Update on NIST Radiation-Processing (High-Dose) Dosimetry Services

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e-Traceability to Ionizing Radiation National Standards

An Internet-based system for fast, remote certification of high-dose radiation sources against the U.S. national standard is near completion in the Radiation Interactions and Dosimetry Group of the NIST Ionizing Radiation Division. The new service will establish traceability in real time by using automated routines and the Internet. The software architecture is based on the Real-time Control System (RCS) methodology for control of intelligent systems. The RCS methodology uses a unique task-based approach to organize information during the design phase of an automated system. High-level tasks are broken down into smaller subtasks. The software modules built around these tasks have very limited specific functions and are coordinated and managed by upper level "manager" modules. The modules are organized into a hierarchy that is unrelated to the computer or physical location in which the module is resident. The highest level managers in the scheme coordinate other modules and ensure that these lower-level modules complete their tasks appropriately. Multiple levels of state-of-the-art encryption technology will ensure the protection of private information as well as the highest degree data integrity. The hardware and software configurations of this service, as well as the communication and information management aspects, are developed in a generic format that should be transferable to other metrology services. A beta version of the Internet-based certification service is expected to be available to NIST customers in 2008. This service will provide industry with 24-hour, 7-day-per-week, on-demand certifications, immediate turnaround times, and electronic traceability to national standards, ultimately improving the quality of irradiation processing.

NIST/NPL High-Dose-Rate Gamma-Ray Source Comparison

The high-dose dosimetry service of the NIST Ionizing Radiation Division performs a comparison each year with its counterpart at the National Physical Laboratory (NPL) of the United Kingdom. This annual comparison, though conducted for several years, is now formally integrated into the operation of the service with the recent NIST quality-system declaration of conformance to ISO Guide 17025. Approximately biennially, the NIST and the NPL exchange about 12 alanine dosimeters with the objective of irradiating

four dosimeters to each of three pre-specified absorbed doses (5 kGy, 15 kGy, and 30 kGy) and ship them back to their respective institutions for measurement. The average temperature during the irradiation for each set of dosimeters is reported to each institution for applying the appropriate temperature correction. The actual values for the absorbed doses are reported by the institution performing the irradiations only after the measuring institution reports their findings. In 2005, the absolute differences between the absorbed doses measured were 1.5 % and 1.9 %. These findings are consistent with annual comparisons dating back to the late 1990s.