U.S. DEPARTMENT OF ENERGY
NUCLEAR ENERGY RESEARCH INITIATIVE
ABSTRACT

PI: **Robert Cranwell** **Proposal No.: 99-0306**

Institution: **Sandia National Laboratories**

Collaborators: **Pennsylvania State University, Massachusetts Institute of Technology, ABB-Combustion Engineering, Duke Engineering & Services**

Title: **"Smart" Equipment and Systems to Improve Reliability and Safety in Future Nuclear Plant Operations**

Nuclear power plants can reduce construction, maintenance and operations costs while improving reliability, availability and safety by making their equipment "smarter." Smart equipment can autonomously determine its condition (self-monitoring) and any appropriate fix (self-diagnostic). The team will design, develop and evaluate a set of methodologies to:

1. Identify opportunities for upgrades to smart equipment,
2. Determine best designs for integrating the status information of smart machines with standard control room status and operator observations for better plant management,
3. Plan and design systems exploiting smart equipment, and
4. Estimate the potential benefits from introducing smart equipment into a new nuclear power plant or retrofitting an existing plant.

Methods will be prototyped both on actual equipment, and on "virtual machines" which will be built as part of the study. This work will build from past smart equipment studies on non-nuclear systems by study participants.