

Magruder Fertilizer Check Sample Program

History - Round robin samples are frequently used to provide comparisons of analytical results. The first such program to make use of comprehensive statistical techniques is the Magruder Fertilizer Check Sample Program. The program bears the name of its originator, Dr. E. W. Magruder. Dr. Magruder was a chemist with the F.S. Royster Guano Company. He distributed the first sample to 29 laboratories in November, 1922. The Royster Guano Company and its successors continued to totally support this program for 36 years, first under the direction of Dr. Magruder and later under the direction of Dr. S. F. Thornton.

In 1958, the sponsorship of the program transferred from Royster to the joint co-sponsorship of the **Association of American Plant Food Control Officials** (AAPFCO) and **The Fertilizer Institute** (TFI). TFI asked AAPFCO to assume administration of the program in 1971. It continues to function under this arrangement today. In addition, W. R. Grace & Company agreed to subsidize the program by furnishing statistical evaluations of the data through its statistician, Edwin Glocker. This continued until the death of Ed Glocker in 1989. The statistical evaluations continue via an independent statistical consultant engaged by the Magruder Committee.

In 2015, several changes occurred in how data was reported by laboratories, statistically analyzed, and presented in summary reports back to the labs. Laboratories log into a data reporting website (Lab Portal) with a login ID and password to enter data on analytes tested and to review various summary reports on data collected from the samples. A lab can evaluate their proficiency with individualized reports summarizing how well their lab results compared to results from all other laboratories. An analyte proficiency report compares results to all other lab results for a particular analyte. A method proficiency report compares the results to all other lab results for an analyte determined by a specific method. Protocols from ISO 13528:2015 (Statistical methods for use in proficiency testing by interlaboratory comparison) are used to perform robust statistical analysis of laboratory results to develop consensus values and variation of results from all labs.

Administration - The Magruder Program is administered by a committee appointed by the President of AAPFCO. Membership is balanced between control officials and industry representatives, with six members from each sector. This is the only AAPFCO committee which permits industry representatives to hold full committee privileges, including holding committee offices and voting. The committee sets subscription fees, selects the samples comprising the series, contracts with a commercial laboratory to prepare and distribute samples, retains a consultant statistician, and authorizes educational programs.

Current Programs - Each subscribing laboratory receives one or two, (5 to 6 ounce, 142 to 170 gram) samples each month. Each month's samples contain the primary plant nutrients N, P and K, and about four samples each year contain secondary and minor nutrients, as well as contaminants of interest. Samples are analyzed by methods chosen by the individual participating laboratories. Their results, with designation of method used, are reported directly to the statistician. A comprehensive statistical report is prepared noting inter-laboratory bias, precision and accuracy for each method and analyte. These reports are made available on the web to the subscribers to allow them to evaluate their performance. Laboratories are identified

only by a confidential number, one being assigned to each subscriber. Individual laboratory performance is held in strict confidence.

Interorganizational Cooperation - The Magruder Program objectives and goals are those of AAPFCO , AOAC International, and TFI. In turn, each of these organizations strongly supports the Magruder Program. The methods designated on reports are those of AOAC International.

Participants - There are around 100 laboratories subscribing to the Magruder Program. Most of the state laboratories in the United States are participants. The remaining number are equally divided between commercial and industrial laboratories on all continents except Antarctica.

Quality Assurance - Interlaboratory evaluation of methods of analysis and personnel performance is increasingly important in the modern laboratory. Instrumentation in laboratories is a great time saver, but needs careful control. Both precision and accuracy should constantly be monitored by every laboratory. These areas can be improved by an Interlaboratory statistical evaluation of your laboratory. The Magruder Program offers this service to all organizations involved in fertilizer analysis.