APPLICATION OF THE SARCI SYSTEM TO THE GRAPHITE RESEARCH PROGRAM AT THE LOS ALAMOS SCIENTIFIC LABORATORY*

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ABSTRACT

One of the tasks assigned to the Materials Science Group of the Los Alamos Scientific Laboratory in support of the Rover program has been that of studying the interrelations between the fabrication variables, the structure, and the properties of graphites. This is a rather complex problem in communication even in a rather small group since the rates of production of information on structures and properties of graphites which have been produced in the group are quite variable and the feed-back of data to the fabrication section is likely to be rather inefficient. In an effort to minimize communication problems within the group, a system of data collection and retrieval (SARCI, for Storage and Retrieval of Carbon Information) was designed for use on the LASL's digital computers and implemented in the Materials Science Group.

Information which is stored on the SARCI master tapes consists of two general categories; data pertinent to the fabrication process and data on structure and properties. Fabrication data include a specific identification which is keyed to all other outputs on this material, complete details on the composition of the starting materials, blending information, and powder and binder information, both of which are in turn keyed to specific data which have been gathered on the powder and binder respectively. Also included are data on the forming process, whether molded or extruded or other, and information concerning the temperature history during the curing, baking and graphitizing cycles. All information inputs are alphameric in nature so that pertinent observations as well as number data may be recorded. Information on structure consists of data gathered by optical and electron microscopy and by X-ray diffraction. Room temperature measurements are routinely made on porosity and electrical resistance of the experimental graphites. Also reported in this category are data collected over various parts of the temperature spectrum (liquid helium to about 3000°C) on streng th and elastic properties, creep and deformation characteristics and thermal conductivity and thermal expansion. Inputs also exist for powder characterization and statistics, binder composition and kinetics etc., and miscellaneous data such as green, cured, baked and graphitized densities and anything else which might be considered pertinent to the project.

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The sorting program is set up to perform two general functions: the first is to retrieve and compile all existing (stored) information for a given graphite, the second is to list any set of physical properties or structural information along with any one of the fabrication variables. In the case of the first type of sorting, since each graphite has a separate identification number, all data with the required identification is sorted out and listed; in this manner the data can be compiled by graphite type, and any researcher can at any time review the total amount of information which exists on any material. The second sorting procedure was intended to be an aid to persons wishing to isolate effects of fabrication variables on structure or properties; this works by listing all existing information on any one fabrication variable (just for example, baking temperatures and temperature cycles) and all existing information on any one property (for example: Young's modulus). If relationships or trends exist, this form of data isolation should help to reveal them.

The organization of the group is broken down roughly into four staff members who work on fabrication, three on structure, and six who report on the various properties. This comes out to forty-three separate data inputs which encompass the total Program.