

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

Title: BRIEFING BY NUMARC ON PLANT MAINTENANCE

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2 UNITED STATES OF AMERICA
3 NUCLEAR REGULATORY COMMISSION

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5 PUBLIC BRIEFING BY NUMARC ON PLANT MAINTNENANCE

6 ***

7 PUBLIC MEETING

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9 Nuclear Regulatory Commission
10 One White Flint North
11 Rockville, Maryland
12

13 WEDNESDAY, AUGUST 3, 1988
14

15 The Commission met in open session, pursuant to
16 notice, at 2:00 p.m., the Honorable LANDO W. ZECH, Chairman of
17 the Commission, presiding.

18 COMMISSIONERS PRESENT:

19 LANDO W. ZECH, Chairman of the Commission
20 THOMAS M. ROBERTS, Member of the Commission
21 KENNETH CARR, Member of the Commission
22 KENNETH ROGERS, Member of the Commission
23
24
25

1 STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

2 S. CHILK

3 B. LEE

4 C. O. WOODY

5 G. BRONS

6 W. PARLER

7 C. MCNEILL

8 G. COLVIN

9 P. BEARD

10 T. TIPTON

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1 CHAIRMAN ZECH: Good afternoon, ladies and gentlemen.
2 Today we welcome the Nuclear Management and Resources Council,
3 NUMARC, for a briefing concerning maintenance in the nuclear
4 industry.

5 This is an information briefing, status report.
6 NUMARC organization has been representing nuclear utilities to
7 the NRC for about four years and in the past year, NUMARC has
8 become the industry focal point for the discussion of many
9 technical issues.

10 I firmly believe that the safe nuclear facilities are
11 reliable nuclear facilities and reliable nuclear facilities are
12 economic nuclear facilities. Proper maintenance programs that
13 are vigorously executed in my view make a substantial
14 contribution to safety, reliability and just make good economic
15 sense.

16 After visiting 104 nuclear power plants in our
17 country now, I'm convinced that maintenance is one of the major
18 safety areas where some power reactor licensees could improve
19 substantially and where virtually all licensees could improve
20 to some degree.

21 The Commission, with the need for improved
22 maintenance in mind, directed the NRC staff to prepare a
23 proposed rule on maintenance which may be ready for publication
24 or public comment later this summer.

25 Today's presentation by NUMARC on the current

1 industry activities is timely and may be useful to the
2 Commission in our consideration of the proposed rule. I'd also
3 like the NUMARC representatives today to talk to us perhaps
4 briefly about the status of NUMARC's efforts to help the
5 Commission in determining whether or not substandard components
6 are being used in nuclear power plant safety systems and what
7 activities NUMARC is undertaking in that regard.

8 Do any of my fellow Commissioners have any opening
9 comments to make? If not, Mr. Lee, welcome and you may begin.

10 MR. LEE: Thank you, Mr. Chairman. I'm Byron Lee
11 from -- president of NUMARC and I'd like to thank you and the
12 Commissioners for giving us this opportunity to appear before
13 you at this public meeting.

14 The purpose of our briefing this afternoon is to give
15 you a complete description of the important industry
16 initiatives in the plant maintenance area. We know that we've
17 heard piecemeal pieces of it and we thought it was important at
18 this point that you hear a complete story.

19 We've taken a lot of initiatives and there are still
20 a lot of things underway at the present time. In addition,
21 we'd like to give you our perspective of the NRC's maintenance
22 rulemaking -- on that rulemaking.

23 First, I'd like to acknowledge four of the
24 participants that are here with me today. On the right, C. O.
25 Woody, Executive Vice President of Florida Power and Light.

1 Next to C. O. is Corbin McNeill, Executive Vice President of
2 Philadelphia Electric. On my left, Joe Colvin, Executive Vice
3 President of NUMARC and on the far left, Jack Brons, Executive
4 Vice President of New York Power Authority.

5 Proper maintenance of nuclear power plants has been
6 at the top of our attention list for several years now and our
7 commitment, I assure you, is strong. The utility and industry
8 generic maintenance programs are expanding year by year and
9 these programs build on the experience and the success and are
10 consistent we believe with the Commission's policy statement on
11 maintenance.

12 Although we may differ with the Commission on the
13 need for a specific rule, I want to assure you again, Mr.
14 Chairman, that the industry is willing and ready to work with
15 you in this area as in all the other areas to reach our common
16 goal and that's safe nuclear plants.

17 The utility executives here with me this afternoon
18 have been actively involved in the industry's maintenance
19 initiatives and in addition, they direct the operation and
20 maintenance of their own facilities which is a significant
21 undertaking.

22 Joe Colvin will discuss the results of the industry's
23 maintenance initiatives and will compare them with several
24 approaches that we've taken in the past on what we think are
25 several successful issues. The nuclear industry believes that

1 our efforts to improve maintenance are showing results.

2 While we agree that there is much left to be done --
3 we agree with you in that respect -- we are sincerely concerned
4 with the potential impact on utility resources that would occur
5 should the NRC redirect our efforts on maintenance at this
6 point in time.

7 I'd like first to ask Corbin McNeill -- I mean, C. O.
8 Woody, if he would give us a history of the NUMARC initiatives
9 and the program. C. O.?

10 CHAIRMAN ZECH: Thank you very much.

11 MR. WOODY: Thank you, Byron. Good afternoon, Mr.
12 Chairman and fellow Commissioners. It's a privilege for me to
13 be here and I'm speaking for the industry -- initiatives on
14 behalf of the NUMARC working group to give some historical
15 perspective of the approach that's been taken and the progress
16 that's been made. The nuclear power industry recognizes the
17 importance of an effective maintenance program to support safe,
18 successful operation of our commercial nuclear generating
19 stations.

20 We all realize that good maintenance is good business
21 and is not an option but a necessity if we're to continue to
22 promote nuclear power as a viable energy option in this
23 country. In 1984 NUMARC formed one of its original working
24 groups composed of 24 senior utility officers and maintenance
25 managers to bring industry focus to this issue.

1 [Slide.]

2 I have listed on a chart that I think you have before
3 you, the main objectives of the original NUMARC working group.
4 They were to address the issue of understanding, the current
5 state of maintenance, to analyze the industry practices, to see
6 if there were any needed programmatic changes, to put into
7 place some selective maintenance indicators so that we could
8 monitor our performance and finally perform a very important
9 function and that was to assist INPO in the performance
10 improvement, particularly at plants that were having recurring
11 maintenance-performance problems.

12 Our working group felt that we needed to know more
13 about the state of maintenance so in 1984, we initiated a root
14 cause analysis of some 650 significant events from the time
15 period of 1980 to 1984.

16 [Slide.]

17 From our data, we determined that about 51 percent of
18 all root causes were human performance related. Of that, 38
19 percent of all root causes were maintenance-related.

20 Maintenance was a dominant factor. Clearly the industry had a
21 challenge in reducing the number of maintenance-related events.

22 Many of the performance problems, that is,
23 approximately 43 percent of all human performance problems,
24 were attributable to deficient procedures for documentation.
25 In response to that problem, NUMARC assisted INPO in the

1 development of a written guideline for maintenance test and
2 calibration procedures. It was issued in May of 1986 and INPO
3 as a follow-up action has continued to evaluate the full
4 implementation of that by the licensees at their evaluation
5 each year.

6 [Slide.]

7 Our analysis also showed that we needed to improve
8 the conduct and execution of maintenance activities and this
9 chart will show you that 17 percent of the events were related
10 to deficient planning and scheduling, 16 percent of the events
11 were related to failure to follow procedures and frankly, quite
12 a surprise to me, only 12 percent of the events at this
13 analysis time were related to inadequate knowledge or what
14 might be characterized as training.

15 We also did an analysis of the practices and
16 methodologies used by the industry. We produced a document
17 referred to as the matrix study in March of 1985 in which we
18 tried to capture the many things that were in place in the
19 industry to assist in the performance of maintenance.

20 We were trying through this analysis to determine if
21 there were any programmatic voids which should be addressed.
22 We looked at the NRC's maintenance surveillance program, at all
23 of the SALP data for the previous 5-year period, at the
24 performance appraisal team reports. We looked at some 250 INPO
25 evaluations of maintenance and we compared that against the

1 best we knew at that time of a standard to see if we knew in
2 the industry how to do maintenance. We concluded from that
3 analysis that we as a general industry knew how to do
4 maintenance but there was in fact a performance problem in that
5 some plants were doing relatively well and as you pointed out
6 in your opening remarks, there were some plants not doing well
7 at all.

8 During this time period, there was an emerging
9 recognition on the part of utility executives and maintenance
10 managers that maintenance needed considerably more than it was
11 getting. Through our interaction with CEO workshops,
12 maintenance manager workshops and industry meetings, we were
13 able to bring some focus to this and felt that there was a
14 consensus within the industry to begin to take on an
15 improvement for the overall performance of maintenance within
16 the plants.

17 The working group took action to correct the generic
18 issues. We did find a couple of weaknesses. For example,
19 there was an absence of a strong document on post-maintenance
20 testing so in those areas where we did find opportunity to help
21 the industry in a programmatic way, we took action.

22 We also determined again that there was a broad
23 spectrum of performance and our challenge was then on how to
24 accomplish the needed improvement as an industry and
25 particularly how to accelerate the improvement of the outlier

1 plants.

2 Several specific actions have been taken to
3 accomplish the needed improvement. Generally, the INPO process
4 is the vehicle that we've used to address them. I would like
5 to touch on a few in my discussions since our work with INPO
6 over a three-year period was significant in providing them
7 hands-on input in transferring technology back to the industry.

8 [Slide.]

9 MR. WOODY: Early on, we recognized the need for
10 better guidance and a more definitive criteria for maintenance
11 programs. To this end, NUMARC assisted INPO in development of
12 a guideline for conduct of maintenance at nuclear power
13 stations. INPO and NUMARC are very proud of this document that
14 was issued in November of 1985.

15 It provides a means by which a utility can assess its
16 maintenance program against a valid criteria and it's divided
17 into 16 chapters. Each chapter has three sections that gives
18 the general introduction, the criteria and then the guideline
19 for how to best accomplish that function.

20 The guideline document for the first time addressed
21 much more than mechanical, electrical and I&C repair functions
22 as plant maintenance. Outage management, procurement,
23 technical support, training, stores and other functions are now
24 assessed in relation to the support of an effective maintenance
25 program for the entire plant. The first application of this

1 guideline came in 1986 when the working group sponsored a pilot
2 self-assessment program for member utilities representing the
3 ten plants participated in this program using the guideline as
4 a basis.

5 [Slide.]

6 MR. WOODY: The results of the pilot effort clearly
7 demonstrated the value of this self-assessment approach in
8 identifying needed improvements and it confirmed the validity
9 of the INPO maintenance guideline as a sound baseline document
10 for self-assessment. In December of 1986, we performed an
11 analysis of NRC SALP data by region for operating years 1980-
12 1986.

13 The study showed that the composite of maintenance
14 SALP performance for all plants in the U.S. was improving at a
15 rate of two tenths of a point per five years and that for the
16 last five years, the SALP rating had averaged better than a
17 category of 2.

18 The NUMARC working group was pleased at the positive
19 trend, but not satisfied with the rate of overall industry
20 improvement and presented this data to INPO as a basis for
21 conducting an industry-wide maintenance self-assessment
22 initiative. The industry wide self-assessment began in early
23 1987, when INPO requested all member utilities to perform a
24 self-assessment based on the methodology and lessons learned
25 from the pilot.

1 I understand that 72 of 75 plants have now completed
2 that self-assessment and of course, there's more to the story
3 as we talk about the follow-up action from INPO.

4 CHAIRMAN ZECH: What happened with that self-
5 assessment? Can you give us a few words on that?

6 MR. WOODY: Yes, each utility performed the self-
7 assessment and laid out an action program -- in many cases, a
8 multi-year action program -- that was forwarded to INPO and as
9 a control means on that corrective action program, INPO
10 assesses their progress and also the validity of their self-
11 assessment during their routine evaluations.

12 In addition, as a part of this initiative in '87,
13 INPO put in place an assistance visit concept, using
14 maintenance managers and corporate officers from other
15 utilities, principally those who had good maintenance programs
16 in place, to go to the plants where through the previous
17 evaluations it had been determined that there was an
18 accelerated need for their improvement.

19 I understand that 16 of those evaluations have been
20 done. Those utilities have identified specific corrective
21 actions that are in the process of now being implemented.

22 CHAIRMAN ZECH: Thank you.

23 MR. WOODY: Of course, we found varying approaches
24 and varying degrees of implementation when the self-assessments
25 were done. However, we do believe the industry has developed

1 the mechanism to identify its shortcomings and they have
2 initiated methods to improve effectiveness. In order to
3 measure performance against valid criteria, NUMARC developed a
4 set of maintenance indicators in late 1985.

5 [Slide.]

6 MR. WOODY: These indicators are now being used to
7 monitor trims and broad relative positions on maintenance
8 within our industry, both collectively and on an individual
9 plant basis. Many plants have taken these indicators and
10 broken them down into lower level performance indicators for
11 use by plant maintenance departments so that they can monitor
12 specific activities and direct attention to problem areas
13 related to maintenance before they affect unit performance or
14 safety.

15 The maintenance indicators are now being reported to
16 INPO on a quarterly basis by each utility. INPO reports a
17 histogram summary of industry data along with plant-specific
18 data to each nuclear utility. This information has proven very
19 useful to managers so they can assess their individual plant
20 against industry averages, look at trends in their plants and
21 apply additional resources to those areas where analysis
22 indicates it is needed.

23 A word of caution though about indicators. They are
24 not an end but a means -- in fact, a management tool. They
25 need to be supplemented by knowledge of the many dynamic

1 conditions impacting the plant. Since existing lines of
2 communications among utilities have been less than fully
3 effective for addressing technical problems as they occurred,
4 the working group initiated through the Electric Power Research
5 Institute, the establishment of a Nuclear Maintenance Assist
6 Center.

7 [Slide.]

8 MR. WOODY: this is a new concept with the single
9 purpose of assisting utilities in improving their maintenance
10 efforts. The Nuclear Maintenance Assist Center will provide
11 more than solutions to technical maintenance problems. It will
12 be a vehicle for communicating tried and proven solutions to
13 technical maintenance problems and it will assist in helping
14 plants allocate maintenance resources such as deciding what
15 preventive maintenance tasks are really necessary and desirable
16 and what tasks to automate and how and whether to use
17 predictive or periodic maintenance.

18 NMAC's startup is heavily supported by EPRI, but it
19 is to be the industry's maintenance assistance organization and
20 it is expected that it will be funded from within the industry
21 in the future. NMAC will draw o the best talent in the
22 industry, both domestic and foreign and we expect that it will
23 be self sufficient and independent by 1991.

24 The director for this organization is now in place.
25 There is a steering committee in place. The initial

1 prioritization of the problems to take on and some of the
2 products that will be early coming out of that group is the
3 bolting manual and the motor operated valve service manual.

4 This center is basically a methods and hardware
5 approach. It is not redundant to INPO, but fills a need. For
6 example, in December of 1986, the AEOD case study on safety
7 related motor operated valve performance was forwarded to
8 NUMARC with the request that we undertake appropriate
9 initiatives to remedy the motor operated valve performance and
10 reliability problems.

11 To address this issue, action was taken by NUMARC to
12 have INPO analyze the elements of a good motor operated valve
13 performance at certain plants and communicate the lessons
14 learned to the rest of the industry.

15 During plant evaluations and assist visits, INPO now
16 places additional emphasis on improving motor operated valve
17 maintenance. In addition, the first project for the new NMAC
18 organization is to assist in improving motor operated valve
19 performance and reliability by addressing issues in a technical
20 repair standard. It's my understanding that this standard is
21 targeted to be issued in October of this year.

22 NMAC will be using an advisory group composed of
23 utility, valve manufacturers, MOVATS, EPRI and INPO
24 representatives to guide this effort.

25 [Slide.]

1 MR. WOODY: In the area of maintenance evaluations,
2 the working group assisted INPO in instituting the maintenance
3 peer evaluation program in which maintenance managers and
4 supervisory level personnel accompany INPO teams on plant
5 evaluations or maintenance assist and review visits at other
6 plants. We've made initial contacts to utilities in February
7 of 1986 to solicit their help and support. To date, about 120
8 of the nuclear maintenance managers and supervisors have
9 participated in these peer reviews.

10 We see several benefits of this program such as a
11 improved evaluation team capability by the addition of
12 experienced people, enhanced professionalism and communication,
13 a learning opportunity for peers, exposure of peer evaluators
14 to good practices from other plants and finally,
15 familiarization of the peer evaluator with the INPO process and
16 the ever-rising standard of excellence that's being
17 promulgated.

18 Feedback received from the participants in the
19 program has been very positive in reinforcing these benefits.
20 I want to make the point that we've continued in our efforts
21 toward improvement and applying emerging techniques and things
22 that we've learned in this complex arena. Let me illustrate.

23 [Slide.]

24 MR. WOODY: While reviewing the various types of
25 maintenance performed in the industry, we conducted a survey in

1 1986 which revealed that the most widely used form of
2 predictive maintenance in the nuclear industry was the
3 vibratory monitoring program. Based on information from 71
4 plants at that time, we found that most used some form of
5 vibration monitoring and analysis on plant rotating equipment.
6 Many plants also were beginning to perform lubricating oil
7 analysis on selected equipment for quality and wear particles
8 to determine the origins and severity of machinery wear.

9 [Slide.]

10 MR. WOODY: Other predictive techniques being used
11 and expanded include infra red detection and thermography,
12 motor operated valve dynamic testing and others that are on the
13 chart that is on the screen. To promulgate these industry
14 practices, two presentations were given at the 1987 INPO
15 maintenance superintendents' workshop in Atlanta that directly
16 addressed these predictive maintenance techniques and the
17 benefits that would accrue to a plant from using them.

18 I've spoken about several initiative developed since
19 the NUMARC working group appointment in June of 1984. We've
20 worked toward raising the level of maintenance performance in
21 our industry, using industry experience and innovation and
22 we've directed our efforts to achieve not only economical
23 operation, but more importantly, to increase the margin of
24 safety in our plants. We've reviewed and analyzed areas of
25 concern pointed out by both our regulators and our peers.

1 We have developed a set of industry indicators that
2 allow us to track our progress and guide us to areas that may
3 be deficient.

4 [Slide.]

5 MR. WOODY: Let me mention training. All of the
6 craft and maintenance training programs of the 60 operating
7 plants as committed to you have now been accredited. Through
8 training, we can take appropriate action before we experience
9 significant negative changes in performance. The indicator
10 program helps us with that.

11 The INPO guidelines for the conduct of maintenance at
12 nuclear power stations tie together all of the components of
13 the maintenance function at a nuclear station and the self
14 assessment process gives the utilities the opportunity to
15 compare its maintenance program to a practical set of
16 guidelines which show how the various parts of the program
17 should all fit together. These guidelines provide the
18 flexibility needed to serve this purpose since they address all
19 functions needed for an effective program while not becoming
20 necessarily prescriptive.

21 This is important considering the variation in
22 plants, organizations and locale conditions throughout our
23 membership.

24 The peer evaluation program has helped upgrade the
25 quality of the INPO evaluations as well as facilitate the

1 transfer of good practices from plant to plant.

2 Through NMAC, we have established a central point to
3 obtain maintenance assistance and expertise. We believe the
4 industry initiatives that we have implemented and support have
5 achieved gains toward improving the quality of maintenance in
6 the nuclear industry and the methods being used.

7 Again, a review of the SALP data from 1980 through
8 1987 shows a continuing steady improvement. INPO maintenance
9 indicators and performance indicators also show steady
10 improvement.

11 By moving forward in the area of maintenance training
12 upgrade, improved management focus, continuing vigilance
13 through ongoing self evaluation, INPO evaluations and
14 assistance and EPRI support, we can continue these positive
15 trends.

16 Thank you for allowing me to address our industry
17 initiatives.

18 CHAIRMAN ZECH: Thank you very much.

19 MR. LEE: Thank you, Mr. Chairman. I might indicate
20 we have quite a bit of support here with us today from the
21 industry. I might ask the industry people if they would raise
22 their hands. We have a pretty good turnout. I'm sure most of
23 them would rather be home attending to the plants to meet these
24 large loads that everybody seems to be experiencing.

25 CHAIRMAN ZECH: Conducting maintenance, too.

1 MR. LEE: Do the maintenance; right. This last day
2 or two, you might just want to watch everything run, keep the
3 loads going.

4 We have asked Corbin McNeill and Jack Brons to talk a
5 little bit about --

6 COMMISSIONER ROBERTS: Are you going to have
7 questions at the end of the presentation?

8 CHAIRMAN ZECH: Go ahead.

9 COMMISSIONER ROBERTS: Your hand-out chart two, did I
10 hear correctly, that was for 1984?

11 MR. WOODY: This was 650 significant events between
12 the years 1980 and 1984.

13 COMMISSIONER ROBERTS: To compare apples and apples,
14 if you used the same criteria on what an event is, what would
15 this look like for the period 1984 to 1988?

16 MR. WOODY: We have not done that, Commissioner
17 Roberts.

18 COMMISSIONER ROBERTS: What was the number?

19 MR. WOODY: 650.

20 COMMISSIONER ROBERTS: How many would fall into a
21 significant event in the period 1984 to 1988? I think those
22 would be interesting numbers.

23 MR. WOODY: We do know that the number of significant
24 events have been decreasing and the rate, in fact, someone from
25 INPO might be able to help here, it has been cut in about half

1 in the last five years, the number of significant events per
2 operating unit.

3 Pat?

4 COMMISSIONER ROBERTS: The gross number would be
5 smaller. I'd be interested to know if you would have the same
6 percentage for cause.

7 CHAIRMAN ZECH: Would you please step up to the
8 microphone? Please identify yourself for the Reporter.

9 MR. BEARD: I am Pat Beard, Vice President,
10 Government Relations at INPO. We have not done an analysis as
11 C.O. Woody said of the causes of all the events from 1984
12 through 1988. It is true that the number of events that we
13 have classified significant have about halved. The number is
14 still decreasing on a yearly basis.

15 CHAIRMAN ZECH: Thank you very much.

16 MR. WOODY: We will take a look at that.

17 COMMISSIONER CARR: I might note that the slope of
18 that SALP line is pretty steady from 1980 through 1987. I
19 didn't see any drastic drop from 1984 on.

20 CHAIRMAN ZECH: Also it started out at a pretty high
21 level; it has a ways to go.

22 MR. WOODY: We certainly acknowledge that, Mr.
23 Chairman.

24 CHAIRMAN ZECH: Let's proceed.

25 MR. McNEILL: Good afternoon, Commissioners. I am

1 Corbin McNeill, Executive Vice President, Nuclear, for the
2 Philadelphia Electric Company. I've been a member of the
3 NUMARC Technical Committee and its successor, the Issues
4 Management Committee since 1986.

5 That group has had an advisory role in overseeing the
6 various industry working groups which NUMARC has sponsored.
7 This includes the original Maintenance Working Group which was
8 chaired by Mr. Woody starting in 1984. That came under NUMARC
9 purview after it had been in operation for some time.

10 This past year I was also appointed a member of the
11 NUMARC Ad Hoc Advisory Panel on Maintenance to look at what we
12 could in fact do within NUMARC to continue to coordinate the
13 maintenance activities and the maintenance initiatives that the
14 industry had undertaken.

15 The utility industry has always had a strong interest
16 in maintenance and it is particularly true in the nuclear
17 utilities. Earlier inclusion of surveillance tests in the
18 technical specifications and the dedication of time during re-
19 fueling outages to equipment overhaul were evidence of that
20 fact.

21 Just as Mr. Woody has indicated and the later
22 presenters will show, there has been an increased emphasis on
23 maintenance in recent years. If you review the evolution of
24 this industry over the last eight years, I believe you will
25 find at least in my opinion that there is a logical sequence of

1 the improvement initiatives which have been undertaken and of
2 which maintenance is only the most recent one.

3 This initiative has a sound basis and will be
4 continued by the industry. It is not one which is fleeting in
5 nature.

6 In the early 1980's, the industry organized itself
7 under INPO and subsequently established standards and
8 performance measures. It set industry-wide goals and
9 implemented an evaluation process. In the early years, INPO
10 review of significant operating events highlighted personnel
11 issues as a major problem requiring more vigorous training
12 programs. The training program improvements and accreditation
13 therefore became the major industry efforts of the early and
14 mid-1980's.

15 Since training was such a cornerstone of operational
16 safety and of long term improvement programs, it rightly
17 received this high priority.

18 As Mr. Woody has indicated, near the completion of
19 the development of our training program upgrades, performance
20 indicator data caused us to shift our focus to plant
21 reliability and capacity. The result was the major maintenance
22 issues which are being described today.

23 Since these areas were more technical in nature, lead
24 responsibility was in fact shifted to NUMARC after NUMARC's
25 formation which was then the industry's recently formed

1 technical organization.

2 The industry's response to maintenance was and is
3 coordinated using both the resources of INPO and NUMARC. INPO
4 has issued maintenance guidelines which Mr. Woody has
5 described. It has revised the evaluation criteria and
6 instituted both maintenance, self assessment and maintenance
7 assistant review teams, commonly referred to as MART's. NUMARC
8 has worked with the industry and EPRI in establishing the
9 Nuclear Maintenance Assistance Center, and addressing specific
10 maintenance issues such as motor operated valves.

11 The coordination of these activities has created
12 commonality of approach to maintenance throughout the industry.
13 This commonality of approach is one which I believe to be one
14 of your objectives.

15 Our maintenance initiatives are both manpower
16 intensive and expensive. A MART inspection itself will consume
17 a minimum of about three weeks of executive time and on the
18 order of 20 man weeks of industry or peer review assistance.

19 In addition, there is significant utility resources
20 which at Peach Bottom have required for instance approximately
21 50 man weeks of effort on the part of the station itself. Much
22 more significant is the implementation of resulting programs or
23 strategy in maintenance. We have estimated that Peach Bottom
24 and Limerick will spend approximately \$5 million a year for
25 four years on maintenance program upgrades for each plant and

1 close to \$10 million a year over the same period for spare
2 parts procurements.

3 Public Service Electric and Gas, of which I used to
4 be an officer, had estimates of the same order of magnitude.

5 I would like to point out that with that level of
6 expenditure and it may be similar among plants, the focus at
7 each plant has in fact been different. Peach Bottom for
8 instance is focusing on reliability. It has suffered from a
9 number of trips and a high forced outage rate. Limerick, which
10 has a very low forced outage rate, has a need to improve its
11 planned outage performance and reduce that time.

12 Broad performance indicators such as those currently
13 used by INPO and the NRC, will be used to measure the
14 improvements and subsequently the continuing health of our
15 programs. Other more specific indicators such as preventive
16 maintenance status will be used for work group goal setting,
17 diagnostic efforts or in some cases leading indicators of the
18 trend of performance.

19 When dealing with people in a social or
20 organizational setting, it is important to understand that
21 implementation of similar programs by different organizations
22 frequently produce differing results. Similarly, performance
23 indicators can be defined, interpreted and managed differently
24 by similar organizations. As a result, can have variable
25 effectiveness as a management tool.

1 If too many indicators are created or they are too
2 narrowly focused, organizations will manage the performance
3 indicators and disregard the activities which are not measured.
4 The end result could well be an overall decline in broad
5 performance.

6 In most cases, I believe they are collectively
7 reaffirming a longstanding management principle, that the issue
8 really is not just the implementation of the programs but the
9 management capability behind the implementation.

10 I offer that the current industry maintenance
11 emphasis and efforts are logically placed within the evolution
12 of the industry. The direction provided by INPO, NUMARC and
13 the NRC are proper and significant progress is being made.

14 That progress is also very compatible with the
15 resource availability and management skills of the industry.
16 We have adequate standards and goals. The utility programs
17 have focus and they have the advantage of individual plant
18 prioritization, that focus and prioritization will be adversely
19 affected by additional broad regulatory action.

20 The commitment of the industry will be sapped by such
21 action resulting in my opinion in diminished industry
22 effectiveness and maintenance. Neither of us will benefit from
23 such a result.

24 Thank you very much.

25 CHAIRMAN ZECH: Thank you.

1 MR. BRONS: Thank you. I have some material that is
2 a little bit different from what you have heard. With respect
3 to maintenance, I think the New York Power Authority is being
4 represented here as a part of the industry because we are
5 typical. The Power Authority has not been either a leader or a
6 lager in the area of maintenance. We are able to offer a full
7 scope viewpoint because we operate a boiling water reactor and
8 a pressurized water reactor. We have a different union at each
9 one of them. We are able to see the full scope of issues that
10 are present in maintenance.

11 In addition, we have long believed that good
12 maintenance can and does pay off.

13 [Slide.]

14 MR. BRONS: We manage our maintenance program through
15 the use of performance and process indicators. I stress that
16 there is a difference between performance and process
17 indicators, and on this particular page, you see indicators
18 which I would classify as performance.

19 We'll not discuss each indicator, but point out that
20 in the aggregate availability is one thing. When we want to
21 use that indicator for guidance in our maintenance programs, we
22 must break it down in component parts. And so we look at
23 planned and forced outage time. We look at planned and forced
24 derate time, forced LCS's.

25 All of those things yield information about

1 maintenance that's either going well or needs correction. A
2 similar story can be told about the relationship of thermal
3 performance to the derate numbers. Automatic scrams clearly
4 have a maintenance tie and chemistry performance, a subject
5 that's often forgotten in the maintenance area, is an extremely
6 important indicator of plant quality.

7 [Slide.]

8 MR. BRONS: As we proceed down the list of
9 indicators, I begin to gray into the area of stretching from
10 performance indicators to process indicators, but clearly
11 radiological performance is a good measure of our ability to do
12 work efficiently and effectively. The results of our
13 maintenance also are measured in terms of our effect on our
14 environment and on our work force.

15 In the area of equipment operability, we measure
16 control room annunciators and control room instruments that are
17 out of commission because we, like you, believe the operators
18 must have a full deck.

19 As we move into maintenance department performance
20 indicators, we are clearly into the area of process indicators.
21 I would like to take just a moment to discuss the first two
22 listed here and to give you an example of how, even within a
23 single company, there is some difficulty in measuring these
24 items.

25 Work requests outstanding by priority. One of my

1 plants is represented by the IBEW, the other one by the UWUA.
2 Because of work rules agreed to many years ago, which are not a
3 problem in any way, shape, or form, we are required to use a
4 work request of one priority at one plant in order to call out
5 people on the weekend.

6 A lower priority work request will do the same thing
7 at the other plant. So doing the same work at both plants will
8 generate different numbers in the ratio of high priority to
9 average priority work requests.

10 The ratio of preventive to corrective maintenance is
11 an intellectually very appealing item. In fact, I got by Board
12 of Directors to include it as part of the objectives of the
13 company in measuring our performance. I become somewhat
14 disenchanted as I recognize that there are vast differences in
15 that aggregate number between the ratio of preventive to
16 corrective maintenance in the mechanical area, the electrical
17 area, and the I&C area.

18 It's easy to understand. Mechanical work generally
19 requires scaffolding, removal and reattachment of lagging, all
20 of those things which tend to distort the numbers. By the same
21 token, most switch gear is located at ground level and designed
22 to be racked in and out.

23 So the time spent on these tasks changes. Also, if I
24 analyze those numbers by the number of maintenance work
25 requests or the number of man hours or the number of dollars

1 spent, I can come up with different ratios of what we're doing
2 there.

3 And in addition, we've found that there is a deep
4 philosophical discussion worthy of taking place on what is
5 preventative maintenance and what is corrective, particularly
6 when you consider predictive maintenance aspects.

7 [Slide.]

8 MR. BRONS: There are other performance and process
9 indicators that I will not dwell on. These are the ones that
10 we consider useful. We track many others because we are
11 required to report them, but we don't find them especially
12 useful. There's a whole arena of indicators possible.

13 [Slide.]

14 MR. BRONS: Looking at the scope of maintenance from
15 another view point, I've shown for 1987 our numbers that the
16 two plants, of preventative maintenance work requests broken
17 down by the maintenance department which encompasses mechanical
18 and electrical maintenance and the I&C department.

19 Similarly, you'll see corrective maintenance work
20 requests for the same time period and surveillance tests. I
21 would like to stress that the numbers of work requests are
22 about 50-50, balance of plant as you would define it, and
23 safety-system related, and that's true in the preventive
24 maintenance area as well.

25 If you look at those overall numbers, you would

1 conclude that we are doing vastly more preventive maintenance
2 than corrective maintenance. If I look at it on a man hour
3 basis, I get the opposite picture.

4 I would like to comment on the surveillance tests.
5 Of the surveillance tests, about 95 percent of them are tech
6 spec related and only five percent are related to what you
7 would call balance of plant.

8 That's not a statistic I am proud of. I would like
9 to be able to apply more resources to that area. I think that
10 provides an opportunity which we can discuss later.

11 [Slide.]

12 MR. BRONS: Looking at the scope of maintenance yet
13 another way, our average number is 15 man hours per work
14 request on preventive maintenance items, 60 hours for
15 maintenance department, corrective maintenance work requests,
16 and 17 the I&C department.

17 Within the maintenance department, I would also break
18 that down that mechanical maintenance takes much, much more
19 time on average than electrical maintenance per work request.

20 The surveillance tests, eight hours per surveillance
21 test. It is in this particular area that I think that there is
22 a regulatory opportunity to free up some resources, which I'll
23 discuss later.

24 [Slide.]

25 MR. BRONS: Looking at human resources applied to the

1 problem, a snapshot of our maintenance department at Indian
2 Point 3 in 1977 and 1988, shows that the total staff has more
3 than doubled. This application of human resources is true not
4 only in -- at both plants. A similar change has taken place,
5 but in all maintenance related departments.

6 Probably the most disappointing thing to me
7 personally on this thing is you'll notice that we've gone from
8 one maintenance engineer to nine engineers. I was one of the
9 driving forces behind that change and my hope was to apply
10 those resources to improved preventive maintenance programs and
11 they have been siphoned off to a whole host of emergent issues
12 such as they've been relatively ineffective, at least by what
13 we intended to accomplishing that program.

14 COMMISSIONER ROBERTS: Pardon me, I show my
15 ignorance. What's a PUW?

16 MR. BRONS: Slide seven, please.

17 [Slide.]

18 MR. BRONS: Good question, Commissioner Roberts, and
19 I did have some notes but in order to put the viewgraphs
20 together -- it's a utility worker with apprentice maintenance
21 skills and they have janitorial duties.

22 The two most relevant notes on this page is that the
23 maintenance department does not include I&C design engineering
24 or procurement functions, and also the growth is masked a
25 little bit because we took some responsibilities away.

1 In 1977, this department was responsible for rad
2 waste compacting and handling.

3 [Slide.]

4 MR. BRONS: What do we do about maintenance at the
5 power authority and how have we tried to approach it? In 1983,
6 we were concerned that our peak attention had shifted from
7 operation and maintenance of the plant to performance of a
8 whole host of things, regulatory work included.

9 We were in the peak years of installing TMI
10 modifications, appendix R things and so on, and frankly we felt
11 that our focus on maintenance was slipping. As a result, we
12 began some efforts to asses our maintenance programs.

13 It began as a two-pronged approach to look at balance
14 of plant activities and separately to look at preventive
15 maintenance. In short order, we recognized that maintenance,
16 if it was going to be effective, was a single issue for the
17 entire plant and so we put together a planned maintenance task
18 force whose charter was to include preventive maintenance and
19 other aspects of maintenance plant-wide.

20 The task force was composed of the plant managers at
21 the two plants. There are maintenance and I&C superintendents
22 and several individuals from corporate headquarters. In
23 November of that year, they issued their report which covered
24 the items noted and most significantly listed what we
25 considered to be the attributes of the maintenance program we

1 would like to have.

2 An interesting aside was the classification of
3 maintenance.

4 [Slide.]

5 MR. BRONS: As we looked at overall maintenance
6 activities, we found, of course, that we dealt with forced
7 corrective maintenance. We dealt with general repair, that's
8 housekeeping and building and grounds and that kind of thing.
9 And then we found that in both of those areas we were satisfied
10 with what we were doing. If something broke, we reacted
11 properly and fixed it.

12 But it was in the area of planned maintenance that we
13 found that we had significant room for improvement. They
14 defined plant maintenance to be composed of three elements.
15 Preventive, predictive, and planned corrective maintenance.
16 That's where we call the shots, stage the equipment for
17 something that we recognized to be deteriorating.

18 [Slide.]

19 MR. BRONS: In 1985, we began the implementation of
20 those maintenance programs that we had developed from our
21 attributes listing and in 1985 INPO issued its guidelines.
22 Shortly after those guidelines came out, we conducted an
23 assessment of our planned maintenance programs to the INPO
24 guidelines.

25 We really felt good about that. We found that we had

1 a very good correlation with what was in the INPO guideline and
2 so we made some very minor adjustments to our program and
3 continued on with what we had planned.

4 In '86, we formed a standing nuclear maintenance
5 committee whose purpose was to ensure that transfer of good
6 practices from, at least between our plants. If one had a good
7 program in rigging control and another one on tool control, we
8 wanted to make sure we didn't reinvent the wheel and so those
9 guys were responsible for getting those things back and forth,
10 as well as our continued assessment of our efforts in
11 maintenance.

12 And so it is continued. We reported our efforts to
13 INPO as a result of their call for the self-assessment and in
14 December of last year we conducted another assessment of our
15 progress and set objectives for '88 and '89.

16 What kinds of things did we do in maintenance? I've
17 listed here some routine predictive and preventive maintenance
18 techniques. These ideas have come from our own experience,
19 from INPO workshops and good practices, and from just generally
20 being professionals in the field and reading trade literature.

21 We do vibration analyses, both baseline and
22 troubleshooting. I would caution you to please understand that
23 when I say that it doesn't mean that every rotating machine in
24 my plant has a baseline measurement on it. We start at mid-
25 stream on this. We're working towards getting there.

1 We do oil analyses. There's a special story here I'd
2 like to tell. About three years ago, we replaced a main
3 transformer on the plant, solely based upon the chemical
4 trending of dissolved gas in the transformer oil.

5 We had opened up the machine and gone inside. We
6 could not find anything wrong. We put it back together, put it
7 on the line. The trend continued in the parts per million
8 range and we elected to take the machine out of service and
9 replace it.

10 Later destructive disassembly of that transformer
11 showed that it would have failed while the unit was on the line
12 had we not replaced it on that analysis.

13 We do RF monitoring and the idea came from a magazine
14 article about another utility's practice in that area and we
15 monitored the main generator. We've also installed antennas at
16 our four reactor coolant pumps so that without receiving high
17 radiation exposure we can go into low radiation areas of the
18 containment and measure the RF fields on the reactor coolant
19 pumps.

20 [Slide.]

21 MR. BRONS: We do acoustic monitoring, and I'm not
22 just talking about stethoscopes and transducers, but we also
23 teach our people to stop and smell the roses and listen while
24 they're in the plant.

25 [Slide.]

1 MR. BRONS: We do routine preventive maintenance in
2 infrared areas, which has expanded from the switch yards and
3 transformers to use in the plant with steam traps. We do leak
4 testing with helium. And not all these things work out well.
5 We tried to get more sensitive than helium and shifted to SF-6,
6 and found that when we injected SF-6 in the condenser in the
7 plant and it came out in the lake a half a mile later or out
8 into Lake Ontario. It was an on-shore wind. We could sense it
9 in the plant. So that was clearly too sensitive. So not all
10 these ideas are good ones.

11 [Slide.]

12 We have the motor-operated valve program and live
13 load packing and I have not written here, but we do all the old
14 fashioned things too, like reviewing logs for temperature
15 trends and Delta P's and motor running currents. We have done
16 maintenance based on all those items.

17 We have some things that are more or less unique to
18 the Power Authority in maintenance, not exclusive but some of
19 them are less extensive in the industry than others.

20 Following an INPO report on a visit to European
21 utilities would suggest that a good item for a work control
22 center. We instituted that at a plant where we had the
23 geography and we had the need.

24 We have video-mapped both our plants so that our
25 design engineers, our maintenance engineers, our ALARA planners

1 can review the high rad areas of the plant, even take
2 measurements from those video maps and plan jobs to help out in
3 maintenance. We lately have found that it has a good
4 application in emergency plan work also.

5 We have a patent application pending for a
6 resistance, heat stress improvement program that we developed
7 to replace induction heat stress improvement on BWR piping when
8 we could not get the coils into place. We have a patent on our
9 post-accident sample system which was designed with maintenance
10 in mind.

11 We list a number of others. I think the two I would
12 like to focus on are the Failure Analysis Associates.

13 [Slide.]

14 We read an article in either Time or Newsweek when
15 the walkway collapsed in the Hyatt Hotel that an outfit named
16 Failure Analysis came in and did some work. Shortly after that
17 we had a main generator failure and we called them in. In that
18 case they were able to tell us what caused the failure. We
19 were so pleased with their work that in two subsequent events
20 we have used them that have led to a design change in the case
21 of our reactor coolant pump motors and an operational change in
22 the case of our main turbine.

23 Our suggestion program produces the largest monetary
24 awards for employees with suggestions in maintenance, not by
25 design but because they are most cost effective.

1 We had an apprentice program at our J.F. plant which
2 pre-dated the accreditation process.

3 [Slide.]

4 In this area of maintenance I think there are some
5 regulatory opportunities. I would urge you to emphasize
6 performance and not process. The quote I have there is from 10
7 CFR 50.49, "must be maintained in auditable form." The paper
8 trail for the inspection, removal, repair and replacement of a
9 single motor operated valve is over one inch thick. Human
10 factors effects which required the signatures to be next to the
11 step require us to save all those pages. We sometimes do 60
12 MOV'S in an outage.

13 Balance the regulatory need and maintenance impact:
14 As a result of some regulations now we are sealing instruments,
15 conduits, connectors. We are redoing splices in the plant
16 whose quality and workmanship I can attest to but whose
17 pedigree I could not.

18 We are developing a disposable mentality with sealed
19 components that says you don't maintain them; if they fail,
20 throw them out. It is affecting our resources and our man-rem.

21 I would encourage you to encourage us to shift the
22 reliability based surveillances. I have a surveillance test
23 that I do week after week after week, month after month without
24 failure, but I do them because I am required to do them. In
25 those surveillances that I address myself to balance the plant,

1 if the equipment proves reliable, I adjust the frequency of the
2 surveillance to match the reliability.

3 If you consider rule-making, please recognize that
4 our interests and concerns are the same as yours. We have
5 initiatives in place. We are producing positive results. I am
6 concerned that rule-making may increase process and stifle
7 performance.

8 [Slide.]

9 This last slide (slide 16) has a controversial
10 heading, which frankly didn't dawn on me until last night.

11 [Laughter. Slide heading is "Advice to Naval
12 Officers.]

13 I refer here to my background and to good advice that
14 I received as a young Naval officer. I believe it is
15 particularly applicable when dealing with good people reaching
16 for excellence, as this industry is. Always tell your people
17 what you want done, not how to do it.

18 You have told us in your policy what you want done
19 and by our actions and initiatives we had agreed in advance.
20 We have some excellent guidelines from INPO. Together I
21 believe they should be sufficient.

22 Thank you.

23 CHAIRMAN ZECH: Thank you very much. We'll finish
24 with Joe Colvin, who'll talk about the results.

25 MR. COLVIN: Good afternoon. I will assure you that

1 I have no such slide at the end of my package.

2 CHAIRMAN ZECH: I think you are well advised. We'll
3 have a few words about that later.

4 [Laughter.]

5 MR. COLVIN: Gentlemen, the purpose of my
6 presentation is to provide an overview of what we were doing in
7 maintenance and why and to summarize the results, what some of
8 the results of those initiatives are, how they compare to other
9 industry initiatives that we have undertaken and what the
10 future holds for those initiatives as we proceed.

11 [Slide.]

12 First, what are we doing in maintenance and why do we
13 have increased interest? That is slide 2.

14 [Slide.]

15 First of all, our primary interest is in the area of
16 improving and enhancing maintenance and we have had plant
17 events that have been attributable to maintenance. Secondly,
18 to increase the reliability of our plants and as Mr. Woody
19 pointed out, to reduce the operating and maintenance costs in
20 order to maintain a nuclear viable option in our energies mix,
21 in our nation's mix. Next slide, slide 3, please.

22 [Slide.]

23 The next three slides that we present will provide an
24 overview of the major industry initiatives, and as Mr. Woody
25 pointed out, these initiatives form the foundation for overall

1 improvements in maintenance. Both Mr. Woody spoke about a
2 number of these. INPO has recently briefed the Commission so
3 my purpose is only to cover the highlights.

4 In the INPO evaluation and assistance area, as you'll
5 note, the chart only provides starting times from 1984 through
6 and into 1989. Many of these initiatives have been under way
7 for some time and where so, where that is the case, they are so
8 indicated.

9 INPO's evaluation program is by far the best method
10 we have had as an industry in determining overall performance
11 and achieving improvements. In 1986 the focus of that effort
12 was enhanced on maintenance to address issues such as work
13 control, coordination of maintenance activities, post-
14 maintenance testing, material conditions, preventive
15 maintenance on motor operated valves, to name but a few.

16 Mr. Woody -- jumping to accreditation -- also
17 mentioned the accreditation of the maintenance training
18 programs. The initial commitment in December of 1984 was for
19 the accreditation of programs, all training programs at the 60
20 sites that were currently operating. That equated to 180
21 programs, maintenance training programs, required for
22 accreditation. We met that commitment. All programs have been
23 accredited for those plants. The other plants that are in the
24 process of either loading fuel or completing construction are
25 also in the process of completing their accreditation

1 commitment. Slide 4, please.

2 [Slide.]

3 I would like to focus my comments on slide 4 and
4 slide 5 with respect to some of the initiatives under way at
5 EPRI. We have discussed in depth some of the initiatives of
6 INPO. I would like to bring in a couple other aspects and
7 elements.

8 EPRI established the Maintenance Equipment and
9 Application Center in 1984 with the purpose of transferring
10 technology, conducting workshops and seminars, evaluating
11 equipment and demonstrating that equipment as well as direct
12 assistance to utilities. This center is established in
13 conjunction with the Non-Destructive Examination Center at
14 Charlotte, North Carolina. A number of the initiatives that
15 they have undertaken to date have been preventive maintenance
16 models, erosion/corrosion, bolting, diagnostic training for
17 maintenance personnel, work on protective coatings. They have
18 also done work in MSIV mock-ups, robotics, electrical
19 characterization and diagnostic systems. Slide 5, please.

20 [Slide.]

21 On slide 5 I note that the EPRI Component Monitoring
22 and Diagnostic Technology Transfer Center, M&DC for short, was
23 established recently, in the middle of 1986 to assist the
24 industry in the development and implementation of practical
25 monitoring and diagnostic technology. We have mentioned

1 several of those examples today, the vibration analysis
2 performance monitoring, oil analysis thermography, et cetera.

3 This center is in the process of working with the
4 industry to develop those programs both in safety-related
5 applications and in balance of plant.

6 The last two items on slide 5 are examples of some of
7 the more issue-specific initiatives the industry has
8 undertaken, the example of motor operated valves and that of
9 check valves wherein we tried to focus the resources of the
10 industry where we can make real and significant improvements.

11 The initiatives on these charts are really some of
12 the key initiatives underway to improve maintenance. That work
13 is progressing and the results are being achieved.

14 These initiatives cover both the total maintenance of
15 the plant, both safety related and balance of plant, and form
16 the foundations for proper maintenance.

17 Please skip to slide 8.

18 [Slide.]

19 We have discussed at some length both in this meeting
20 and in other forums overall performance indicators and the use
21 of performance indicators. The industry has put in place the
22 overall performance indicators as managed by INPO with the
23 understanding or with the thought that good results indicate a
24 well-managed plant and a well-managed plant overall is a plant
25 that is more reliable and therefore has a higher margin of

1 safety.

2 I noted the Equivalent Availability Factor and the
3 Industry Averages on Equivalent Availability Factor to discuss
4 because these are the same and this is the same as the
5 Equivalent Availability Factor in the INPO trifold that I am
6 aware that you gentlemen have seen. However, this is the only
7 indicator that was not showing improvement of the indicators
8 specified. I think we need to look beyond that to determine
9 whether we are or are not making progress in an issue such as
10 the Equivalent Availability Factor.

11 [Slide.]

12 If you'd turn to slide 9, if you'll note that we have
13 the distribution of the Equivalent Availability Factor that
14 indicates where the plants fit within that distribution,
15 numbers of units versus the percent EAF. The 1987 average was
16 61.8 percent and yet the median is 66.7 percent. If we were
17 able to remove the six plants down at the bottom that were at a
18 very low Equivalent Availability Factor, then we would have
19 raised that industry average up to near 70 percent.

20 [Slide 10.]

21 If you turn to slide 10, you will see that we have
22 plotted the median Equivalent Availability Factor for the years
23 1985, 1986 and 1987. It shows that there is an improving trend
24 in the industry -- that is that the distribution of the
25 Equivalent Availability Factor is moving to the right, as shown

1 on the previous slide, and that is indicating improvement. We
2 plotted that trend line out to show where it intersects, at the
3 1990 goal, and we hope that that progress continues. We expect
4 it too.

5 Also this EAF factor is a strong indicator of not
6 only overall performance but also performance of maintenance.
7 It is difficult to have good availability, good capacity with
8 out doing maintenance properly. Please skip to slide 13 --
9 excuse me. I apologize. Back to slide 11.

10 [Slide.]

11 We have also indicated here the unplanned automatic
12 scrams while critical. This is an issue where we have
13 demonstrated significant progress in reducing unnecessary and
14 unplanned automatic scrams. This is indicative of improvements
15 in maintenance in the overall plant including the POP. This
16 improvement is driven primarily by the reduction of equipment
17 failures. The progress we have seen to date results from that
18 progress. Recently AEOD -- I know AEOD has a draft report in
19 preparation that was provided to the industry for review. This
20 draft report confirms this progress made and the reasons for
21 that progress. Now skip to slide 13, please.

22 [Slide.]

23 We also took a look at the unplanned automatic scrams
24 while critical associated with maintenance activities. This is
25 one of the original maintenance performance indicators

1 developed by the working group under Mr. Woody.

2 These are automatic scrams that are caused by
3 maintenance activities, where the root cause is maintenance
4 related. We will note on this slide the distribution between
5 1986 and 1987 wherein the average in 1987 has improved, is 1.4
6 as compared of an average of 1986 of 2.2. The important thing
7 is really the distribution, the shift in distribution and the
8 improvements indicated.

9 [Slide.]

10 MR. COLVIN: The forced outage rate, the median value
11 of forced outage rate in the industry from 1980 through 1987,
12 it is clear that we have not made the progress and improvement
13 in forced outage rate that we would desire. We are working to
14 reduce the forced outage rate at all utilities.

15 We looked at the distribution on slide 15, we looked
16 at the average, the average forced outage rate as well as the
17 median is driven by a few plants that are in long term
18 shutdown, plants that are up at the upper end of that scale
19 have a very significant impact on median and average values.

20 [Slide.]

21 MR. COLVIN: C.O. Woody has already indicated a
22 viewgraph on improvements in SALP ratings. I only show this as
23 the lead-in to slide 17, which is slightly different.

24 [Slide.]

25 MR. COLVIN: Slide 17 is a slide demonstrating the

1 percentage of plants receiving Category 1 and 2 ratings for
2 maintenance SALP's as compared to the percentage receiving
3 Category 3 ratings. I think the important thing to the
4 industry to note is that the SALP 3 trend line has been
5 downward as well as the SALP 2 line while the SALP 1 trend line
6 is upward.

7 We recognize as pointed out earlier that we are not
8 where we would like to be and there is vast room for
9 improvement. I would note that the data is only from January
10 through March and recognize that we understand the Commission
11 has issued a SALP 3 rating in maintenance to an utility
12 recently. This needs to be updated.

13 [Slide.]

14 MR. COLVIN: Slide 18. The industry has had
15 excellent experience in results with other major industry
16 initiatives. These results were recognized by the Commission
17 and the staff as well as by Congress. The bases for these
18 results were the industry initiatives, the time that the
19 industry was given to demonstrate the results, proper oversight
20 by the Nuclear Regulatory Commission.

21 Our approach to make improvements in maintenance has
22 followed these basic practices. I would like to illustrate
23 that with these slides.

24 Both maintenance and training were a fundamental INPO
25 cornerstone program from the beginning of INPO, fitness of duty

1 was started as an evaluation effort in 1982 and with more
2 emphasis beginning in 1985.

3 Each of the areas has specific evaluation subjects, a
4 specific area for the evaluation and has unique performance
5 objectives and criteria. Industry guidelines were developed in
6 all areas with broad industry input, review and comment.

7 All utilities are committed to meet the intent of
8 those guidelines. We use industry peer evaluators to assist
9 the INPO evaluation teams in the evaluation and assistance
10 efforts in maintenance and training. It was determined that
11 was not necessary in the area of fitness for duty.

12 [Slide.]

13 MR. COLVIN: Slide 19. All utilities are conducting
14 or have conducted a self assessment of their program against
15 the industry guidelines and reported the results to INPO. The
16 "no" in fitness for duty here is not to indicate that we did
17 not conduct a self assessment against the guidelines in fitness
18 for duty, in fact, that was conducted. The results of that
19 self assessment were not reported to INPO.

20 INPO reviews the self assessment results to determine
21 need for additional assistance to the utility and also for
22 possible generic lessons learned. This is applicable in both
23 maintenance and training.

24 The INPO evaluation team follows up on utility
25 identified corrective actions in all three areas.

1 [Slide.]

2 MR. COLVIN: Slide 20. The INPO assistance teams
3 visit selected utilities. INPO has conducted several hundred
4 assistance visits in a broad range of areas to utilities in the
5 area of maintenance, training and fitness for duty over the
6 past several years.

7 Training has an accreditation process. It is
8 accredited or certified. Whereas maintenance and fitness for
9 duty are not. There are NRC rules, regulations that are
10 applicable to maintenance and training. We recognize the
11 Commission's intent to proceed to issue rules within the
12 fitness for duty area but they are not currently issued.

13 NRC inspections are being conducted to assess utility
14 programs in all areas. NRC has overview of the industry
15 initiatives including participation with selected INPO
16 evaluation teams and assistance teams.

17 [Slide.]

18 MR. COLVIN: Slide 21. NRC has authority to address
19 plants not performing at desired levels and we believe the NRC
20 is exercising that authority. We have industry initiatives
21 that are achieving results.

22 [Slide.]

23 MR. COLVIN: In summary, I'd like to project what the
24 future holds. We believe that through the industry initiatives
25 performance is being improved and will continue to be improved.

1 This results in a higher margin of safety for our plants,
2 increased capacity factors and reduced costs. We are not where
3 the industry desires to be in maintenance but we are making
4 significant progress.

5 This is not an overnight achievement. It takes time
6 to implement effective corrective actions. We think that some
7 of the early signs of these will be mixed but we will make
8 improvements. This requires and has an industry-wide
9 commitment and also requires a regulatory commitment, both are
10 essential for the nuclear option.

11 Thank you.

12 CHAIRMAN ZECH: Thank you very much.

13 MR. LEE: Thank you. I hope that gives you a much
14 more complete presentation, understanding of the operation, all
15 four of these gentlemen have been actively involved in the
16 industry initiatives as well as being actively involved in
17 their plant operations on a day to day basis.

18 Our members, I hope you will get the feeling are
19 strongly motivated to preserve certainly their plant
20 investments through the excellence maintenance program.

21 We recognize that maintenance is essential for the
22 safety and reliability needed to retain nuclear power as a
23 viable option. I can assure you that we are dedicated to
24 fulfilling that responsibility.

25 The past six or eight years have been busy times for

1 the U.S. nuclear industry. We have undertaken several major
2 industry initiatives and we have responded to many new
3 regulations and requirements over this period. These major
4 efforts have had an impact on our operation of our plants and
5 the associated personnel. We have made great strides toward
6 improving the level of safety and the reliability of our
7 plants.

8 Improvement programs must be given time to show
9 results. This is especially true or it should be allowable
10 when the trends of performance are in the right direction. We
11 recognize that the results have not been uniform. We have said
12 that several times and we agree with you on that point. The
13 industry is now concentrating its efforts in the areas where
14 effort is needed most.

15 The Japanese experience seems to be one that is
16 pointed to as being very successful. Good maintenance programs
17 are in place there.

18 During the NRC maintenance workshop in July, Mr.
19 Omato from Tokyo Electric reported that it took them about six
20 years from their lowest level of capacity factor, between 75
21 and 77, to get to a 70 percent capacity factor in 1982. It
22 took them another three years to get to their present level of
23 75 percent plus.

24 We believe that our initiatives have us moving in a
25 similar course. We need stability in the regulatory process.

1 We need to avoid duplication of effort and we think the
2 combination of the NRC maintenance policy issued earlier this
3 year and the commitment of the industry to the INPO guidelines
4 for the conduct of maintenance along with all the other
5 initiatives that we have talked about today provides the
6 adequate guidance for keeping the industry moving upward on
7 that performance curve.

8 Because maintenance covers so many facets of a
9 station's operation, it certainly is an area where there is
10 more than one way to reach a common goal. We believe it is
11 wise to allow the utilities to develop implementation plans
12 that fit their location conditions and for the industry to
13 learn from each other as we have done so well in other areas.

14 To do that, the NRC must set the tone, the desired
15 direction and the objectives or expectations as we used to call
16 them. We think you have done that in the Commission policy
17 statement on maintenance and now we believe that you need to
18 monitor the results in some defined and consistent manner and
19 to focus your attention on the areas where we are not meeting
20 your expectations.

21 We think that the maintenance inspection programs and
22 some other efforts that you have underway that have been
23 started recently give you that ability and are headed in the
24 proper direction.

25 You need to set in a sense the climate for

1 achievement which will encourage the utility management and
2 employees to meet our common objectives.

3 Senator Breaux's nuclear regulations subcommittee
4 issued a report at the end of last year that accompanied his
5 legislative proposal and the report concluded that policy
6 statements can prove to be an effective means of addressing
7 issues of regulatory concern, especially where there is a high
8 degree of plant specific consideration, or where there is
9 considerable expertise on the particular issue within the
10 regulated community. We think the maintenance area is
11 certainly an area that meets that definition. The subcommittee
12 report cautioned that the policy statement approach is fine as
13 long as sufficient basis exists for taking necessary
14 enforcement action.

15 They recognize that this approach permits more timely
16 response to the Commission's concern. Although they apparently
17 supported the promulgation of a regulation in the area of
18 maintenance, that support appears to be based on the premise
19 that the rules presently do not exist in the maintenance area
20 that allow or provide adequate enforcement capability. There
21 are several rules. There are many requirements that govern
22 maintenance in the form of technical specifications, in
23 Appendix B, ALARA, NRC generic letters, and other industry
24 individual licensing commitments.

25 As Joe had indicated, you have taken aggressive

1 action. There seems to be agreement that writing a rule for
2 maintenance is difficult. A prescriptive rule would take an
3 extremely long time to develop and we believe it would reduce
4 the incentive for the industry to continue its self improvement
5 initiatives. It certainly would have high costs in terms of
6 manpower required to respond before any real results could be
7 seen.

8 On the other hand, a general rule appears to be no
9 better than the present maintenance policy when that policy is
10 combined with the industry's guidelines, except to possibly
11 cause confusion by providing two interpretations of what is
12 desired.

13 I would like to conclude by saying that we appreciate
14 the opportunity to appear before you, provide you our
15 perspectives, the status of the industry initiatives which we
16 think are aggressive, broad, all encompassing, and we think are
17 showing significant trends in the right direction.

18 We ask you to carefully consider, which we know you
19 will, our concerns during your deliberations. Again, as I said
20 before, we will continue to cooperate in any way we can to
21 assist in improving maintenance programs at our plants.

22 With that, we are concluded. I would be happy to
23 make a few comments about the fraudulent material.

24 CHAIRMAN ZECH: Please do.

25 MR. LEE: Again, this is an area where industry has a

1 large effort underway at the present time and we're working
2 very closely with the NRC staff on trying to first evaluate the
3 scope of the problem and then secondly to try and evaluate the
4 safety significance of any findings that we have.

5 And our third step will be then to look at the long
6 term program as to how do we avoid getting into these kinds of
7 situations in the future. How can we assure ourselves that the
8 material we are specifying and buying and paying for is the
9 material that we need and want at our plants.

10 We started our efforts on the pipe flange or the WJM
11 psi effort a month and a half ago or so and we've established a
12 broad extensive industry program to attack that problem. The
13 first thing we did was to develop a testing method for in-on
14 plant, in the plant, on-site, in place and situ testing, so
15 that we got a comparable testing from all plants, so that we
16 had numbers that we felt we could compare and can look at.

17 We held two major training programs, one on the west
18 coast and one on the east coast, to train our members, people
19 on the testing methodology at those plants. We've run detailed
20 laboratory testing on in-stock program materials that were
21 available.

22 And we've done some detailed engineering analyses
23 with several consultants to look at the impact, the potential
24 impact of flanges and other material that were supplied by
25 those companies. I would say that the results to date, we've

1 looked at, and the material, the pipeline is full of
2 information coming in. Over 2,000 field tests and a 130 lab
3 tests, and I think we can say very -- with what we've looked at
4 that the materials are no substandard with the exception of a
5 handful of what appear to be nonconforming blind flanges and
6 even when you do an engineering analysis of those handful of
7 blind flanges, it appears that that material is suitable for
8 the intended service.

9 We have spent, on this program, in the first five or
10 six weeks, an estimate, from a little survey that we did, of
11 100 man years of effort in trying to get the information,
12 understand where it is, and try to evaluate it. So it is no
13 small effort on the part of the industry.

14 In the area of electrical components, we are working
15 again with the NRC, trying to get the scope, understanding of
16 the magnitude of that problem. And really there are three -- I
17 guess three separate areas that are all related to the same
18 problem.

19 I should say back on the flange area, we think that
20 the safety significance is not there at this point in time. We
21 are worried, of course, about the documentation and that aspect
22 of the program. That is an open issue and one that we'll look
23 at in the long run.

24 On the electrical component side there really are
25 several areas that we need to look at. One was -- one of the

1 first ones was the information notice on planned maintenance
2 systems, equipment that was suspect, determined that there
3 might be some problems there, and concluded that it's not a
4 widespread problem.

5 What we have done is we have set up an advisory
6 committee, ad hoc advisory committee, initially to help us
7 evaluate, scope out the problems here again. These are people
8 who are familiar with the engineering design procurement
9 process.

10 We have seven major companies that are on that
11 advisory group. They cover all geographic areas of the country
12 so we think we have a fairly good sample of purchase
13 experience. And we can really indicate that only at the
14 present time, this company has only been in service for three
15 years, so that it's not a long history area.

16 But in looking at that program again we concluded
17 that this is not a widespread generic issue. The lists that
18 were attached to the information notice was really a list of
19 companies that were -- had been contacted or had requested to
20 be on the bidding list, and in some cases may be on the bidding
21 list, but only a few companies actually procured any materials
22 from PMS, and those companies are in the process of evaluating
23 the materials that they bought and the safety significance of
24 that and we will take a broader look at that.

25 In terms of the second area are the five California

1 companies and again there we are trying to get feedback from
2 all of the utilities on how many, how much material was
3 purchased from each of them, to determine if it's in safety
4 related areas initially, and again the preliminary assessments
5 there are that very little of the material bought from that
6 company has actually been used in safety related systems.

7 Many of the purchases, in fact, that again were
8 listed on the inspection report are for non-nuclear plants.
9 The fossil plants at these companies, and in several cases, for
10 other purposes. We are also working on the list of 50 plus
11 companies that were alleged to be doing the same thing as the
12 California companies.

13 What we have done there is to ask again those seven
14 companies to send to us their Q lists, their bidders list, of
15 the companies that they purchase safety related electrical
16 equipment because we were not -- we were trying to maintain
17 that list confidentially at this point in time.

18 We've evaluated those lists and to date there is only
19 one of those companies that is on any of the bidders lists of
20 our seven companies and it does not appear that that was safety
21 related equipment that was purchased or it was used in safety
22 related work at this point in time.

23 I think that our overall program that we're going to
24 be getting into is to establish the NUMARC Board -- at our
25 Board meeting on June 30th, approved the establishment of a

1 working group and Bill Cavanaugh, the President of Surrey, has
2 agreed to Chair that group. We will be getting that group
3 together at the end of the month.

4 We need to get more complete understanding of the
5 scope of the problem. We are filling out that working group at
6 the present time and as I said earlier, our objective is really
7 to review our existing programs and find out where the failings
8 are in those programs, if any. To determine where we can
9 improve them in the future, again, as I said, to assure
10 ourselves that we get the quality materials that we've asked
11 for and paid for.

12 CHAIRMAN ZECH: Thank you very much. As you know,
13 the NRC is actively pursuing that fraudulent problem, too. We
14 have a series of bulletins and an information notice that we
15 put out. We're working on taking other actions at the present
16 time. We appreciate very much what NUMARC is doing, has a
17 leadership role in this area.

18 We certainly don't want any defective material in our
19 plants. You don't want that and we don't want it. We won't
20 stand for it as far as our regulations are concerned, as you
21 well know. But we do appreciate the effort that is going on.

22 We have investigations going on as well as our own
23 staff reviews, as you know, and we encourage you to continue
24 that aggressive action in that regard.

25 MR. McNEILL: Mr. Chairman, if I might make a

1 comment. From a utility executive standpoint, I believe that
2 it would be very worthwhile for you to understand that I
3 believe that there's a strong consensus among the utilities
4 that this approach of working through NUMARC to resolve these
5 issues has been very successful from our standpoint.

6 It has provided a unique way to interpret the desires
7 of the NRC in a common manner so that they're not being done
8 individually by utility. It has saved us a great deal of
9 effort and it provides a database from which broad
10 interpretations can be drawn from the commonality of approach
11 that is employed across the board. And I would encourage both
12 NUMARC as an organization representing the utilities and the
13 NRC in future cases like this to continue that type of working
14 relationship because I believe it does help the individual
15 utilities in filling the role that many of us have envisioned
16 for NUMARC in its formation, since its formation.

17 CHAIRMAN ZECH: Well, we appreciate that very much.
18 Since you made that comment, of course, our effort is not only
19 to inform NUMARC, but in NUMARC's role to get the word out to
20 the utilities so that they can be aware of the problem as well
21 as NRC getting the word out.

22 And what you're saying I guess I guess is that you
23 believe that not only putting out our notices and bulletins and
24 our regulatory -- taking those regulatory actions, that working
25 through NUMARC, as far as you're concerned, is effective and it

1 is perhaps getting to the heart of the problem which is
2 protecting public health and safety which is our responsibility
3 as well as yours.

4 You're telling us that that is working reasonably
5 well. Is that what you're saying?

6 MR. McNEILL: It's a very efficient and effective way
7 both to meet that objective on the part of the individual
8 utilities.

9 CHAIRMAN ZECH: Thank you very much. Appreciate
10 that. Let's have comments from my fellow Commissioners.

11 COMMISSIONER CARR: I have a couple of questions for
12 Jack Brons. On your surveillances that you cited were really a
13 waste of time to keep doing them, have you requested that we
14 just knock them off?

15 MR. BRONS: Yes, sir. We have taken up some
16 individual ones and one that comes to mind is the turban stop
17 valve testing, resurgence were in steam generators with
18 phosphate control which we never had, and we found that the
19 effort to extend the interval on doing that testing, not to
20 delete it, was extraordinary. We worked on that for a couple
21 of years. My most honest and direct answer to you is that
22 those few cases that we have tried to change that interval has
23 proved to be a very difficult experience.

24 COMMISSIONER CARR: Well, let me encourage you to
25 keep trying because I think we ought to quit doing things we

1 shouldn't be doing if they're not producing any value and I
2 think that's generally the feeling of the Commission and the
3 staff. I don't think anybody wants to -- if we have the
4 documentation and support that it's unnecessary, we shouldn't
5 be doing it.

6 MR. MCNEILL: I think the tech spec improvement
7 program certainly has a high degree of focus on allowing more
8 flexibility or at least --

9 COMMISSIONER CARR: If you can get it finished.

10 MR. MCNEILL: Yes, sir.

11 COMMISSIONER CARR: Talk to me a little bit more
12 about RF monitoring. I don't understand the procedure.

13 MR. BRONS: Rotating electrical equipment produces a
14 radio frequency signature and the variations in that signature,
15 indifferent, just like an audio signal, in various frequency
16 bands can be indicative of corona occurrences or ground
17 leakage.

18 COMMISSIONER CARR: Is that a continuous monitoring
19 or is that just --

20 MR. BRONS: No. It's a -- on the main generator,
21 it's a continuous monitor logged on a recorder and reviewed in
22 time against generator loading and so on. On the reactor
23 coolant pumps, we must make a periodic containment entry and go
24 in and assess it.

25 COMMISSIONER CARR: Okay. The other question I got

1 is on your one inch of documentation on MOV's. Is that both
2 balance of plant and safety related?

3 MR. BRONS: It's -- we only maintain that level of
4 documentation on the safety related ones. We prepare a -- for
5 ones that are kept for our own records, we keep a record which
6 is substantially less. We use the same procedures. It would
7 be very similar --

8 COMMISSIONER CARR: One standard of maintenance, two
9 standards of documentation.

10 MR. BRONS: Yes, sir.

11 COMMISSIONER CARR: Okay. That's all I got.

12 CHAIRMAN ZECH: Thank you. Mr. Roberts?

13 COMMISSIONER ROBERTS: I have a quick question. When
14 we were briefed about the staff -- here's a staff requirement,
15 staff is to obtain industry's commitment for early transmittal
16 of its proposed standard technical specification. When is that
17 going to happen?

18 MR. BRONS: Tom Tipton from NUMARC --

19 CHAIRMAN ZECH: Would you identify yourself for the
20 Reporter, please?

21 MR. TIPTON: Tom Tipton of NUMARC. That's April 1st,
22 1989, all four topicals from all four owners groups.

23 COMMISSIONER ROBERTS: Thank you.

24 MR. LEE: There are several steps in between that.

25 COMMISSIONER ROBERTS: I understand.

1 CHAIRMAN ZECH: Thank you very much. Commissioner
2 Rogers?

3 COMMISSIONER ROGERS: Yes. I guess Mr. Woody first
4 talked about performance indicators and listed the various ones
5 that NUMARC has established to look at maintenance. Have --
6 there's always the question that comes up of to what extent is
7 a performance indicator a retrospective look that doesn't tell
8 you very much about the future and to what extent does it
9 predict the future?

10 And have you done anything to look at performance
11 indicators and any of those performance indicators and compared
12 them with significant events attributed to maintenance at any
13 plants in the past? In other words, you've got the information
14 now, can you look back and see whether any of those performance
15 indicators, when applied to significant events that are
16 attributable to maintenance at any of the plants, would have
17 predicted a problem or whether they would just have simply not
18 shown anything.

19 My understanding is that it is very difficult to get
20 a performance indicator on maintenance that's predictive and I
21 think it's worth looking to see to what extent any of these
22 things tell us about what we can expect in the future rather
23 than what was good about the past. It's really very important
24 for us to know about.

25 MR. WOODY: An overall validation of the nine

1 maintenance indicators that are being tracked has not been done
2 on an industry-wide basis and as you point out, the proper use
3 of indicators is a very complex issue, the hierarchy of
4 indicators and the analysis, the cause and effect, if you will
5 -- in our own utility we are pursuing that vigorously and we
6 have cases where taking process and control charts, they do
7 produce predictable things that you can act on but generally
8 the indicators that we have shown you here today are what I
9 would call out-put indicators and they're really recording
10 facts and do not give you much opportunity to take early
11 actions.

12 They're not leading edge or predictive indicators --
13 the management aspect of the tool. For example, if a plant
14 sees its position on occupational exposure or industrial
15 accident rate being outside of the median and let me give you a
16 point in case with one of the industry indicators being fuel
17 performance.

18 In my own case I found upon looking at the industry
19 data that my target for 1988 was no better than the industry
20 was already achieving. So it certainly gave me reason to
21 rethink whether or not my target was aggressive enough.
22 There was a better way. So for that purpose, they do work in
23 order to help utilities set higher goals and achieve targets
24 where they might not be performing to the level that we now can
25 perform to.

1 MR. LEE: I might add, Commissioner Rogers, I think
2 in trying to look at broad, general indicators for the future
3 is very difficult in any field whether it's business, the stock
4 market or what have you. I think some of the methods and
5 approaches that Jack Brons was talking about are in a sense
6 predictive. I would say the vibration analysis, the radio
7 frequency -- those kinds of things are certainly predictive of
8 events to come.

9 COMMISSIONER ROGERS: Yes, right, but you know, if
10 you're trying to look at a -- they're not performance
11 indicators. They really are --

12 MR. LEE: No, that's right -- broad performance
13 indicators -- very difficult to predict for the future.

14 COMMISSIONER ROGERS: And one of the problems we have
15 in this whole business is in fact implementing the good advice
16 which you quoted at the end of your remarks. How do you know
17 when somebody has in fact done what you've asked them to do?
18 What are the measures? Even if you don't tell them how to do
19 it, what are the measures that in fact something has happened
20 and been achieved that you want to achieve.

21 In this particular arena, we're talking about an
22 effective program that prevents something from happening and
23 what are the measures that would give us some assurance that in
24 fact a good maintenance program has created a situation that we
25 feel safe about.

1 I don't expect you to give me an answer because I
2 think this is something we're all quite concerned about but I
3 would simply say that you can't just give a general statement
4 about it's nice to now have a proscriptive approach but we need
5 some measures of performance or achievement in this area and
6 they are hard to come by and I think we should all recognize
7 that that's an important element in regulation, some kind of a
8 measure of success and when we talk about maintenance, it's a
9 particularly thorny area to get into.

10 MR. BRONS: Yes, sir, Commissioner Rogers. The
11 indicators that I talked about as process indicators are in
12 fact useful to an individual utility or to an individual plant
13 on a trended basis. The difficulty that we have and that I --
14 certainly is one that I was trying to express is that comparing
15 plant to plant on those indicators is not necessarily helpful.

16 COMMISSIONER ROGERS: Yes, right.

17 MR. WOODY: Let me suggest one other comment. The
18 nine quality indicators that the industry is using that have
19 been briefly expressed today are a general overall indication
20 of improved performance. Then, within that -- when you break
21 it down and stratify, if you find a plant for example in
22 trouble with forced outage rate, you then need to go ask why a
23 lot of times to find out, is it a short-term thing? What is
24 the real cause to correct that and that is the proper use of
25 indicators in our view.

1 COMMISSIONER ROGERS: Well, it is a difficult problem
2 but I think that the whole purpose of maintenance is to prevent
3 something from happening and we want to have some way of
4 feeling comfortable about that short of from my point of view
5 anyway, short of a very proscriptive approach and procedural
6 approach. There's the dilemma. How do you do that? How do
7 you measure it?

8 Mr. Colvin, you showed us some graphs but you skipped
9 over a couple in the packet that I think were quite interesting
10 and the Equivalent Availability Factor, three-year distribution
11 and the unplanned automatic SCRAMS while critical one-year
12 distribution. Now they're not quite from the same period but
13 presumably they're roughly the same collection of plants. One
14 is 76 units. The other is 86 units. I notice that in the
15 Equivalent Availability Factor, there is a superior group up
16 there between the 80 and 90 percent availability. Twelve
17 plants are up there.

18 If I look at the unplanned automatic SCRAMS while
19 critical, I see that there's a number eleven down there around
20 zero. Are they the same plants?

21 MR. COLVIN: In some cases, Mr. Commissioner, in some
22 cases in fact they are the same plants but in a number of cases
23 they are not. To have zero SCRAMS in a unit per year is very
24 difficult task to achieve and so the fact that you have one
25 scram or two SCRAMS in a year does not necessarily mean that

1 you have an unacceptable program or poor performance overall.

2 INPO does look at the distribution and as was pointed
3 out by Mr. Woody, each year the reports are issued to the
4 individual utility with not only the distribution on an
5 industry-wide basis but the distribution of where that
6 particular plant sits on there and can be used in that process
7 to determine --

8 COMMISSIONER ROGERS: All I'm saying is that if they
9 are more or less the same set of plants that are in both
10 categories, they're telling you that there's a good place to
11 look for practices that really produce results. Whether that's
12 sustained over a longer period of time than one or three years
13 is another question, of course.

14 MR. COLVIN: Mr. Commissioner, I was going to make
15 one other comment on performance indicators. I think you're
16 aware that INPO began that process in 1982, late 1982, to look
17 at how do we measure overall industry performance and that was
18 the idea or thought that was the genesis of the development of
19 those indicators and that process came to fruition in 1984 with
20 the development of the overall industry goals for 1990 by about
21 the 1986 time frame.

22 With the efforts by the international community to
23 establish the World Association of Nuclear Operators that --
24 and that initiative as well as for consistency of data between
25 the International Atomic Energy Agency and the U.S. nuclear

1 industry, there's an effort currently underway by INPO to look
2 and review performance -- look at performance indicators, to
3 review those and to determine what performance indicators
4 should be established for 1990 and beyond and how should those
5 goals be applied and that's an initiative I'm sure that INPO
6 taking the lead for the industry will brief the Commission on
7 at some future date.

8 COMMISSIONER ROGERS: Just one more point, Mr.
9 Colvin. You also gave us a list of what were cornerstone
10 activities of INPO in the beginning and so on and so forth and
11 what is accredited and certified and what is not and I wonder
12 if you could comment on the possibility or the concept of
13 accrediting and certifying a maintenance program?

14 MR. COLVIN: Yes, sir. I'd be pleased to comment on
15 that. I think that to this date, we've taken the approach that
16 there are several reasons for accrediting a training program
17 that were different from a maintenance program. I think that
18 the basic approach that we've utilized in all the initiatives,
19 the improvement in training and I think the improvement we're
20 achieving in maintenance really results from the process that
21 we take in getting to the point and making these -- undertaking
22 these initiatives.

23 If you go through the process that I outlined that
24 is, we've established the industry guidelines, the standards
25 for that particular program, the bases for that program, the

1 conduct of a self-assessment, the reports to INPO, the follow-
2 up on that corrective action, the INPO look at that, that's the
3 process by which I'm talking about. The final accreditation of
4 the training programs by an accrediting board is quite
5 different but the real improvement is achieved by going through
6 that process.

7 In addition, training itself is fairly standard
8 whether it be training -- the approach to training either from
9 a university or training in a utility program for mechanical,
10 electrical, I&C or whether it be for reactor operators. The
11 process through which we put training is -- lends itself to an
12 accreditation of the process and of the program.

13 To date we have not reviewed in detail whether we
14 should consider an accreditation or certification of
15 maintenance program. I believe that is certainly something
16 that we would undertake to review.

17 COMMISSIONER ROGERS: Well, certainly you're setting
18 up centers to study maintenance and to produce maintenance
19 manuals on various topics and in fact, maintenance training
20 programs that look very good.

21 I've visited the center in Charlotte and was quite
22 impressed with the quality of what they were doing and it
23 didn't seem to me that the approach that was being taken there
24 was very different from the kinds of training programs that
25 we're conducting or that are being conducted in other areas and

1 I would think that that's an approach that's probably worthy of
2 some real study, the notion of accrediting -- certainly
3 accrediting maintenance training programs if not all
4 maintenance programs.

5 COMMISSIONER CARR: This obviously doesn't need to be
6 said, but I'll say it anyway. The performance indicator
7 program is databased and therefore, it's got to be on past
8 performance, otherwise you don't have any data. So, trying to
9 use it to predict, as has been said, it's only a tool to tell
10 you, you ought to go look at something that doesn't look right.

11 That's where you're going to improve future
12 performance, is by getting that tipoff early enough that you
13 lead the problem rather than lag it.

14 CHAIRMAN ZECH: Let me just make a couple comments.
15 First of all, Mr. Rogers has already talked a little bit about
16 your comment about naval officers could tell what you want
17 done, not how to do it. We all think that's a pretty good
18 principle in general. There's also another saying that I
19 recall, not the exact words, but it says, if you don't get
20 results, do something.

21 If we're not satisfied with the results here and we
22 don't think it's happening, we're going to do something -- not
23 all bad either in my view. What we want to do is to do what's
24 right -- do the right thing. I think that is important to keep
25 that in mind. We recognize, certainly I do, that improvements

1 have been made in the maintenance program in the utilities
2 since I've been on the Commission.

3 I remember talking about it in a meeting in, I think,
4 1984, and C.O. Woody was here and I must say, I'm more
5 encouraged by the presentation I heard today than I was in
6 1984. We have indeed made progress. I'll tell you, in my
7 view, the progress is across the table. I do think that the
8 utilities have now recognized that maintenance is something
9 that you've got to get serious about.

10 I didn't have that impression in 1984. I did not,
11 but I do today. I do recognize that you are doing something
12 about and perhaps you are doing something about it. That is
13 important. At least that's my impression today and I think
14 it's encouraging.

15 A word on surveillance -- I agree that if we're doing
16 something wrong in surveillance. If we're requiring too many
17 surveillances, we want to know about it. Don't give up.
18 Commissioner Carr has picked up on that and I agree with that.
19 That's your responsibility though. Don't just complain about
20 it. Make sure you get our attention.

21 Another thing I said before too; I think we did too
22 much surveillance and testing at power. I know the staff is
23 looking at this. You can contribute to that effort too. If
24 you believe that we are; I certainly do. That's one of things
25 that impressed me when I first starting looking at these

1 commercial power plants -- all the people fidgeting things and
2 testing and surveillance and it's all perhaps very important to
3 do, but we do an awful lot at power and we give ourselves
4 problems because of personnel errors.

5 It is being looked at. I challenge the utilities to
6 continue to look at that very program. It's in your best
7 interest, I think, to stop those inadvertant scrams and
8 actuations as we've discussed here briefly today. If you see
9 improvements that can be done by reducing some of the
10 surveillance and testing that's done, especially at power, I
11 think that's your obligation to bring that forward. I'm glad
12 at least that we mentioned very briefly today, chemistry,
13 because I think personally that chemistry is also a part of
14 maintenance and it can be indicative of maintenance.

15 It was at least mentioned and I hope that you'll
16 continue to think about that part of it. Balance-of-plant was
17 mentioned too. I think there's a growing recognition on the
18 part of perhaps the Commission as well as the utilities that
19 balance-of-plant does, indeed, play a key role in safety of
20 operations. I'm pleased that at least that was mentioned today
21 and I think that's important to keep in mind as we think about
22 maintenance. Maintenance cuts across the whole line of all of
23 your entire plant.

24 Performance indicators for maintenance; I won't go
25 into that. We've talked about it enough. I guess the only

1 thing I would say is, that when INPO was here not long ago and
2 talked to the Commission, it was at least my impression that
3 they were a little bit discouraged about trying to come up with
4 any kind of performance indicators for maintenance. I must say
5 from what I've heard today, I'm encouraged by the fact that you
6 are at least working on a number of different types of
7 performance indicators for maintenance.

8 I recognize that it's complicated. It's a very
9 complex issue. We're talking about corrective maintenance,
10 predictive maintenance, preventive maintenance and it can be a
11 rather difficult subject to sort out to try to get some kind of
12 performance indicator for. It's worth doing. It's important,
13 I think. I'm pleased to see that you're still working on
14 trying to come up with some meaningful performance indicators
15 for maintenance.

16 Maintenance does, indeed, play an important role in
17 safety of operations. I think Corbin McNeill said that
18 maintenance is the cornerstone of safety. I think that's what
19 you said. I agree with that; it is. Maintenance truly is.
20 It's the cornerstone of safety from our standpoint, from the
21 regulatory safety standpoint.

22 At least in my experience in looking at your plants,
23 it seems to me that if you're paying attention to maintenance,
24 you are operating your plant better. You're not actuating the
25 safety systems when they shouldn't be actuated. You're not

1 having inadvertent scrams and you are not putting challenges to
2 your people either that you shouldn't be doing.

3 Maintenance plays an important role in our part of
4 regulatory safety. In my judgment, it also plays an important
5 role in your part of the safety of operations of your plant.
6 Maintenance can reflect and certainly is in my judgment, a key
7 factor in a well operated plants.

8 Your better operating plants in my view, usually do
9 have good maintenance programs. Those plants that seem to have
10 problems and don't operate as well as others; if you look at
11 their maintenance, it might show you a parallel. At least
12 that's my judgement. It may not fit together every time, but
13 maintenance does has a relationship in my judgment, to good
14 operation.

15 Let me just conclude by saying that we recognize that
16 there have been improvements in the past few years in all the
17 measures that you can show and look at and indicate in nuclear
18 power plant operations. The scrams have gone down; the
19 actuators have gone down. Personnel exposures have gone down.
20 Generated rad waste has gone down. Maintenance is being
21 attended to and improved. Even availability, as you pointed
22 out today, Mr. Colvin, does show that it's improving, although
23 a little slower than some of the other indicators.

24 In general, the indicators are all in the right
25 direction. That's encouraging, but in my view, there's still

1 room for improvement. Although there is overall improvement,
2 there is room for more improvement. I think the encouraging
3 part is to see that it is coming.

4 As far as maintenance is concerned, we appreciate
5 very much your views on maintenance. We have heard from our
6 staff, your presentations to them too. We believe that
7 maintenance, again, is such an important area that we do want
8 to see results. We want to see a program that impacts on
9 improved safety of operations. It's been slow in coming, in my
10 judgement -- very slow.

11 It's not just the past few years we're talking about;
12 this program has been in effect for 30 years or so, you know.
13 Apparently, even though we're late in the day now, we are
14 focusing on maintenance. Whether we go to rule or not, the
15 inclination here is that we will. Whether that's done or not,
16 has not been decided yet. I am encouraged by what I've heard
17 today and I'm encouraged by your committment to maintenance.

18 It's not only important to safety, by in my judgment,
19 it's truly in your best interests for operations of your
20 utilities. It just makes good common sense, as well as
21 important to safety.

22 We thank you very much for an excellent presentation.
23 If there are no other comments from my fellow Commissioners, we
24 stand adjourned. Thank you very much.

25 [Whereupon, at 3:55, the meeting of the Commission

1 was adjourned.]

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CERTIFICATE OF TRANSCRIBER

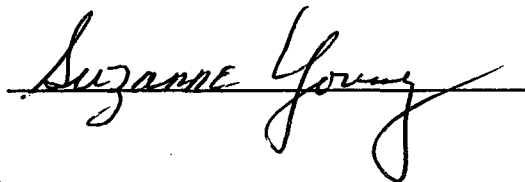
This is to certify that the attached events
of a meeting of the U.S. Nuclear Regulatory Commission
entitled:

TITLE OF MEETING: ANNUAL BRIEFING BY NUMARC ON PLANT
MAINTENANCE

PLACE OF MEETING: Washington, D.C.

DATE OF MEETING: WEDNESDAY, AUGUST 3, 1988

were transcribed by me. I further certify that said
transcription is accurate and complete, to the best
of my ability, and that the transcript is a true and
accurate record of the foregoing events.

A handwritten signature in cursive script, reading "Suzanne Young", written over a horizontal line.

Ann Riley & Associates, Ltd.

C. O. WOODY

FLORIDA POWER & LIGHT CO.

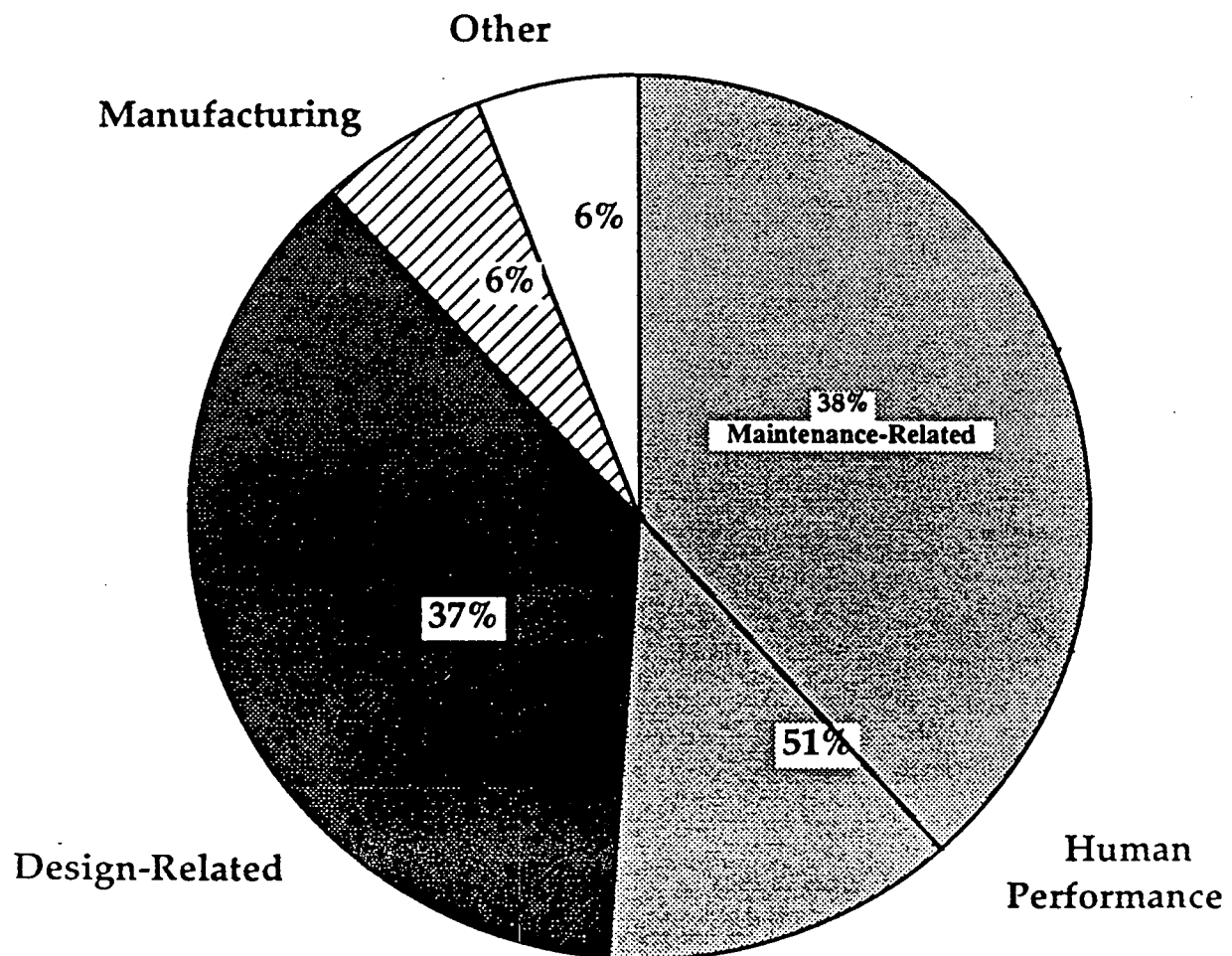
NRC COMMISSION BRIEFING

ON MAINTENANCE

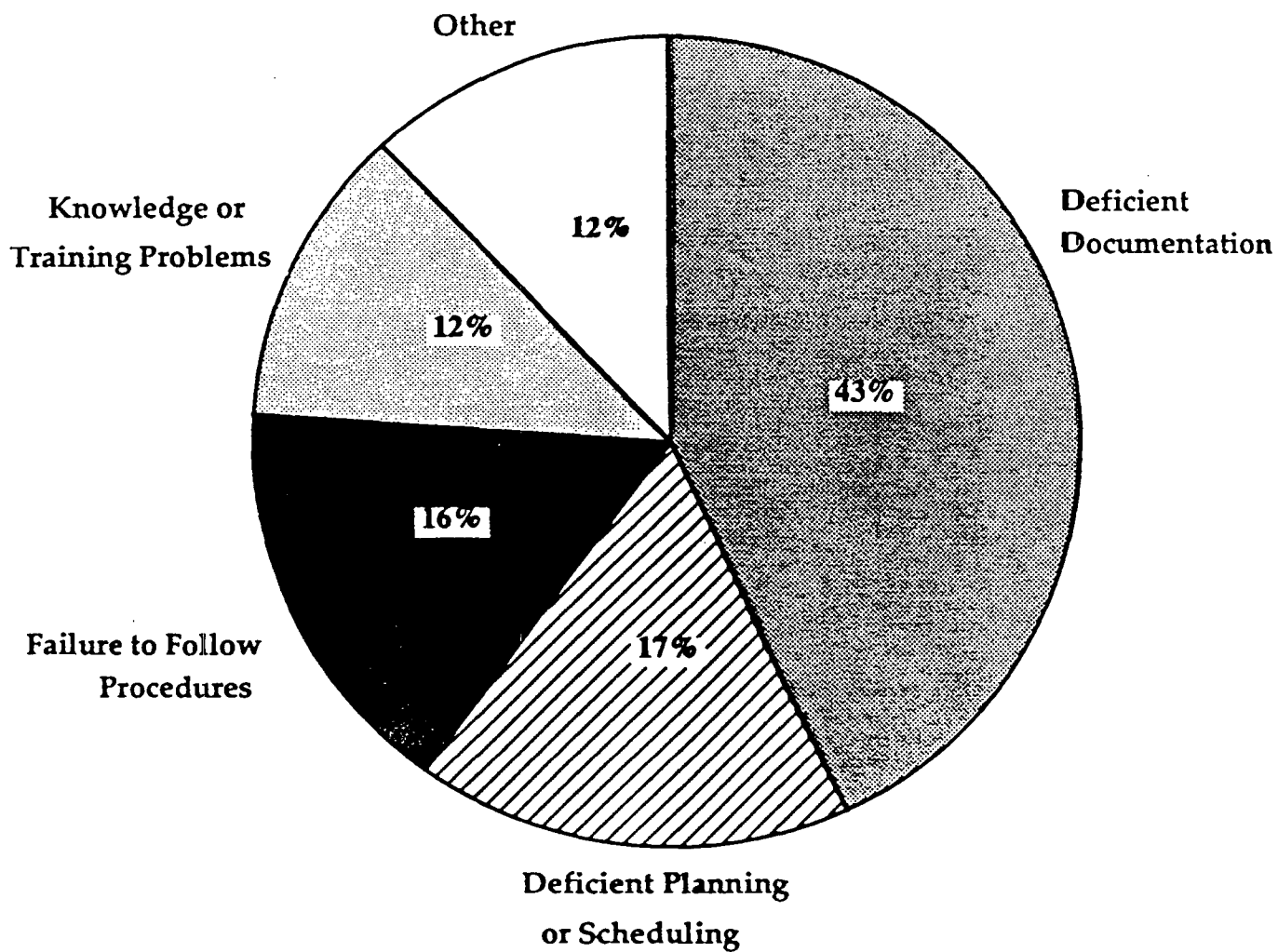
**FOUR MAIN OBJECTIVES
OF NUMARC WORKING GROUP 4
ON MAINTENANCE**

1. TO ASSIST INDUSTRY IN UNDERSTANDING
THE BROAD MAINTENANCE ISSUES
2. TO FOCUS INDUSTRY INITIATIVES ON
IMPROVEMENTS
3. TO INTERACT WITH THE NRC, PARTICULARLY
ON DEVELOPMENT OF THE MAINTENANCE
AND SURVEILLANCE PLAN PROGRAM (MSPP)
4. AND TO SERVE AS THE INDUSTRY POINT
OF CONTACT FOR GROUPS SUCH AS STANDARDS
COMMITTEES, EPRI, INPO AND NRC.

Distribution of Event Root Causes by Cause Category



Distribution of Maintenance-Related Problems by Human Performance Category

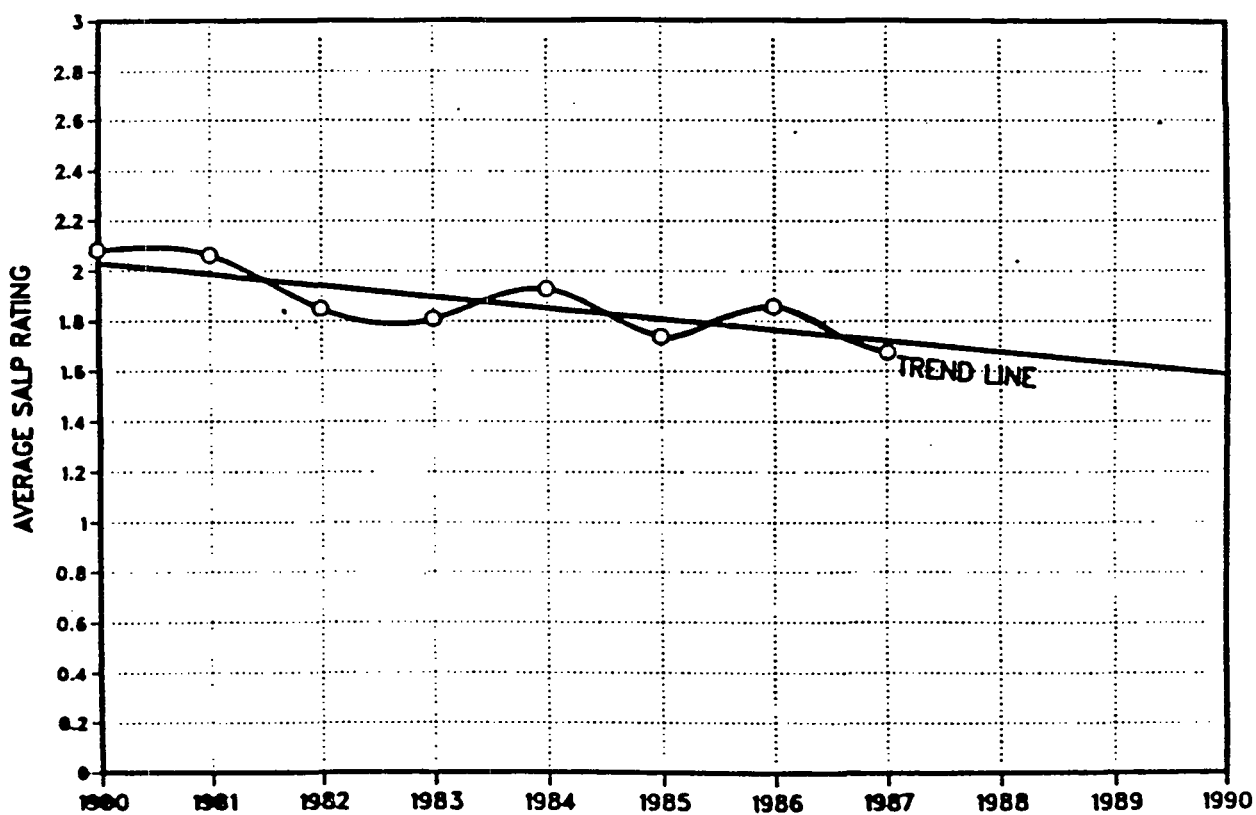


**GUIDELINES FOR THE CONDUCT
OF MAINTENANCE AT
NUCLEAR POWER STATIONS
INPO - 85-038**

- I. MAINTENANCE DEPARTMENT ORGANIZATION
AND ADMINISTRATION**
- II. TRAINING AND QUALIFICATION OF
MAINTENANCE PERSONNEL**
- III. MAINTENANCE FACILITIES, EQUIPMENT,
AND TOOLS**
- IV. TYPE OF MAINTENANCE**
- V. MAINTENANCE PROCEDURES**
- VI. PLANNING, SCHEDULING, AND
COORDINATION OF MAINTENANCE**
- VII. CONTROL OF MAINTENANCE ACTIVITIES**
- VIII. POST-MAINTENANCE TESTING**
- IX. PROCUREMENT OF PARTS, MATERIALS,
AND SERVICES**

- X. MATERIAL RECEIPT, INSPECTION,
HANDLING, STORAGE, RETRIEVAL, AND
ISSUANCE
- XI. CONTROL AND CALIBRATION OF MEASURING
TEST EQUIPMENT
- XII. MAINTENANCE TOOLS AND EQUIPMENT
CONTROL
- XIII. STATION MATERIAL CONDITION INSPECTION
- XIV. MANAGEMENT INVOLVEMENT
- XV. MAINTENANCE HISTORY
- XVI. ANALYSIS OF MAINTENANCE PROBLEMS

ALL REGIONS (ALL UNITS)
NRC MAINTENANCE SALPS
AVERAGE RATING VS. OPERATING YEAR



**INDUSTRY-WIDE NUCLEAR
POWER PLANT MAINTENANCE
PERFORMANCE INDICATORS**

- o CORRECTIVE MAINTENANCE BACKLOG GREATER THAN 3 MONTHS OLD
- o RATIO OF HIGHEST PRIORITY MWRs TO TOTAL MWRs COMPLETED
- o PREVENTIVE MAINTENANCE ITEMS OVERDUE
- o RATIO OF PREVENTIVE TO TOTAL MAINTENANCE
- o MAINTENANCE OVERTIME WORKED
- o MAINTENANCE RADIATION EXPOSURE (BWR)
- o MAINTENANCE RADIATION EXPOSURE (PWR)
- o LOST-TIME ACCIDENT RATE FOR PERSONNEL INVOLVED IN MAINTENANCE
- o UNPLANNED AUTO. SCRAMS WHILE CRITICAL ASSOC. WITH MAINTENANCE ACTIVITIES

**NUCLEAR MAINTENANCE
ASSISTANCE CENTER
NMAC**

OBJECTIVE -

- O TO ASSIST UTILITIES IN IMPROVING
THE MAINTENANCE ACTIVITIES ALREADY
IN PLACE AT NUCLEAR POWER PLANTS**

DEVELOPMENT STRATEGY -

- O EPRI PLAYING DOMINANT ROLE IN
ESTABLISHMENT THROUGH FUNDING AND
MANAGEMENT**
- O NMAC TO BE A SELF SUFFICIENT
ORGANIZATION BY 1991 THROUGH DIRECT
UTILITY SUPPORT**

NUCLEAR MAINTENANCE
ASSISTANCE CENTER

NMAC (CONT'D.)

ACTIVITIES -

- O INDUSTRY INITIATIVE TO IMPROVE
MOTOR-OPERATED VALVE (MOV) PERFORMANCE
AND RELIABILITY BY DEVELOPING A
TECHNICAL REPAIR STANDARD
- O PLANNED DEVELOPMENT OF A MOV
APPLICATION/DESIGN REVIEW GUIDE TO
AID TECHNICIANS AND ENGINEERS IN MOV
SPECIFICATIONS, INITIAL SETUP AND
TESTING

BENEFITS OF INPO MAINTENANCE PEER EVALUATION PROGRAM

- o IMPROVEMENT EVALUATION TEAM CAPABILITY BY THE ADDITION OF EXPERIENCED PEOPLE FROM SIMILAR PLANTS**
- o ENHANCED PROFESSIONALISM AND COMMUNICATION WITHIN THE NUCLEAR INDUSTRY MAINTENANCE COMMUNITY**
- o A LEARNING OPPORTUNITY FOR PEERS BY OBSERVING MAINTENANCE ACTIVITIES AT ANOTHER UTILITY**
- o ADDITIONAL SKILLS THAT THE PEER EVALUATOR CAN USE TO IMPROVE MAINTENANCE AT HIS OWN PLANT, AND**
- o FAMILIARIZATION OF THE PEER EVALUATOR WITH INPO AND ITS PROGRAMS**

**SUMMARY OF INDUSTRY INITIATIVES
SUPPORTED BY THE NUMARC WORKING GROUP
ON MAINTENANCE**

- o INDUSTRY-WIDE PERFORMANCE INDICATORS
- o INPO "GUIDELINES FOR THE CONDUCT OF
MAINTENANCE AT NUCLEAR POWER STATIONS"
85-038
- o MAINTENANCE SELF-ASSESSMENT INITIATIVE
- o INPO MAINTENANCE PEER EVALUATION PROGRAM
- o NUCLEAR MAINTENANCE ASSISTANCE CENTER
(NMAC)
- o REVIEW OF NRC SALP DATA FOR TRENDING
MAINTENANCE
- o INTERACTION WITH THE NRC ON MAINTENANCE
ISSUES

PREDICTIVE MAINTENANCE TECHNIQUES

- o VIBRATION MONITORING/ANALYSIS**
- o LUBRICATING OIL ANALYSIS AND MONITORING**
- o CONDENSER AIR IN-LEAKAGE MONITORING**
- o ELECTRICAL INSULATION CHECKS**
- o HEAT EXCHANGER AND EQUIPMENT PERFORMANCE
MONITORING**
- o INFRARED DETECTION**
- o MOTOR-OPERATED VALVE DYNAMIC TESTING**

JACK BRONS

NEW YORK POWER AUTHORITY

MAINTENANCE ISSUES BRIEFING

**INDIAN POINT THREE
965 MWE PWR**

**JAMES A. FITZPATRICK
810 MWE BWR**

PERFORMANCE AND PROCESS INDICATORS

AVAILABILITY

- PLANNED AND FORCED OUTAGE TIME
- PLANNED AND FORCED DERATE TIME
- FORCED LCO'S

THERMAL PERFORMANCE BTU/KWH

- PLANT-SPECIFIC NUMBERS

UNPLANNED AUTOMATIC SCRAMS

- KEYED TO INDUSTRY BEST QUARTILE
PERFORMANCE

CHEMISTRY PERFORMANCE

- LESS THAN PLANT-SPECIFIC OWNERS GROUP
GUIDELINES

PERFORMANCE AND PROCESS INDICATORS (CON'T.)

RADIOLOGICAL PERFORMANCE

- DECONTAMINATED AREA
- RADWASTE GENERATED/SHIPPED
- ENVIRONMENTAL RELEASES
- MAN REM

EQUIPMENT OPERABILITY

- CONTROL ROOM ANNUNCIATORS
- CONTROL ROOM INSTRUMENTS

MAINTENANCE DEPARTMENT PERFORMANCE

- WORK REQUESTS OUTSTANDING BY PRIORITY
AND TIME
- RATIO OF PREVENTIVE TO CORRECTIVE
MAINTENANCE
- WAREHOUSE STOCK PM PROGRAMS

PERFORMANCE AND PROCESS INDICATORS (CON'T.)

- VENDOR MANUAL UPDATE PROGRAM
PROGRESS**
- PM ITEMS OVERDUE**
- MAINTENANCE OVERTIME WORKED**

ENGINEERING PERFORMANCE

- BACKLOG OF ENGINEERING REQUESTS**
- NUMBER OF FIELD ISSUED ENGINEERING
CHANGES**
- NUMBER OF DATED TEMPORARY MODIFICATIONS**
- IMPLEMENTATION OF PREDICTIVE MAINTENANCE
PROGRAMS**

SCOPE OF MAINTENANCE

	<u>IP3</u>	<u>JAF</u>
1987 PREVENTIVE MAINTENANCE WORK REQUESTS		
o MAINTENANCE DEPARTMENT	940	713
o I&C DEPARTMENT	1634	1124
1987 CORRECTIVE MAINTENANCE WORK REQUESTS		
o MAINTENANCE DEPARTMENT	791	349
o I&C DEPARTMENT	1296	1002
1987 SURVEILLANCE TESTS	2175	1905

SCOPE OF MAINTENANCE

- o PREVENTIVE MAINTENANCE**

15 MANHOURS/WORK REQUEST

- o CORRECTIVE MAINTENANCE**

**MAINTENANCE
DEPARTMENT**

**60 MANHOURS/WORK
REQUEST**

I&C DEPARTMENT

**17 MANHOURS/WORK
REQUEST**

- o SURVEILLANCE TEST**

8 MANHOURS/SURVEILLANCE TEST

1P3 MAINTENANCE DEPARTMENT

1977

1 SUPERINTENDENT
1 ASSIST SUPER.

1 MAINTENANCE ENG.

1 PLANT FOREMAN
4 FIRST LINE
 MAINT. FOREMEN
24 MECHANICS
6 PUW'S
1 CLERK
39 TOTAL STAFF

1988

1 SUPERINTENDENT
1 MAINTENANCE GENERAL
 SUPERVISOR
9 ENGINEERS
2 PLANNERS
1 PLANT FOREMAN
6 MAINTENANCE
 SUPERVISORS
50 MECHANICS
12 PUW'S
2 CLERKS
85 TOTAL STAFF

NOTES:

- A. THE MAINTENANCE DEPARTMENT DOES NOT INCLUDE ANY I&C, DESIGN ENGINEERING OR PROCUREMENT FUNCTIONS. ALL OF THESE MAINTENANCE ACTIVITIES HAVE UNDERGONE SIMILAR GROWTH.**
- B. "MECHANICS" INCLUDE ELECTRICIANS, WELDERS, MACHINISTS, ETC.**
- C. "PUW" IS A UTILITY WORKER EMBRACING APPRENTICE MAINTENANCE TASKS AND JANITORIAL DUTIES.**
- D. IN 1977, THIS GROUP WAS RESPONSIBLE FOR RADWASTE COMPACTION AND HANDLING. RADWASTE RESPONSIBILITIES ARE NOW IN A DIFFERENT DEPARTMENT.**

MAINTENANCE PROGRAM ASSESSMENT - NYPA

- 1983** **EFFORTS BEGAN TO ASSESS
MAINTENANCE PROGRAMS**
- O BALANCE OF PLANT ACTIVITIES**
 - O PREVENTIVE MAINTENANCE**
- 1984** **PLANNED MAINTENANCE TASK FORCE**
(APRIL) **FORMED**
- 1984** **PLANNED MAINTENANCE TASK FORCE**
(NOVEMBER) **REPORT ISSUED**
- O CLASSIFICATION OF MAINTENANCE**
 - O ATTRIBUTES OF MAINTENANCE
 PROGRAMS**
 - O SUPPORT REQUIREMENTS**
 - O MAINTENANCE POLICY**

CLASSIFICATION OF MAINTENANCE ACTIVITIES

- o FORCED CORRECTIVE**
- o GENERAL REPAIR**
- o PLANNED**
 - PREVENTIVE**
 - PREDICTIVE**
 - CORRECTIVE**

1985	IMPLEMENTATION OF PLANNED MAINTENANCE PROGRAMS BEGAN
1985 (OCTOBER)	INPO GUIDELINES ISSUES
1986 (JANUARY)	ASSESSMENT OF PLANNED MAINTENANCE PROGRAMS
1986 (APRIL)	NYPA NUCLEAR MAINTENANCE COMMITTEE FORMED
1987 (MAY)	INPO SPONSORED INDUSTRY SELF- ASSESSMENT
1987 (DECEMBER)	ASSESSMENT OF PLANNED MAINTENANCE PROGRAMS

ROUTINE PREDICTIVE/PREVENTIVE MAINTENANCE TECHNIQUES

- o VIBRATION ANALYSIS**
 - BASELINE AND TROUBLESHOOTING**
- o OIL ANALYSES**
 - TRANSFORMERS AND ROTATING EQUIPMENT**
- o RF MONITORING**
 - MAIN GENERATOR**
 - REACTOR COOLANT PUMPS**
- o ACOUSTIC MONITORING**

ROUTINE PREDICTIVE/PREVENTIVE MAINTENANCE TECHNIQUES (CON'T.)

- O INFRA RED THERMOGRAPHY**
 - SWITCH YARD AND TRANSFORMERS**
 - STEAM TRAPS**

- O HELIUM LEAK TESTING**
 - CONDENSERS AND STEAM GENERATORS**
 - ATTEMPTED USE OF SF 6**

- O MOVATS**

- O LIVE LOAD PACKING**

NYPA UNIQUE MAINTENANCE INITIATIVES

- o WORK CONTROL CENTER**
 - FOLLOWS INPO REPORT ON VISIT TO EUROPEAN UTILITIES**

- o VIDEO MAPPING**
 - ALARA PLANNING**
 - DESIGN ENGINEERING APPLICATIONS**
 - EMERGENCY PLAN APPLICATION**

- o DEVELOPMENT OF RHSI - PATENT APPLICATION**

- o POST-ACCIDENT SAMPLE SYSTEM - PATENTED**

NYPA UNIQUE MAINTENANCE INITIATIVES (CON'T.)

- o LABOR BROKER CONCEPT**
 - HAS EVOLVED TO MIXED CREW CAPABILITY**

- o FAILURE ANALYSIS ASSOCIATES**
 - MAIN GENERATOR FAILURE**
 - RCP MOTOR FAILURE - DESIGN CHANGE**
 - TURBINE BLADE FAILURE - OPERATIONAL CHANGE**

- o SUGGESTION PROGRAM**
 - LARGEST AWARDS FOR MAINTENANCE SUGGESTIONS**

- o APPRENTICE PROGRAM AT JAF**
 - PREDATES ACCREDITATION**

REGULATORY OPPORTUNITIES

- o EMPHASIZE PERFORMANCE NOT PROCESS
"MUST BE MAINTAINED IN AUDITABLE FORM"**
- o BALANCE REGULATORY NEED AND MAINTENANCE
IMPACT**
- o ENCOURAGE RELIABILITY BASED
SURVEILLANCES**

ADVICE TO NAVAL OFFICERS

ALWAYS TELL YOUR PEOPLE WHAT YOU WANT DONE

NOT

HOW TO DO IT

JOE F. COLVIN
NUCLEAR MANAGEMENT
AND RESOURCES COUNCIL

NRC COMMISSION BRIEFING ON MAINTENANCE

MAINTENANCE

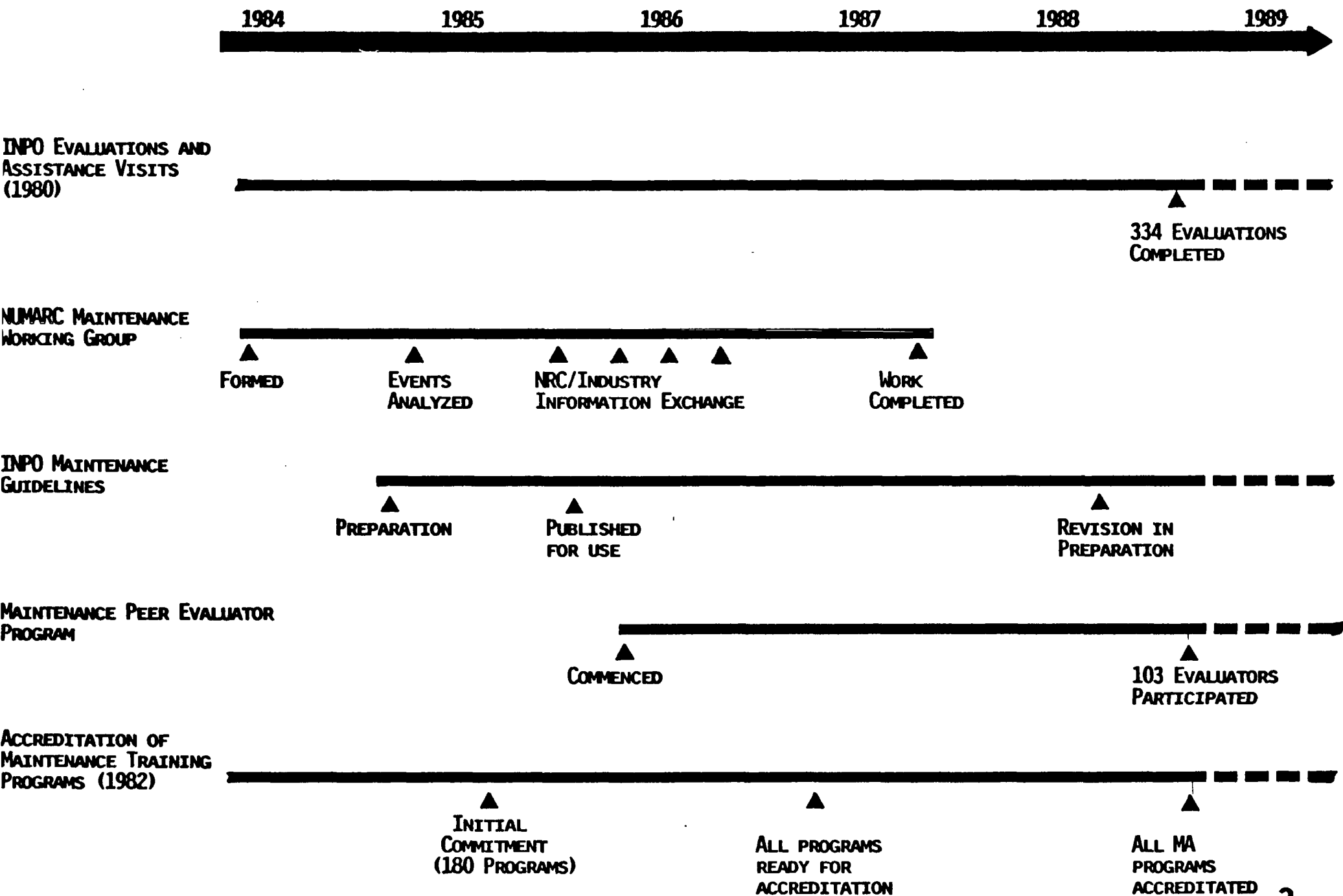
- 0 WHAT WE ARE DOING IN MAINTENANCE AND WHY**
- 0 WHAT THE RESULTS OF THESE INITIATIVES ARE**
- 0 HOW THESE INITIATIVES COMPARE TO OTHER INDUSTRY INITIATIVES**
- 0 WHAT THE FUTURE HOLDS**

**WHAT ARE WE DOING IN MAINTENANCE?
WHY THE INCREASED INTEREST?**

**PLANT EVENTS ATTRIBUTABLE TO MAINTENANCE
SAFETY**

**PUSH TOWARDS INCREASED CAPACITY FACTORS
RELIABILITY**

**PRESSURE TO REDUCE O&M COSTS
ECONOMY**





**HUMAN PERFORMANCE
EVALUATION SYSTEM
(VOLUNTARY)**



**PERFORMANCE
INDICATORS (1982)**



**SELF ASSESMENT
INITIATIVES**



**MAINTENANCE
ASSISTANCE AND
REVIEW TEAMS (MARTS)**



**OUTAGE MANAGEMENT
ASSISTANCE PROGRAM**

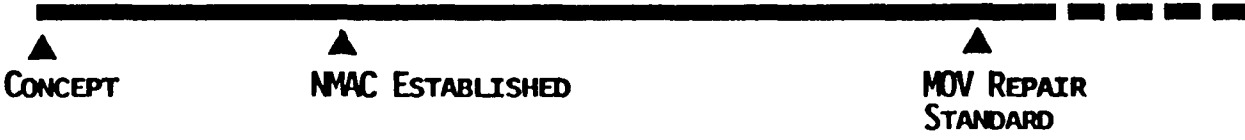


**EPRI MAINTENANCE
APPLICATION CENTER
(MEAC)**





**NUCLEAR MAINTENANCE
ASSISTANCE CENTER**



**EPRI COMPONENT
MONITORING AND DIAGNOSTIC
TECHNOLOGY TRANSFER CENTER
(M & DC)**



**INTEGRATED MOV
INITIATIVES**



**CHECK VALVE
INITIATIVES**



EXCERPTS FROM INPO MAINTENANCE GUIDELINES

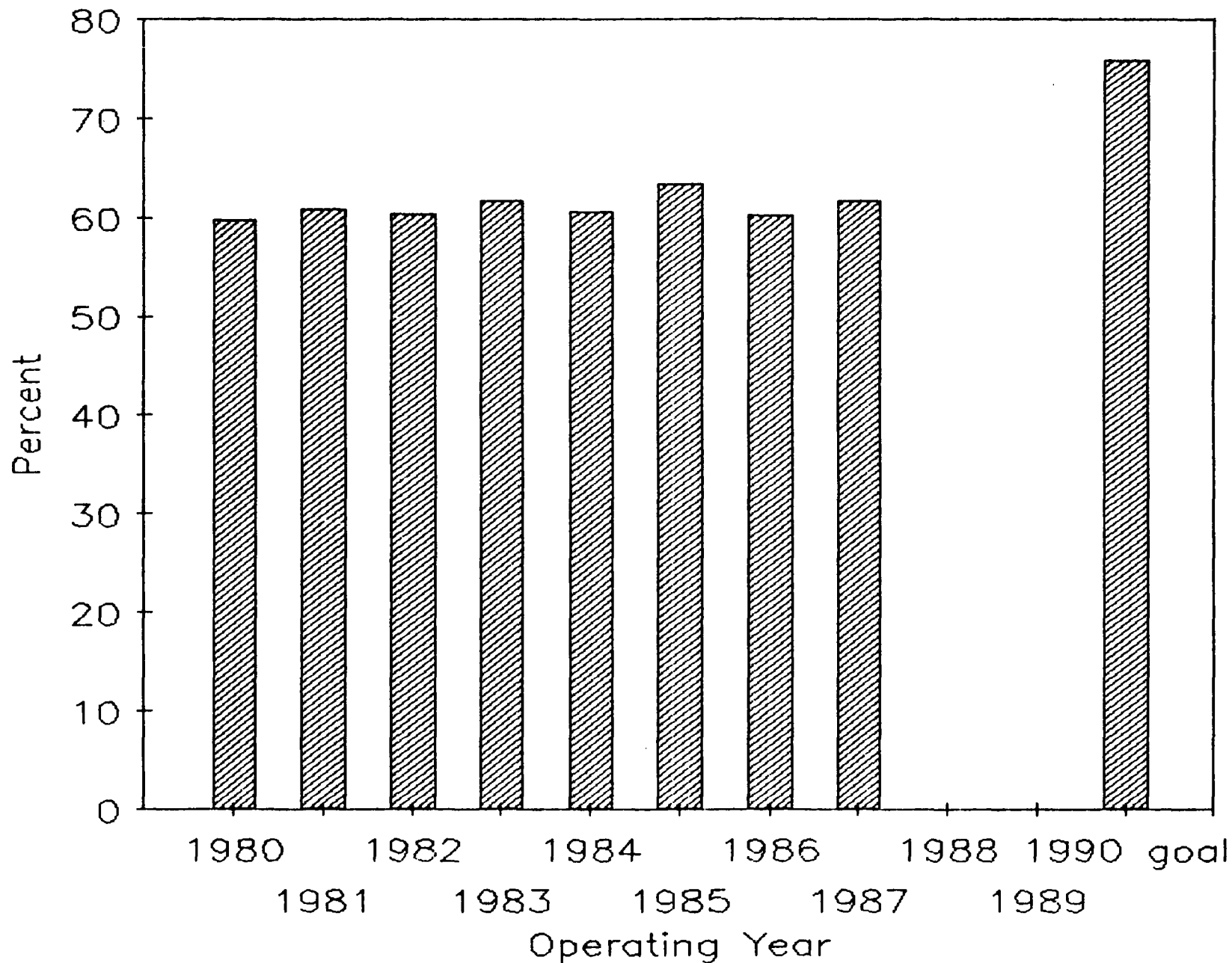
CONTROL OF MAINTENANCE ACTIVITIES

- WORK CONTROL PROCEDURE**
- MAINTENANCE REQUESTS**
- SUPERVISION OF MAINTENANCE ACTIVITIES**
- REVIEW OF COMPLETED MAINTENANCE REQUESTS**
- TEMPORARY REPAIRS**
- CONTROL OF NON-STATION UTILITY AND CONTRACTOR PERSONNEL**

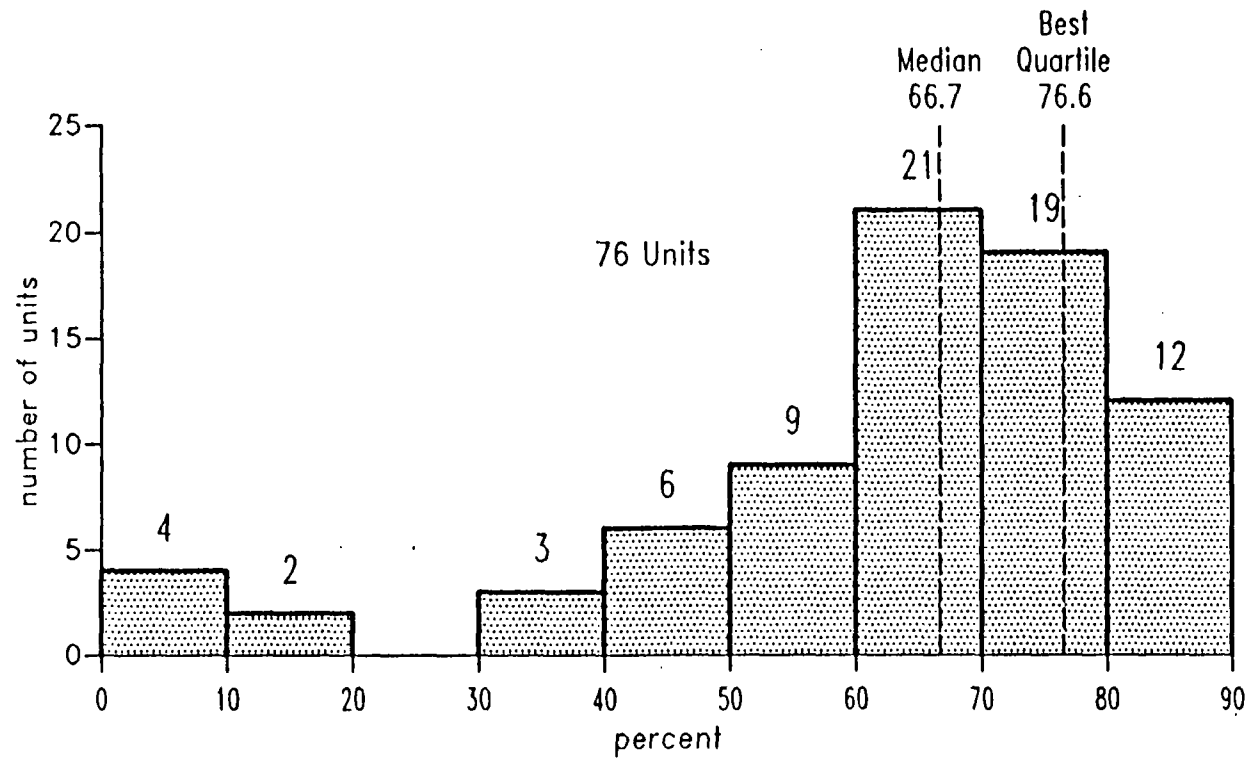
INPO
"TOP EQUIPMENT PROBLEM LIST"

- | | |
|--|---------------------------------------|
| 0 STATION BATTERIES | 0 MOTOR-OPERATED VALVES |
| 0 DIESEL GENERATORS | 0 STANDBY TURBINE DRIVEN PUMPS |
| 0 MAIN FEEDWATER FLOW
CONTROL | 0 HEAT EXCHANGER TUBES |
| 0 RELIEF VALVES | 0 PIPING |
| 0 MAIN STEAM TURBINES | 0 CHECK VALVES |
| 0 REACTOR COOLANT
PUMPS | 0 A.C. INVERTERS |
| 0 AIR SYSTEMS | |

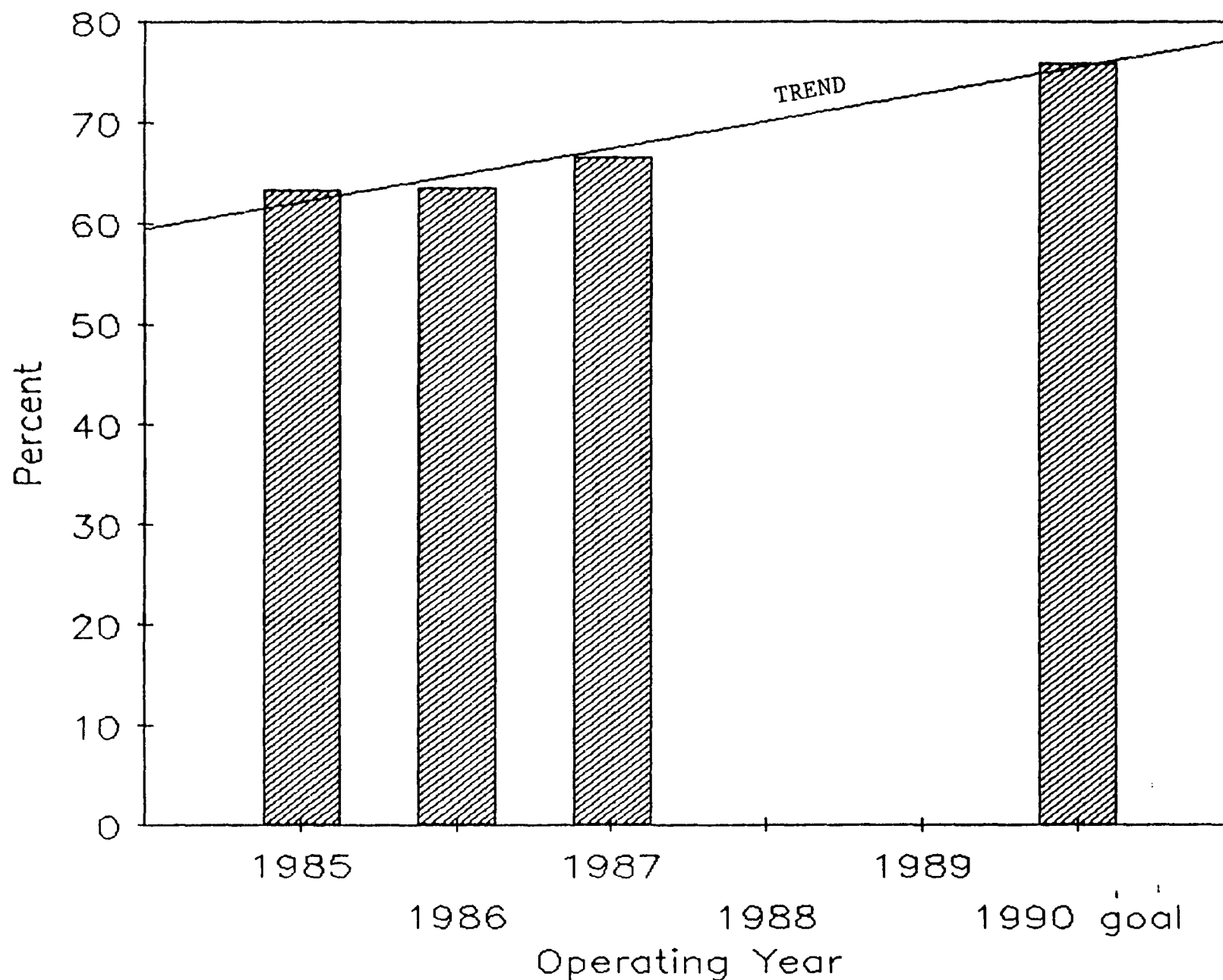
Equivalent Availability Factor Industry Average



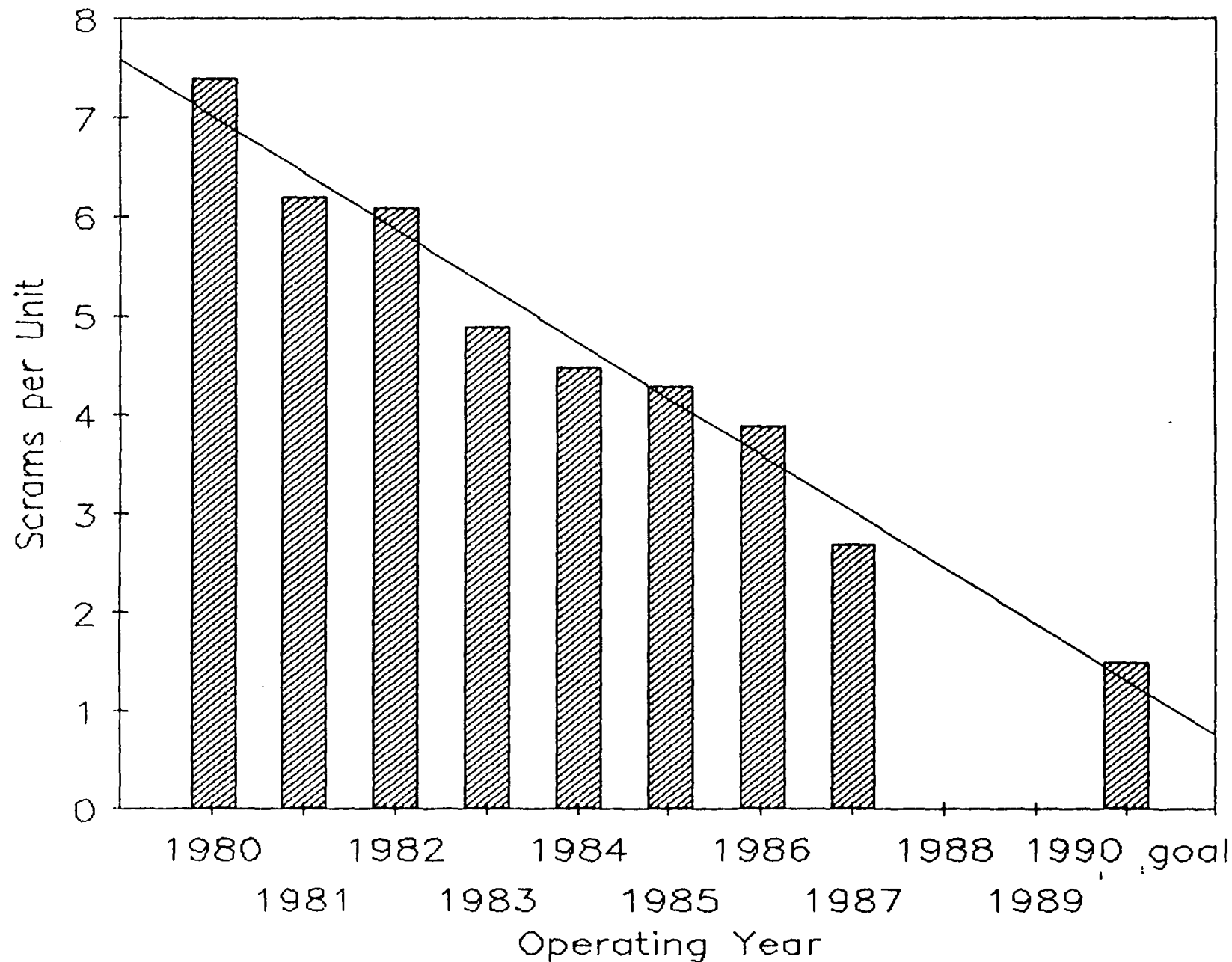
Equivalent Availability Factor
Three Year Distribution
(1/85 - 12/87)



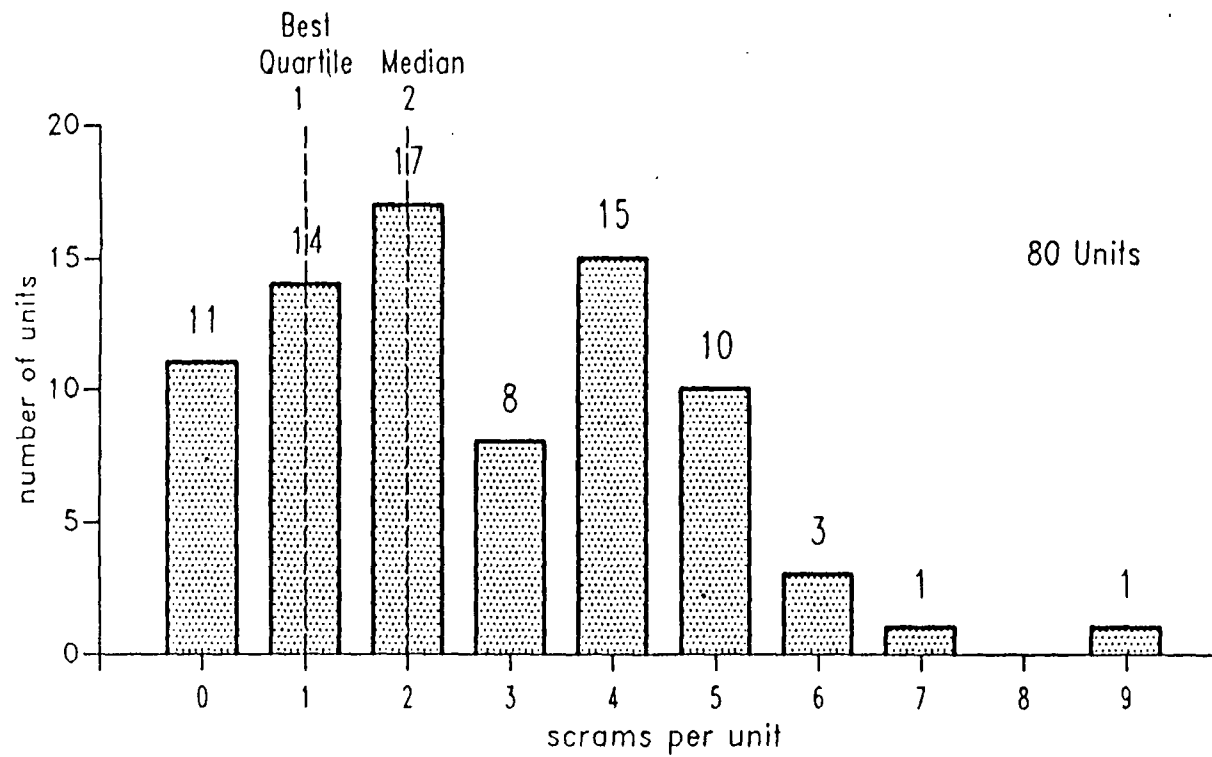
Median Equivalent Availability Factor for 1985, 1986 and 1987



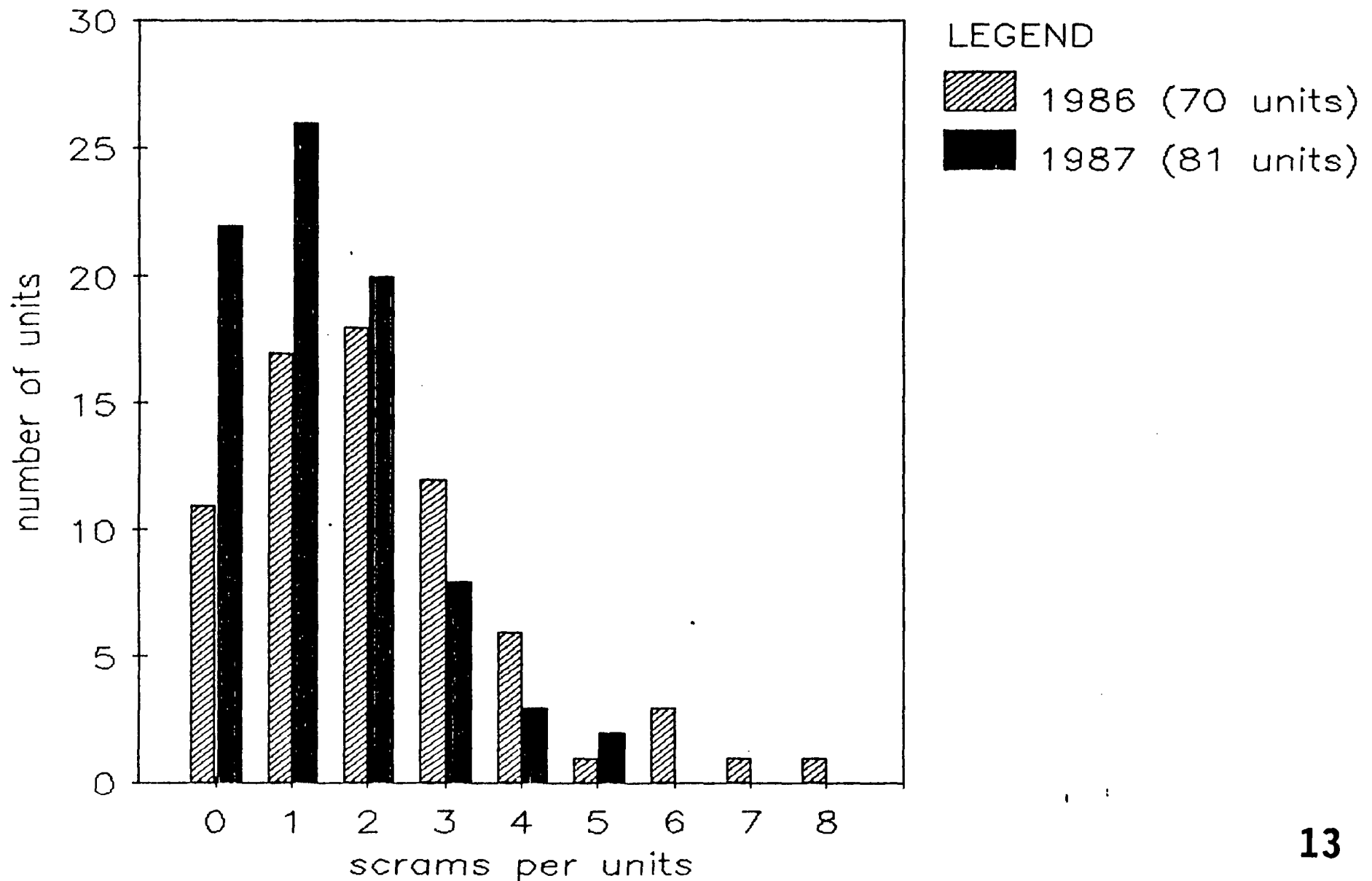
Unplanned Automatic Scrams While Critical Industry Average



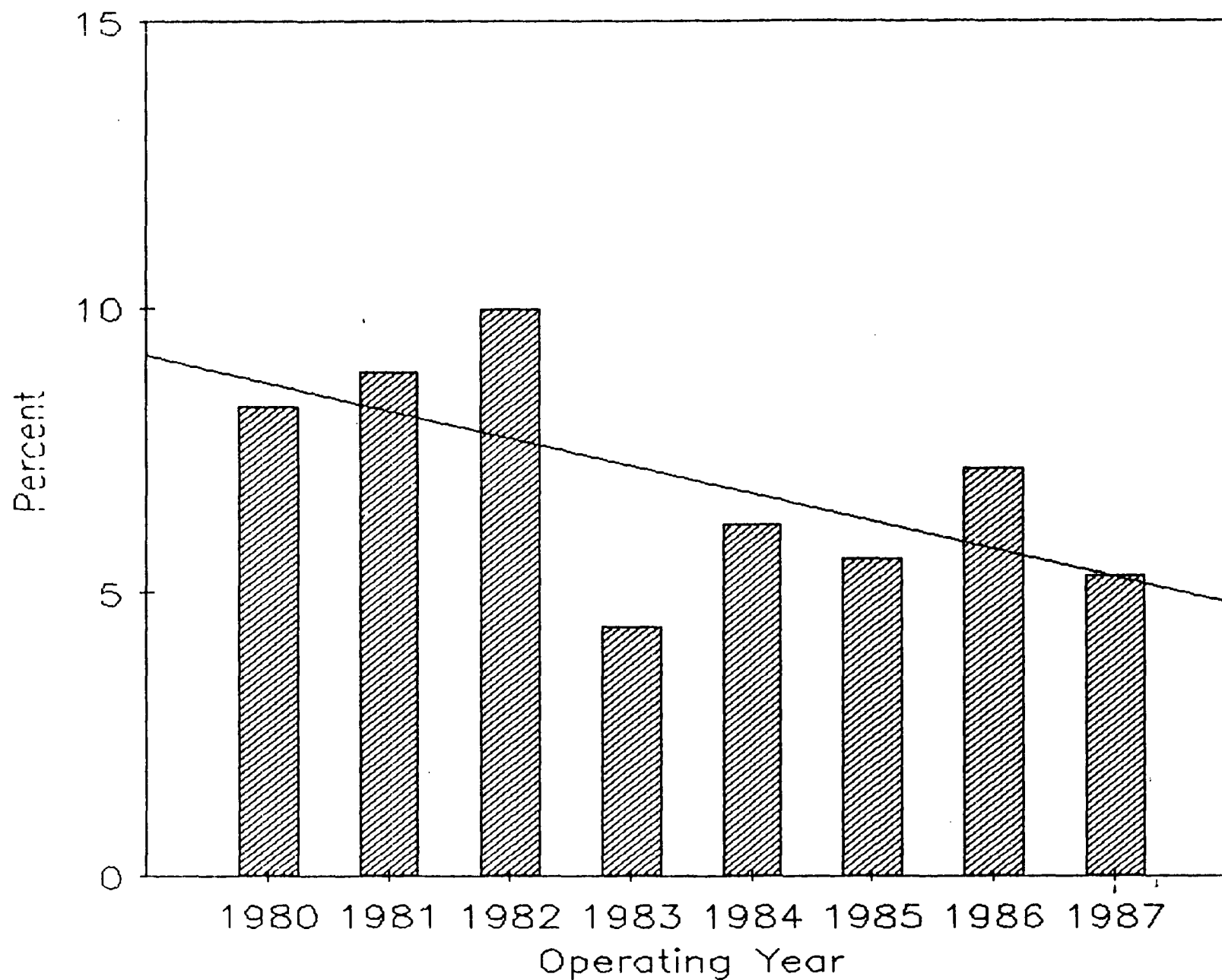
Unplanned Automatic Scrams While Critical
One Year Distribution
(1/87 - 12/87)



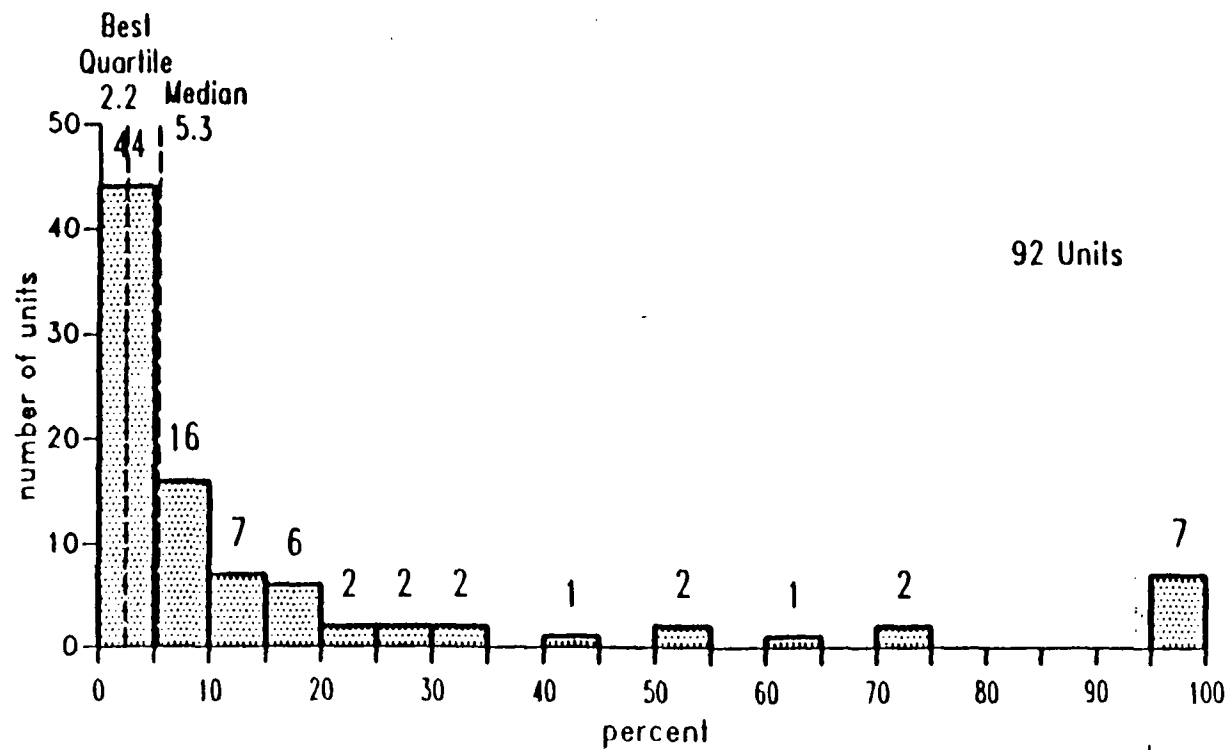
Unplanned Automatic Scrams While Critical Associated with Maintenance Activities 1986 vs. 1987



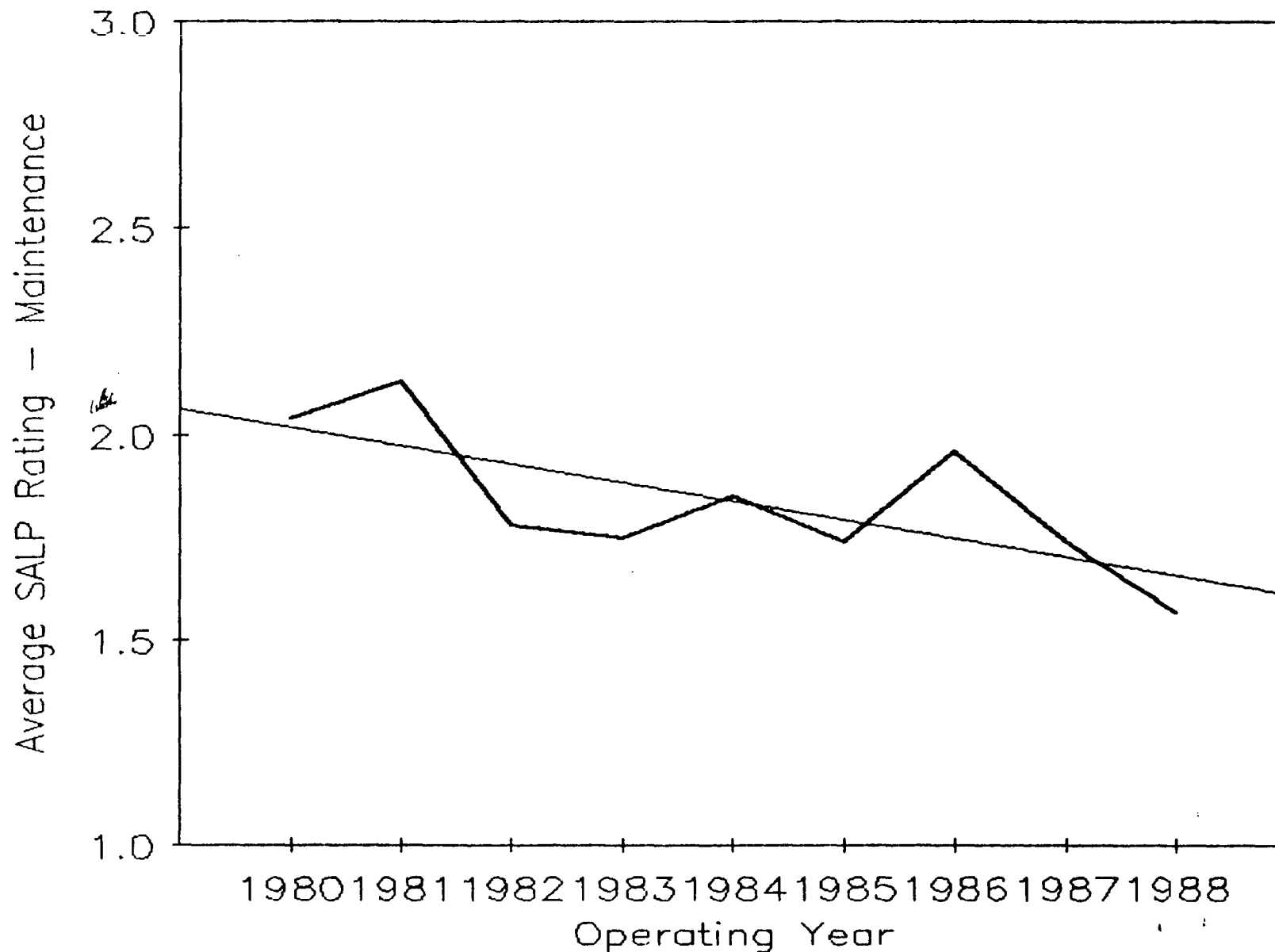
Forced Outage Rates Industry Median Values



Forced Outage Rate One Year Distribution (1/87 - 12/87)

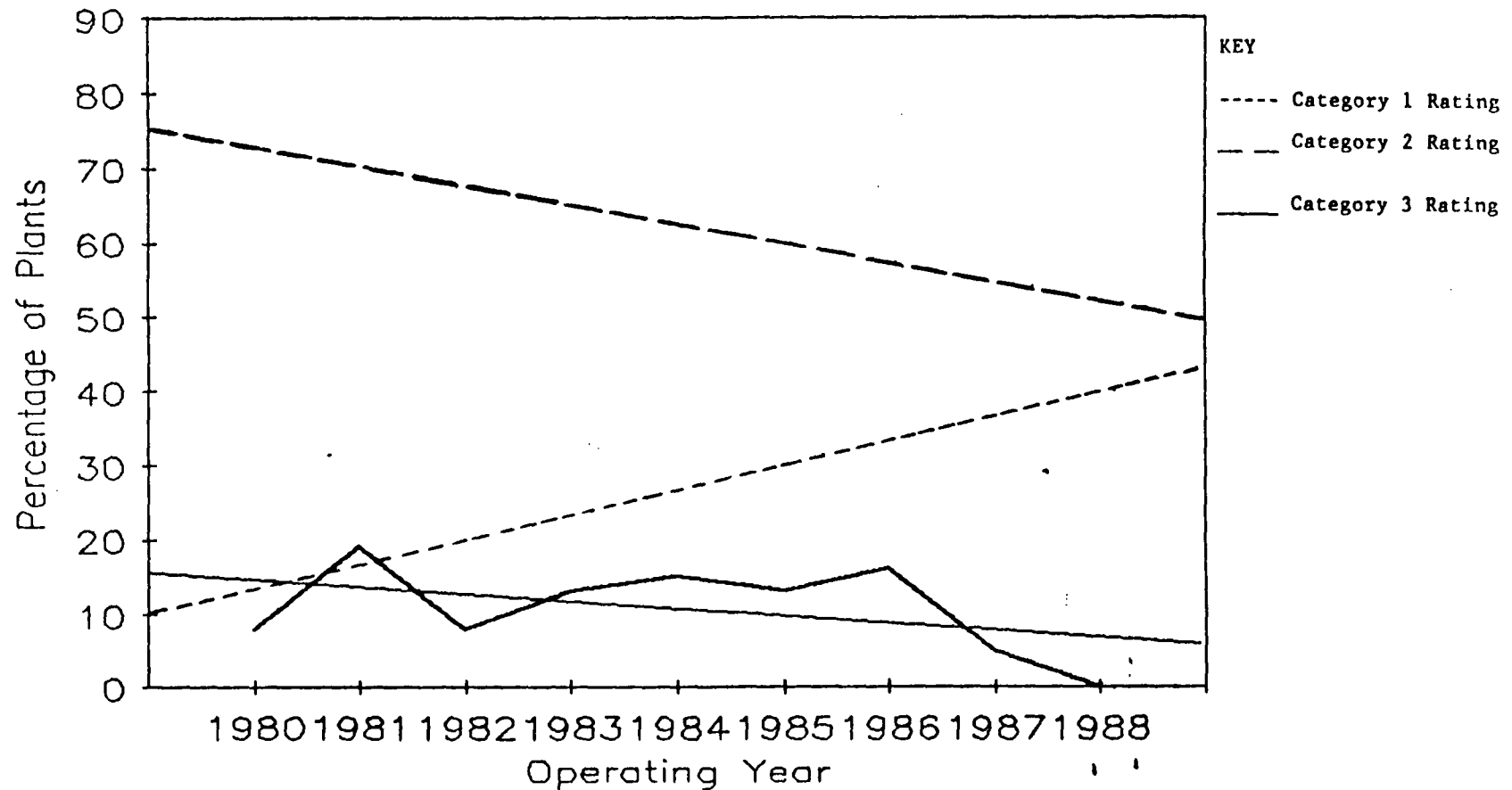


Average Ratings (all Regions/all units) for NRC Maintenance SALPS



1988 data incomplete (Jan - March)

Percentage of Plants Receiving Categories 1 and 2 Ratings for Maintenance SALPS as Compared to Percentage Receiving Category 3 Ratings (all Regions)



1988 data incomplete (Jan - March)

COMPARISON OF APPROACH

	<u>MAINTENANCE</u>	<u>TRAINING</u>	<u>FITNESS FOR DUTY</u>
FUNDAMENTAL INPO CORNERSTONE PROGRAM (SINCE 1979)	YES	YES	NO
SPECIFIC EVALUATION SUBJECT AREA WITH UNIQUE PERFORMANCE OBJECTIVES & CRITERIA	YES	YES	YES
INDUSTRY GUIDELINES ESTABLISH PROGRAM ELEMENTS. DEVELOPED WITH BROAD INDUSTRY INPUT AND NRC REVIEW AND COMMENT.	YES	YES	YES
ALL UTILITIES COMMITTED TO MEET INTENT OF GUIDELINES.	YES	YES	YES
INDUSTRY PEER EVALUATORS ASSIST INPO EVALUATION TEAMS DURING EVALUATION AND ASSIST VISITS.	YES	YES	NO

COMPARISON OF APPROACH

	<u>MAINTENANCE</u>	<u>TRAINING</u>	<u>FITNESS FOR DUTY</u>
ALL UTILITIES CONDUCT SELF-ASSESSMENT OF PROGRAM AGAINST INDUSTRY GUIDELINES AND REPORT RESULTS TO INPO	YES	YES	NO
INPO REVIEW SELF-ASSESSMENT TO DETERMINE NEED FOR ADDITIONAL ASSISTANCE TO UTILITY AND POSSIBLE GENERIC LESSONS LEARNED. FOLLOW ON WORK WITH UTILITY TO IMPROVE PROGRAM.	YES	YES	N/A
INPO EVALUATION TEAM FOLLOW-UP ON UTILITY CORRECTIVE ACTIONS TO IDENTIFIED DEFICIENCIES	YES	YES	YES

COMPARISON OF APPROACH

	<u>MAINTENANCE</u>	<u>TRAINING</u>	<u>FITNESS FOR DUTY</u>
INPO ASSISTANCE TEAM VISITS TO SELECTED UTILITIES.	YES	YES	YES
ACCREDITATION/CERTIFICATION OF PROGRAM	NO	YES	NO
NRC RULES/REGULATIONS APPLICABLE	YES	YES	NO
NRC POLICY STATEMENT RECOGNIZING INDUSTRY INITIATIVES	YES	YES	YES
NRC INSPECTIONS TO ASSESS UTILITY PROGRAMS	YES	YES	YES
NRC OVERVIEW OF INDUSTRY INITIATIVES, INCLUDING PARTICIPATION WITH SELECTED INPO EVALUATION AND ASSISTANCE TEAMS	YES	YES	YES

COMPARISON OF APPROACH

	<u>MAINTENANCE</u>	<u>TRAINING</u>	<u>FITNESS FOR DUTY</u>
NRC AUTHORITY EXISTS TO ADDRESS PLANTS NOT PERFORMING UP TO DESIRED LEVEL	YES	YES	YES
INDUSTRY INITIATIVES ACHIEVING RESULTS	YES	YES	YES

WHAT DOES THE FUTURE HOLD?

PERFORMANCE WILL BE IMPROVED

- SAFETY ENHANCEMENT
- HIGHER CAPACITY FACTORS
- LOWER MAINTENANCE COSTS

NOT AN OVERNIGHT ACHIEVEMENT - 3 TO 5 YEARS

EARLY SIGNS WILL BE MIXED

REQUIRES AN INDUSTRY-WIDE COMMITMENT

REQUIRES A REGULATORY COMMITMENT

ESSENTIAL FOR THE NUCLEAR OPTION