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CONSIDERATION OF MANAGEMENT PRUDENCE IN A RATE CASE

by
Joseph E. Manzi*

Several years ago, the issue of management prudence was one of accolades for the remarkable cost efficiency being realized. A stable economic environment and vigorous load growth afforded the growth of larger generating units with attendant economy of scale rate savings. In such an environment, the tendency towards construction of nuclear units was overwhelming. What is being witnessed today is the pendulum swinging in the reverse direction. Public utility commissions are reinforcing regulations with increasing regularity. The circumstances steering these trends—decreased load growth, uncertain economic conditions, public opposition, project cost overruns, etc. — are frequently characterized as uncontrollable and with uncertain outcomes. While some of these circumstances may indeed be unmanageable, the major elements are susceptible to and demand improved management controls. The management of a rate case must look towards affirmative positions, albeit anticipatory of actions/criticisms from the Commissions.

Since January of 1974, over 80 nuclear generating units in this nation were either cancelled before project commencement or actually terminated during construction. Of these units, over 30 have been cancelled during the past four years. Certainly, assessing the extent to which the costs of a terminated unit will receive rate base treatment (in the face of used and useful criteria as well as the reasonableness of management decisions) is a vital concern. Of equal concern to PUC's is the perceived out-of-control cost spiral. Some examples only highlight the condition experienced by the entire industry:

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PLANT TIME/COST OVERRUNS

	Initial Cost & Year of Operation	Current Cost & Year of Operation
Seabrook	$1.18 Billion/ 11/79 & 8/81	$9 Billion/ 2/86 & 2/88
South Texas	$1.4 Billion/ 10/80 & 3/82	$5.5 Billion/ 6/87 & 6/89
Zimmer	$235 Million/ 1975	$3.1 Billion/ 1985 (Deferred)

These plants (as well as all of the remaining units under construction) have seen dramatic estimate increases in the past few years. For instance, the estimates for Seabrook Units 1 and 2 have evolved as follows:

Year of Estimate	Estimate
1973	$1,180,000,000
1974	1,300,000,000
1975	1,540,000,000
1976	2,020,000,000
1978	2,360,000,000
1979	2,610,000,000
1980	3,120,000,000
1981	3,560,000,000
1982	5,120,000,000
1983	5,240,000,000
1984	9,000,000,000

The complexity of determining whether (or not) the decisions of management were prudent have readied the stage for PUC staffs to seek outside expertise to address such issues as:

1. Analysis of construction management organizational structure, policies and procedures; placement of authority and responsibilities; roles, responsibilities and accountability of architect/engineer (A/E) and construction manager (CM) and authority delegated to them; adequacy of

planning and revisions; use of reporting processes and cost controls; management reporting systems; scheduling and coordination methods and aids; prevention of schedule slippage and cost escalation; delay and loss prevention provisions and insurance coverages; coordination of engineering, materials availability, construction readiness, crafts availability, site workforce densities, use of overtime; use of tracking and expediting aids; evaluation of idle time or waiting time of labor and equipment.

2. Analysis of contractor evaluation and selection processes, bid procedures, contract award procedures, documentation, review and approval at appropriate levels of project management, contract monitoring; review of all contracts for appropriate performance clauses, incentives to cost containment; frequency of amendments and renegotiations to remedy deficiencies, adequacy of protection in disputes and settlements.

3. Assessment of bidding and procurement policies and practices for plants equipment, building materials and supplies, construction equipment and personal services; vendor selection processes; quality inspections and controls, delivery scheduling provisions, prevention of unnecessary costs, improper quantities, or unnecessary gains to vendors, carriers, contractors or other suppliers; materials loss prevention security.

4. Assessment of engineering controls, use of design aids and methods, approvals and justification of redesign and changes, appropriateness and timeliness of response to NRC directives, impact of changes on construction cost, engineering quality controls, design coordination.

5. Analysis of productivity standards and performance measurements, actions taken with respect to perceived deficiencies, and quality of monitoring and control, as appropriate, to workforce, including engineering and administrative personnel as well as crafts people, in all cases wherein such services were a variable cost component, not subject to fixed-price contract; workforce management practices, work methods, work supervision.

6. Determination of the extent of budgeting and control, variance reporting, effect of contingency reserve provisions, responsibility accounting, senior management oversight, simulation modeling, (financial options, workforce size options, materials acquisition options, etc.) cost tracking, reliability of cash requirements estimating, auditing.

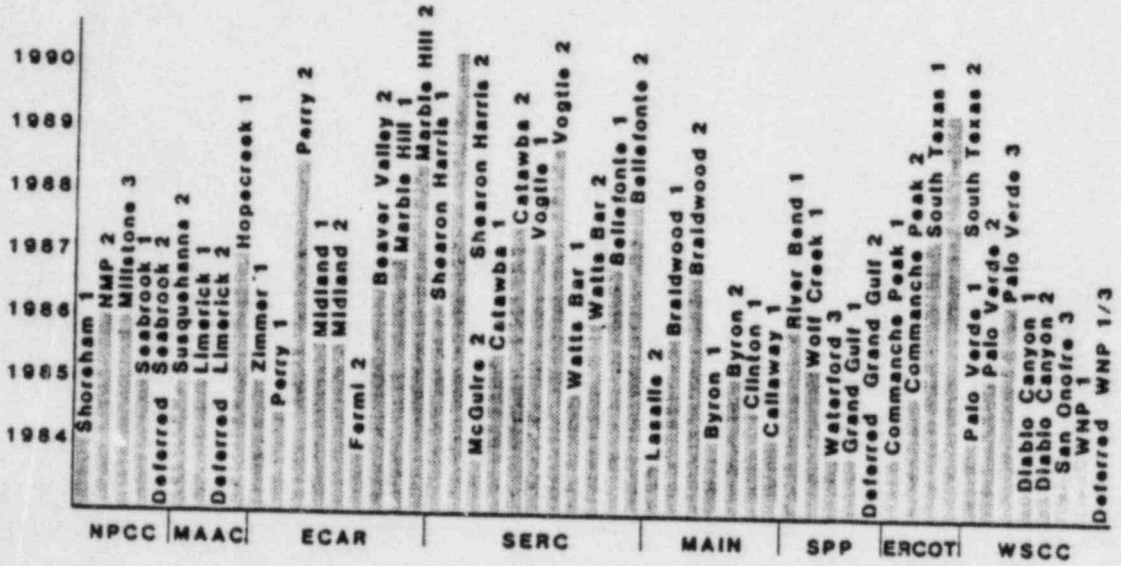
7. Analysis of financing, sources and costs, timeliness to needs, temporary investment, financial community information and relations.

8. Assessment of postponement decisions, and costs thereof, to determine if prudently made under the internal and external conditions actually existing, including fuel cost trends, construction cost escalation trends, length of deferral, load growth indications, alternatives of deferring other components of construction program, reserve margins, purchased power availability, internal financial conditions, financing capability, interest costs, interest rate levels and trends, PUCA rate decisions, cash flow forecasts, NRC construction requirements, etc.

Issues addressed and decisions rendered in recent rate cases portend an increasingly difficult time for the utility company to secure plant costs into their rate base. While cancelled or terminated units have had a difficult time overcoming a Commission's focus on the "used and useful" rule, generating plants successfully completed (albeit over time and cost budgets) are not without risk and criticism. Since a complex and comprehensive rate case is patently foreseeable, substantially all of the plants noted in Figure 1 should already have case planning and preparation underway.

Figure 1

Projected On-Line Dates for Nuclear Units Under Construction



Anticipating a Commission's Inquiry

As noted above, the primary PUC areas of inquiry are:

Project Planning and Management
Organization
Construction Budget Control
Contractor/Vendor Selection
Construction Supervision
Project Status Monitoring
Contractor Selection and Performance Evaluation
Relationships with NRC and EPA

Much of the controversy surfacing in commission hearings relate to their addressing the prudency of the utility's management decisions. Granted that a utility's planning, construction and operation lie within the prerogative of management, PUC's are nevertheless obligated to consider the prudency of management's decisions. Further, PUC's are being increasingly critical of utility management decisions. In a broad sense, the PUC's inquiry into the prudency issue will address:

Was the judgment of management reasonable under the circumstances?

Was there a rational basis for management's judgment?

Was management's judgment an abuse of discretion?

More specifically, some areas that many PUC's view as inadequately addressed by the utility companies are:

- Project cost estimates for on-going construction. These are frequently suspected of bias and unwarranted optimism. On the other hand, rebuttal estimates prepared by consultants to the commissions are equally controversial and all too often are done on an empirical basis without being site specific.

- Inadequate justification and documentation of management decisions, such as schedule changes, design changes, and contract claim dispute settlements. Such decisions made in the exigencies of the moment may not appear prudent when examined in the retrospective environment of a rate hearing. Without thorough justification and documentation, the utility has little hope for a favorable outcome.

- Failure to adequately plan and execute construction and repair operations in an effective manner. Such problems range from new project construction to major equipment overhaul and other scheduled maintenance outages.

Increasingly, PUC's are denying the requests of management to incorporate costs relating to the above into the rate base. Furthermore, even if technically justifiable, the political aspects of rate shock make each new request a more difficult selling job. Is it therefore vital that the utility commence rate case preparation at the earliest possible time.

The overwhelming issue seized upon by intervenors and PUC staff is that of prudence. A PUC's inquiry into this issue is well within their rights and based on sound legal principle. Obviously if the PUC concludes that the utility has been imprudent, the associated costs would not be passed along to the rate payers but instead would be borne by the company's shareholders. The inquiry is one in a positive sense, namely that the utility is assumed to have been prudent unless shown to be otherwise. The basic legal description for prudence is founded in a telephone company regulatory case now fifty years old:

> "The term "prudent investment" is not used in a critical sense. There should not be excluded, from the finding of the base, investments which, under ordinary circumstances, would be deemed reasonable. The term is applied for the purpose of excluding what might be found to be dishonest or obviously wasteful or imprudent expenditures. Every investment may be assumed to have been made in the exercise of reasonable judgment, unless the contrary is shown."[1]

The task of timely preparing for the rate case is two-fold:

- Ensure that the utility company's position is established from the point of management prudence from initial project inception to plant commercial operation

  - and -

- Ensure that project participants are not in a position to criticize the utility sponsor for failure to timely and adequately prepare the case resulting in rate base exclusions.

Estimating Project Completion Costs

As depicted in Figure 1, many nuclear plants have considerable time periods remaining to reach completion. From the vantage point of several of the above mentioned points, the consideration of project completion costs is perhaps in the forefront of the PUC's concern. Whether because the utility company is seeking rate base treatment of CWIP or intervenors are placing pressure on the PUC to direct a plant termination, PUC's are directing increasing focus on the cost to

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[1]Southwestern Bell Telephone Co. v. Public Service Commission of Missouri, 262 U.S. 276 (1923)

complete the project. It has not been uncommon to witness the projected cost of a plant to increase ten-fold over a several year period:

Of equal importance in the area of cost assessment is the wide cost range of plants under construction:

RANGE OF NUCLEAR POWER PLANTS COSTS UNDER CONSTRUCTION*

	Current $/kWe	Current $/kWe w/o AFUDC	Constant $/kWe	Constant $/kWe w/o AFUDC
Lowest Cost Plant	1276	742	1871	1331
Highest Cost Plant	4125	2682	6134	4160

*DOE/NE-0048/4, Nuclear Power Program Information and Data

The utility must credibly and candidly forecast the project's completion cost to the maximum extent possible. Secondly, the utility must maintain a sufficient and documented data base to substantiate the prudence of their management decisions. These requirements are sometimes taken for granted.

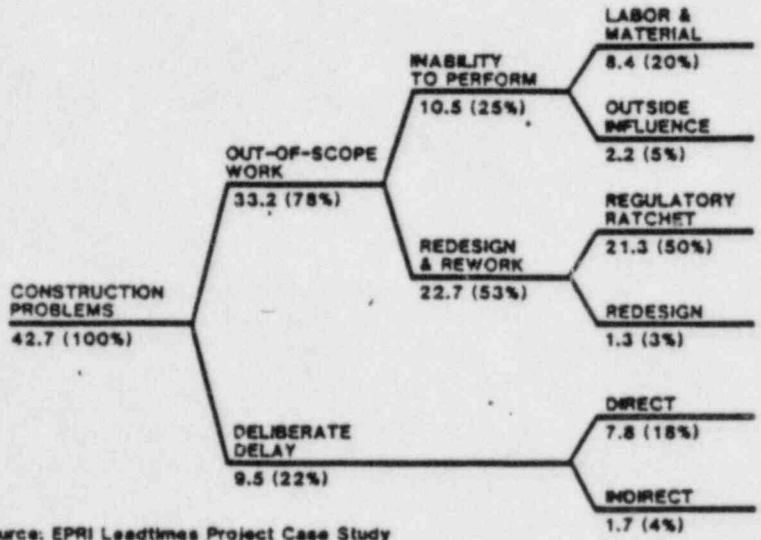
In recent years, the criticism that the utility's construction cost estimates has turned out to be unjustifiably and substantially too low has been countered with the argument that many external forces were driving forces on the project costs, such as:

- Changes in licensing, environmental, or safety requirements.
- Changes in construction or design concept
- Modification betterments additions to original facility
- Site conditions differing from those expected
- Safety related emergencies, i.e., accidents
- Continuing evolution of regulatory requirements
- Construction problems such as labor shortages, adverse weather, etc.

Taken further, these forces may have substantial and adverse schedule impacts, extending project completion. Figure 2 reflects some of these forces. Because the overall project duration will be adversely affected by these driving forces, the time-related costs will increase substantially, as depicted in Figure 3.

Figure 2

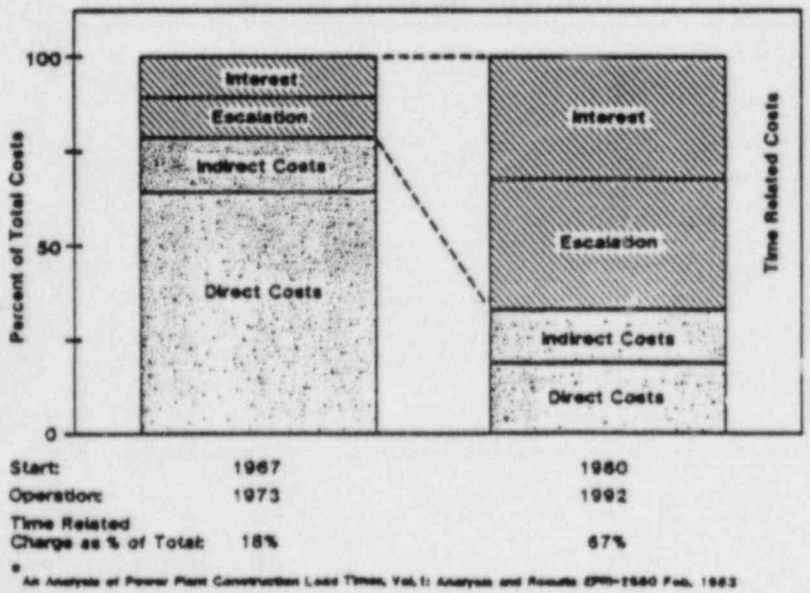
Nuclear Power Plants: Hierarchical Classification of the Causes of Delays (Average months of delay per unit)



Source: EPRI Leadtimes Project Case Study Database - 26 nuclear units

Figure 3

Allocation of Nuclear Plant Costs*



* An Analysis of Power Plant Construction Lead Times, Vol.1: Analysis and Results (EPRI-1580 Feb. 1982)

It is generally acknowledged by PUC's that an estimate predicated on a systematic construction engineering evaluation is clearly more reliable than one based on theoretical models or regression analyses. Unfortunately for the utility company, often the PUC believes that the cost estimate fails to address critical elements that may influence the overall project costs. Because of these "perceived" omissions by the utility, PUC's often accept the theoretical approach. While this approach is clearly regrettable, it should be avoidable. Because of the significance of these cost estimates, the methodology used and the independence employed in their preparation are critical.

In general, construction cost estimate is comprised of several elements:

(a) Direct Costs:
- equipment/material procurement
- engineering/construction labor

(b) Indirect Costs
(c) Escalation
(d) Interest (AFUDC)

Driving the above cost elements are influencing parameters which jointly affect overall plant costs and design/construction duration. In effect, these parameters represent estimate contingencies:

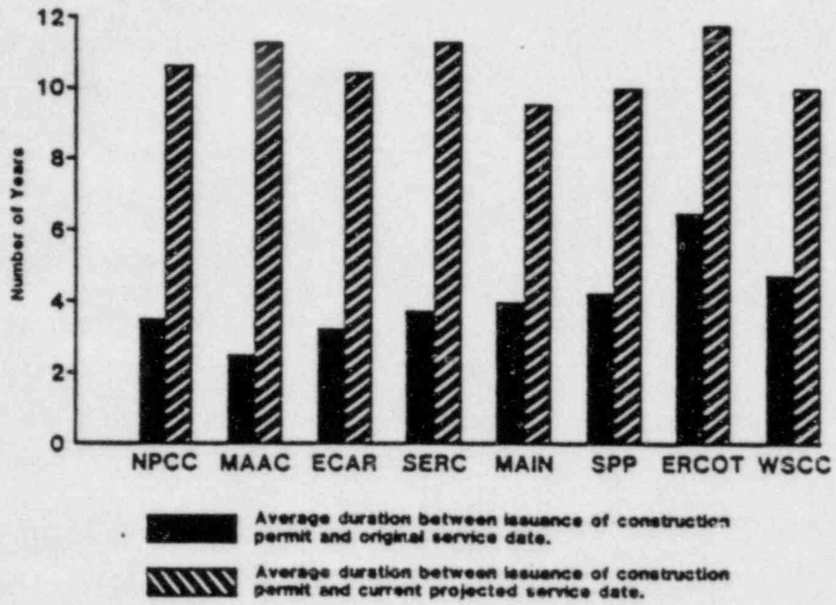
ESTIMATE CONTINGENCIES

- Licensing/Environment Changes
- Design/Construction Changes
- Scope Increases/Site Differences
- Accidents/Unusual Occurrences
- Labor Strife
- Scheduling Changes

Unfortunately, these contingencies are not mutually exclusive. The common bond between them is their common effect - that of prolonged project completion. As noted in Figure 3, time is the overriding factor driving the cost of plant construction.

Figure 4

Comparison Between Original and Current Projected Service Dates For Nuclear Units Under Construction



The Time Influence on Cost Estimates

The history of plant construction during the past decade has a direct link between plant delays (cause) and increased costs (effect). Figure 4 is indicative of the extent to which project delays have been experienced nationally. Taken on an annualized basis, the duration between commencement of construction and fuel load has risen steadily during the past decade:

SUMMARY OF CONSTRUCTION DURATION TO FUEL LOAD

Year of Commercial Operation	Units	Average Duration (mos.)
1970	4	47.6
1971	5	55.7
1972	6	60.9
1973	12	71.1
1974	14	72.1
1975	3	78.7
1976	7	94.3
1977	4	90.0
1978	3	102.7
1979	—	—
1980	4	130.4
1981	2	131.4

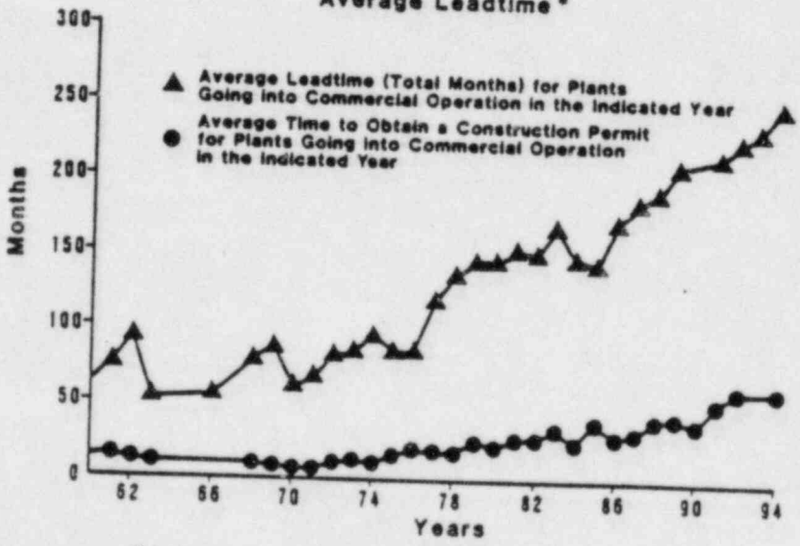
Source: Nuclear Regulatory Commission, "Construction Status Report," NUREG-0030, March 1982

This increase, fortunately, has not been followed by a parallel increase in the duration required to secure a construction permit. This is depicted in Figure 5.

Figure 5

LICENSING LEADTIMES

Average CP
Average Leadtime *



* A Regional Analysis of Leadtimes and Delays to Nuclear Power in the United States, Dec. 1981 Dames & Moore

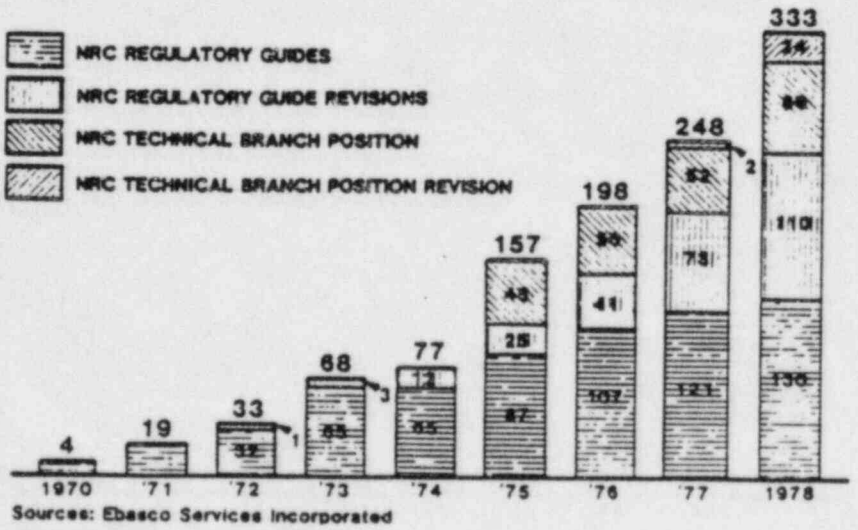
The 1971 Supreme Court Clavert Cliffs decision prevented plant construction from beginning until after the construction permit was issued. The 1975 Browns Ferry fire caused new requirements to be set forth for system separation and protection. The Three Mile Island-2 accident in March 1979 virtually halted licensing activities for seventeen months while the effects and preventative measures were studied and implemented. Subsequent to the TMI-2 event, the number of NRC Inspection and Evaluation Branch documents requiring action by licensees increased dramatically and added many new requirements for plant safety in systems and operating procedures. In 1970 there were four NRC regulatory requirements issued. By 1977 there were 250 in existence or under development. By the end of 1980 there were 313 active regulatory guides, 38 draft guides and a total of 213 that were revised, thus compounding the difficulty of licensees in building their plants.

Figure 6 is illustrative of the growth of NRC regulations during the 1970's.

Figure 6

ADDED STATUTORY & REGULATORY REQUIREMENTS, 1970–1978

(CUMULATIVE NUCLEAR PLANT GUIDES)



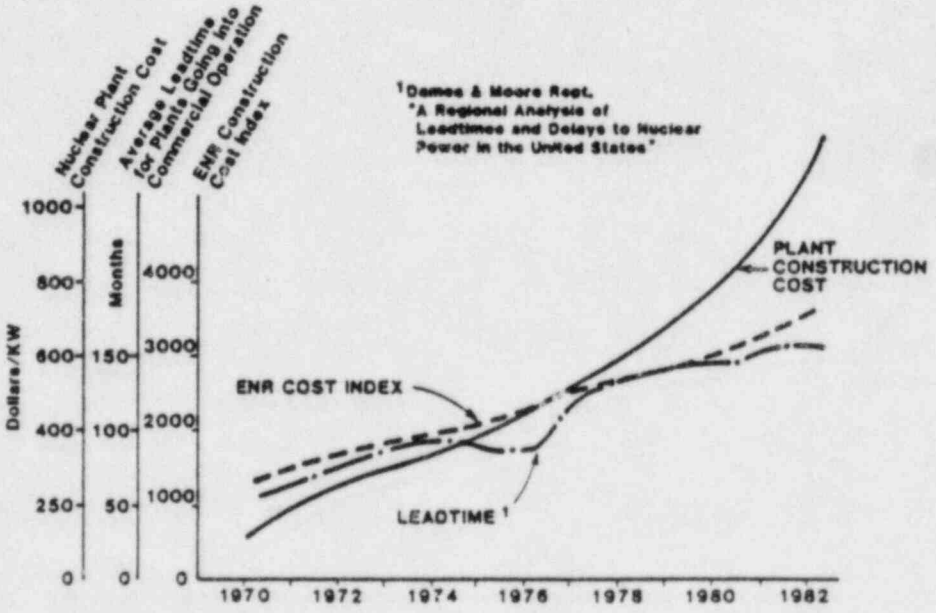
Sources: Ebasco Services Incorporated

Just how extensive have regulatory changes been on plant delays and cost overruns is difficult to say with certainty when viewing the industry as a whole. Critics of the industry can point to a contemporary success story - St. Lucie Unit 2 - which was constructed right through the peak of the TMI controversy, September 1977 - September 1983, a six year construction duration and a cost of approximately $1,750/KW.

Reflecting on the regulatory turmoil experienced during the 1970's does not diminish the inexplicability of the rampantly increasing cost-to-complete estimates seen in the 1980's. Figure 7 is indicative of the wide disparity existing between plant construction costs and other relevant comparison parameters. Two key factors driving project costs - inflation rate and duration of plant construction (lead time) - are no longer remotely in parallel with plant costs. Also, the influence of TMI has been addressed and is no longer a regulatory uncertainty for plant completion.

Figure 7

Comparison of Plant Costs to Inflation/Leadtime Trends



Perhaps the estimate for project completion should be comprised of two elements: those costs based on design and construction as it is known now and the variable costs encompassing all of the contingency items as noted previously.

Outcome Risks on Rate Case

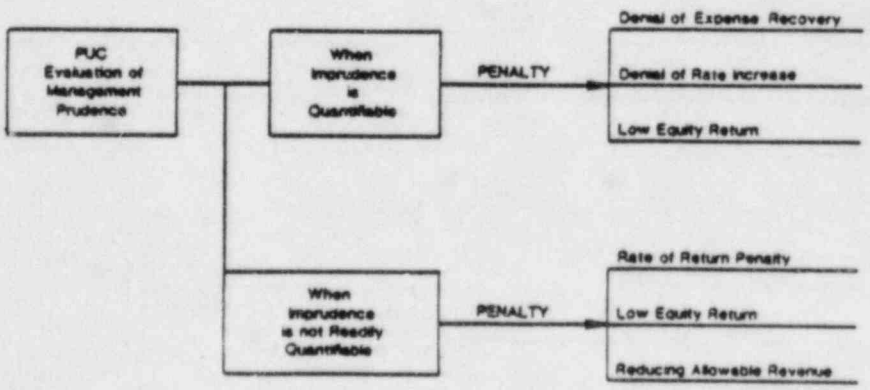
Recent outcomes have been devastating. PUC's now routinely penalize utilities for perceived mismanagement including:

- Denial of rate increase/expense recovery
- Rate of equity return set on low end
- Financial pressure for indefinite deferral/termination of unit
- Incentive rate of return risks

Figure 8 relates the types of penalty imposed by the Commission as a function of the extent to which the "management imprudence" can be quantified.

Figure 8

PUC PENALTY OPTIONS FOR MANAGEMENT IMPRUDENCE



Three recent Commission decisions (company names expressly expurged) represent the trends pervading the industry nationally:

1. **Requirement for company to prove that it was prudent:**

"The department does believe that the entire issue of the adequacy of (the Company) review process and the prudence of its decisions concerning its continued participation in the project — as distinct from the decisions or participation of Company Light and Power or any other utility — will be addressed in a future proceeding. . . .

"As a general matter, we note that a company's decision to construct a power generating facility does not automatically guarantee that the cost of that facility or any part of the cost of that facility will be recovered through rates. A company must demonstrate the prudence of its investment and that the manner in which it proposes to recover the costs of its investment is reasonable. The questions raised by staff have served to highlight Company's responsibility to demonstrate, at the time it seeks to recover the costs associated with its investment in nuclear plant, the prudence of its actions."

2. **Vicarious liability of a participant company for the actions of the plant's Project Manager Company:**

"Applicant has attempted to point out distinctions which it contends justify a different resolution of the nuclear plant issue in this case than in (other) proceedings, supra. We do not find these arguments persuasive. First, applicant asserts that because the Project Manager Company is the NRC licensee and, as such, the party responsible for the plant's problems, it is inappropriate to penalize participant company by denying it an allowance for its plant investment, particularly in light of the steps the company has taken, such as the commencement of an arbitration proceeding, in an effort to protect its rate-payers. This is a rate case, not a witch hunt. It is not the commission's intention to penalize anyone. However, the fact remains that although there are many doorsteps at which blame might be laid for the plant problems, the doorsteps of the customers of these companies are not among them. These customers have already gone the extra mile with respect to the plant, and the commission cannot ask them to contribute further without any reliable indication as to when, and at what cost, they will receive service from this unit."

3. **Prudence constraints in an IROR (Incentive Rate of Return) Scenario:**

"While the record may be inconclusive as to the blame (or penalties) which should be assessed against company for its role in this project until 1981, the examiner strongly suggests that the record justifies more stringent regulatory treatment of this project from this time forward. . .

"However, the participants should be modified so that if Company reaches this ceiling, and still needs more funding for nuclear plant, it would have three options:

"(1) it may institute a docket at any time to have the ceiling amount raised;

"(2) it may apply to have the ceiling raised in its annual rate case; or

"(3) it may wait until the plant is scheduled to be included in rate base and attempt to raise the ceiling at that point.

"However, Company will have the burden to show that the ceiling should be raised; i.e., that the reason for the cost overruns is not the result of mismanagement for which the Company rate-payers should not be responsible.

"This suggestion is a sound one because the Company will be given an incentive to improve its management of this project. Any further cost overruns or delays which are not attributable to any management deficiencies at the Company (such as routine NRC scope changes, etc.) should not be excluded from the final cost of the project, provided the Company provides proper documentation that the problem was not caused by its role as project manager. The record which the company must develop to present to this commission in the event of any future cost overruns should cause it to pay much closer attention to problems of any nature at the project."

Planning and Managing the Rate Case

In the best of all worlds, the utility will have in place the necessary audit trails to:

- Document the bases for management decisions and the facts/conditions that existed at the time those decisions were made.
- Engineering and construction decision/cost records to establish the cost and scheduling aspects of the project. In a generation facility (as in other complex "process" facilities), the synergism between engineering/design, construction progress/costs and project scheduling aspects is acute.
- Detailed sensitivity analysis for cost-to-complete tied to variables, such as labor conditions, added regulatory requirements, material takeoff changes, etc.

By and large, many utilities have the capability to address those specific inquiries in the area of imprudence. What may not be in place is the ability to react to the situation where the utility must prove that it was not imprudent. In effect, the issue of management prudence is one of the utility company's most crucial issues to address. In the face of the economic risks associated with confronting this dilemma, rate case planning should be comprehensive enough to address the matter. At a minimum, the utility should be prepared to address:

- Initial planning/load projection criteria
- Construction costs incurred
- Cost-to-complete and scheduling analysis
- Affirmative treatment towards productivity improvement and audit of engineering/construction performance
- Incentive rate-of-return (IROR) possibilities

As part of this effort, the utility should have performed cause and effect studies to assess the issue of management prudence. Additionally, sensitivity analysis should be available to display awareness of alternatives, risk assessments and cost/time evaluations.

To reiterate, the most important issue facing the Company is that of an affirmative assessment of the prudence of management's decisions. In general, the utility is faced with the burden of proof to establish that throughout the project, both decisions and costs were prudently made and incurred.

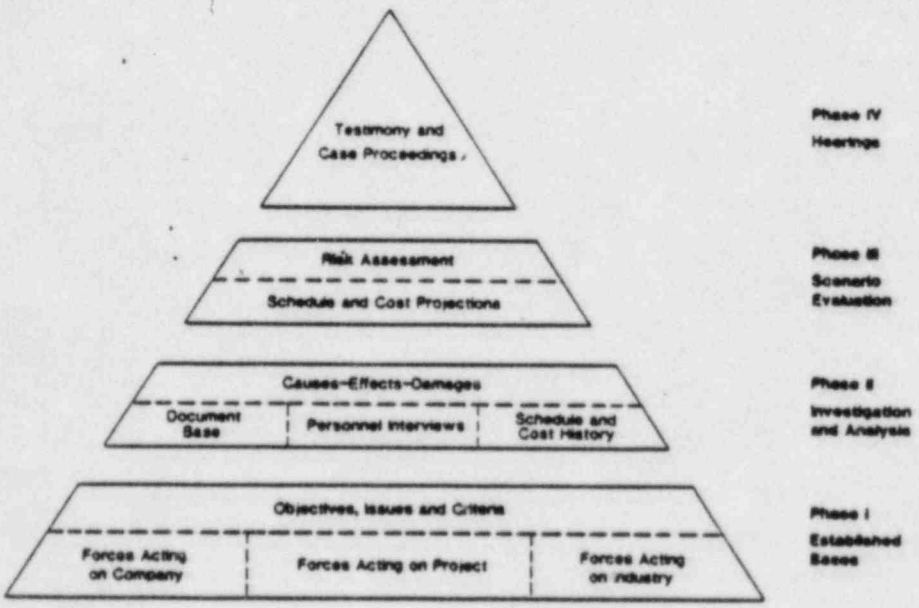
This assessment relies exclusively on the factual determination of the cause-effect relationships of the project and the decisions made over due course. The fact that the construction of the unit overran the original time and cost estimates does not, by itself, substantiate imprudence. The driving forces causing these overruns may well have been outside the control of the utility and even unforeseeable. These driving forces cannot be speculative, but must be predicated on a detailed, comprehensive project record integrated into a manageable data base which in turn can be used to establish the actual cause-effect relationships. Failure to produce the factual data base frequently results in commission doubts to the effect that the utility has failed to meet its burden of proof. In establishing the proof that management's decisions were reasonable, the intermediate milestones will be examined intensely. Did the utility and their agents prudently control their density from original load forecasting through design and procurement and, finally, to construction and management. All of these elements must be assessed in preparation for the rate case. In this regard, there is no substitute for readiness and preparedness since it is foreseeable that these issues will be raised by the commission and intervenors.

Although the trends are growing more severe, management has the ability to direct a reasonable effort. Rate case preparation assessing the hard and soft areas will minimize the downside economic risks that can beset the utility. Solutions are not simple, but they are available.

Figure 9 visually depicts the structured approach necessary for a company to methodically plan and carry through a rate case. Each of the pyramid levels represents an extent of effort necessary to reach an evaluation node point.

Figure 9

STRUCTURED APPROACH TO RATE CASE



The initial effort focuses on the bases confronting the company and the issues likely to be addressed.

- Forces acting on the Company include changes in load growth, company financial condition, participants seeking altered joint venture agreements, etc.

- Forces acting on the project include evolving engineering/design conditions on construction progress, potential deficiencies in areas of QA/QC/ quality of design/adequacy of procurement materials/insufficient planning and scheduling, changing labor environment, etc.

- Forces acting in industry include evolving NRC requirements, uncertain economic conditions influencing load growth, public concerns as to plant safety, etc.

Although certainly not all-encompassing, answers to the following specific questions should be addressed as early as possible:

- Did the utility adequately forecast capacity requirements?

- Were capacity requirements matched with alternative capacity sources?

- What plant evaluations (nuclear vs. coal) were performed assessing costs, on-line timing, etc.?

- Did the utility have previous nuclear generation design/construction experience? If not, what measures were taken to secure competent and experienced senior management?

- To what extent did the utility oversee/critique/supervise design and construction?

- Did the utility periodically evaluate cost and scheduling parameters to ascertain if earlier assumptions were still viable?

- To what extent were project completion cost estimates and schedule-to-complete evaluations honestly and independently performed?

- Were comparative plant economics considered over the duration of construction?

- Did the utility perform periodic management, engineering and construction technical audits of itself?

With the broad parameters of bases established, the investigation and analysis stage is next. A review of recent PUC decisions clearly points to the inadequacy of company effort expended in this area. The analysis required is a factual inquiry. Examination into the extent to which a company's management process and decisions were imprudent is not a legal issue - it is a factual issue. Furthermore, the inquiry must focus on the adequacy of the management decisions

at the time they were made (and based on the facts available at the time). Too often the company addresses the areas of finance/accounting and data processing in the belief that evidence to support cost of service is all that is necessary. This form of rate-case management is naive at best. Focusing on "effects" in the current PUC environment is meaningless unless equal treatment of causes is also done. Detailed examination of the factual circumstances that occurred (or are occurring) on the project is indispensable. At this level, the inquiry must include:

- Detailed examination of project/company documents
- Preparation of project history
- Interviews of project/company personnel
- Schedule/cost history evaluations
- Cause-effect tracing

When the factual history has been evaluated, a risk assessment as to rate case strengths and weaknesses is vital. At this point, scenario evaluations can be performed anticipating the expected inquiry from intervenors and Commission staff. This effort subsequently blends into actual rate case hearing preparation and testimony.

The bottom-line facing the utility company today is not optimistic. With the expectation that the rate case will be highly investigative and comprehensive, planning from the outset makes the only sense.