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SUBJECT: Forwards white papers to be presented to Commissioner Curtiss on 911025 for info.Subjs of interest,include maint rule - regulatory suprise & Generic Ltr 89-10 re safety related MOVs.

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Harold W. Keiser
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October 23, 1991

Director of Nuclear Reactor Regulation
Attention: Mr. C.L. Miller, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: WHITE PAPERS FOR COMMISSIONER CURTISS

Dear Mr. Miller:

Enclosed for your information are white papers on various subjects of interest to Pennsylvania Power & Light Company that will be presented to Commissioner Curtiss on October 25, 1991.

If you have any questions, please call me.

Very truly yours,

H. W. Keiser

Enclosure

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THE MAINTENANCE RULE - A REGULATORY SURPRISE

A nuclear power plant is an example of a large modern, technologically advanced system functioning in a highly integrated and interdependent manner. Because of the fiscal investment and the potential for unacceptable safety consequences sustaining equipment reliability and performance through effective maintenance is not an option. PP&L is convinced that effective plant maintenance is achieved through an understanding of what structures, systems and components most impact reliability and safety and then establishing and implementing goals to effect improvement.

In 1986, PP&L began development of a reliability model for Susquehanna SES. That process has evolved and its results have been integrated into our Maintenance planning by identifying components important to safety and Plant Generation. We have also recently completed the Susquehanna Individual Plant Examination and have integrated those results into our planned maintenance activities. Through that process we have developed an extensive understanding of risk from failures of plant structures, systems and components and have identified where special attention through predictive and preventive maintenance is warranted. We have also recognized that this process must have a goal of continuously increasing our level of awareness and our standards of performance. However, we also recognize that our goals must be tempered by achievability and cost effectiveness.

Promulgation of the maintenance rule indicates to the industry that the Commission believes that sound maintenance practices can only be developed through regulation and that there is a weakness to the argument that these same ends can be achieved by an industry maturing through its understanding of plant structure, system and component integration and interdependence. This underlying philosophy and the process by which the rule was adopted is and should be of great concern to the industry. The nuclear industry has finite resources. Its expectations are for the regulator to have a strong recognition of those limitations and exercise management controls such that resources are expended optimally, i.e., without compromising the NRC's role of overseeing safe plant operation. The maintenance rule is ambiguous legislation which will expend significant industry and NRC resources just to understand what is required for compliance. Most alarming is that these resources will be expended in spite of agreement between industry and the NRCs staff, based on clear evidence that progress was being made by the industry to improve maintenance effectiveness, that it is unnecessary.

Background

The NRC originally proposed a rule to require commercial nuclear power plants to implement a documented maintenance program covering safety-related and ceratin nonsafety-related systems, structures, and components (SSCs), including "balance of plant SSCs on November 28, 1988. The proposed rule was opposed by the industry

as both vague and unnecessary. A major concern of the industry was application of the proposed rule to balance of plant systems. Further, the industry maintained that its initiatives, particularly INPO's development of a maintenance standard, were sufficient to address concerns regarding plant maintenance and that promulgation of a rule could have a stifling effect on the process.

In August of 1989, draft Regulatory Guide (DG-1001) was published for comment. This document was proposed to provide guidance for implementation of the proposed rule.

On December 8, 1989, the Commission agreed to hold in abeyance its rulemaking for eighteen months to evaluate the industry's initiatives and the need for a rule. The Commission subsequently directed the Staff to conduct the evaluation. Six months later, the Commission also directed the Staff to develop a reliability based rule proposal.

The Staff provided the results of their evaluation on April 26, 1991 (SECY-91-110). The Staff found that licensees had adequate maintenance programs and that the industry had made a sufficient commitment to a maintenance standard acceptable to the Commission. The NRC staff, based on its conclusions, recommended that a maintenance rule not be promulgated and that a revised policy statement emphasizing the importance of maintenance be issued.

The NRC staff, as previously directed, also provide the Commissioners with a draft reliability-based rule (SECY 91-110) in which the effectiveness would be monitored against a set of established performance goals. Additionally, the Staff revised the draft process-oriented rule to reflect public comment. Both of these draft rules were written to apply to a limited set of safety-related and non safety-related SSCs determined to be safety-significant.

To almost everyone's surprise, the Commissioners rejected the recommendation and approved a reliability based rule and instructed the Staff to develop a final regulatory guide on the new rule within two years. Implementation of the new rule is required by July 10, 1996.

<u>Requirements of the Rule</u>

The rule as codified applies to safety-related SSCs and three classes of nonsafety-related SSCs:

1) nonsafety-related SSCs relied upon to mitigate accidents or transients or are used in EOPs;

2) nonsafety-related SSCs the failure of which could prevent safety-related SSCs from fulfilling their safety-related functions; and

3) nonsafety-related SSCs the failure of which could cause a reactor scram or actuation of a safety-related system.

The rule requires monitoring SSCs against licensee-established goals sufficient to provide reasonable assurance that the SSCs are capable of performing their intended functions. The goals must be established commensurate with safety and, where practical, take into account industry operating experience. The rule will allow foregoing monitoring of a particular SSC where effective control through the performance of appropriate preventative maintenance is demonstrated in that the SSC remains capable of performing it intended function.

Performance and condition monitoring, goals, and preventative maintenance activities are required to be evaluated by licensees on an annual basis. This evaluation must, where practical, account for industry operating experience. Adjustments are required to be made to ensure that the object of preventing failures of SSCs through maintenance is balanced against the objective of minimizing unavailability of SSCs due to monitoring or preventive maintenance. Additionally, monitoring and preventive maintenance activities must consider the overall effect of equipment that is out of service on the performance of safety function.

The Compliance Dilemma

1. The Scope

The first step in compliance with the rule is identifying its scope. The Commission has argued that the rule "is comprised of a subset of the aspects of the proposed maintenance rule and its associated draft regulatory guide", 56 Fed. Reg. 31309, 31310. However, neither the rule, the supplementary information in the Federal Register, nor the draft regulatory guides associated with previously proposed rules provide any guidance on how compliance with this rule is to be accomplished relative to scope:

a. Safety-Related SSCs

Although identification of safety-related SSCs should be straight forward, definition remains open. Will items on the plant's Q-list be sufficient? They should be!

b. Non-safety Related SSCs Relied Upon to Mitigate Accidents or Transients or Used in EOPs [50.65(b)(2)(i)].

Use of the term "accidents or transients" without definition creates a significant problem. Is the term limited to a specific set of occurrences such as those defined as design basis events (FSAR Chapter 15) or should it be expanded to every operational occurrence considered in the FSAR, or is a look beyond the FSAR required? The fact is that balance-of-plant systems, unlike safety-related systems, were not designed to be single failure proof. These systems contain many components whose failure will result in a reduction of electrical output and a plant scram. Previous to the maintenance rule, the word "transient" was considered to refer to infrequent anticipated operational occurrences. Is it necessary to consider the secondary side of the plant to identify transients never identified or analyzed in any licensing documents?

c. Nonsafety-related SSCs Whose Failure Could Prevent Safety-Related SSCs from Fulfilling their Safety Function [50.65(b)(2)(ii)

This requirement presents a very difficult issue. As with item b. above, there is no guidance in the rule or supporting documents. To determine indirect failure modes requires extensive system interaction reviews. Not only is this requirement very difficult to satisfy, it appears to be inconsistent with the position of the license renewal rule in which the NRC only requires evaluation of nonsafety-related SSCs that directly present a safety-related SSC from performing its intended function.

d. Nonsafety-related SSC Whose Failure Could Cause a Reactor to Scram or Actuation of a Safety-related SSC [50.65(b)(2)(iii)]

Again, there is no guidance in the rule or supporting documents. The major issue in this requirement is whether, and to what extent, analysis must be done to determine if an SSC failure could results in a scram or safety system actuation. For example, must multiple failures be considered? There is clearly the potential for an extremely broad scope with the maintenance rule as written. As with item c. above, the maintenance rule's potentially broad scope is inconsistent with the more narrowly defined set of SSC's deemed important to license renewal and with the NRC's decision not to require system interaction analyses to support implementation of the license renewal rule.

2. Effectiveness

a. Demonstration

The rule indicates that SSC monitoring regimes and goals can be avoided by demonstrating that the SSC's performance or condition is being effectively controlled through the performance of appropriate preventive maintenance, such that the system remains capable of performing its intended function. The approach of avoiding the establishment of a monitoring program appears to be desirable; however, because of the rules lack of specificity, it also opens the door to creating potential enforcement action due to differences in judgement between the staff and utilities.

It is not at all clear how requisite demonstration will be accomplished or even if it will be allowed at the outset of rule implementation. There is no guidance as to whether evidence of effectiveness of preventive maintenance should be compiled and, if so, what the evidence should consist of. Will documented history of the equipment be adequate? What constitutes complete and accurate information? For what period should the history cover? Will an integrated maintenance program satisfying the elements of INPO 90-008 or the previously issued draft regulatory guide be sufficient to demonstrate a SSC's performance or condition as being controlled through proper maintenance?

b. Monitoring

Should a monitoring program be the path chosen for compliance with the rule, both the rule and supplementary information indicate that the monitoring regime must be sufficient to reasonably assure that SSCs will not fail, a standard which may not be possible to satisfy (50.65(a)(i); 56 Fed. Reg. @ 31,309). To provide this level of predictive ability, it assumed that the Commission intends a very extensive monitoring effort more in the nature of a program of surveillances within a rigidly established set of acceptance criteria. The dilemma is that the NRC, in information provided supplementary to the rule, indicates it is not the intent of the Commission to require a monitoring program so extensive that it detracts from the ability to otherwise maintain equipment. Although the Commission's intent is further explained, it leaves many questions which opens any decision to a later date second guess by the Staff that a particular monitoring regime will not be deemed sufficient to reasonably assure that a particular SSC will perform its intended function. Currently the rule gives neither guidance on the establishment

of a monitoring regime nor the vehicle for providing preapproval of a selected methodology.

c. Reevaluation

The program to satisfy the requirements of the rule requires, at least annually, reevaluation of the goals, monitoring and maintenance activities done to satisfy the rule. This reevaluation must take into account, "where practical", industry wide experience.

This reevaluation requirement, although simple to state, represents a substantial work effort. Other than to state the requirement, the rule is essentially silent with respect to implementation.

The information given supplementary to the rule indicates that adjustments are to be made to goals, monitoring, or preventive maintenance requirements where equipment performance or condition do not satisfy established goals. Two questions arise. First, whether or to what extent adjustment is required to goals that are satisfied. Second, whether one year is a long enough period to draw meaningful conclusions regarding the accomplishment of goals, the success of monitoring programs and maintenance activities done to satisfy the rule.

d. Out of Service Equipment

Section 50.65(a)(3) contains the requirement to assess the total plant equipment that is out of service to determine the overall effect on the performance of safety functions. Several questions arise with this requirement. How technically comprehensive must an assessment be? Is a probabilistic risk assessment required for each assessment? Is a new assessment required every time a piece of equipment is taken out of service? What constitutes documentation of an assessment? Since plant technical specifications, by way of limiting conditions of operation, permit equipment to be out of service in various modes of operation for various periods of time, is the maintenance rule reopening these technical specifications to regulatory review by requiring a risk assessment of each? Currently the rule gives no guidance on this subject. The potential impacts of this requirement are significant.

The Rule Making Process

The rulemaking process employed by the Commission in promulgating the maintenance rule was, at best, disappointing to the industry. Without question it begs the question, as to how seriously the Commission is considering the industry's concerns with respect to regulatory impact. The industry made a substantial effort to develop a coherent program to deal with plant maintenance. Progress was being made. The Staff in SECY 91-110 concluded that there was no need to proceed with rulemaking and advised the Commission to adopt a final policy statement on maintenance. Moreover, the Staff determined that the industry had generally met the criteria and factors previously approved by the Commission to assess the need for the maintenance rule. So why was the rule promulgated? Even more importantly, why was it done in such haste?

The rule adopted, despite the Commission's assertions to the contrary, differs greatly from proposed rules. To claim that the rule is a derivative from aspects of the originally proposed rule is, at best, difficult to accept. To promulgate the rule without allowing comment is inappropriate and underscores a lack of sensitivity to the industry as a whole. In addition, it is arguable that in promulgating the final rule without public comment on the variation which constitutes the rule represents a failure to comply with the Administrative Procedure Act.

To further aggravate industry feeling with respect to the rule's promulgation, the backfitting analysis does not appear to adequately comply with the standards of the backfitting rule (10 CFR 50.109). The Commission has conceded that the rule is not necessary to provide "adequate protection" (50.109(a)(5)), but rather must be justified by a full, cost-based backfitting analysis (50.109(a)(2)). However, the analysis accompanying the rule is highly qualitative. In addition, it could be concluded that the regulatory analysis relied upon by the Commission was prepared in support of the Staff's proposed "process rule," not the final approved by the Commission. Further, the Commission relied upon elements, such as cost savings through improved plant reliability that the industry finds highly questionable. It is very hard for the industry to justify this rule based on the mere fact that "maintenance is good" irrespective of its cost.

Most disappointing in this process is the assumption impled by the backfitting analysis that without a rule, plants would revert to levels of maintenance effectiveness existing prior to industry initiatives in this area. Not only is this a highly questionable assumption, but it is one that indicates a lack of trust and ignores self-improvement initiatives on the part of the industry.

Conclusion

The nuclear industry has a maintenance rule. Interpretation and implementation of the rule will be an arduous task that will drain significant industry experience, expertise, time, and money. In order to mitigate this impact, two objectives must be attained:

1. Industry must develop a guideline for acceptably satisfying the regulation that recognizes the work already accomplished.

2. Industry and the NRC must work together in order to assure that implementation is both well understood and enforceable.

Regardless of any industry effort, two questions need to be answered. It is reasonable to ask how we, as an industry, got where we are today with this rule. It is also reasonable to ask, in light of the process employed to promulgate this rule, whether, based on this model, nuclear power has a place in an environment where cost containment will be the only means of survival.

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GENERIC LETTER 89-10:

THE IMPACT OF UNDISCIPLINED REGULATION

A PP&L PERSPECTIVE

The regulatory process as it works today has the potential to force utilities and the NRC to spend millions of dollars with neither a firm definition of a problem, nor a well-based technical approach to resolve concerns. PP&L fully realizes that the NRC's mission dictates that they take whatever action is deemed necessary to protect the health and safety of the public. We share that mission and take it very seriously. What we are compelled to take issue with is that once a potentially significant safety concern becomes defined by the NRC, it does not appear that the NRC is exerting sufficient management controls to take a more disciplined approach to resolving the problem.

A case study is Generic Letter 89-10 regarding safety-related motor operated valves (MOVs). While PP&L agrees with the broad purpose of NRC's efforts with regard to safety-related MOVs, we believe that:

- NRC's decision to issue the regulatory action to the extent identified was not based on adequate information concerning the need for and consequences of a proposed regulatory action.

- The regulatory actions identified are not cost effective nor are they totally consistent with providing the necessary protection of the public health and safety.

- NRC is compelled to duplicate and check our plant design assumptions and calculations, rather than confirming regulatory compliance in its MOV and other inspections. This increases manhours and costs for both NRC and utilities.

- It appears that NRC is promulgating a Prescriptive Maintenance Rule via the Generic Letter regulatory process.

As a result of these NRC actions, PP&L estimates that the nuclear industry will spend some $1.8 billion over the next 25 years to comply with Generic Letter 89-10. This cost estimate <u>excludes</u> any costs for normal scheduled maintenance and/or modifications or replacements of valves and actuators.

PP&L asks NRC to consider two critical questions at this time in the evolution of the nuclear power industry:

- What went wrong with the regulatory process to allow this uncontrolled regulation to occur? and,

- What can be done to correct this problem, and to prevent recurrence, such that nuclear power can remain a viable alternative in the future?

THE MOV ISSUE AND PP&L-SPECIFIC BACKGROUND

1. I. E. Bulletin 85-03

On November 15, 1985, The Nuclear Regulatory Commission issued I. E. Bulletin 85-03. This document recommended that licensees develop and implement a program to ensure that motor operated valve (MOV) switch settings for MOVs in several specific systems (HPCI and RCIC) are selected, set, and maintained so that the MOVs will operate under design basis conditions for the life of the plant.

The PP&L scope of MOVs under this Bulletin was 22 per unit, or a total of 44 MOVs. All applicable recommended actions were taken, and a final report was submitted to NRC in January 1988, documenting our actions taken and the results of our engineering evaluations.

On April 27, 1988, NRC issued Supplement 1 to I. E. Bulletin 85-03. This Supplement added 7 MOVs per unit, or a total of 14 MOVs, to PP&L's scope of work. PP&L complied with this NRC request, and implemented follow up actions of these additional 14 MOVs by year end 1989.

The result of the actions taken by PP&L and other licensees resulted in increased reliability of these specific safety-related motor operated valves.

2. NRC Expands Scope and Requirements under Generic Letter 89-10

On June 28, 1989, the NRC issued Generic Letter 89-10, Safety-Related Motor Operated Valve Testing and Surveillance. This document expanded the 85-03 Bulletin recommendations to include ALL safety-related motor operated valves (MOVs). In addition, the GL defined eight (8) licensee actions and stipulated an implementation schedule to complete these actions. One of these actions stipulated dynamic testing of each valve under design basis postulated differential pressure and flow conditions initially. A five year implementation schedule to complete all actions to meet compliance with the Generic Letter was defined (by June 28, 1994).

The Generic Letter increased the MOV scope for PP&L to 150 MOVs per unit, or a total of 300 MOVs.

Subsequently, NRC issued Supplement 3 to GL 89-10 on October 25, 1990. Supplement 3 added a further stipulation for BWR plants that certain high pressure containment isolation valves (HPCI, RCIC, and RWCU) meet the requirements of the Generic Letter within 18 months of the issue date of the Supplement. For Susquehanna, the stipulated compliance date to implement all corrective actions is April 27, 1992.

In addition to the above documented recommendations, PP&L and other utilities have received inferred or implied recommendations that appear to go beyond the scope of the original recommendations. These messages have been heard during inspection activities and industry MOV forums. An example is the need for dynamic testing at a five year frequency to verify MOV operability. The generic letter does not state this, but questions from your staff indicate this is desired. Clearly, such suggestions can, and are, being interpreted as new recommendations by PP&L and many licensees, resulting in further scope increase. This "moving target" approach demonstrates the lack of discipline in formulating the original guidance, increases the cost of compliance, and threatens our ability to achieve compliance per the required schedule without NRC consideration of such effect.

PP&L is currently in the process of attempting to comply with GL 89-10; however, we are finding it increasingly difficult to address this moving target.

THE COST OF THE PROCESS

1. Susquehanna

PP&L estimates that the direct cost to ensure that Susquehanna is in compliance with Generic Letter 89-10 will total approximately $18 Million through June 1994. This amount EXCLUDES normal scheduled maintenance and any modifications that may result. In addition, PP&L estimates the cost to comply with the requirements of Generic Letter 89-10 over the remaining useful life of Susquehanna is approximately $26 million, or about $1 million <u>per year</u>. These estimates are in 1991 dollars (no escalation).

These costs are in comparison to NRC's cost estimate of $1.2 million per unit or $2.4 million to implement the initial program at Susquehanna, and $6.8 million for a continuing program after 1994.

2. The Nuclear Industry

Presently, many parallel activities are underway at utilities and via combined industry efforts which is costing millions of dollars.

Table 1 (Attachment 1) provides an approximate estimate developed by PP&L of the total industry cost to address this regulatory issue. PP&Ls costs are included in this estimate.

The estimated total cost burden by nuclear utilities over a 20 year period following 1994 to continue the requirements of the Generic Letter is on the order of $1.0 Billion. This excludes the following costs: previous and planned NRC fees related to this subject; previous utility costs associated with implementing the requirements of I. E. Bulletin 85-03; normal scheduled maintenance; and any modifications that may result.

Our question for NRC consideration is:

Is the cost of this process with regard to MOVs resulting in a commensurate increase in the health and safety of the public?

3. The Cumulative Impact of New Regulations

In addition, the cumulative costs of this and other recent generic letter communications is seriously affecting PP&L's ability to effectively manage and operate the Susquehanna units. The reality is that operating budgets cannot be expanded to absorb the increased costs. With the significant increased costs related to generic letter requirements, we are currently struggling with the issue of *"What are we not going to do."* NRC states in the Regulatory Impact Survey (RIS, SECY-91-172) that, "NRR is developing a process to enhance its ability to estimate the impact of specific NRC generic communications on licensees", and is also taking into "consideration..... the cumulative impact of generic communications." *We strongly endorse the need for such action and believe this must be a high priority for the future viability of the industry.*

WHAT IS WRONG WITH THE REGULATORY PROCESS?

1. Good Subject; Wrong Approach

PP&L agrees with the broad purpose of NRC's efforts with regard to safety-related MOVs. PP&L acknowledges that the reliable operation of motor operated valves is critical to both nuclear safety and station reliability. PP&L's Nuclear Department Mission statement reflects this belief:

"To operate, maintain, and support Susquehanna such that the station reliably and efficiently generates the maximum amount of electricity without compromising public or employee safety."

PP&L believes it has taken the correct, measured steps since the issuance of I. E. Bulletin 85-03 to enhance the reliability of station safety-related motor operated valves. At that time, PP&L took an aggressive approach to maintaining ALL safety related MOVs, not just those under the scope of the I. E. Bulletin. PP&L has a total population of 850 MOVs, of which 350 are safety-related. Table 2 (Attachment 2) indicates cumulative actual costs of maintaining our MOV population since 1985. As noted, PP&L has expended over **nine (9) million dollars** over that timeframe. Note that these are direct material and labor costs only; they do not include engineering costs.

PP&L acted upon the regulation and we believe we spent our shareowner's and customer's funds wisely to increase MOV reliability. However, we are now spending an <u>additional</u> $40-45 million over the next twenty-five years for the Generic Letter requirements (initial program and continued program). What is the incremental benefit? The NRC does not have to answer this question. However, PP&L and other utilities must answer this question to our public utility commissions, shareowners, and customers.

PP&L acknowledges that the failure rate of Susquehanna safety-related MOVs has decreased since 1986. This can be attributed to actions taken as a result of NRC initiatives. Table 3 (Attachment 3) indicates Susquehanna's safety-related MOV failure rate since commercial operation on both units.

As a result of the I. E. Bulletin, Susquehanna MOV reliability was trending in the right direction. However, as a result of blowdown tests at Idaho National Engineering Laboratory (INEL) under contract to NRC, NRC issued Generic Letter 89-10 in June of 1989. This increased both the actions and number of MOVs required to be addressed. Susquehanna's scope increased from 58 MOVs (I. E. Bulletin 85-03) to 300 MOVs (some safety-related MOVs are outside the scope of the Generic Letter). In addition, the Generic Letter defined the following further requirements:

- Demonstrate all MOVs to be operable by testing them at maximum design-basis differential pressure and/or flow determined from the design basis reviews. Justify operability of each MOV, including those where it is impracticable to test at design-basis conditions.

- Perform diagnostic testing of each MOV. "INEL has concluded that diagnostic systems that measure both stem thrust and motor torque are best suited for predicting valve motor performance under design-basis conditions."

- Design basis "review should include effects on MOV performance of design-basis degraded voltage, including the capability of the MOVs power supply and cables to

provide the high initial current needed for the operation of the MOV."

- Implement a MOV failure trending program for safety-related MOVs.

PP&L believes NRC issued Generic Letter 89-10 with the scope as defined prematurely. Various evaluations of the INEL test data by independent parties (PP&L, consultants to PP&L, and consultants to Electric Power Research Institute) indicate the conclusions drawn by INEL to be very questionable at best, typically indeterminate, and limited in applicability. However, the NRC Staff has refused to consider industry's technical position regarding this issue.

NRC testing at INEL surfaced potential significant problems with certain types of MOVs. However, NRC quickly issued regulation applicable to a wide population of valves without properly laying the groundwork to define the issues so that the development of the resolution could be achieved. Specific issues that PP&L and the industry have been concerned with regarding GL 89-10 are:

- The Generic Letter included butterfly valves and globe valves as part of the scope, including dynamic testing. As only gate valves had been tested by NRC, there was no technical basis to include any other types of valve.

- NRC Staff indicated that valve mis-positioning be reflected in the analysis.

- NRC indicated that a specified valve factor should be included in MOV design calculations based on the INEL tests.

- NRC recommends that an allowance be included for rate-of-loading phenomenon, when it is inconsistently observed and there is a wide scatter of severity.

- NRC indicated that stem friction factor was not conservative, without substantial technical basis.

In effect the NRC, without sufficient technical basis, put the burden on utilities to re-analyze and prove again that every safety-related MOV is operable under design basis blowdown conditions; to prove that there is not a problem. PP&L questions the validity of this technical approach.

During public workshops on the Generic Letter, NRC Staff did not listen with the intent of understanding the utility perspective. The workshops resembled "one-way lectures" that did not allow open discussion of the issues to define the problem, the priorities, and to determine the best approach to resolve.

As a result, the relationship that has evolved between regulator and utility on MOV design adequacy is one of mistrust. In addition, this "conflict" approach is not cost effective. The regulatory process has resulted in a Lose-Lose situation for both parties. The NRC, each utility, and the Industry as a whole are spending millions of dollars without a firm definition of the problem and a consensus technical approach to address the problem. The only winners in this process are the consultants - they are pocketing millions of dollars!

2. Indirect Promulgation of a Prescriptive Maintenance Rule

It is PP&Ls observation that NRC Staff is slowly implementing a "prescriptive Maintenance Rule" via the implementation of Generic Letter requirements on specific populations of nuclear plant components. Examples of these are:

PRESCRIPTIVE MAINTENANCE RULE IMPLEMENTATION?	
GENERIC LETTER	**COMPONENT POPULATION AFFECTED**
89-04	Check Valves
89-10	Motor Operated Valves
89-13	Heat Exchangers
91-15	Solenoid Operated Valves

Is the Generic Letter regulatory process being used to create the prescriptive Maintenance Rule that the NRC felt was not required?

CONCLUSION

PP&L believes the direction to perform a full flow test program for each safety-related MOV at each plant was, in our opinion, premature. PP&L believes the following "phased-in" approach would have been more appropriate:

PP&L PROPOSED GL 89-10 IMPLEMENTATION

PHASE	SCOPE
I	Design basis development; establish correct torque switch settings; develop program to review and revise the methods for selecting and setting all switches. Timeframe: Immediate (1989)
II	Industry perform a massive full flow and differential flow testing program on a large number and variety of valves (for example, the EPRI MOV Performance Prediction Program). Determine what the specific issues are, and the responses to those issues. Specifically investigate: valve factor; stem factor; rate-of-loading; valve design effects; friction effects; packing effects; lubrication effects; MOV diagnostic systems accuracy and application. Timeframe: Near Term (1989-1992)
III	Based on specific problems and issues arising out of the flow test program, develop regulatory guidance to utilities to narrow the scope of the issue. Let utilities implement the requirements. This may include site specific static or dynamic testing of MOVs, depending on the issues or similarity of MOVs. Timeframe: Longer Term (1992-Beyond)

Cost effectiveness is a major initiative for utilities during the 1990's, and especially for those with operating nuclear power plants. PP&L believes that one of the keys to successful cost effectiveness is safe operation of our nuclear station. Therefore, we fully endorse NRC initiatives which enhance overall safe operation. PP&L's main objection to the current status of Generic Letter 89-10 is that there exists no industry and NRC agreement on cost/benefit, nor have we been working together to define the problem and develop cost effective solutions. Utilities are attempting to satisfy questionable testing requirements at the same time both parties are debating basic design requirements. As a result, expenditures are rapidly escalating and some of the effort may later be proved to be wasted for both the NRC and utilities.

There is no denying problems have occurred with the operation of Motor Operated Valves, and that more needs to be done to better understand the performance characteristics of MOVs. Whether or not the INEL test results are or are not valid needs to be put behind us. NRC and the industry must mutually define the necessary actions to resolve the open issues.

We look forward to NRC Management's review of the current status of Generic Letter 89-10 and decision on future direction for the Industry to resolve the existing concerns. We also urge NRC Management involvement in future developing issues so that we can together preclude another "89-10".

ATTACHMENT 1

TABLE 1

INDUSTRY PROGRAM COSTS THROUGH YEAR 2014 [1]		
TASK	THROUGH 1994	1995 - 2019
EPRI MOV Performance Prediction Program [2]	$ 18 M	-
Utilities direct Response to GL 89-10 [3]	$ 800 M	-
Periodic Dynamic Testing, Reverification,[4] Static Post Maintenance Testing, Documentation of Ability of MOV to Function	-	$ 960 M
NRC Research and Enforcement Costs [5]	?	?

[1] Assumes current population of GL scope 89-10 MOVs. All costs are in 1991 dollars without escalation.

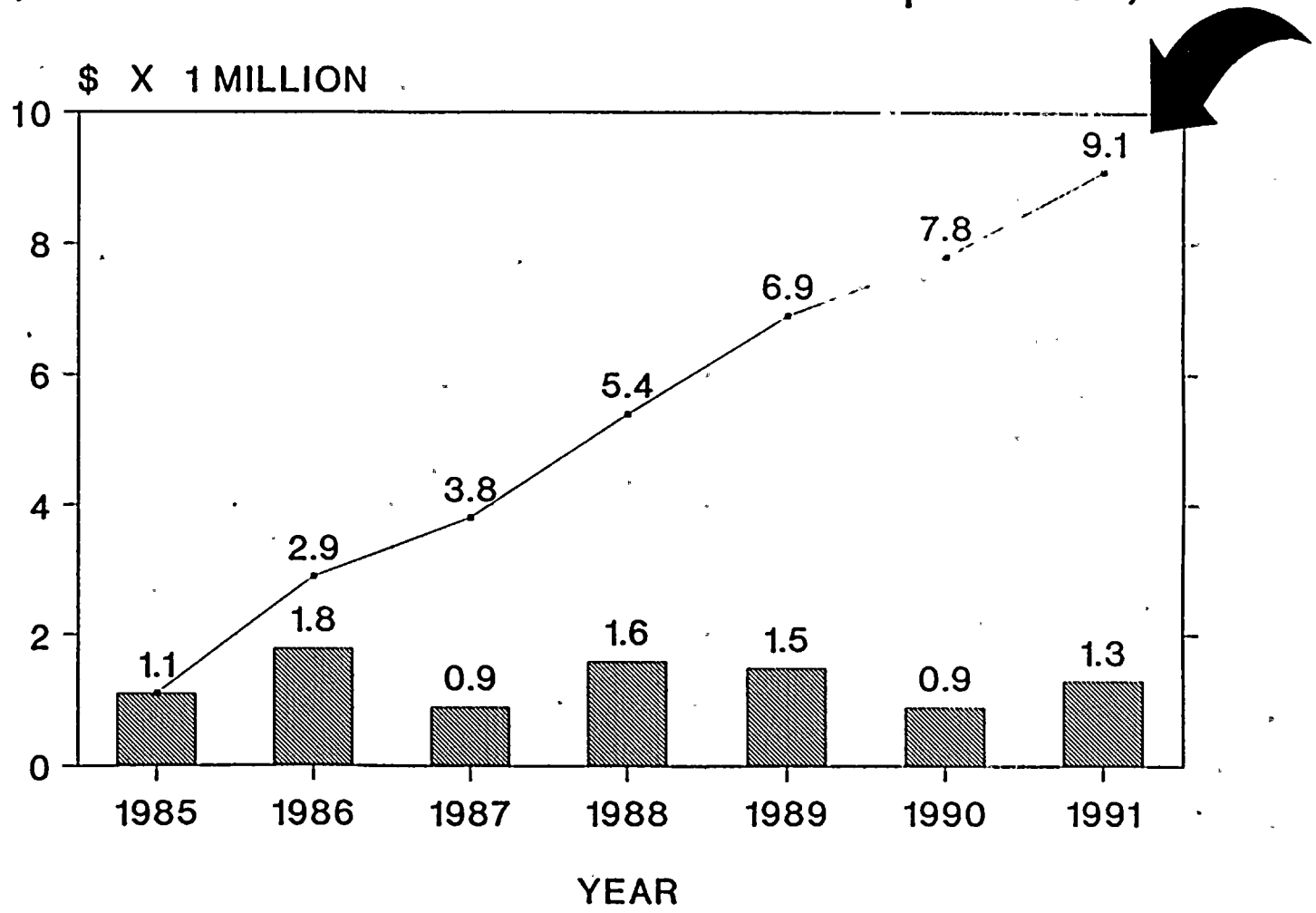
[2] PP&L Shared cost is $600,000.

[3] Excludes the cost of any modifications or replacements of valves and/or actuators. Assumes 16,000 MOVs @ $50,000 per.

[4] Assumes 16,000 MOVs, frequency of 5 Years, or 3,200 MOVs per Year @ $15,000 per.

[5] Fees passed on to utilities at actual cost, cannot be estimated.

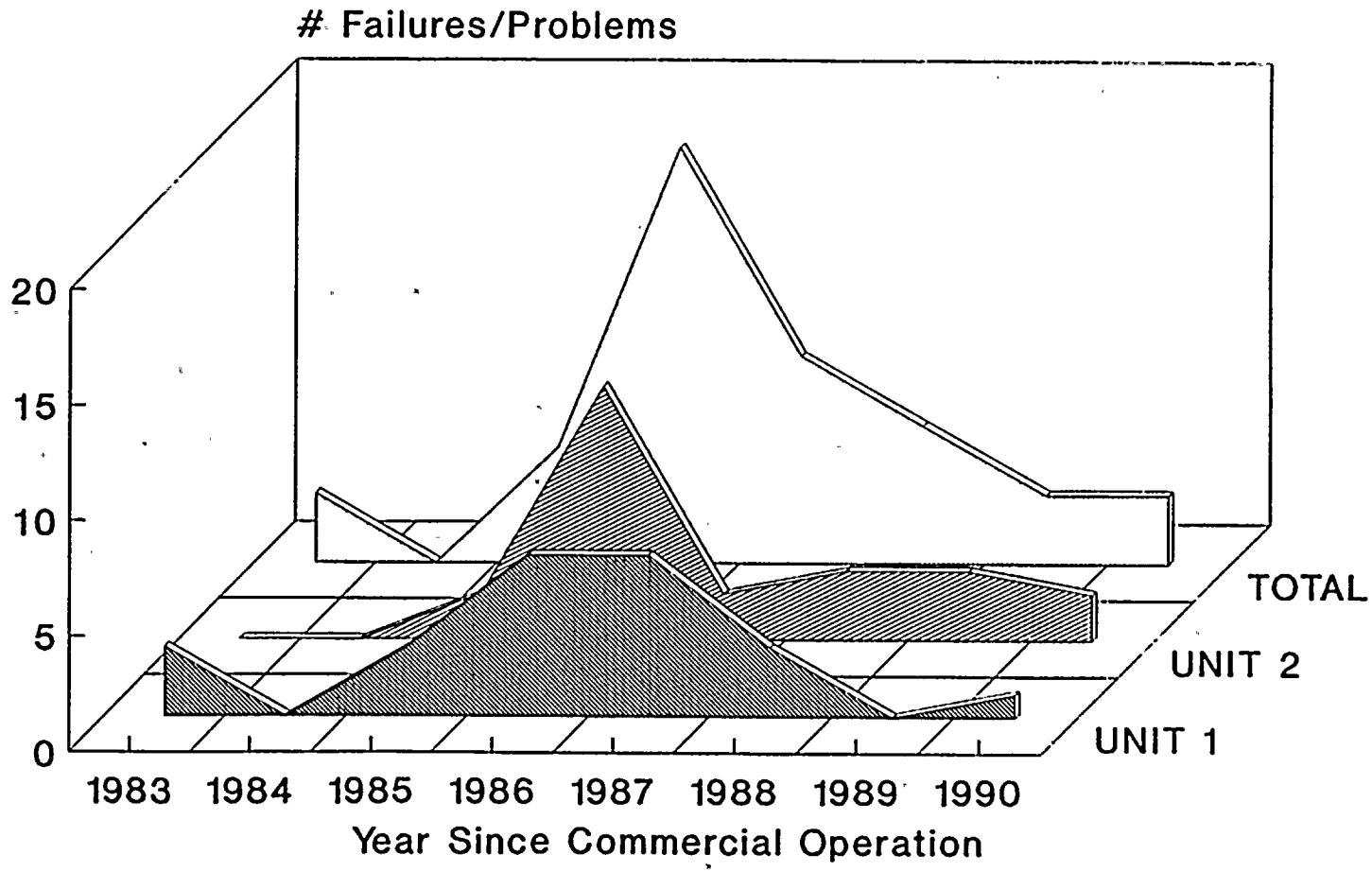
SUSQUEHANNA MOV MAINTENANCE COSTS
(Cumulative since Commercial Operation)



1. 1986 AND 1989 WERE TWO OUTAGE YEARS.
2. EXCLUDES GL 89-10 COSTS.

SUSQUEHANNA MOV FAILURES

(Per Year, Safety-Related)



UNIT 1 COMMERCIAL OPERATION: June, 1983
UNIT 2 COMMERCIAL OPERATION: Feb., 1985

THE SUSQUEHANNA EXPERIENCE

Presented At St. Louis May 29, 1991

NUMARC/NRC WORKSHOP

ON

OPERATOR LICENSING

Howard J. Palmer, Jr. P.E. SRO

Manager of Operations
Susquehanna Steam Electric Station
Pennsylvania Power & Light Company

The Title is: The Susquehanna Experience

The Executive Summary is: Quit your whining and do your job.

I. INTRO

- March 28, 1980 - The Dreaded Denton Letter - 1 1/2 pages on training - 7 yrs later.
- May 26, 1987 ES601 Rev 4 - 14 Pages - 18 mo. later
- January 1989 ES601 Rev 5 - 79 Pages - 18 mo. later.
- June 1990 ES601 602, 603, 604, 605 Rev 6 - 121 pages.

Is the curve going this way ⌒ or this way ⌒ I don't know.

I did not plot it, because frankly I was afraid of the results.

I do know that if it is not going this way ⌒, leveling off, then it means that the people in this room have failed to buckle down and do their job. It means that we are spending too much time codifying exceptions and not enough time paying attention to the business of obtaining and maintaining operator competency.

II. WHO I AM

I am Howard Palmer - I have been a Nuclear Operator since 1960. I have been the Manager of Operations at Susquehanna Steam Electric Station since just prior to initial criticality on Unit I, September 10th 1982 at 2316. I own the Operator Training program from the entry level screening process to being the lead examiner every other year for our annual exams.

Our training manager has every reason in the world to be proud of the accomplishments and success of his organization. As the customer - the failures are my responsibility.

III. SSES IS

Susquehanna, located in NE PA, is a dual UNIT 1050 MWe each BWR. We have a common control room and the challenges of common equipment such as Diesel Generators, Emergency Service

Water and Radwaste. We are very fortunate in that our Engineering folks work very hard to ensure that both units remain identical. There are 151 people in Operations that include RE's and STA's and we have 6 crews that rotate on 12 hour shifts. We have 70 licensed operators at the station: Four like myself in Staff positions, 8 in training, and the remainder on shift.

IV. RESULTS IN THE POWER PLANT

If people did not act as they are trained we would not have a reason for being here today. Let me first relate a few successes at the plant before I discuss what goes on at the training center.

- Three years ago at PP&L we instituted a company wide assessment process for determining the suitability of a bargaining unit employee to be promoted to 1st line supervisor. It is a program in use by many companies. Perhaps because I had done this in a previous life, I and 6 reactor operators participated in the pilot program. The normal pass rate of the program is about 30%. Of the 17 reactor operators who have been assessed to date 16 have passed. It is not because they wear ties to work. It is because of the high level of professionalism we demand of them at the training center. We treat them as responsible professionals and they respond accordingly.

- Since 1982, we have had 131 shutdowns or scrams and 133 startups. 65 S/D (Drive Rods) and 66 scrams. That's about 14/year and so far we have only had 3 this year. Out of the 131 shutdowns only 5 were caused by an operator malfunction. The first one occurred shortly after our first critical. The operator is now in QA. (thought that might draw a chuckle - actually he was and is a strong contributor and in fact was very instrumental in developing our OPS set of values). The last operator malfunction resulting in a scram occurred January 12, 1989. Art Fitch of our Training Group, who is with us today, and I, and the operator at the controls spent the weekend at the simulator teaching all our licensed operators how to put a feed pump in service. Thank God for simulators or we could not have properly learned from our mistake. The bottom line is 5 out of 131, or one every other year, is a pretty good testament to the success of our training program.

- In addition, we have not broken any major pieces of equipment, and,

- There have been no (zero) fuel failures other than the statistically expected manufacturing defects. This of course means a great deal to everyone at the station.

- Finally, there has been an increased utilization of procedures and improvements in procedures that is directly attributable to JPM'S.

V. RESULTS IN TRAINING

Let me give you some idea of how well we have done in training. We have had 9 annual exams and 9 licensed operator initial programs.

- Six annual exams were the old style with one SRO and 2 RO's in the Simulator. I would examine the SRO'S, and instructors, who are SRO'S, examined the RO's. We had 340 exams with 16 partial failures. We have had 3 exams that are the new style with 2 SRO's and 2 RO's. I am the team evaluator and 2 instructors evaluate the SRO's and RO's. We have had 203 exams with 8 partial failures. That is a total of 543 exams with 24 partial failures. Less than 3 per year or about 4.5%. 8 failures have been in the simulator and 16 have been written. 17 partial failures have been RO's and 7 partial failures have been SRO'S. 23 of the 24 were retrained and retested without difficulty. We elected to drop one staff license. Again, that's 543 exams with 24 partial failures.

- We presently have 70 licensed operators. We have had a total of 93 people receive 115 licenses, obviously some both RO and SRO. We have had 7 people out of 115 fail the first NRC exam with 6 of them subsequently passing. The 7th has not yet sat for a subsequent exam. We have had 10 RO's and 4 SRO's fail our certification program and were not allowed to sit for an NRC exam. One of the 14 did reenter the program and has obtained his license. The point is, if I don't think you can make it, you ain't going. And if I think you can, then you will make it. That is a $350,000 decision I have made 14 times.

- For the last 3 years we have requested the NRC to participate in the annual evaluation process at Susquehanna. They have graciously offered their assistance in parallel grading and evaluating our program and evaluators.

  The first year we did 16 with one RO partial failure, the second year we did 20 in one week with 2 RO partial failures and the 3rd year we did 20 in one week with no failures. We have 4 man teams plus an STA and had no team failures. The last 2 years were type B exams with one NRC evaluator for 2 operators. All 3 years were with a different NRC Lead Examiner. That's 56 operators with 3 partial failures and much more important to me, 100% agreement between the NRC and our evaluators, or as close to 100% as you can reasonably achieve.

- As an aside, I would like to encourage the continuation of type B exams. While extra bodies do not always bother the operator, or at least they don't bother me, I think extra people in the simulator makes it more difficult for the evaluators to monitor the exam.

- It really doesn't matter to me one way or the other whether the NRC is there or not. I have 70 exams to do every year. If they are there to watch 20, I still have 50 to do the same way. Cutting thru all the smoke, the only negative I can find is that I have to spend money to Xerox and mail 500 pounds of paper. Actually, it is money well spent since I get in return an outside look at how well or bad I am doing and some pretty good ideas on how we can improve the exam and the process.

- As a lead in to Susquehanna Practices I would like to discuss JPM results, which have caused us to improve both procedures and performance. In January of 89 we did 10 JPM's each with 20 questions total. Out of 57 people only 12 scored 100% on questions. We had 57 failures out of a possible 570 JPM's or a 10% failure rate. The only other time I have been that concerned was when we lost all our ESW pumps, which is a story for another day. Well, pretty soon the Shift Supervisors were just as concerned as I was. What that meant was, if we performed 20 procedures each day at the station we were screwing up at least 2 of them every day. <u>Not good</u> - all of the Operators recognized their

poor performance and worked hard to improve themselves and their procedures.

In January of 90 we did 5 JPM's and 10 questions. 42 Out of 63 people scored 100% on questions and 62 people passed all JPM's and 1 failed 2 JPMs.

In January 91 out of 350 JPMs only 1 was unsatisfactory. That's a 0.02% failure rate, down from 10% when we first started.

What that means, and I have seen it, is that we have made our procedures better, we use them with confidence, and we know how to use them correctly. This is the most objective indicator I have of the usefulness and success of the requal exams as they are presently structured.

VII. SUSQUEHANNA PRACTICES

INPO does "good practices", I do "Susquehanna practices". You can decide if they are good or not.

- JPM's I just talked about - of course we do them throughout the year and we are incorporating them into Plant Operator training.

- We video Tape all our lectures. If you miss one because of sickness or vacation you have to make it up. Actually, I find it easier to concentrate on the instructors when I am watching a tape..

- Training comes first. We have had 9 refueling outages and a tie in outage for the 2nd Unit and have never stopped requal training for Licensed Operators or Plant Operators.

- All quizzes and Simulator sessions have to be made up if missed or failed within 12 weeks.

- We have strong management involvement from the Chief Executive Officer on down. We are building a new simulator that includes a TSC and remote shutdown panel.

- I approve all Courses of Instruction, Units of Instruction, Schedules, Annual Exams, JPM'S, etc. The only thing I don't approve is the weekly quizzes.

- The STA's attend with their shift.

- The RE's assist with instruction.

- System Engineers assist with instruction.

- The Shift Supervisors do periodic team evaluation throughout the year.

- The Shift Supervisor and training Staff meet every Friday morning to compare notes and determine a course of action to correct deficiencies.

- Besides periodic tweaking we have a formal curriculum committee meeting for each of our programs on an annual basis to plot a new direction as needs dictate.

- Besides passing an entrance exam, all new operator helpers have to have a 2 year degree in science or engineering.

- To enter the licensed Operator training program the Plant Operators have to pass a comprehensive written exam.

- We have an annual Requalification Bonus system.

- We do not have pride of ownership, if there is a better way we are very willing to work it out with the lead examiner.

- We appreciate the 6 month implementation policy and recognize that to be successful you have to start right away.

- We appreciate the opportunity to review proposed changes to NUREG 1021.

- We do have a premeeting with the region prior to an annual exam. The first one I attended took 2 hours. The last one took 30 minutes.

- Both Management and Bargaining Unit Operators periodically accept assignments to assist in training.

- Our operators are completely exposed and trained on all changes before they are held accountable for them.

- To the extent practical our operators participate fully in change development. Everything from EOP's to procedures to exams.

- Our annual training schedule incorporates periodic practice of all facets of the annual exam.

- Stress reduction is a function of:

  1. Competency and confidence of the individual - partially a training function.
  2. The individual's confidence that I will administer a correct exam.
  3. Exam schedule designed to minimize stress on the operator and examiners.

  We work very hard on all 3 aspects.

- We support the concept of Generic Fundamentals Exams and are struggling with the scope of science to retain in our requal program.

  We have had 23 pass and 4 failures. In the first exam, fall of 88 we had 13 pass and 3 failures. One with a 4 yr degree, and two who taught science at Navy Nuclear power school. The one operator passed his second try.

  Last summer we compiled a Fundamentals Exam from 4 NRC Exams. We gave it to a total of 61 operators without AU preparation or pump up. The average grade was 76.6. I was very pleased with those results but more importantly it allowed us to analyze where we want to devote our energies this year. Also this year we decided to provide 4 hours /week of science with a separate test. 3 hours of lecture 30 min test 30 min discussion of the test. We will continue to monitor and adjust as necessary to the retained knowledge of the operators at SSES; provided of course that the rules do not become so Prescriptive that I no longer have the flexibility required to make site specific necessary adjustments.

VI. CHALLENGES

- The challenges that the trainer faces today are pretty brutal. He receives input from the NRC, INPO, Station Management, Operations Management, Training Management, and the Operators. And just when he gets it all sorted out we add 60 more pages to ES 601. The unfortunate thing is we did it to ourselves. There is some outlier out there who does not want to get with the program, leaving the NRC no choice but to codify every little detail and thereby reduce my flexibility to do a good job.

- We have had 3 different lead examiners and not a bit of trouble because we are willing to meet them more than half way.

- We need flexibility with NUREG 1021 to fix what's broke and adjust for the needs that are different at each station. Details should be left to NRC/Utility lead examiners.

- I want to be able to devote my resources to <u>enhancements in training</u> not to changes in testing.

- It is vitally important to me to be able to <u>trend performance</u> both in individuals, in the team, and in the program from year to year. I will not be able to trend performance if the testing tool changes significantly from year to year. We know enough not to change ISI program pump test parameters from test to test. The same principle applies to people.

- I stated earlier that stress is reduced if the operator knows he is receiving a correct test. No one writes a correct test the first time. If Art writes 100 questions, when I review them I will throw out or modify at least 30 of them. We then give them to Bruce and he will find problems with 10 more. We hand it to the NRC and they find problems with 5 of them. That is the nature of the beast. All exams require review by more than one person. We have had excellent test review cooperation with the NRC for requal tests. Remember the team includes one SRO from Operations. Both parties have wanted the tests to be as correct as possible. That practice must also be carried over to the initial or replacement exams. The replacement cost to me today, in training alone, is $350,000 for a reactor operator. The cost to the individual

and his family is hard to calculate. He has just devoted 14 difficult months of his life to becoming a licensed operator. We must be willing to devote what ever is needed to ensure the test is 100% correct. That means sufficient reviews by both utility and NRC.

- Other challenges that we face, that I don't have an answer for yet, are things like, the aging work force, and we have not had good success with getting engineers licensed, and how to keep the balance between basic skills and responding to catastrophic failures.

- Finally the use of pilot programs to evaluate proposed changes is certainly something I want to encourage that we continue.

X. CONCLUSION

We do not want to lose site of the fact that everyone in this room has a common goal: Trained, competent, qualified operators on shift at all times. That is my primary responsibility and it has been a tough job for all of us to figure out how to make that happen. I certainly appreciate your continued support.