

Detects Only Probability Plot Correlation Coefficient
Arsenic Concentrations Detected in Crawford and Bexar Stony Soils
Camp Stanley Storage Activity, Texas

Uniform Order Normal Order					Normal				Lognormal					
Order(i)	Statistic Medians	Statistic Medians	$M_i - M_{avg}$	$(M_i - M_{avg})^2$	Ordered Concentrations (mg/kg)	$X_i - X_{avg}$	$(X_i - X_{avg})^2$	$(X_i - X_{avg}) * (M_i - M_{avg})$	Ln of Ordered Concentrations (mg/kg)	$X_i - X_{avg}$	$(X_i - X_{avg})^2$	$(X_i - X_{avg}) * (M_i - M_{avg})$		
i	m_i	M_i	$M_i - M_{avg}$	$(M_i - M_{avg})^2$	$x_{(i)}$	$X_i - X_{avg}$	$(X_i - X_{avg})^2$	$(X_i - X_{avg}) * (M_i - M_{avg})$	$\ln(x_{(i)})$	$X_i - X_{avg}$	$(X_i - X_{avg})^2$	$(X_i - X_{avg}) * (M_i - M_{avg})$		
1	0.10910	-1.23132	-1.23132	1.516	1.2				0.18				Nondetect	
2	0.26434	-0.63003	-0.63003	0.397	1.3				0.22				Nondetect	
3	0.42145	-0.19820	-0.19820	0.039	1.3				0.22				Nondetect	
4	0.57855	0.19820	0.19820	0.039	1.3				0.22				Nondetect	
5	0.73566	0.63003	0.63003	0.397	3.4	-4.800	23.040	5.910344	1.22	-0.334	0.111	0.410845		
6	0.89090	1.23132	1.23132	1.516	4	-4.200	17.640	2.646144	1.39	-0.171	0.029	0.107826		
				Total:	4.4	-3.800	14.440	0.753149	1.48	-0.076	0.006	0.015030		
					5.3	-2.900	8.410	-0.574772	1.67	0.110	0.012	0.021855		
					20	11.800	139.240	7.434404	3.00	1.438	2.069	0.906175		
					26	17.800	316.840	21.917526	3.26	1.701	2.892	2.094059		
					Totals:			519.610	38.086795	Totals:			5.119	3.555790
					$X_{avg} =$			8.2000	$X_{avg} =$			1.5574		
					$r =$			0.845549	$r =$			0.795292		
		$M_{avg} =$	0.0000											

Probability Plot Correlation Coefficient^{a,b}

$r = \text{Corr}(X, M)$

$$r = \frac{\sum_{i=1}^n (X_i - X_{avg}) * (M_i - M_{avg})}{\sqrt{\sum_{i=1}^n (X_i - X_{avg})^2 * \sum_{i=1}^n (M_i - M_{avg})^2}}$$

$M_i = \Phi^{-1}(m_i) =$ ith Normal order statistic median

where $\Phi^{-1} =$ inverse of standard Normal cumulative distribution

$= f(z, 0, 1)^{-1} = \sqrt{2\pi} e^{z^2/2}$

$$m_i = \begin{cases} 1 - (.5)^{1/n} & \text{for } i = 1 \\ (i - .3175) / (n + .365) & \text{for } 1 < i < n \\ (.5)^{1/n} & \text{for } i = n \end{cases}$$

$M_{avg} =$ average of M_i

$X_{avg} =$ average of X_i

^a The Probability Plot Correlation Coefficient Test for Normality, James J. Filliben, Technometrics, Vol. 17, No. 1, February 1975

^b Statistical Training Course for Ground-Water Monitoring Data Analysis-Draft Addendum to Interim Final Guidance, EPA /530-R-93-003, 1992