ANS Issues Clarification on ANSI/ANS-6.4-2006, "*Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants*."

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Inquiry: I performed a shielding calculation at the concrete surface of a spent fuel storage facility using the Monte Carlo N-Particle Transport Code Version 4C and the QAD-CGGP-A, a point-kernel code for calculating fast-neutron and gamma-ray penetration through various shield configurations defined by combinatorial geometry specifications. According to ANSI/ANS-6.4-2006, the word "cured concrete" is mentioned in the second line of Section 5.3.1. What is the meaning of "cured concrete?" Does it mean completely drying concrete in furnace or natural drying condition. I want to know the meaning of cured concrete.

Response: "Cured concrete" does not refer to furnace dried concrete. Rather, as indicated in Section 5.1 of the standard, curing is a process of hydration of water in the initial concrete mix during which the strength of concrete increases. The process may require several months.

The Engineering Compendium on Radiation Shielding, Vol. II (Springer-Verlag, New York, 1975) addresses the curing (or aging) of concrete. Table 9.1.12-1 states that "Curing of concrete refers to completion of the process of hydration of absorbed water into the cement in concrete, which takes place over a period of weeks or months... Concrete shields, which have been developed with a higher water content than normal, require at least a 28-day moist curing period to develop the proper strength."

More information on concrete curing may be found in industrial and manufacturing standards. One such document is ACI 308R, "Guide to Curing of Concrete," issued by the American Concrete Institute.