random ware .com
RANDOM SELECTION SOFTWARE
P.O. BOX 30704, LONG BEACH, CA 90853, (323)793-1535, Email: solutions@randomware.com

Random Selection and Uniform Distribution: How Fairness is Guaranteed.

Drug and alcohol testing is a controversial practice and the issue of "fairness" looms at the heart of the random testing procedure. The individual who is "randomly" selected always questions the fairness of the practice and will likely consider it biased at best. In the event someone is randomly selected on a subsequent occasion, fairness becomes an even greater issue. The drug test program administrator who understands the mechanics of computer generated random selections can help avoid the negative mindset fostered by misconceptions of discrimination and fairness.

The U.S. Department of Transportation (DOT) regards computer generated random selection compliant with their regulations as noted: *CITE 49CFR382.305 Subpart (i) (Department of Transportation TITLE 49) (i) The selection of drivers for random alcohol and controlled substances testing shall be made by a scientifically valid method, such as a random number table or a computer-based random number generator that is matched with drivers' Social Security numbers, payroll identification numbers, or other comparable identifying numbers. Under the selection process used, each driver shall have an equal chance of being tested each time selections are made.* The single point defining the requirement is the hardest to adequately defend with a short explanation but is really quite simple: *"...each driver shall have an equal chance of being tested each time selections are made."* The guarantee of "equal chance" is the provision for a fair and unbiased selection. The mathematical property of "uniform distribution" is the guarantee of "equal chance." If a random selection process provides everyone an equal chance of selection, then it must generate random numbers with uniform distribution.

The flip of a coin provides the simplest example. The procedure must first be well defined: Flip a coin adequately high into the air and allow it to land on a hard surface from which it will bounce with reasonable energy. If you flip the coin twice, it can very likely land "heads" both times. In fact, if you flip it three of four times it's possible it may land "heads" each time. If, however, you were to flip the coin 1000 times, the difference between the number of heads and tails is likely to be small. As you significantly increase the number of coin tosses, the difference will tend to zero. In a simple, yet straightforward way, this procedure demonstrates the uniform distribution of the possible outcomes and the equal chance the coin will land heads or tails.

How does this relate to random selection for drug and alcohol testing? Consider the fairly routine procedure of randomly selecting 10 individuals from a list of 100. If you conduct the procedure only a few times, uniform distribution can't be adequately demonstrated. If you conduct the selection 1000 times, and the routine generates outcome with uniform distribution, each of the 100 individuals will be selected in relatively equal numbers, each person will be picked approximately 10 times. This demonstrates uniform distribution.

Computer driven random number generators reliably produce results with uniform distribution. If you're using software to randomly select drug and alcohol testing participants, you can easily put the system to a simple test. The following procedure will provide reasonable evidence: Ask the system to randomly pick 10 numbers between 1 and 100, and ask it to do it 1000 times, consecutively. The resulting list will contain ten thousand numbers, each between 1 and 100. If you sort the list, it's easy to determine the relative frequency of each number. Simply ask the software to count the occurrence of each number generated if it has the capability. If the randomization algorithm generates numbers with uniform distribution, each number, 1,2,3...100, will appear in the list with approximately equal frequency, i.e., roughly 100 times. If your system can produce this kind of evidence, you can provide the proof required to demonstrate that every individual in the list has the exact same chance of selection.

The random selection procedure need never concern itself with a name or an individual's personal identification number, whether it's a social security number or other proprietary identifier. Once again, consider the list of 100 individuals. The most natural identifier to assign each entry in the list is simply the number that represents their order in the list. Sort the list and everyone's identifier changes. Randomly sort the list and everyone is randomly assigned an identifier. Randomly generate 10 numbers between 1 and 100 and select the entries in the list that correspond to the numbers. Nothing could be more fair and unbiased. This is the heart of the random selection process. Simple, straightforward, fair.