

knife injects a solution into the soil at the rate of one gallon per acre, costing about 30 cents. The solution causes a chemical reaction with nitrates in the soil, which is then electronically measured. Each of three sensors takes a nitrate sample every three feet as the applicator moves across the field. A controller receives the signal and the applicator then applies the appropriate amounts of nitrogen to bring the level up to a predetermined concentration. Initial field tests report an increase of approximately 10 percent in crop yield. The system is currently undergoing additional field tests. The potential energy savings for this technology alone are estimated at 10 trillion Btu per year.

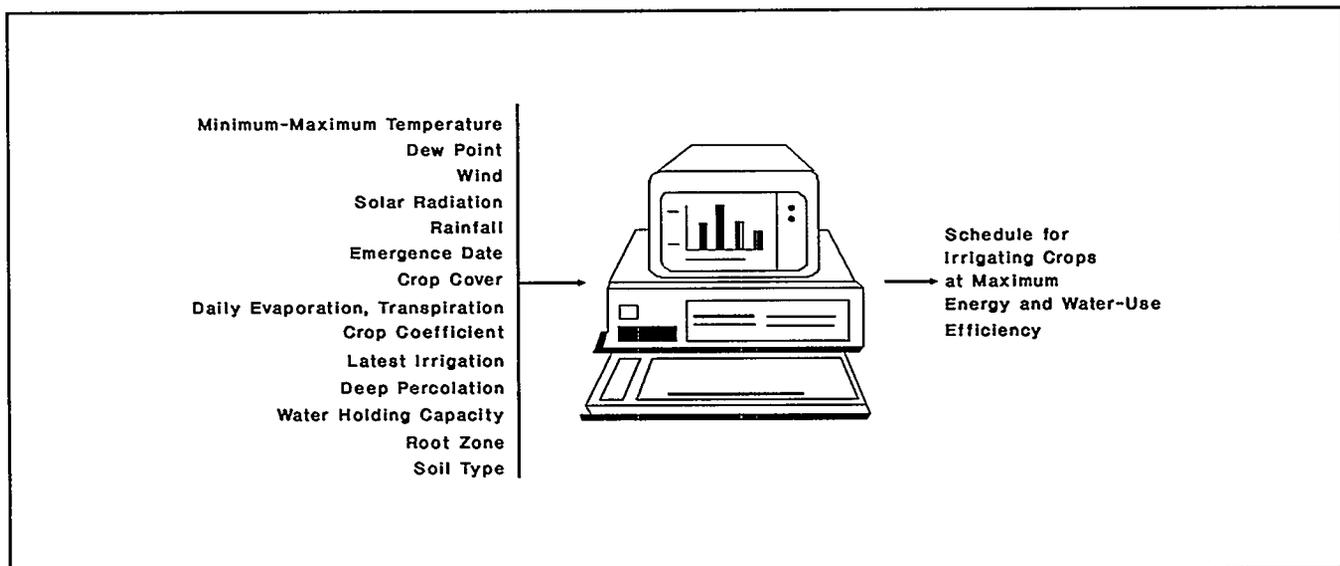
### High-Purity Silicon-Carbide Powder Process

The production of ceramics traditionally has relied on comminution to reduce materials to a uniform particle size. This is accomplished through grinding and crushing operations which are typically less than one percent energy-efficient. A high-purity, low-cost, silicon-carbide powder process, developed by Oak Ridge National Laboratory and Advanced Refractory Technologies Inc., eliminates most of the comminution required in the production of ceramics. In the new process, powder is produced

by a rotary kiln technique. Quantities of sample powder have been distributed to major ceramic component producers for manufacturing evaluation and properties testing. Projected material cost for this pure silicon-carbide powder are estimated at one-third to one-fourth of present powder costs, making high-temperature ceramic recuperators much more economical, as well as providing a higher-quality product.

### Irrigation Systems

An estimated 60 million acres of agricultural land are irrigated annually nationwide, consuming nearly 270 trillion Btu at a cost of \$1.4 billion. DOE, in cooperation with five universities and five private businesses, funded a program to develop and demonstrate new energy saving technologies for irrigation. Three resulting technologies which yielded significant energy and water savings are: 1) computerized scheduling, 2) reduced-pressure application systems, and 3) drop-tube application systems. These technologies are in use at about 12,000 sites across the country and together are saving about 3.5 trillion Btu annually. They have the potential to save 40 trillion Btu per year by the year 2010.



**Computerized Scheduling for Irrigation: Computers can quickly convert a wide variety of data into useful scheduling information.**