PACKAGE ID - 000778IBMPC00 MAVARIC

KWIC TITLE - Nuclear Material Variance Calculation

AUTHORS - Stripe, D.K.
Los Alamos National Lab, NM (United States)

LIMITATION CODE -UNL **AUDIENCE CODE -** UNL

COMPLETION DATE - 01/01/1989 **PUBLICATION DATE -** 01/01/1989

DESCRIPTION - MAVARIC (Materials Accounting VARIance Calculations) is a custom spreadsheet that significantly reduces the effort required to make the variance and covariance calculations needed to determine the detection sensitivity of a materials accounting system and loss of special nuclear material (SNM). The user is required to enter information into one of four data tables depending on the type of term in the materials balance (MB) equation. The four data tables correspond to input transfers, output transfers, and two types of inventory terms, one for nondestructive assay (NDA) measurements and one for measurements made by chemical analysis. Each data entry must contain an identification number and a short description, as well as values for the SNM concentration, the bulk mass (or solution volume), the measurement error standard deviations, and the number of measurements during an accounting period. The user must also specify the type of error model (additive or multiplicative) associated with each measurement, and possible correlations between transfer terms. Predefined spreadsheet macros are used to perform the variance and covariance calculations for each term based on the corresponding set of entries. MAVARIC has been used for sensitivity studies of chemical separation facilities, fuel processing and fabrication facilities, and gas centrifuge and laser isotope enrichment facilities.

PACKAGE CONTENTS - NESC Note 89-17; Software Abstract; LA-CC-87-20; Media Includes Sample Problems;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 5.25 Diskette

METHOD OF SOLUTION - MAVARIC performs variance and covariance calculations for those facilities where the terms in the material balance (MB) equation can be expressed as a product of two measured quantities. Also, the variance equations in MAVARIC assume steady-state facility operation. All variance and covariance equations for the concentration measurements are derived using a multiplicative error model. Variance equations for the mass or volume measurements are included for both the additive and multiplicative error models. Within the MAVARIC spreadsheet there are four equations for calculating the variance of MB transfer terms, three equations for calculating the covariance between MB

PACKAGE ID - 000778IBMPC00 MAVARIC

METHOD OF SOLUTION -(CONT) transfer terms, and five equations for calculating the variance of inventory difference terms. The choice of equations is made by macros based on the entries made to the corresponding row of cells within a data table.

COMPUTER - IBM PC

OPERATING SYSTEMS - DOS 2.1

PROGRAMMING LANGUAGES - Lotus 1-2-3 (second release)

SOFTWARE LIMITATIONS - Maxima of - 86 inventory items, 43 NDA measurements, 43 chemical analysis measurements, 40 covariance calculations between transfer terms, 20 input transfers, 20 output transfers.

SOURCE CODE AVAILABLE (Y/N) - Y

OTHER PROG/OPER SYS INFO - To use MAVARIC the proprietary Lotus Development Corporation's Lotus 1-2-3 software (second release) and the Funk Software's Sideways program, which is used to provide hard copies of the data and results tables, must be installed. This software is not included.

HARDWARE REQS - MAVARIC requires an IBM PC or compatible with one flexible disk drive and 100 Kbytes of memory. A hard disk or a second flexible disk drive is recommended but not required.

TIME REQUIREMENTS - MAVARIC does not handle possible correlations between transfer terms and inventory items.

REFERENCES - K. K. Nasseri, Variance and Covariance Calculations for Nuclear Materials Accounting Using 'MAVARIC', LA-CC-87-20, 1987; MAVARIC, NESC No. 9546, MAVARIC Flexible Disk Cartridge Description, National Energy Software Center Note 89-17, November 30, 1988.

ABSTRACT STATUS - Abstract first distributed November 1988. IBM PC version submitted July 1987. Released AS-IS by ESTSC February 3, 1995.

SUBJECT CLASS CODE - DM

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
M CODES
NUCLEAR MATERIALS MANAGEMENT
ACCOUNTING
INVENTORIES
SAFEGUARDS
LOSSES

PACKAGE ID - 000778IBMPC00 MAVARIC

DETECTION
MATERIAL BALANCE
STATISTICS
DATA COVARIANCES

EDB SUBJECT CATEGORIES -
990200 055001

SPONSOR - DOE/DP

PACKAGE TYPE - AS - IS