
	SW22	High	Moderate	High	Likely
	SW23	High	Moderate	Moderate	Likely
	SW25	High	Moderate	Moderate	Likely
	SW27	High	Moderate	Moderate	Likely

[(1)] Relative likelihood that the chemicals present in the sediment is adversely impacting organisms living in or on the sediment (i.e., benthic community).
[(2)] Relative likelihood of toxic effects based on the toxic response from the amphipod survival test.
[(3)] Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
[(4)] Relative likelihood (likely, possible, or unlikely) that the health of the benthic community is adversely impacted based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

Sediment Chemistry Line-of-Evidence Results Using the San Diego Bay Council's Reference Pool

Site	Station	SQGQ1			SQGQ1 ≥ UPL	# Chemicals > SQG and UPL	LOE Category
		< 0.25	0.25 to 1.0	> 1.0			
NASSCO	NA01		X		Yes	6	**High**
	NA03		X		Yes	6	**High**
	NA04		X		Yes	6	**High**
	NA05		X		Yes	4	**Moderate**
	NA06		X		Yes	8	**High**
	NA07		X		Yes	8	**High**
	NA09		X		Yes	6	**High**
	NA11		X		Yes	6	**High**
	NA12		X		Yes	4	**Moderate**
	NA15		X		Yes	6	**High**
	NA16		X		Yes	8	**High**
	NA17			X	Yes	10	**High**
	NA19			X	Yes	9	**High**
	NA20		X		Yes	4	**Moderate**
	NA22		X		Yes	4	**Moderate**
BAE Systems (SWM)	SW02			X	Yes	14	**High**
	SW03		X		Yes	7	**High**
	SW04			X	Yes	12	**High**
	SW08			X	Yes	12	**High**
	SW09			X	Yes	10	**High**
	SW11		X		Yes	6	**High**
	SW13			X	Yes	12	**High**
	SW15		X		Yes	7	**High**
	SW17		X		Yes	10	**High**
	SW18		X		Yes	9	**High**
	SW21			X	Yes	8	**High**
	SW22			X	Yes	9	**High**
	SW23			X	Yes	11	**High**
	SW25		X		Yes	7	**High**
	SW27		X		Yes	5	**Moderate**

Comparison of NASSCO and BAE Systems Toxicity Data to San Diego Bay Council's Reference Pool 95 Percent Lower Prediction Limit (LPL)

Site	Station	Amphipod Survival (95% LPL = 87.5%)	Urchin Fertilization (See 95% LPL note below)	Bivalve Development (See 95% LPL note below)
NASSCO	NA01	**80**	86	49
	NA03	**84**	84	94
	NA04	**80**	88	84
	NA05	89	95	94
	NA06	**78**	103	74
	NA07	**74**	102	88
	NA09	88	99	1
	NA11	**70**	101	80
	NA12	**82**	89	15
	NA15	97	88	93
	NA16	90	84	3
	NA17	95	88	80
	NA19	89	72	2
	NA20	90	78	80
	NA22	95	111	2
BAE Systems (formerly Southwest Marine)	SW02	88	103	85
	SW03	92	103	88
	SW04	94	108	63
	SW08	91	103	93
	SW09	88	100	85
	SW11	**77**	89	83
	SW13	92	99	28
	SW15	92	103	9
	SW17	95	96	16
	SW18	**74**	83	64
	SW21	91	102	67
	SW22	90	104	1
	SW23	91	107	16
	SW25	**86**	103	10
	SW27	**73**	91	22

NOTES: Toxicity values less than the 95% lower prediction limit values are bold faced and shaded.

95% LPL values could not be calculated for the urchin fertilization nor the bivalve development test because the Bight'98 study did not perform these tests.

Toxicity Line-of-Evidence Results using San Diego Bay Council's Reference Pool

Station	Amphipod Survival			Urchin Fertilization			Bivalve Development			LOE Category
	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	
NA01	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA03	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA04	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA05	**Yes**	No	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA06	**Yes**	**Yes**	No	No	--	No	**Yes**	--	No	**Moderate**
NA07	**Yes**	**Yes**	No	No	--	No	**Yes**	--	No	**Moderate**
NA09	**Yes**	No	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
NA11	**Yes**	**Yes**	No	No	--	No	**Yes**	--	No	**Moderate**
NA12	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
NA15	**Yes**	No	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA16	**Yes**	No	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
NA17	**Yes**	No	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA19	**Yes**	No	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
NA20	**Yes**	No	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
NA22	**Yes**	No	No	No	--	No	**Yes**	--	**Yes**	**Moderate**
SW02	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW03	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW04	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW08	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW09	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW11	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
SW13	**Yes**	No	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
SW15	**Yes**	No	No	No	--	No	**Yes**	--	**Yes**	**Moderate**
SW17	**Yes**	No	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**
SW18	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	No	**Moderate**
SW21	**Yes**	No	No	No	--	No	**Yes**	--	No	**Moderate**
SW22	**Yes**	No	No	No	--	No	**Yes**	--	**Yes**	**Moderate**
SW23	**Yes**	No	No	No	--	No	**Yes**	--	**Yes**	**Moderate**
SW25	**Yes**	**Yes**	No	No	--	No	**Yes**	--	**Yes**	**Moderate**
SW27	**Yes**	**Yes**	No	**Yes**	--	No	**Yes**	--	**Yes**	**Moderate**

Comparison of Benthic Community Metrics Data from NASSCO and BAE Systems Stations to San Diego Bay Council's Reference Pool 95 Percent Prediction Limits

Site	Station	BRI (95% UPL = 35.8)	Abundance* (95% LPL = 232)	# Taxa (95% LPL = 27)	S-W Diversity (95% LPL = 2.7)
NASSCO	NA01	**42.2**	447	33	2.8
	NA03	**45.5**	492	40	3.0
	NA04	**49.6**	285	**25**	**2.5**
	NA05	**44.4**	569	35	**2.4**
	NA06	**54.4**	611	37	2.7
	NA07	**44.6**	475	43	3.0
	NA09	**51.1**	862	44	**2.6**
	NA11	**46.0**	604	33	**2.4**
	NA12	**42.6**	538	37	2.7
	NA15	**51.0**	306	**26**	**2.3**
	NA16	**48.0**	522	33	**2.6**
	NA17	**55.3**	418	33	2.7
	NA19	**46.7**	828	43	2.7
	NA20	**54.0**	412	**22**	**2.3**
	NA22	**51.6**	**107**	**15**	**2.2**
BAE Systems (formerly Southwest Marine)	SW02	**52.1**	976	39	**2.4**
	SW03	**49.9**	361	31	2.8
	SW04	**41.1**	3,175	36	**1.6**
	SW08	**41.5**	2,457	41	**2.4**
	SW09	**53.2**	572	39	2.7
	SW11	**42.4**	777	44	2.9
	SW13	**43.6**	742	53	3.2
	SW15	**37.8**	806	59	3.1
	SW17	**45.7**	621	30	**2.4**
	SW18	**39.5**	829	42	2.8
	SW21	**53.2**	315	**24**	**2.4**
	SW22	**55.1**	363	**26**	**2.4**
	SW23	**50.0**	316	27	**2.6**
	SW25	**41.3**	611	40	2.8
	SW27	**42.9**	927	48	2.9

NOTES:

95% upper prediction limit values presented below each constituent in ( ).

* Values were derived from natural log transformed data.

For the BRI, concentrations greater than the 95% upper prediction limit value are bold faced and shaded.

For the abundance, # taxa, and S-W diversity metrics, concentrations lower than their respective 95% upper prediction limit values are bold faced and shaded.

Benthic Community Line-of-Evidence Results Using San Diego Bay Council's Reference Pool Comparison

Station	Benthic Response Index				Abundance	# Taxa	S-W Diversity	LOE Category
	≥ 73	≥ 53	≥ 42	≥ 95% UPL	≤ 95% LPL	≤ 95% LPL	≤ 95% LPL	
NA01	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA03	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA04	No	No	**Yes**	**Yes**	No	**Yes**	**Yes**	**Moderate**
NA05	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
NA06	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA07	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA09	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
NA11	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
NA12	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA15	No	No	**Yes**	**Yes**	No	**Yes**	**Yes**	**Moderate**
NA16	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
NA17	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
NA19	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
NA20	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**High**
NA22	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Moderate**
SW02	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
SW03	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW04	No	No	No	**Yes**	No	No	**Yes**	**Moderate**
SW08	No	No	No	**Yes**	No	No	**Yes**	**Moderate**
SW09	No	**Yes**	**Yes**	**Yes**	No	No	No	**Moderate**
SW11	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW13	No	No	**Yes**	**Yes**	No	No	No	**Moderate**
SW15	No	No	No	**Yes**	No	No	No	**Moderate**
SW17	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
SW18	No	No	No	**Yes**	No	No	No	**Moderate**
SW21	No	**Yes**	**Yes**	**Yes**	No	No	**Yes**	**High**
SW22	No	**Yes**	**Yes**	**Yes**	No	No	**Yes**	**High**
SW23	No	No	**Yes**	**Yes**	No	No	**Yes**	**Moderate**
SW25	No	No	No	**Yes**	No	No	No	**Moderate**
SW27	No	No	**Yes**	**Yes**	No	No	No	**Moderate**

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SAN DIEGO BAY COUNCIL POOL
(Sediment Chemistry - Metals)

	Ag	Ag - Trans	As	As - Trans	Cd	Cd - Trans	Cr	Cr - Trans	Cu
2227	0.456	-0.341035157	5.65	0.752048448	0.2	-0.698970004	27.4	1.437750563	53.9
2229	0.413	-0.384049948	5.36	0.72916479	0.085	-1.070581074	31.6	1.499687083	58.9
2433	0.5	-0.301029996	8.32	0.920123326	0.25	-0.602059991	34.5	1.537819095	71.6
2434	0.64	-0.193820026	6.22	0.793790385	0.171	-0.76700389	49.8	1.697229343	68.9
2435	0.19	-0.721246399	5.06	0.704150517	0.14	-0.853871964	20.6	1.31386722	28.4
2252	0.2	-0.698970004	4.34	0.63748973	0.04	-1.397940009	14.8	1.170261715	31.1
2441	1.5	0.176091259	12.4	1.093421685	0.25	-0.602059991	43.9	1.64246452	71.8
Average	**0.557**	**-0.35200861**	**6.764286**	**0.804312697**	**0.1622857**	**-0.856069561**	**31.8**	**1.471297077**	**54.94286**
t-stat	1.943	1.943	1.943	1.943	1.943	1.943	1.943	1.943	1.943
Std. Dev.	0.45	0.31	2.78	0.15	0.08	0.29	12.33	0.18	18.47
N	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	1.4830095	**0.285048087**	**12.54517**	**1.125374689**	**0.328262**	**-0.255668764**	**57.40242**	**1.85252392**	**93.30164**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
		1.92773835		**13.34672429**		**0.555048887**		**71.20720191**	
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**	
Wilk-Shapiro	R: 0.8717	R: 0.9626	R: 0.8927	R: 0.9437	R: 0.9803	R: 0.9547	R: 0.9941	R: 0.9863	R: 0.9301
Test	P: 0.0273	P: > 0.10	P: 0.0456	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10

SAN DIEGO BAY COUNCIL POOL
(Sediment Chemistry - Metals)

	Cu - Trans	Hg	Hg - Trans	Ni	Ni - Trans	Pb	Pb - Trans	Zn	Zn - Trans
2227	1.731588765	0.234	-0.630784143	11.1	1.045322979	17.9	1.252853031	112	2.049218023
2229	1.770115295	0.3155	-0.501000636	9.3	0.968482949	24.5	1.389166084	99.3	1.996949248
2433	1.854913022	0.263	-0.580044252	14.9	1.173186268	21	1.322219295	126	2.100370545
2434	1.838219222	0.0015	-2.823908741	11.6	1.064457989	31.6	1.499687083	132	2.120573931
2435	1.45331834	0.123	-0.910094889	9.9	0.995635195	7.1	0.851258349	64.4	1.808885867
2252	1.492760389	0.113	-0.946921557	4.2	0.62324929	13.8	1.139879086	64.2	1.807535028
2441	1.856124444	0.1905	-0.72010502	16.6	1.220108088	21.9	1.340444115	123	2.089905111
Average	**1.713862783**	**0.177214**	**-1.016122748**	**11.08571**	**1.012920394**	**19.68571**	**1.256501006**	**102.9857**	**1.996205393**
t-stat	1.943	1.943	1.943	1.943	1.943	1.943	1.943	1.943	1.943
Std. Dev.	0.17	0.11	0.81	4.03	0.19	7.83	0.21	28.46	0.13
N	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	2.069461161	**0.398054**	**0.67471759**	**19.44733**	**1.416440245**	**35.95282**	**1.693806894**	**162.1031**	**2.275649639**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
	117.3440738		**4.728436816**		**26.08796749**		**49.40909442**		**188.6468851**
	(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.9081	R: 0.9865	R: 0.7858	R: 0.9753	R: 0.9228	R: 0.9893	R: 0.9465	R: 0.9354	R: 0.9130
Test	P: 0.0748	P: > 0.10	P: < 0.01	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10	P: > 0.10	P: 0.0867

SAN DIEGO BAY COUNCIL POOL
(Sediment Chemistry - Organics)

	LMWPAH	LMWPAH - Trans	HMWPAH	HMWPAH - Trans	PPPAH	PPPAH - Trans	TPCB
2227		#NUM!		#NUM!	659.4	2.819148943	50.53
2229		#NUM!		#NUM!	1339.3	3.126877869	50.53
2252	111	2.045322979	79	1.897627091	236	2.372912003	51
2433	111	2.045322979	283	2.451786436	574	2.758911892	51
2434		#NUM!		#NUM!	1133.3	3.054344889	55.93
2435	111	2.045322979	77	1.886490725	234	2.369215857	51
2441		#NUM!		#NUM!	1444.55	3.159732579	50.53
Average	**111**	**#NUM!**	**146.3333333**	**#NUM!**	**802.9357143**	**2.808734862**	**51.502857**
t-stat	1.943	1.943	1.943	1.943	1.943	1.943	1.943
Std. Dev.	0.00	#NUM!	118.36	#NUM!	504.42	0.33	1.97
N	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	111	**#NUM!**	**392.1874635**	**#NUM!**	**1850.685994**	**3.503080457**	**55.587124**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
		#NUM!		**#NUM!**		**3184.787475**	
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**	
Wilk-Shapiro	R: NA	R: NA	R: NA	R: NA	R: 0.9604	R: 0.9468	R: NA
Test	P: NA	P: NA	P: NA	P: NA	P: > 0.10	P: > 0.10	P: NA

SAN DIEGO BAY COUNCIL POOL
(Sediment Chemistry - Organics)

	TPCB - Trans	TCHLOR	TCHLOR - Trans	TDDT	TDDT - Trans	TBT	TBT - Trans
2227	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2229	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
2252	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2433	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2434	1.747644819	0.595	-0.225483034	1.08	0.033423755	NA	NA
2435	1.707570176	0.6	-0.22184875	1.67	0.222716471	NA	NA
2441	1.703549298	0.595	-0.225483034	1.08	0.033423755	NA	NA
Average	**1.711571892**	**0.597143**	**-0.223925484**	**1.332857**	**0.114549205**	**NA**	**NA**
t-stat	1.943	1.943	1.943	1.943	1.943	NA	NA
Std. Dev.	0.02	0.00	0.00	0.32	0.10	NA	NA
N	7.00	7.00	7.00	7.00	7.00	NA	NA
	1.744875348	**0.602694**	**-0.219890389**	**1.987926**	**0.324718203**	**NA**	**NA**
	UPL	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**	**UPL**
	55.57447235		**0.602711684**		**2.112118123**		**NA**
	(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: NA	R: NA	R: NA	R: NA	R: NA	R: NA	R: NA
Test	P: NA	P: NA	P: NA	P: NA	P: NA	P: NA	P: NA

SAN DIEGO BAY COUNCIL POOL
(Sediment Chemistry - SQGQ1)

	SQGQ1	SQGQ1 - Trans
2227	0.1568925	-0.804397785
2229	0.1617331	-0.791201019
2433	0.1785865	-0.748151489
2434	0.2107725	-0.676186044
2435	0.0869673	-1.06064387
2252	0.0949835	-1.022351921
2441	0.2618347	-0.581972775
Average	**0.1645386**	**-0.812129272**
t-stat	1.943	1.943
Std. Dev.	0.06	0.17
N	7.00	7.00
	0.2923666	**-0.450365772**
	UPL	**UPL**
		0.354514684
		(Untr UPL)
Wilk-Shapiro	R: 0.9791	R: 0.9688
Test	P: > 0.10	P: > 0.10

SAN DIEGO BAY COUNCIL POOL
(Toxicity)

	Amphipod	Amphipod - Trans	Bivalve SWI	Bivalve SWI - Trans	Urchin Pore Water	Urchin Pore Water - Trans
2227	98	1.991226076	NA	NA	NA	NA
2229	98	1.991226076	NA	NA	NA	NA
2252	104	2.017033339	NA	NA	NA	NA
2433	97	1.986771734	NA	NA	NA	NA
2434	101	2.004321374	NA	NA	NA	NA
2435	102	2.008600172	NA	NA	NA	NA
2441	88	1.944482672	NA	NA	NA	NA
Average	**98.28571429**	**1.991951635**	**NA**	**NA**	**NA**	**NA**
t-stat	1.943	1.943	NA	NA	NA	NA
Std. Dev.	5.19	0.02	NA	NA	NA	NA
N	7.00	7.00	NA	NA	NA	NA
	87.51155602	**1.942940307**	**NA**	**NA**	**NA**	**NA**
	LPL	**LPL**	**LPL**	**LPL**	**LPL**	**LPL**
		87.68802871		**NA**		**NA**
		(Untr UPL)		**(Untr UPL)**		**(Untr UPL)**
Wilk-Shapiro	R: 0.9337	R: 0.9288	R: NA	R: NA	R: NA	R: NA
Test	P: > 0.10	P: > 0.10	P: NA	P: NA	P: NA	P: NA

SAN DIEGO BAY COUNCIL POOL
(Benthic Community)

	Abundance	Abundance - Trans	# Taxa	# Tax - Trans	S-W Diversity	S-W Diversity - Trans	BRI	BRI - Trans
2227	933	2.969881644	52	1.71600334	2.849	0.45469245	24.89	1.396025
2229	705	2.848189117	63	1.79934055	3.124	0.49471103	15.69	1.195623
2252	327	2.514547753	37	1.56820172	2.81	0.44870632	4.26	0.62941
2433	709	2.850646235	59	1.77085201	3.08	0.48855072	20.99	1.322012
2434	576	2.760422483	50	1.69897	3.305	0.51917146	23.96	1.379487
2435	466	2.668385917	60	1.77815125	3.41	0.53275438	-1.11	NA
2441	1672	3.223236273	86	1.93449845	3.2	0.50514998	17.24	1.236537
Average	**769.714286**	**2.833615632**	**58.1428571**	**1.75228819**	**3.111142857**	**0.49196233**	**15.1314286**	**1.193182**
t-stat	1.943	1.943	1.943	1.943	1.943	1.943	1.943	2.015
Std. Dev.	442.42	0.23	15.03	0.11	0.22	0.03	9.95	0.29
N	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.00
	-149.26297 LPL	**2.365036196 LPL**	**26.9295417 LPL**	**1.52086911 LPL**	**2.650304062 LPL**	**0.4270613 LPL**	**35.8027899 UPL**	**1.818075 UPL**
		231.7587798 (Untr LPL)		**33.1794441 (Untr LPL)**		**2.6733837 (Untr LPL)**		**65.77711 (Untr LPL)**
Wilk-Shapiro Test	R: 0.9117 P: 0.0836	R: 0.9814 P: > 0.10	R: 0.9548 P: > 0.10	R: 0.9679 P: > 0.10	R: 0.9802 P: > 0.10	R: 0.9781 P: > 0.10	R: 0.9477 P: > 0.10	R: 0.8505 P: 0.0178

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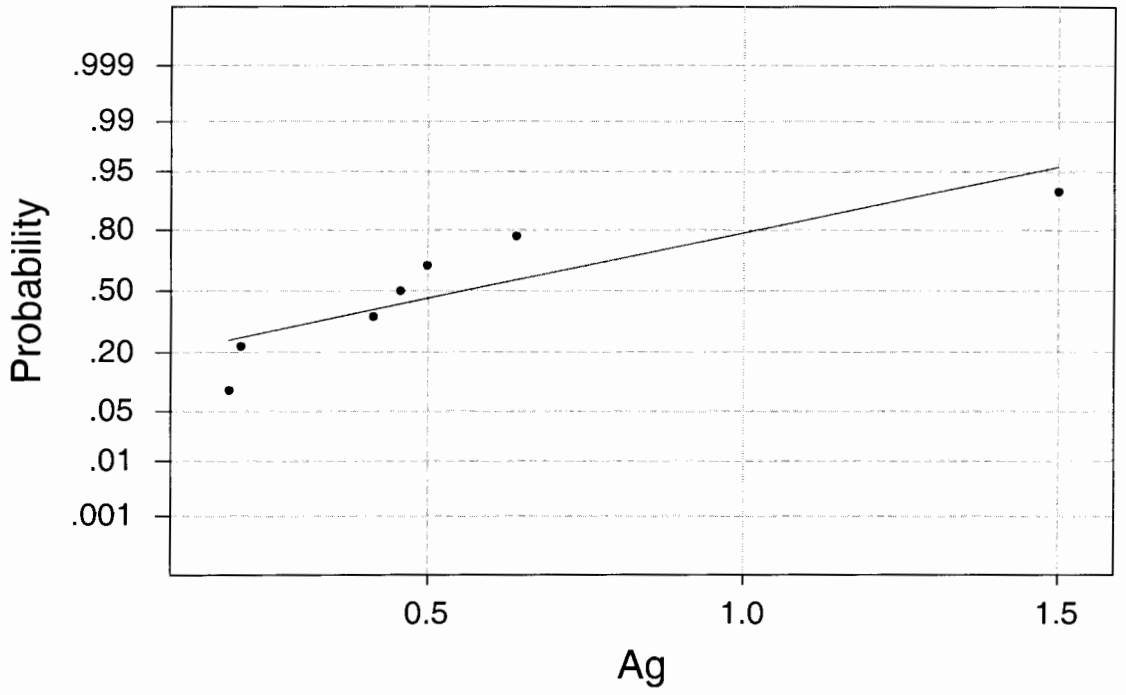
BAY COUNCIL

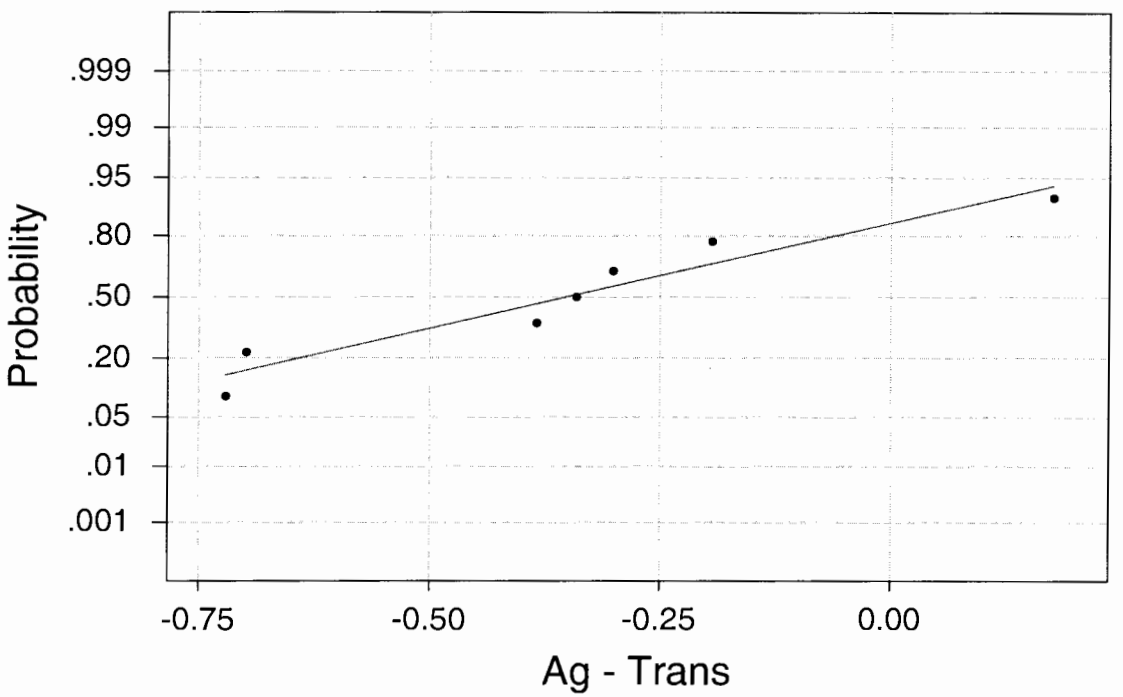
Normal Probability Plot



Average: 0.556714
StDev: 0.445988
N: 7

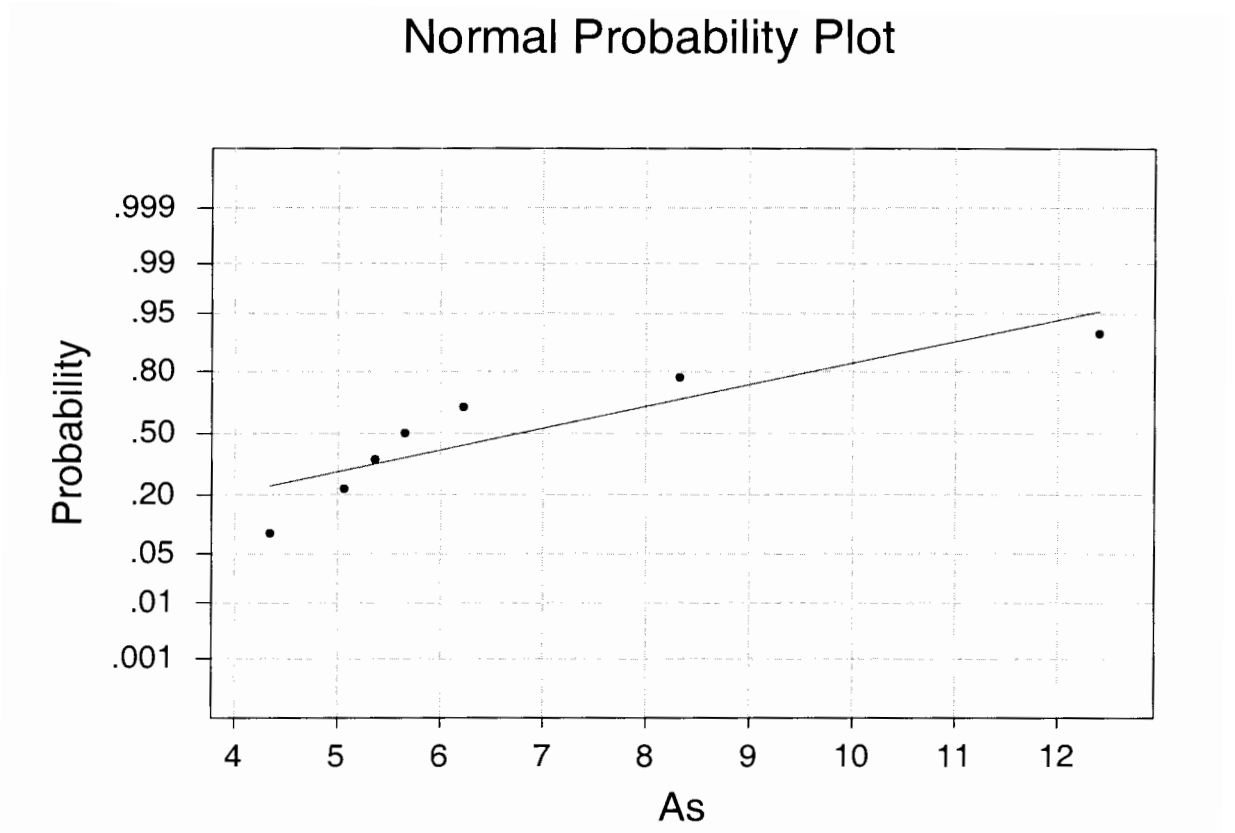
W-test for Normality
R: 0.8717
P-Value (approx): 0.0273

BAY COUNCIL



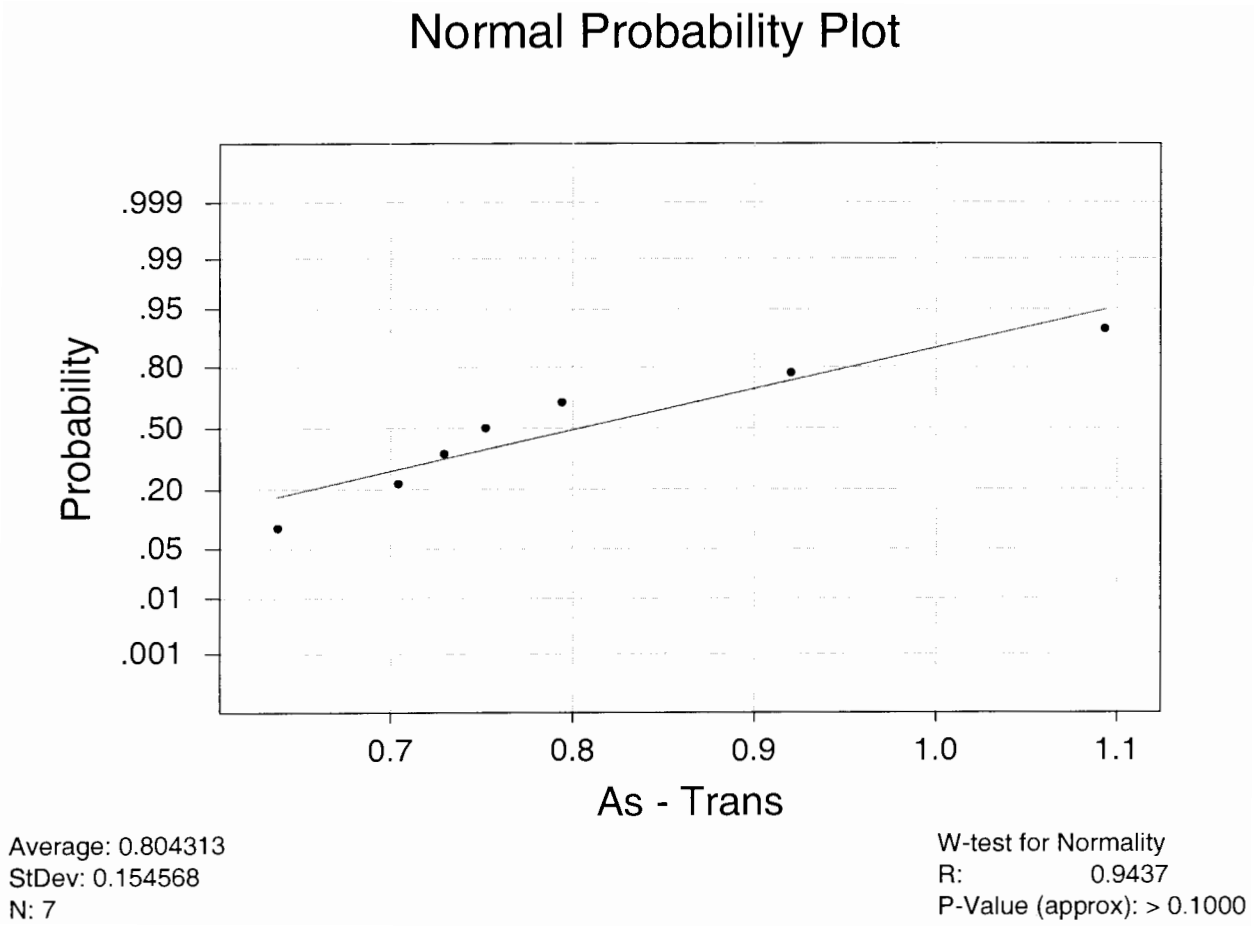
Average: -0.352009
StDev: 0.306697
N: 7

W-test for Normality
R: 0.9626
P-Value (approx): > 0.1000



Average: 6.76429
StDev: 2.78308
N: 7

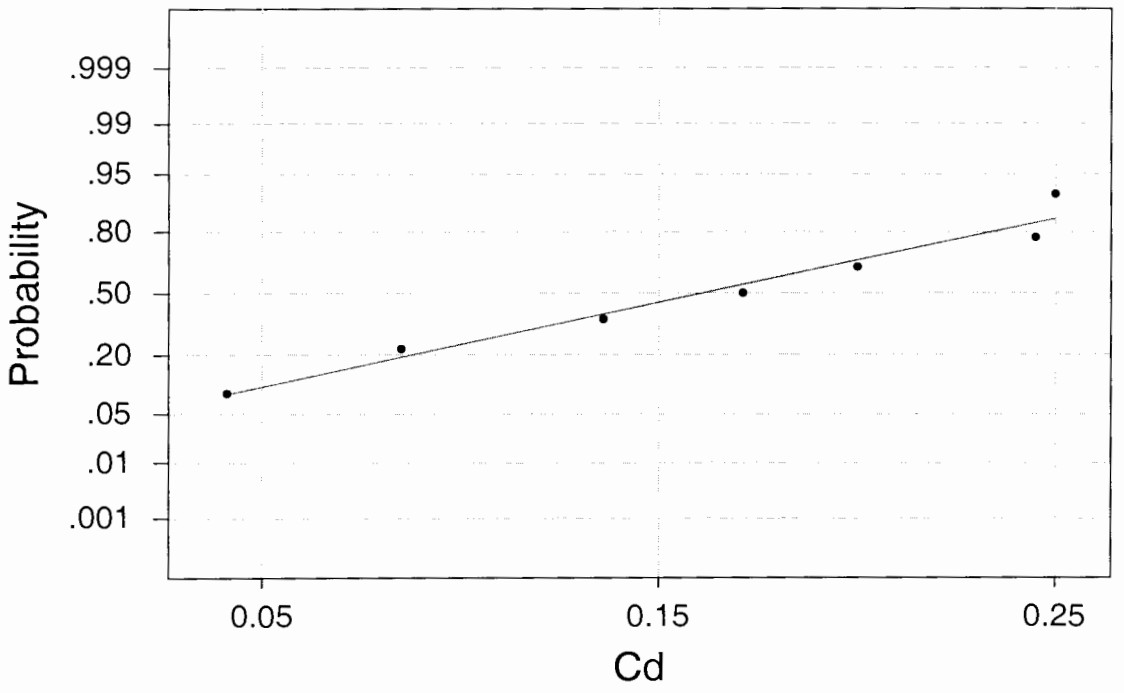
W-test for Normality
R: 0.8927
P-Value (approx): 0.0456



Average: 0.804313
StDev: 0.154568
N: 7

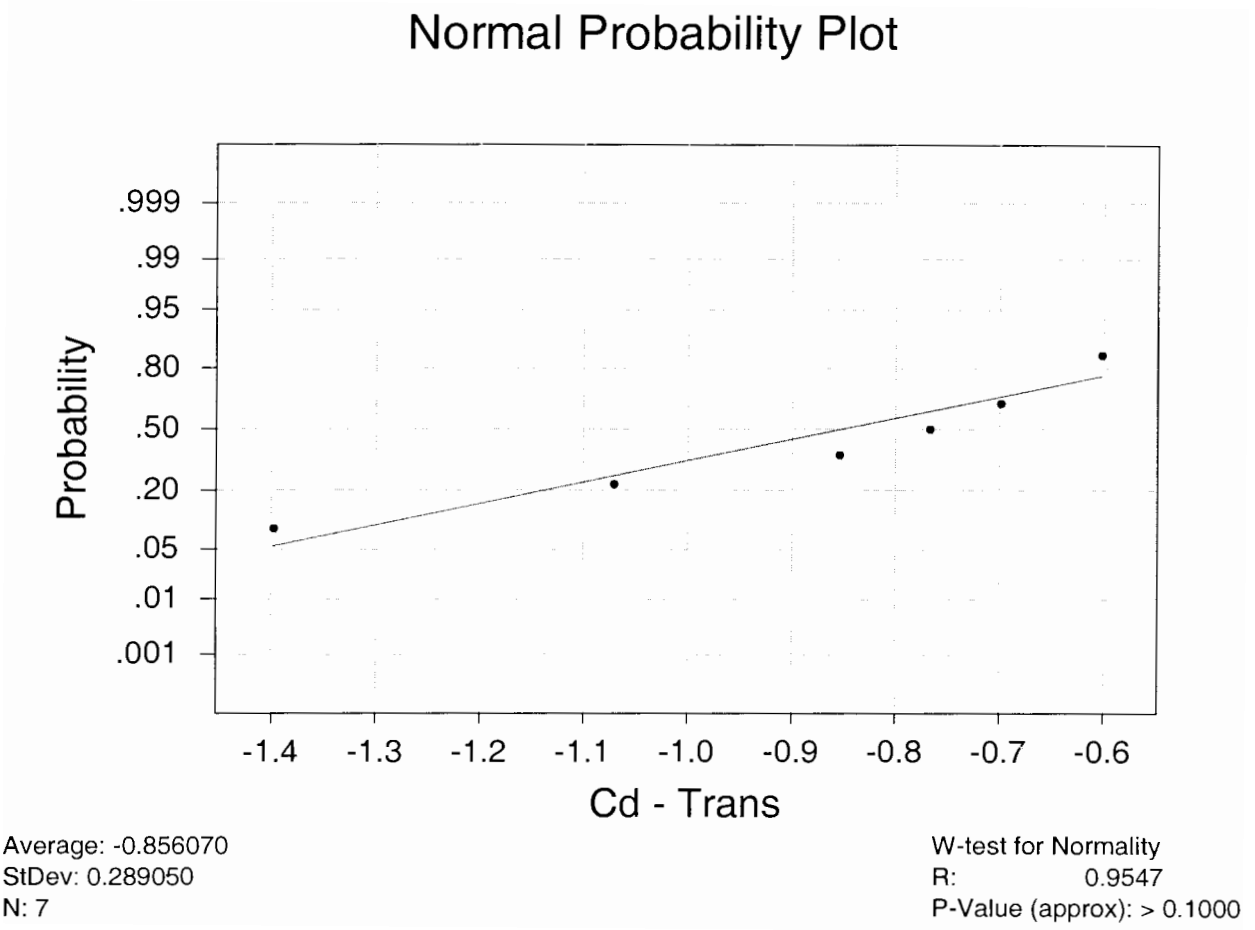
W-test for Normality
R: 0.9437
P-Value (approx): > 0.1000

Normal Probability Plot



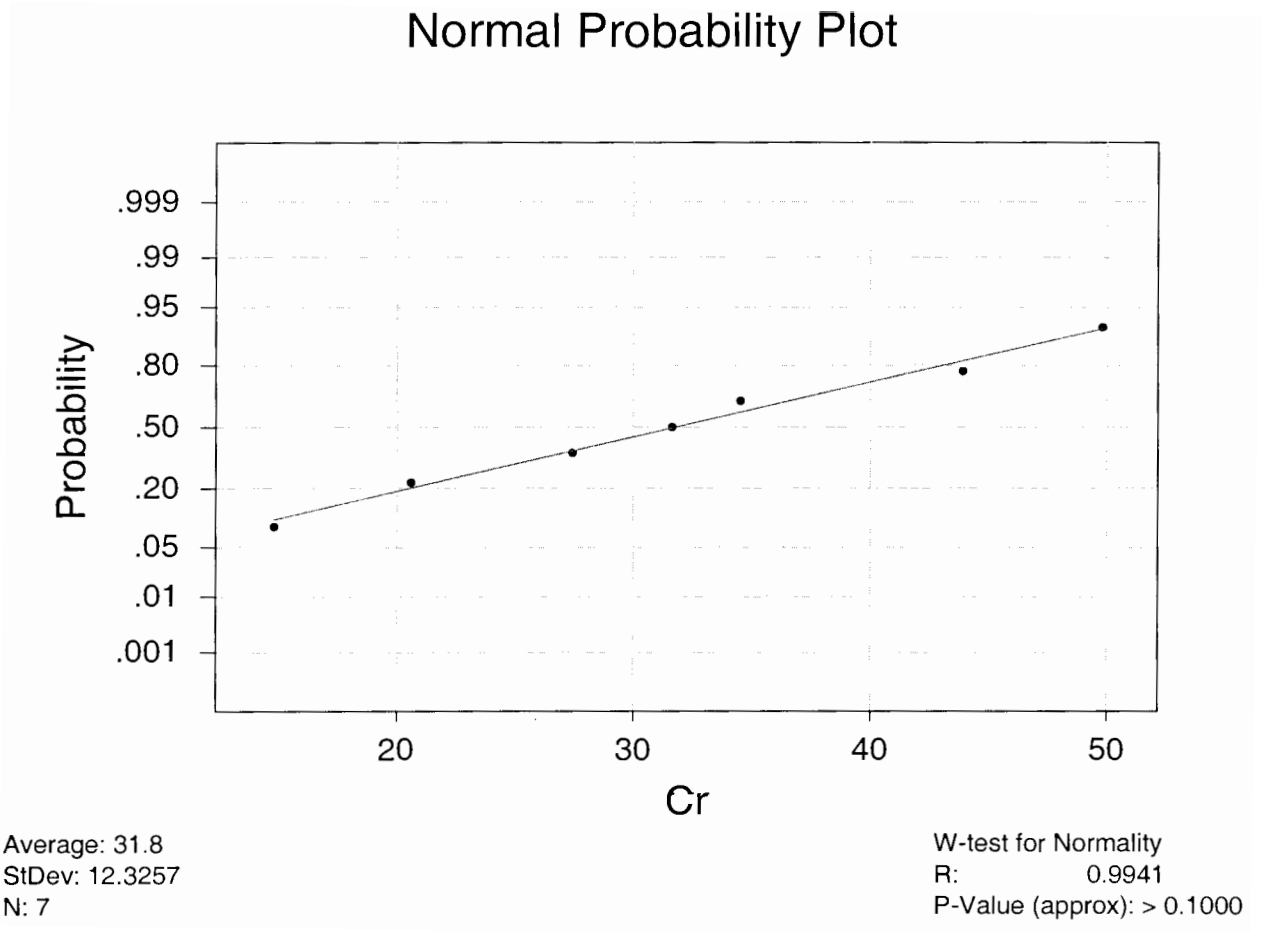
Average: 0.161143
StDev: 0.0789503
N: 7

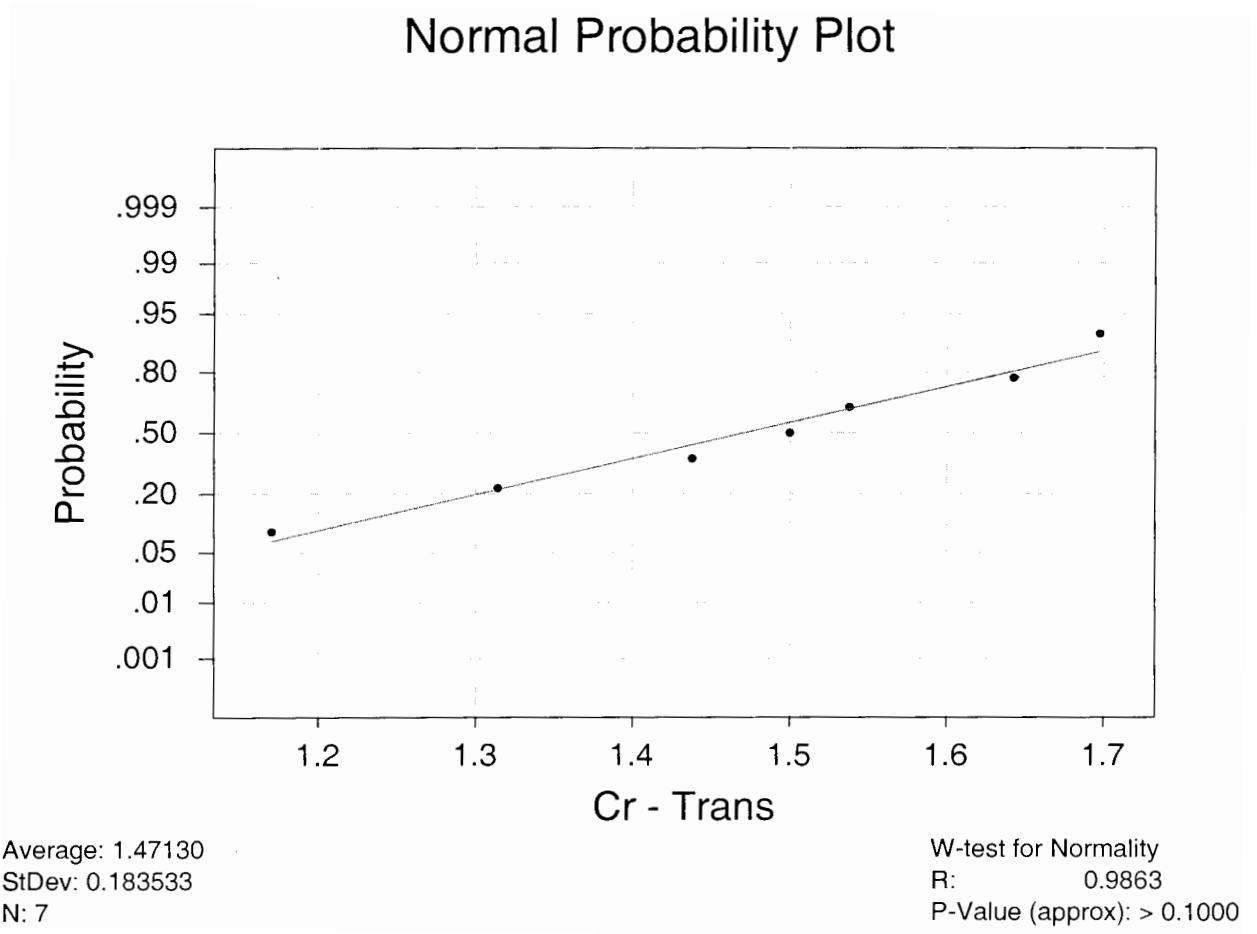
W-test for Normality
R: 0.9803
P-Value (approx): > 0.1000



Average: -0.856070
StDev: 0.289050
N: 7

W-test for Normality
R: 0.9547
P-Value (approx): > 0.1000

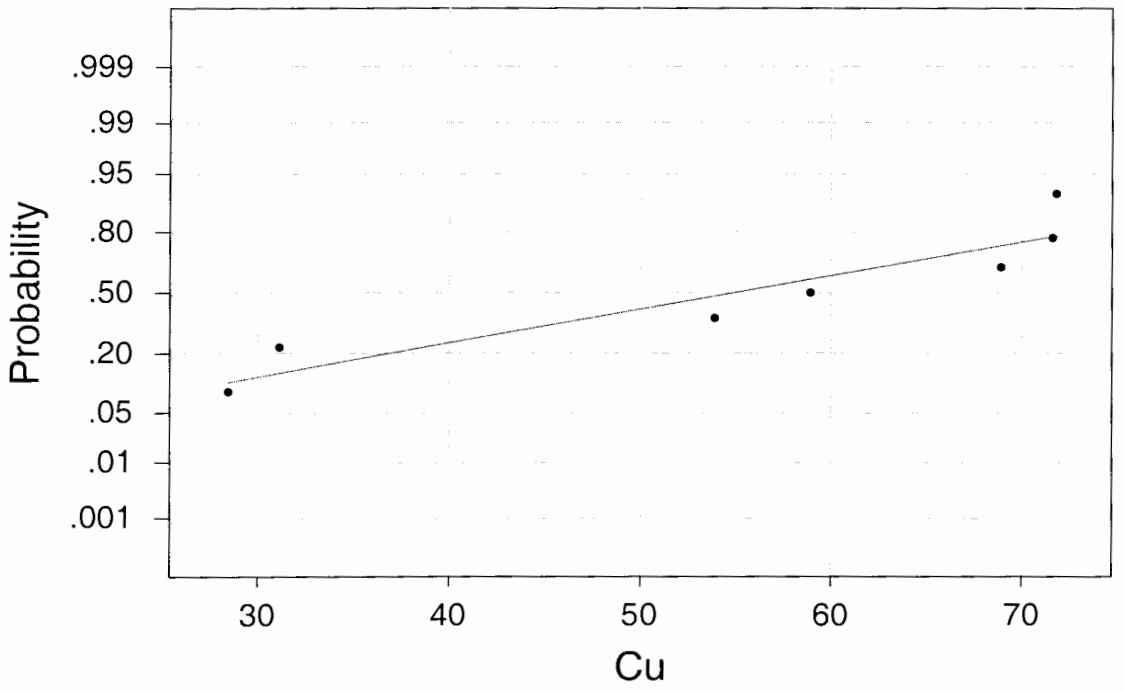

Normal Probability Plot
Probability
.999
.99
.95
.80
.50
.20
.05
.01
.001
20
30
40
50
Cr
Average: 31.8
StDev: 12.3257
N: 7
W-test for Normality
R: 0.9941
P-Value (approx): > 0.1000



Average: 1.47130
StDev: 0.183533
N: 7

W-test for Normality
R: 0.9863
P-Value (approx): > 0.1000

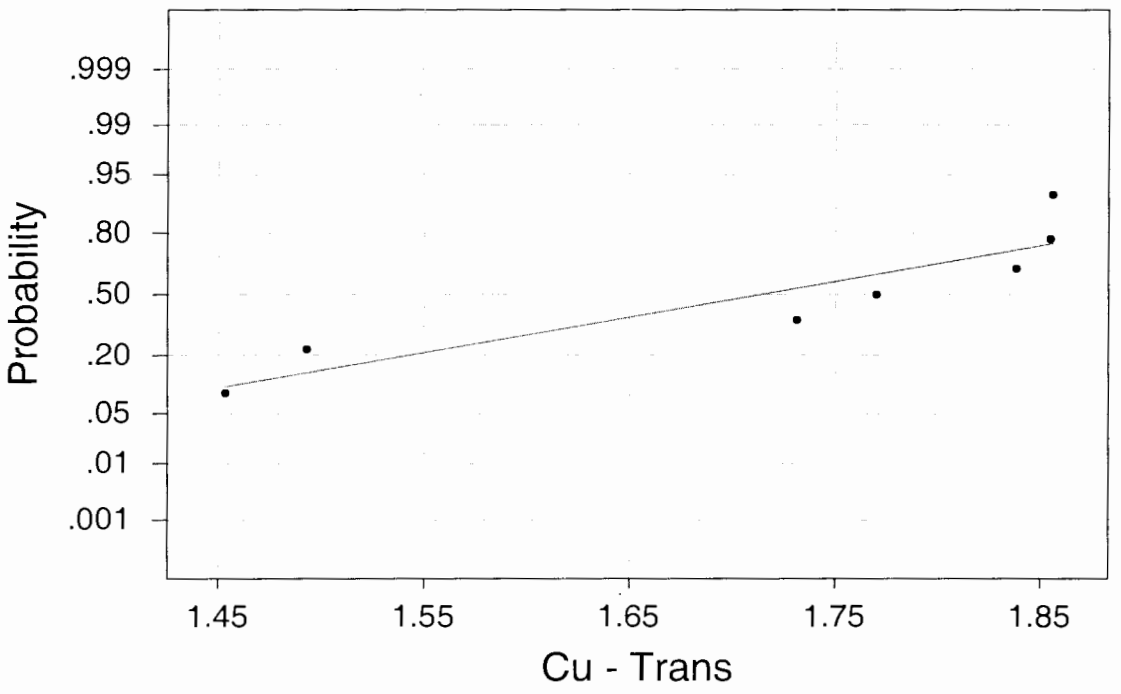
Normal Probability Plot



Average: 54.9429
StDev: 18.4670
N: 7

W-test for Normality
R: 0.9301
P-Value (approx): > 0.1000

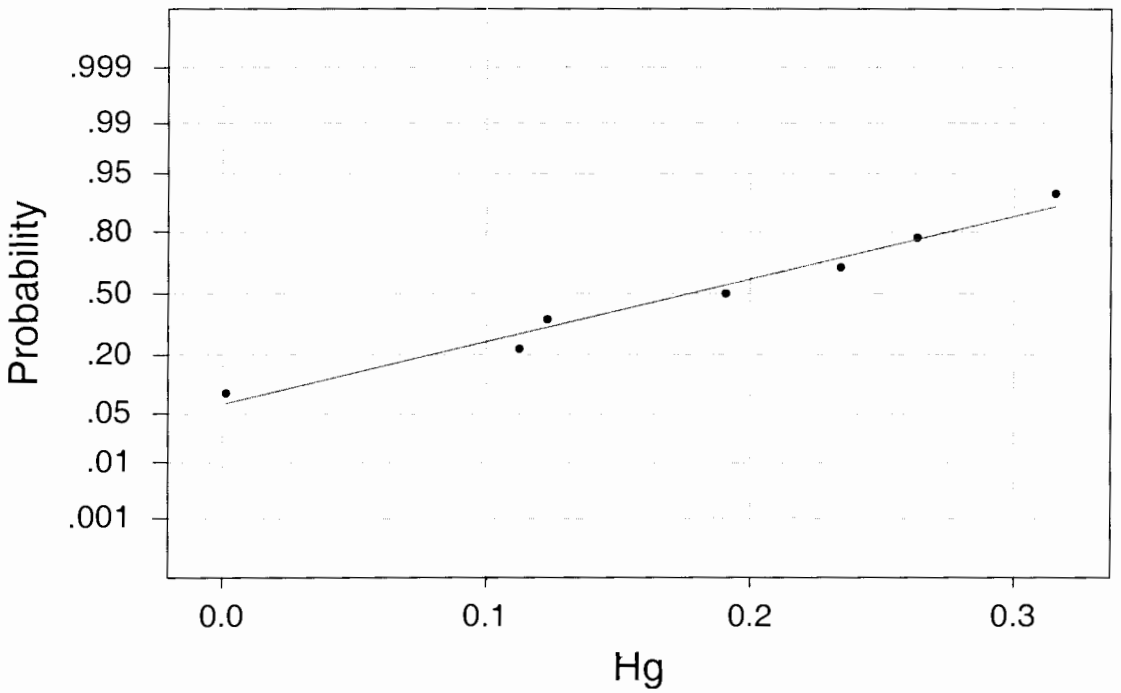
Normal Probability Plot



Average: 1.71386
StDev: 0.171195
N: 7

W-test for Normality
R: 0.9081
P-Value (approx): 0.0748

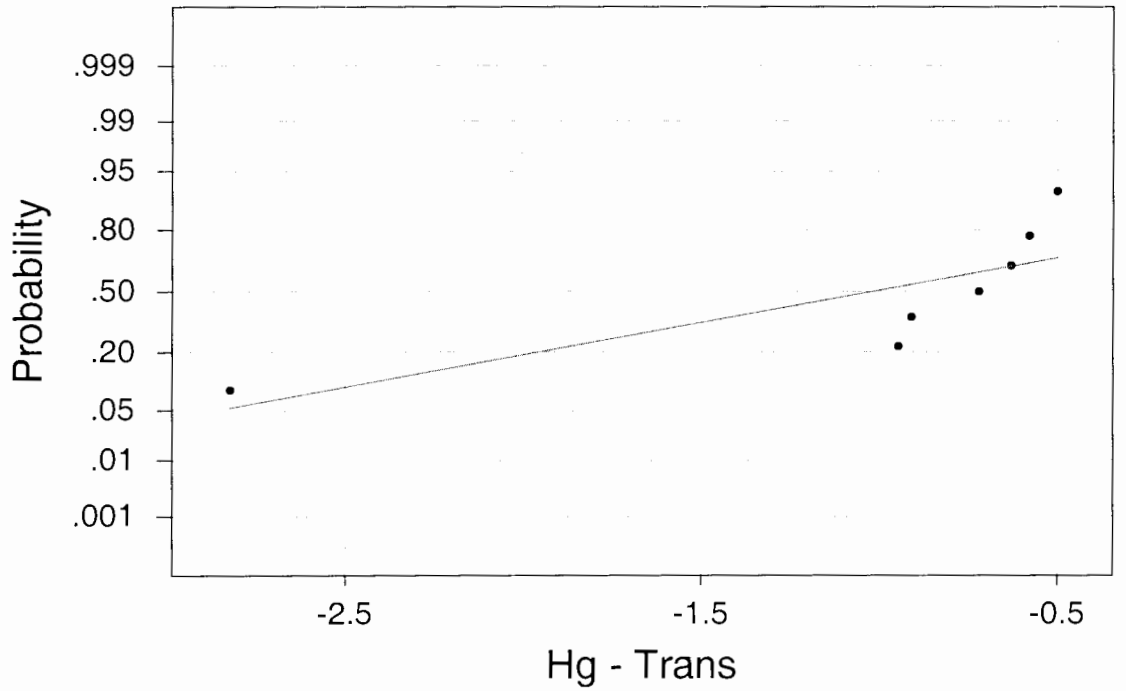
Normal Probability Plot



Average: 0.177143
StDev: 0.106369
N: 7

W-test for Normality
R: 0.9865
P-Value (approx): > 0.1000

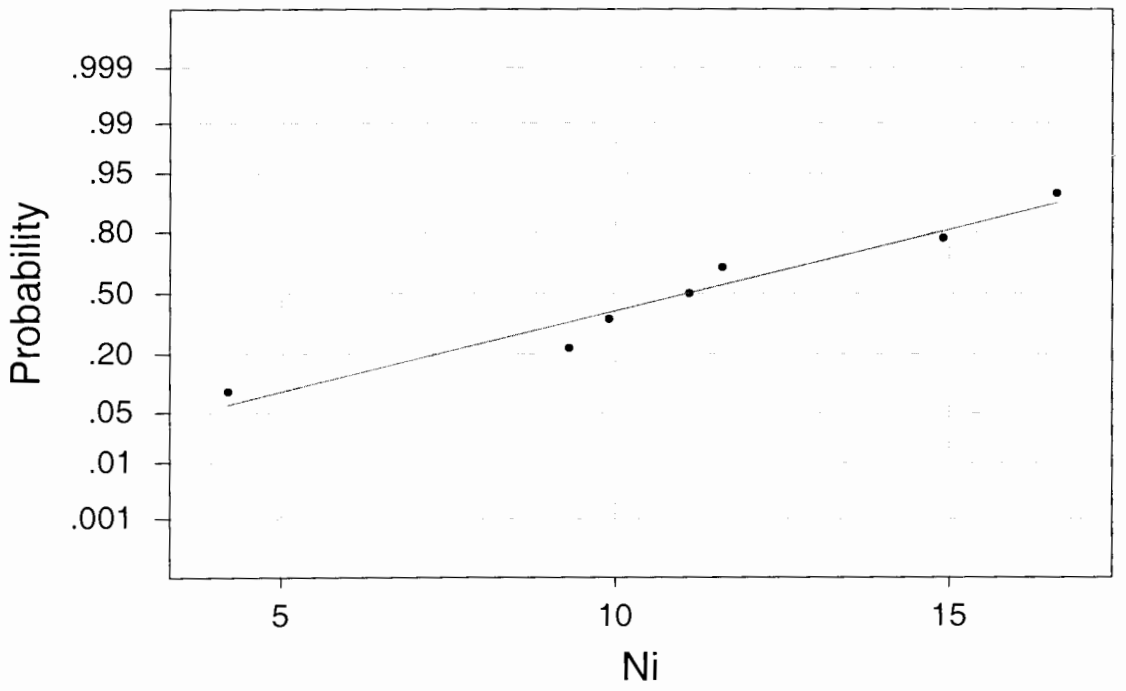
Normal Probability Plot



Average: -1.01612
StDev: 0.814018
N: 7

W-test for Normality
R: 0.7858
P-Value (approx): < 0.0100

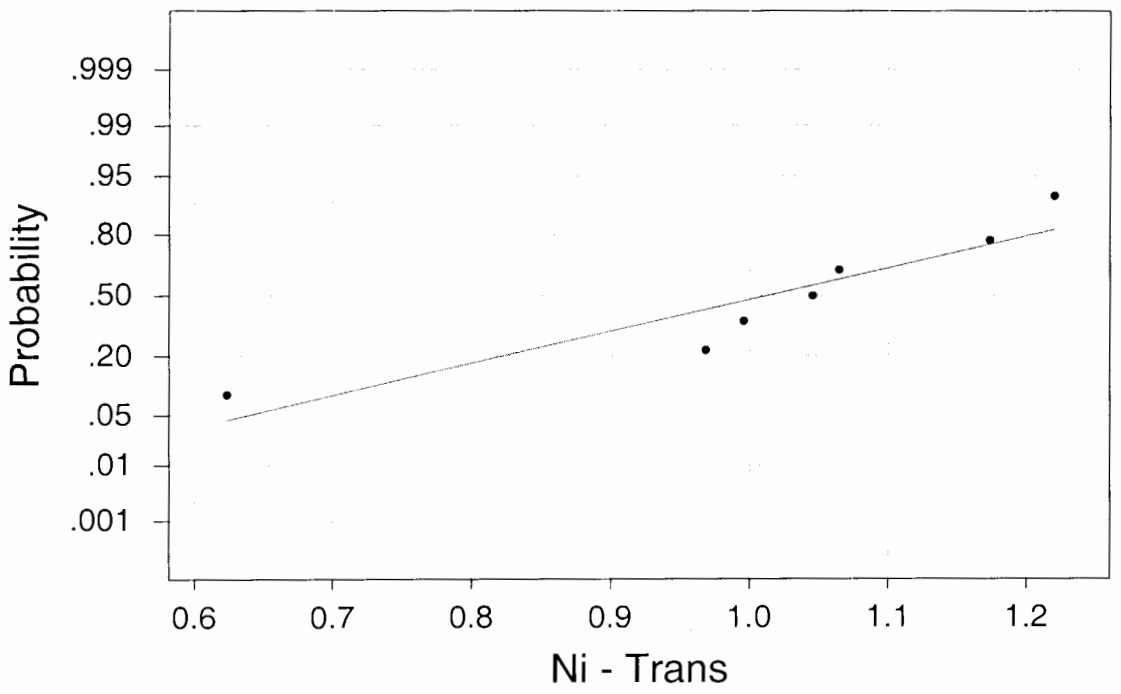
Normal Probability Plot



Average: 11.0857
StDev: 4.02551
N: 7

W-test for Normality
R: 0.9753
P-Value (approx): > 0.1000

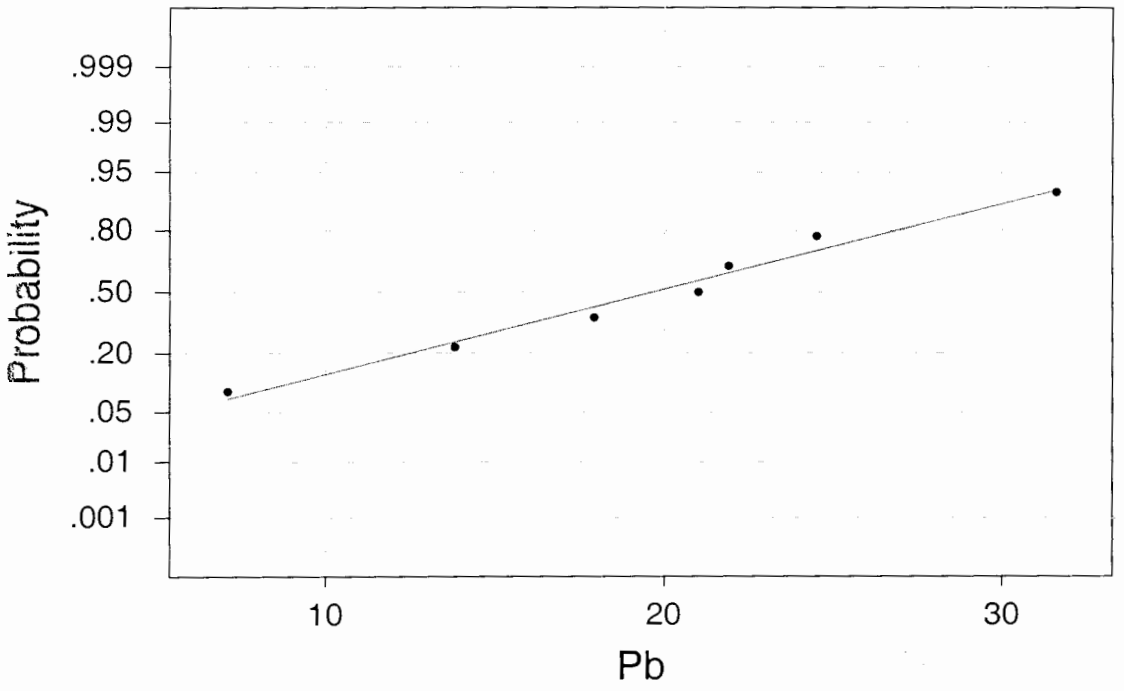
Normal Probability Plot



Average: 1.01292
StDev: 0.194266
N: 7

W-test for Normality
R: 0.9228
P-Value (approx): > 0.1000

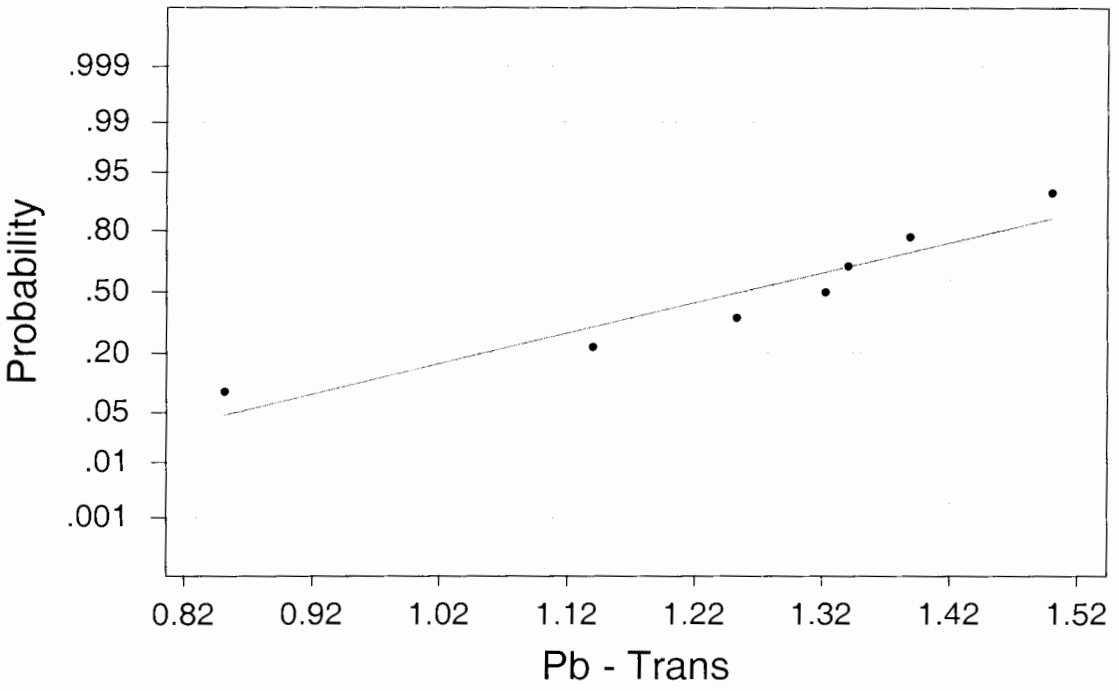
Normal Probability Plot



Average: 19.6857
StDev: 7.83144
N: 7

W-test for Normality
R: 0.9893
P-Value (approx): > 0.1000

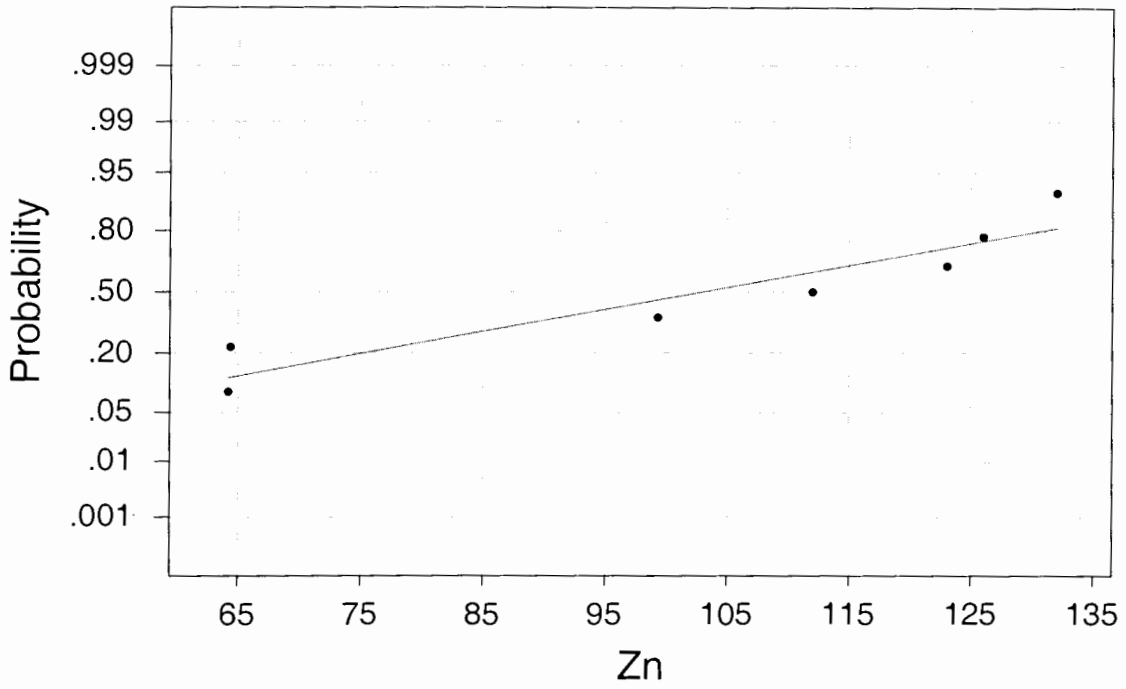
Normal Probability Plot



Average: 1.25650
StDev: 0.210531
N: 7

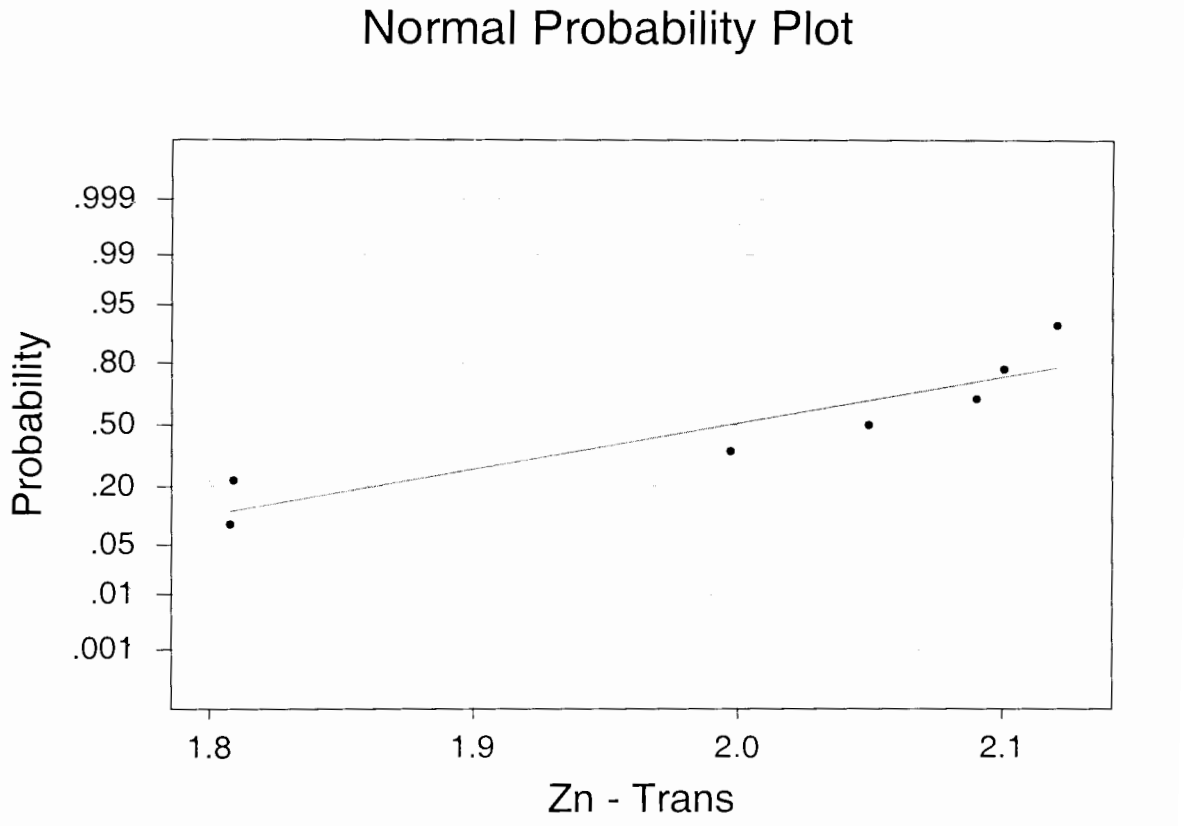
W-test for Normality
R: 0.9465
P-Value (approx): > 0.1000

Normal Probability Plot



Average: 102.986
StDev: 28.4608
N: 7

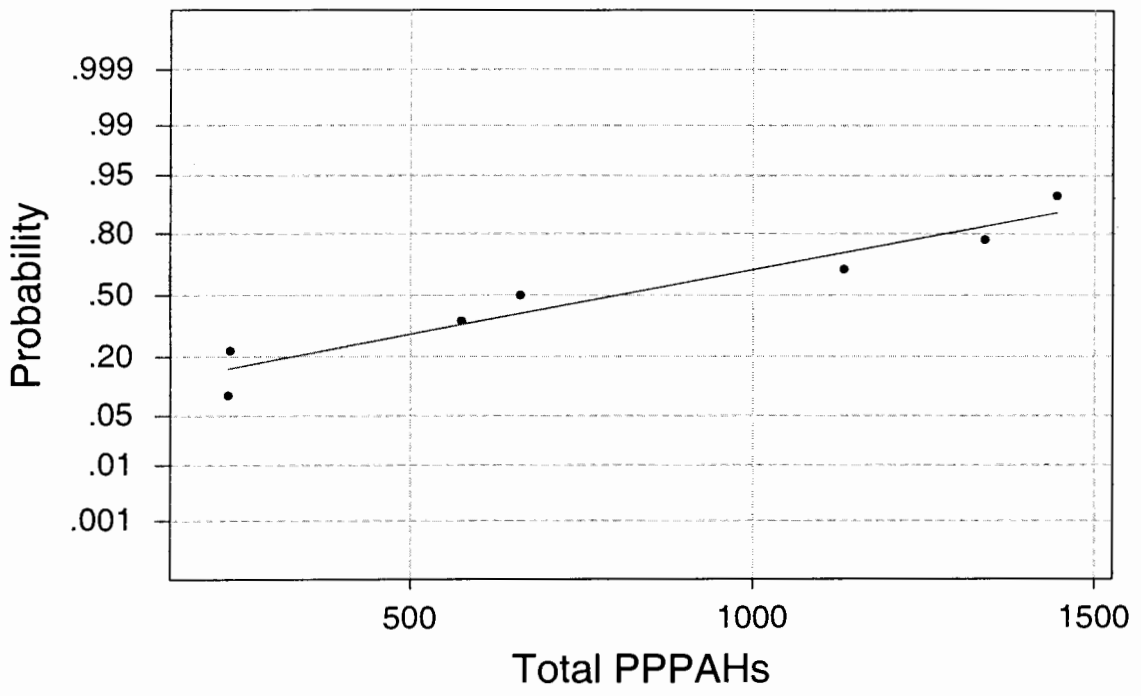
W-test for Normality
R: 0.9354
P-Value (approx): > 0.1000



Average: 1.99621
StDev: 0.134532
N: 7

W-test for Normality
R: 0.9130
P-Value (approx): 0.0867

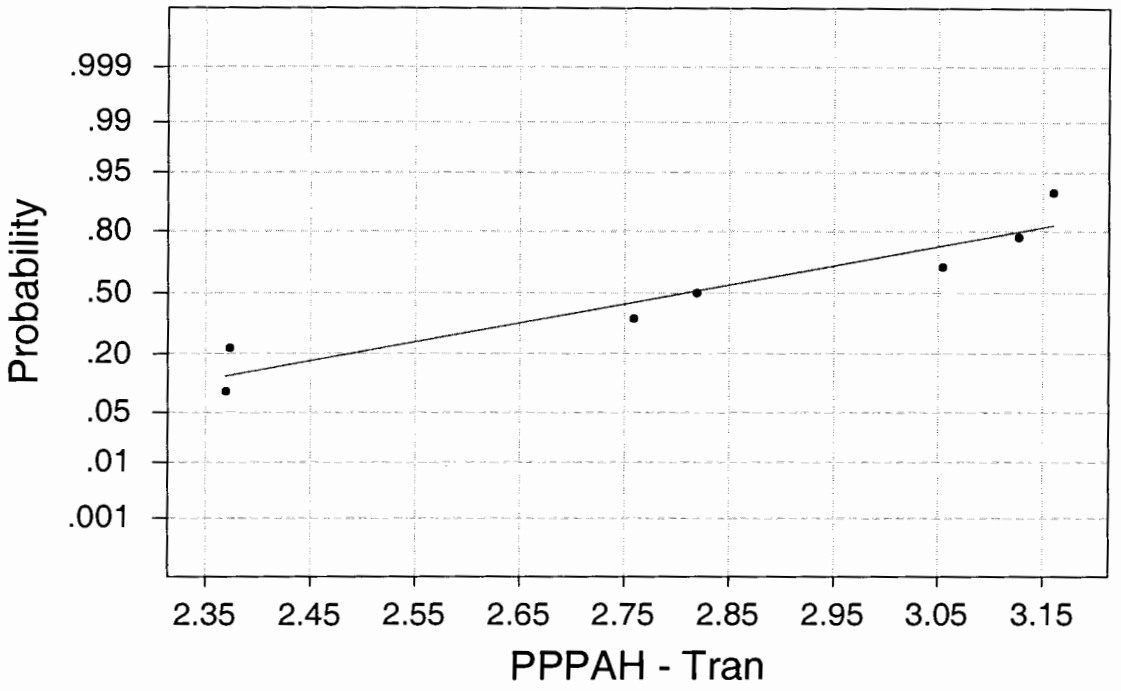
Normal Probability Plot



Average: 802.993
StDev: 504.336
N: 7

W-test for Normality
R: 0.9604
P-Value (approx): > 0.1000

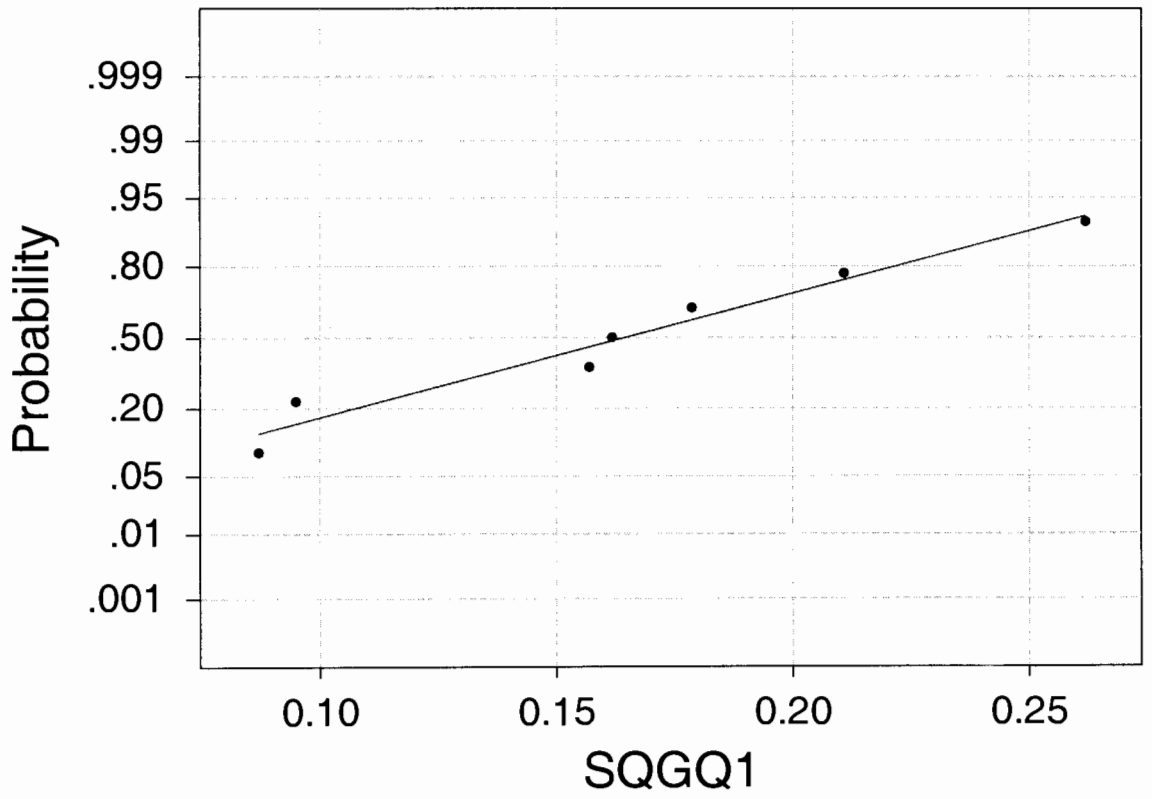
Normal Probability Plot



Average: 2.80873
StDev: 0.334277
N: 7

W-test for Normality
R: 0.9468
P-Value (approx): > 0.1000

Normal Probability Plot

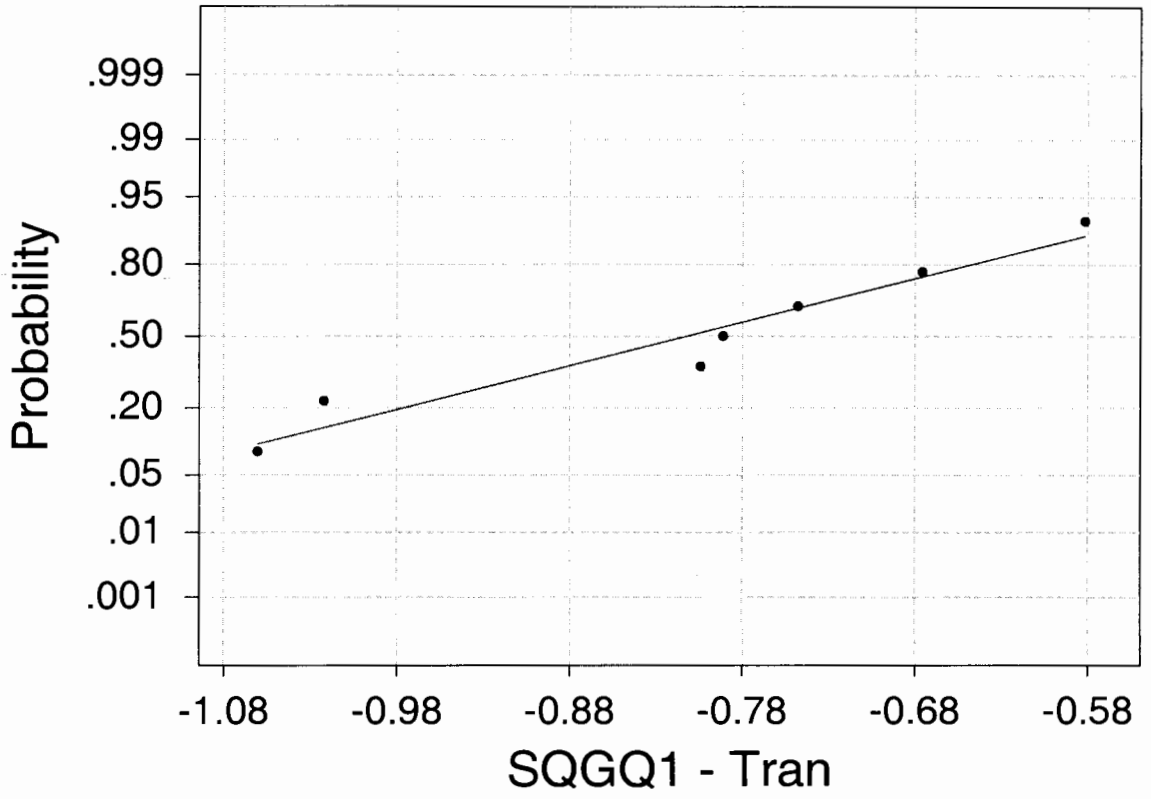


Average: 0.164539
StDev: 0.0615400
N: 7

W-test for Normality
R: 0.9791
P-Value (approx): > 0.1000

Bay Council

Normal Probability Plot

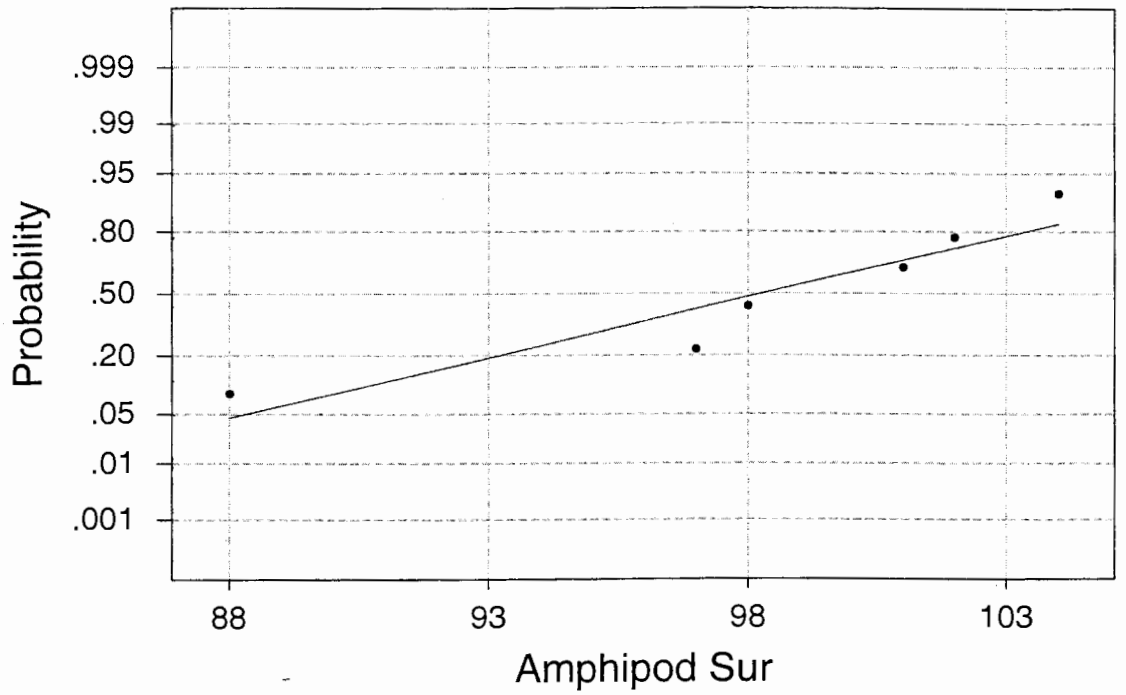


Average: -0.812129
StDev: 0.174163
N: 7

W-test for Normality
R: 0.9688
P-Value (approx): > 0.1000

BAY COUNCIL

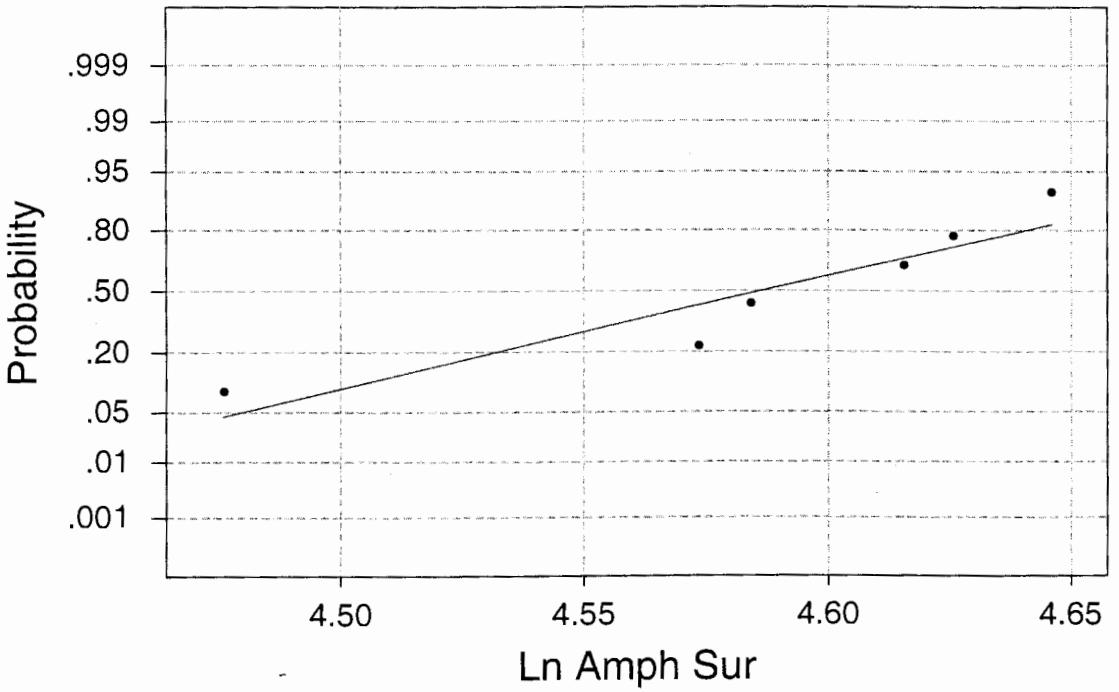
Normal Probability Plot



Average: 98.2857
StDev: 5.18698
N: 7

W-test for Normality
R: 0.9337
P-Value (approx): > 0.1000

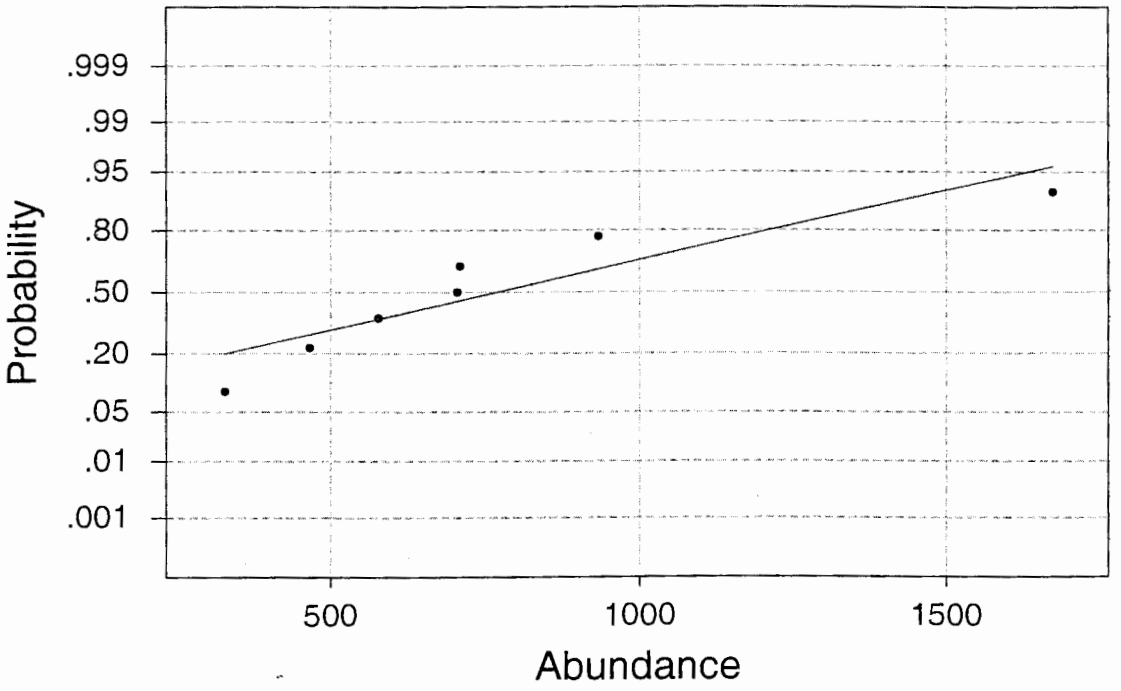
Normal Probability Plot



Average: 4.58642
StDev: 0.0552686
N: 7

W-test for Normality
R: 0.9288
P-Value (approx): > 0.1000

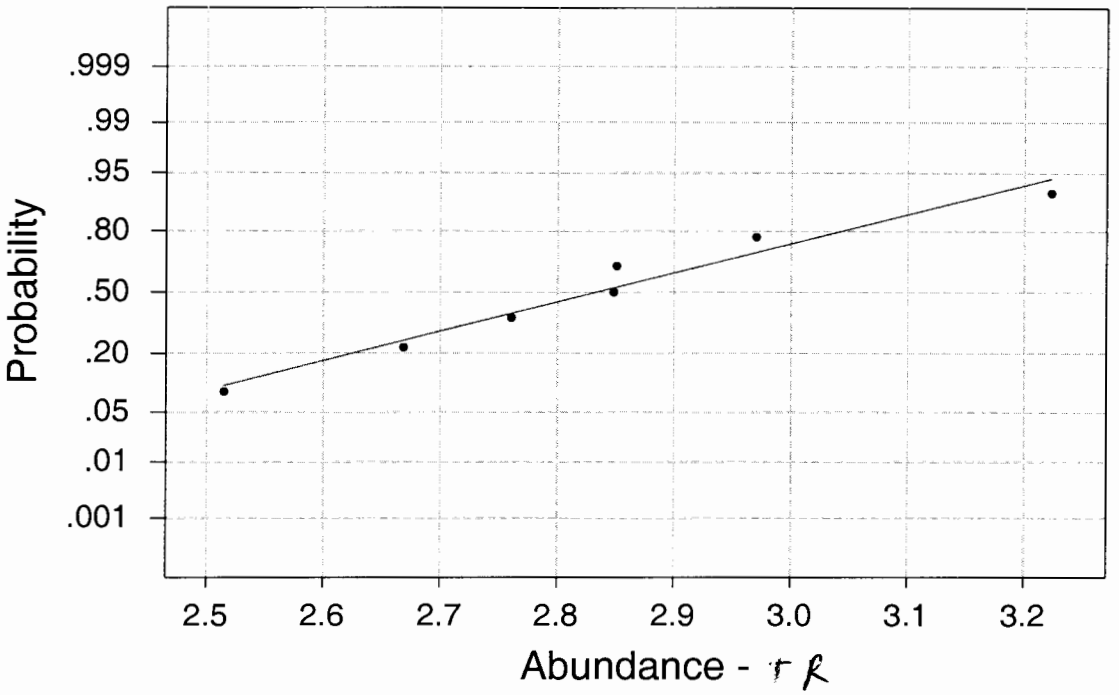
Normal Probability Plot



Average: 769.714
StDev: 442.421
N: 7

W-test for Normality
R: 0.9117
P-Value (approx): 0.0836

Normal Probability Plot

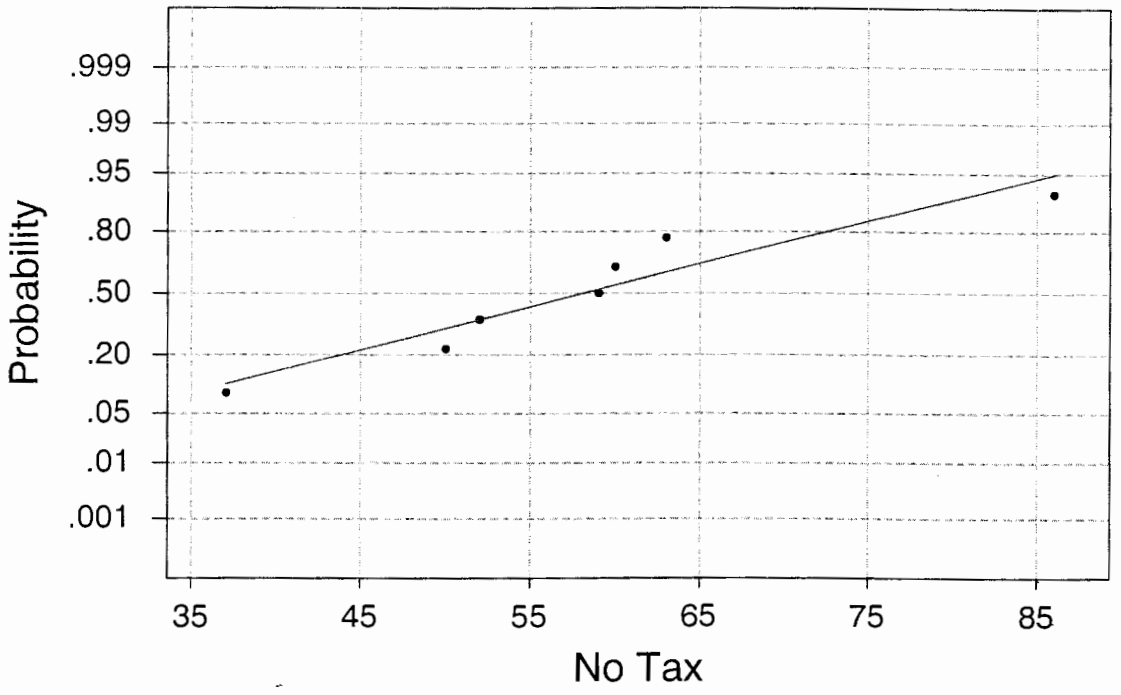


Average: 2.83362
StDev: 0.225587
N: 7

(LOG)

W-test for Normality
R: 0.9814
P-Value (approx): > 0.1000

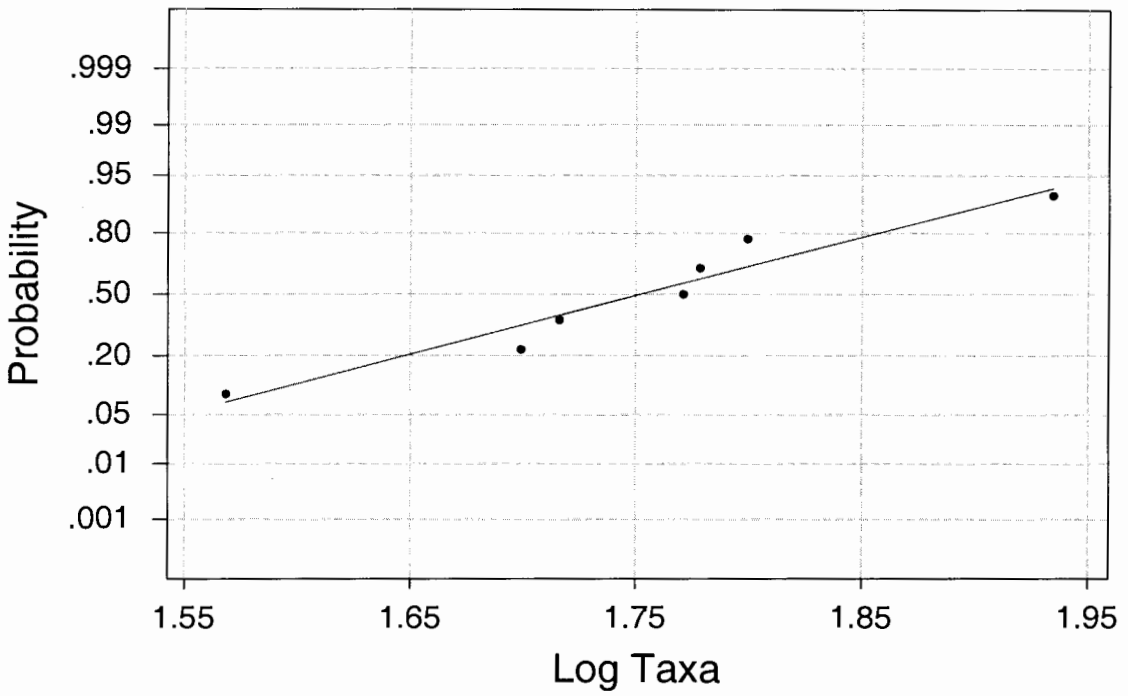
Normal Probability Plot



Average: 58.1429
StDev: 15.0270
N: 7

W-test for Normality
R: 0.9548
P-Value (approx): > 0.1000

Normal Probability Plot

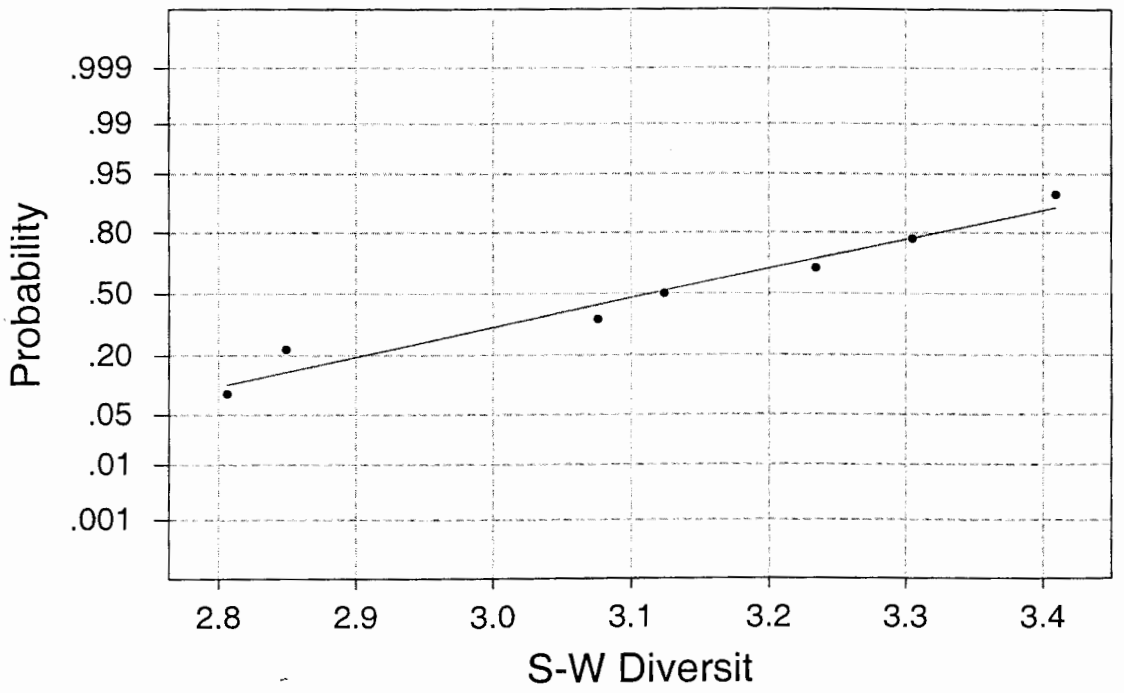


Average: 1.75229
StDev: 0.111412
N: 7

(TR)

W-test for Normality
R: 0.9679
P-Value (approx): > 0.1000

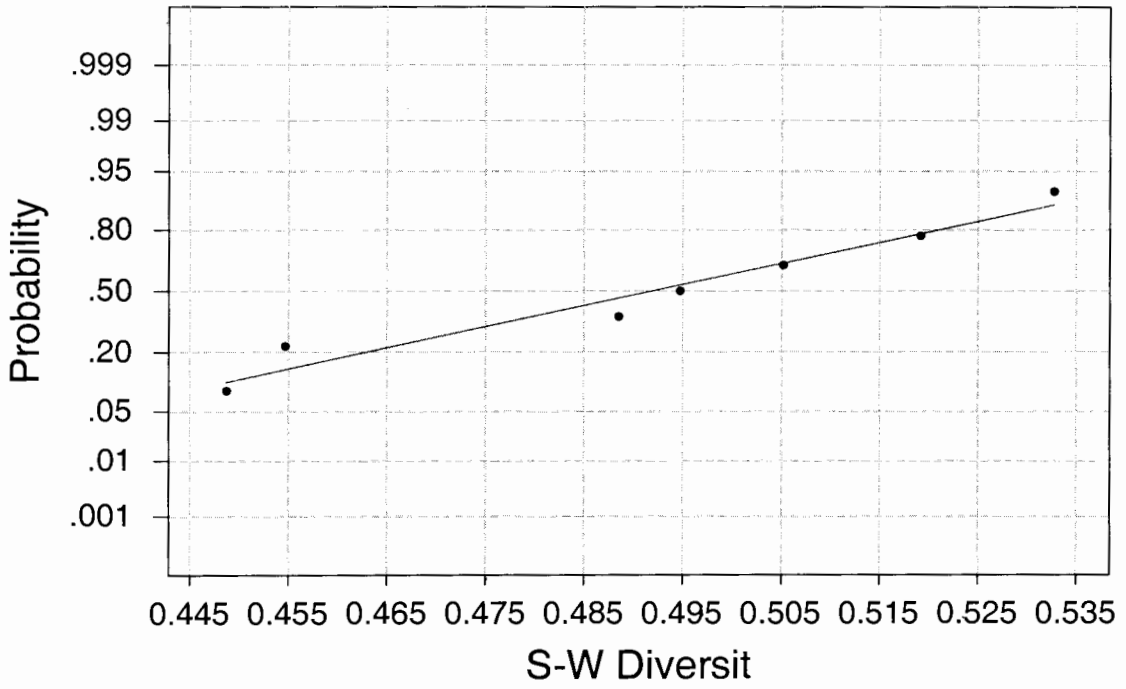
Normal Probability Plot



Average: 3.11471
StDev: 0.225291
N: 7

W-test for Normality
R: 0.9802
P-Value (approx): > 0.1000

Normal Probability Plot

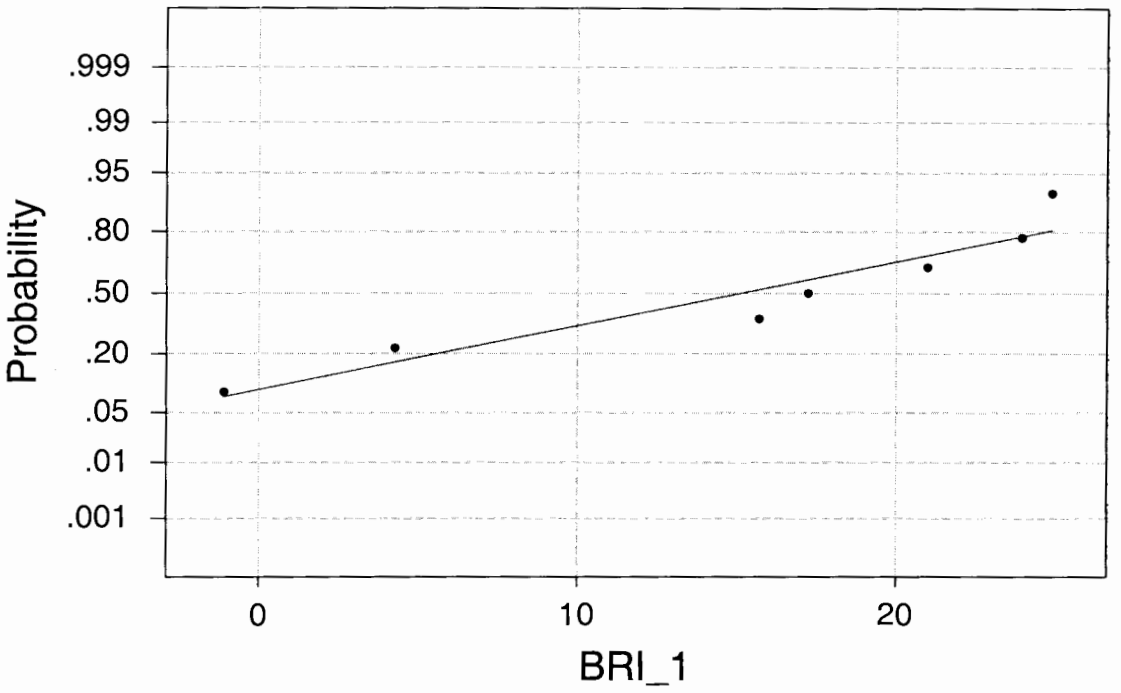


Average: 0.491962
StDev: 0.0312452
N: 7

(T R)
LOG

W-test for Normality
R: 0.9781
P-Value (approx): > 0.1000

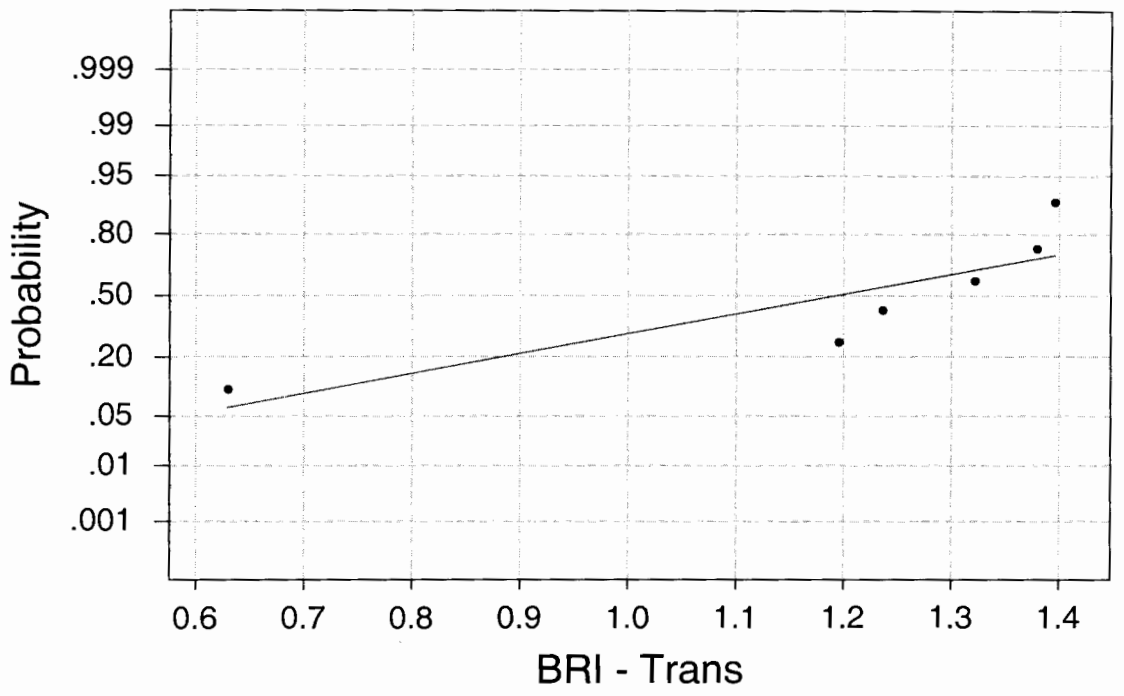
Normal Probability Plot



Average: 15.1314
StDev: 9.95177
N: 7

W-test for Normality
R: 0.9477
P-Value (approx): > 0.1000

Normal Probability Plot



Average: 1.19318
StDev: 0.287116
N: 6

W-test for Normality
R: 0.8503
P-Value (approx): 0.0178

(1 less data point because can't transform a negative number)