
February 28, 1983

A Review of "Nuclear Power Plant Backfitting
and Regulatory Impact Costs"

Prepared by:

Cost Analysis Group
Office of Resource Management

**U.S. Nuclear Regulatory
Commission**



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In response to a February 16, 1983 request for assistance from NRR, the Cost Analysis Group (CAG) within the Office of Resource Management, has reviewed "Nuclear Power Plant Backfitting and Regulatory Impact Costs."* Following is our response to Question 7 posed by James Tourtellotte.

7. Provide any comments the staff may have regarding the accuracy or characterization of the enclosed information. In particular, does the staff agree with the statements on pages 7 (re: Catawba) and 9 (re: Byron) asserting that 40 percent of the total costs of these NTOL's is due to regulatory impact? If not, why not? What evidence can the staff present refuting these claims?

Essentially the industry analysis compares construction costs of nuclear units that were completed in the 1973-74 timeframe with similar units currently under construction by the same utilities. Adjustments were made for inflation and number of reactors at the site (the latter variable accounting for economies of scale) in an attempt to bring the units to an equal footing. The residual cost difference is then totally attributed to new regulatory and backfitting requirements of which 60 percent are viewed as NRC initiated. These assumptions result in a conclusion that approximately 40 percent of the total construction cost of the NTOL's results from new (post 1973-74) NRC requirements.

It is somewhat difficult to speak to the correctness of this approach because it is presented in such generalities. For example, although we are told that adjustments were made for inflation and number of reactors, no real detail is provided on how these adjustments were made and the actual scaling factors and inflation rates assumed. Nevertheless, on the face of it, it appears that the industry's estimate of regulatory and backfit costs is overstated simply because other factors, completely ignored in the industry report, have contributed to the cost increase between 1973-74 vintage plants and NTOL's. The following factors should be separately accounted for before a residual value is derived and identified as the contribution of new regulatory and backfitting requirements.

* Included as Attachment A.

1. The cost of money (and therefore interest payments) has increased by between a factor of five and ten as between NTOL's and 1973-74 vintage plants.* This difference has been further exacerbated by the lengthening of the construction period for NTOL's. Generally, these higher interest payments are not a result of new regulatory requirements. It can be argued that the longer construction period and therefore that portion of the higher interest payments is attributable to increased regulatory requirements, but a case can be made that much of the delays are utility imposed due to financial strains and recognition of lower demand growth. Adjusting for interest during construction can significantly alter the industry's conclusion concerning the cost impact of new NRC-imposed requirements. The table on the following page contrasts the industry estimate for Catawba with staff estimates. All industry assumptions are maintained except in the second column the staff assumes interest during construction is totally independent of new NRC requirements, and in the third column it is assumed that only 50 percent of the interest during construction is impacted by regulatory requirements.

Based on the results in Table 1, it can be seen that new NRC requirements represent between about 29 and 35 percent of Catawba's total construction cost instead of the 41.8 percent reported by the Duke Power Company. Further, in 1982 dollars, the dollar impact is between \$970 million and \$1,190 million vs. Duke's estimate of \$1,407 million.

2. Escalation also looms as an important contributor to the total construction cost of a nuclear facility. For example, for the Catawba units, escalation constitutes about 5.6 percent of Catawba's current cost estimate.** NTOL's have experienced far lengthier construction periods than those plants of 1973-74 vintage*** and, consequently, typically have a far greater escalation component than the earlier units. To the extent the longer construction period is non-regulatory induced (i.e., delayed due to internal financial constraints and slower demand growth), this increase in cost should not be included as a part of the cost of new requirements as it is in the industry estimate.

* "A Review of the Economics of Coal and Nuclear Power," Draft, U.S. Dept. of Energy, Sept. 24, 1981, Fig. 111-2, p. 111-4.

** Source - Quarterly Progress Report on Status of Reactor Construction, Dept. of Energy, Form E1A-254(9-81), June 30, 1982.

*** The Catawba units have a projected average construction period of about 14 years vs. an average construction period of about 7.5 years for the Oconee units with which they are compared. The construction period used here extends from CP application to commercial operation.

Table 1. Effect of Interest During Construction on the Regulatory Impact of Catawba's Construction Cost

	Industry Est. (includes interest during construc- tion)	NRC Staff Est. (includes no interest dur- ing construc- tion)	NRC Staff Est. (includes 50% of interest during construc- tion)
Catawba [1982 \$ cost per kW]	\$1469	\$1008*	\$1238*
Oconee [1982 \$ cost per kW]	\$445	\$305**	\$375**
1982 \$ increase in cost for Catawba [Δ \$/kW x 2,290,000 kW]	\$2,345,000,000	\$1,610,000,000	\$1,976,000,000
Cost of new NRC-imposed require- ments [60% of increase in cost]	\$1,407,000,000	\$966,000,000	\$1,186,000,000
Cost of new NRC-imposed require- ments as % of Catawba/s total cost	41.8%	28.7%	35.2%

* Adjustment for interest during construction for the Catawba plant is from Quarterly Progress Report on Status of Reactor Construction, Dept. of Energy Form E1A-254(9-81), June 30, 1982.

** Adjustment for interest during construction for the Oconee plant conservatively assumes that interest during construction represents the same percentage of Oconee's total capital cost (31.4%) as it does for Catawba.

3. The industry estimates are adjusted to 1982 dollars to permit a fair comparison between NTOL's and 1973-74 vintage plants. It appears that this adjustment accounts for general inflation which only reflects changes in the value of the dollar. Over time, many cost elements have also experienced real increases in price above and beyond the general inflation rate. To the extent this has occurred in the nuclear construction area, the industry estimate overstates the cost increase attributable to new regulatory requirements.

Finally, it is worth noting that the NRC could develop its own estimates of these retrofit costs. The CONCEPT computer model estimates the construction cost of nuclear units based on equipment, material and labor requirements contained in the United Engineer's Energy Economic Data Base. In theory, this data base is updated every year to account for changing physical requirements. If a CONCEPT run based on the 1974 data base were made with a given set of parameters identified (i.e.; cost of money, length of construction period, size of plant, same geographic region, etc.) and a similar run (i.e., same general parameters) were made using the current data base (both in constant 1982 dollars), the difference between the two estimates should reflect solely the change in physical requirements imposed over the years. Adopting industry's view that 60 percent is attributed to new NRC-imposed requirements should produce a defensible estimate to contrast with the results of the industry report. NRC currently has a technical assistance contract in place with the ORNL to perform specific CONCEPT runs such as this. The task could take approximately two weeks and would require a reordering of ORNL's workload priorities to allow them to address the issue immediately.

FROM: James R. Tourtellotte, Chairman Regulatory Reform Task Force		ACTION CONTROL	DATES	CONTROL NO. 12691
TO: Dircks		COMPL. DEADLINE	2/1/83	DATE OF DOCUMENT 1/17/83
		INTERIM REPLY	<i>3.4.83</i>	
		FINAL REPLY	<i>1/10</i>	PREPARE FOR SIGNATURE OF:
		FILE LOCATION	<i>3/15/83</i>	<input type="checkbox"/> CHAIRMAN
				<input checked="" type="checkbox"/> EXECUTIVE DIRECTOR
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DESCRIPTION <input type="checkbox"/> LETTER <input checked="" type="checkbox"/> MEMO <input type="checkbox"/> REPORT <input type="checkbox"/> OTHER		SPECIAL INSTRUCTIONS OR REMARKS		
Questions re Backfitting				
ASSIGNED TO	DATE	INFORMATION ROUTING		
Denton, NRR	1/19/83	Dircks	5. Thompson	
Eisenhut	1/20/83	Roe	6. Check	
<i>Dircks</i>	<i>2-7-83</i>	Rehn	7. Snyder	
		Stello		
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