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Processes and Practices Related to Occupational Dose

ID: 19

FUEL CYCLE LENGTH

Keywords: FUEL CYCLE LENGTH; AVAILABILITY FACTOR; EQUIVALENT UNPLANNED OUTAGE RATE; REFUELING OUTAGE; COST BENEFIT EVALUATION; OPERATIONAL PRACTICE; ALARA; FUEL CYCLE; OUTAGES

Description:

Most U.S. utilities have extended fuel cycles to longer than 12 months. All utilities making this change have experienced a minimum of difficulties, and most have improved unit performance, reduced nonfuel operating costs, and reduced occupational exposure. The average U.S. nuclear unit can achieve an equivalent availability factor improvement of 3 to 7% following an increase in cycle length from 12 to 18 months. However, better-performing units will experience a smaller increase or no increase at all. The study also revealed no increase in equivalent unplanned outage rate (EUOR) following a refueling outage. In fact, the EUOR showed a large decrease in the first few months after refueling and continued to decrease slightly up to 20 to 24 months after startup.

The investigation indicates a clear performance advantage associated with lengthening fuel cycles from 12 to 18 months. NRC acceptance of many utility requests for technical specification revisions has expeditied this change. Replacement of some instrumentation that requires frequent recalibration has helped the utility industry move toward further extnending the cycle to 24 months. Only utility-specific analyses can determine the exact financial and exposure reduction impact of extended fuel cycles.

References and Selected Abstracts:

1. Koppe, R.H. and Olson, E.A.J., "The Influence of Fuel-Cycle Duration on Nuclear Unit Performance - An Update," Final Report EPRI-NP-6333, April 1989. (Available from Research Reports Center, Box 50490, Palo Alto, CA 94304.)

2. Olson, E.A.J., Koppe, R.H., Geller, L., Reyes, O., and Gildersleeve, O., "The Influence of Fuel-Cycle Duration on Nuclear Unit Performance," Topical Report EPRI-NP-5042, February 1987. (Available from Research Reports Center, P.O. 50490, Palo Alto, CA 94304.)

ABSTRACT: This report presents the results of a project conducted by the S.M. Stoller Corporation for EPRI. The purpose of this project was twofold. The first purpose was to compare the historical performance experience of units operating on long fuel cycles with that of units on short cycles. The second purpose was to enumerate and describe other factors affected by cycle length that have an economic bearing on the decision to operate on long cycles. A method for comprehensively and analytically considering all of these factors in an economic cost-benefit (C-B) evaluation was described.

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The performance investigation compared the capacity factors, equivalent forced outage rates, and refueling outage durations of units on long and short cycles. The reasons why average performance improvements have been less than expected were described in detail.

The effect of fuel cycle duration on such direct economic factors as nuclear fuel cost and replacement power cost were also described in detail. Other factors such as scheduling constraints, manpower constaints, direct outage cost, etc., were also discussed.

It should be noted that the C-B evaluation is very unit-specific and some of these less direct factors may prove to be the most improtant. Neither the performance improvement nor the economic benefit of longer (either 18- or 24-month) cycle operation is universally consistent or apparent for all nuclear units.