Attachment A

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

July 12, 1978

Mr. Lee V. Gossick
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: NUCLEAR PLANT RELIABILITY DATA SYSTEM (NPRDS)

Dear Mr. Gossick:

In response to the request contained in your memorandum of April 6, 1978, the Committee has examined the NPRDS Working Group Report dated March 30, 1978 and has had the benefit of a briefing by Mr. Richard A. Hartfield, MPA. The Committee also asked its Subcommittee on Reliability and Accident Probabilities to collect some additional information on this subject. The Subcommittee met on June 8, 1978 to consider presentations by representatives of the American National Standards Institute (ANSI), by Mr. Hartfield and by several other members of the NRC Staff representing potential users of the existing, or of a modified, NPRD system.

The Committee concludes that the existing NPRD system has a reasonable number of participants, and that the quantity of data available is increasing at a reasonable rate. There is evidence, however, that attention should be given to improving the quality of the data and the uniformity of reporting. Based on its limited study the Committee believes the system would be improved by some analyses aimed at examining the internal consistency, the usefulness, and the reasonableness of the data already collected.

The Committee sees no reason at this time to recommend that NPRDS reporting be made mandatory. The system is still in a formative stage and careful thought, based on a variety of needs and inputs, should be given to its continuing improvement.

The Committee recommends that the Staff and the industry continue to collect data, to improve the system, and to use the data and appropriate analyses as aids in effecting continuing improvements in reactor system safety and reliability.

Sincerely yours,

Stephen Lawroski

Stephen Lawroski
Chairman

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N18-20 Responses to Questions Posed by Advanced Notice of Proposed Rulemaking

Question No.1 - How should NPRDS effort be apportioned between improving plant availability and improving plant safety? Where should the emphasis be?

Response: NPRDS was developed to provide to the nuclear industry meaningful, long-term failure statistics and qualitative data on systems and components important to nuclear safety. It should remain as is and the emphasis should remain solely upon the safety related functions of systems and components. The goals and objectives of failure reports for safety related components and systems are substantially different than for balance-of-plant components. An attempt to merge them would tend to dilute the special emphasis on safety related systems.

The NRC already collects availability data from the utilities in the Monthly Operating Status Reports. The utilities also report detailed outage date to the Generating Availability Data Systems (GADS) run by the National Electric Reliability Council (NERC). The electric power industry is supporting development by the Electric Power Research Institute of a comprehensive national data base which will support efforts further to improve plant availability.

Question No.2 - How should NPRDS data be used by industry, the public and the NRC to achieve this emphasis? What other uses, if any, should be made of NPRDS data?

Response: The NPRDS data base is now sufficiently mature so that the nuclear industry and the NRC should be putting it to serious use. The ANSI N18-20 Subcommittee has encouraged increased use of the data through a yearly workshop, through conference papers, through its membership (which includes all NSS light water reactor vendors), and through close association with industry groups such as EEI, EPRI and NERC. Quarterly and Annual Reports have been produced since 1974 which can be used to determine trends, common causes, recurring failures, and other potentially serious system implications.

The nuclear industry should use NPRDS data in its analysis and evaluation of safety related systems and component performances. The results of these activities can also be used to identify precursors of significant events (component and/or system failures) affecting the operations of systems and plants.

The public should use NPRDS data to provide answers to the safety questions concerning the production of electricity and to place in perspective public acceptance of risk of producing electricity from nuclear power plants as compared with other alernative sources.

The NRC should use NPRDS data as a source of failure rates for components and systems in their Integrated Reliability Evaluation Program and in their Systematic Evaluation Program of selected operating plants. NPRDS data could be used to indicate systems where the use of probabilistic reliability analysis would be a more favourable approach than the single failure criteria analysis as a means of complying with criteria. NRC should also use NPRDS data in the development of regulatory guides for surveillance testing of safety related equipment in operating plants, and for refining the Limiting Conditions for Operation in plant technical specifications.

In summary, the NPRDS data should be used by the nuclear industry for such things as:

a. Improvement of component and system reliability.
b. Optimizing surveillance and test schedules.
c. Optimizing designs.
d. Identifying failure trends and wearout patterns.
e. Providing manufacturers with field performance data on their products.
f. Identifying spare parts needs.
g. Probabilistic analyses of various postulated accident sequences.

The NPRDS data should be used by the NRC for:

a. Probabilistic analyses of various postulated accident sequences.
b. Optimizing surveillance and test requirements.
c. Identifying failure trends.

The N18-20 Subcommittee is also encouraging greater use of NPRDS within the nuclear power plants through developments under way to provide piece parts identifiers to the failure reports, thus improving the usefulness directly in plant maintenance programs, and helping to identify the most needed spare parts for various safety related components.

Question No.3 - How should NPRDS data be gathered and analyzed to facilitate recommended uses?

Response: We feel that the existing data collection framework is appropriate. Our responses to Questions 9 and 10 describe Subcommittee efforts to further improve effectiveness.

There is a need with this data system as with others, to "force feed" the nuclear industry with specific periodic analyses and reports. The newly established Institute of Nuclear Power Operations (INPO) and Nuclear Safety Analysis Center (NSAC), both nuclear utility sponsored organizations, have such analyses as a specific part of their activities. INPO will utilize NPRDS and other applicable data sources in studies and analyses related to operations, maintenance, training and human factorrs. NSAC will utilize NPRDS and other applicable data sources in studies and analyses related to equipment design and reliability.

We feel that the existing system has worked well in the past, and it will improve as additional analysis and feedback is received from the newly established INPO and NSAC.

Question No.4 - Who should alert appropriate persons concerning problems uncovered from analysis of NPRDS data? Who should initiate design, maintenance or operating improvements?

Response: Alerts on significant events that need quick action will seldom, if ever, come from a data base analysis. The more likely items such as weakness in design, relative performance of vendors' equipment, need for changes in test or surveillance schedules, etc., are longer term and should not be classified as

alerts. At any rate, if the identified problem results from analyses by organizations such as NRC, INPO, EPRI, NSAC, or an NSSS vendor, that organization should take the lead in notifying the utilities, A/E's, etc.

Suspected generic problems identified by organizations such as utility, manufacturer, consultant, etc., should be referred to the more broadly based nuclear industry organizations, such as INPO and NSAC, for review of the generic implications and need for general notification.

NSAC and INPO have put in place a Significant Event Evaluation and Information Network (SEEIN) to disseminate the results of a comprehensive analysis of all sources of operational data, including the NPRDS. This network links plant operators, designers and vendors, as shown in Attachment C and it ties into the in-house analyses of the utilities' on-site review teams.

Whenever any of the concurrent, overlapping analyses of operational data suggest a generic problem, this network provides a mechanism for notifying all participants who might be affected by the problem. The network also contains feedback loops for monitoring the subsequent design, maintenance, or operating changes and tracking the problem to its resolution.

Safety-related problems uncovered by this network will be reported to the NRC by the appropriate vendor or plant operator under 10 CFR 21.

Question No.5 - What systematic analysis is conducted currently by licensees? To what extent and for what purpose should each licensee be required to analyze data from its plant and from other similar plants?

Response: A requirement already exists that each Licensee review operating experience at plants of similar design (TMI-2 Lessons Learned Task Force Report NUREG 0578). NPRDS through routine detailed output reports and the Special Report Writer capability (now being tested in a pilot program) can assist the utilities in this function by making historical engineering and failure data readily available. The program can serve as a useful tool in operational experience evaluation. But to require each Licensee to analyze the data would be needlessly duplicative, and in fact, would be counter-productive; it would inhibit utilities from performing the

non-routine, specialized types of analyses pertinent to particular situations and immediate needs. This data analysis can be more effectively accomplished with an attendant feedback mechanism by utility sponsored organizations such as INPO and NSAC and by the NRC Office of Analysis & Evaluation of Operational Data.

With 36 utilities currently reporting into NPRDS representing 60 units, it is impossible for the N18-20 Subcommittee to detail the types of analyses currently being performed. However, the interest that some utilities have expressed in using NPRDS data is evidenced by the following requests for information from SwRI.

Vendor Evaluation Program

- Special report to Public Service of Oklahoma of NPRDS date for engineering and failure listing on motors, 1,000 HP and larger, by manufacturers, for assessment of performance during design.
- Special counts and summaries report to Public Service of Indiana of NPRDS data on equipment supplied by vendors and their reported failures (NSSS and equipment manufacturer) for engineering evaluation to follow-up with suppliers to determine resolution of problems.

Responses to Request from NRC (in Licensing)

- Special report to Toledo Edison of NPRDS data for engineering and failure listings of certain types of globe and check valves in feedwater systems. Data were used to prepare an evaluation of proposed main steam non-return valves and feedwater control valves of Davis-Besse Units 2 and 3 as additional basis for applicant's position.
- Special report to Commonwealth Edison of NPRDS date for engineering and failure data of centrifugal and reciprocating pumps to prepare a response concerning surveillance frequencies on certain valves.
- A report by Dr. Vesely at the U.S. NRC Advisory Committee on Reactor Safeguards meeting on Reliability and Accident Probability, Washington, D.C., June 8, 1978 in permitting Portland General Electric to use in-house data to extend downtime on components in the emergency core cooling system, within technical specification limits for Trojan Nuclear Unit 1.

System and Component Performance

- Special report to General Public Utilities of NPRDS data on population and failure reports on Lonergan manufacture safety valves.
- Special report to Northeast Utilities Service Comlpany of NPRDS data on population and failure reports on Ingersol Rand pumps, on Buffalo Forge blowers, and on emergency generator systems.
- Special report to Arkansas Power & Light on NPRDS data on population and failure reports on diesel generator.

Test and Maintenance Planning

- Paper presented by Florida Power and Light Company at NPRD Workshop, December, 1977, San Antonio, Texas on development of Inspection and Test Program for Pumps and Valves using NPRDS data.
- In-house review by Tennessee Valley Authority of Summary Quarterly Report, Failure listing, Q04, and internal distribution of operating and maintenance groups for failures of equipment similar to theirs reported by other utilities.
- Special report to Baltimore Gas and Electric Company of NPRDS data on utilities with identical pump motors manufactured by Allis-Chalmers so that a spare could be located and installed within the repair time set by the technical specifications before the uit was forced to go into unscheduled shutdown or outage.

Spot Probabilistic Analysis, Reliability Studies, and Failure Data Base Buildup

- Special analysis by Duke Power Company for spare switchyard transformer economics researching in-house records and using NPRDS-type data in trade-off studies.
- Paper to be presented by Northeast Utilities Service Company at 7th Annual Conference on Reliability for the Electric Industry using NPRDS coded data for Trend Analysis.

Question No.6 - If NPRDS reporting is made mandatory, what form of NPRDS management (i.e. industry, NRC, or joint industry/NRC) will best lead to fully responsive reporting and to meaningful analysis?

Response: The management of NPRDS should not be dependent upon mandatory or voluntary considerations. The management should be based upon input from industry, government, and the utilities. The present makeup of the N18-20 Subcommittee is composed of these groups.

Meaningful and responsive reporting is being accomplished under the present management.

Question No.7 - To what extent, if any, should the NRC manage NPRDS reporting and data analysis?

Response: As noted by the GAO, the NPRDS has been developed and operated primarily by the nuclear industry for industry's benefit. Under the present management of NPRDS, NRC has representatives on the N18-20 Subcommittee. We consider that this participation is adequate in providing the NRC with a mechanism for constructive input. Management of the system by NRC would inherently force the system into the regulatory arena with all the attendant loss of flexibility and complications of legal and political impacts.

Question No.8 - If NPRDS reporting is mandatory, how should the NRC inspect and enforce mandatory licensee participation? Should licensees be subject to enforcement penalties for non-compliance with NPRDS requirements?

Response: A requirement that all utilities participate in NPRDS does not necessitate a separate inspection and enforcement function at the utility level by the NRC. The degree and accuracy of reporting is readily available for review by the N18-20 Subcommittee (which has NRC representation) and the NRC staff through reports prepared by the NPRDS contractor. The tacit assumption contained in this question, that NRC must inspect and enforce if participation is to be made mandatory, clearly demonstrates the very concerns expressed in the response to Question 7.

The NRC has sufficient regulation (through Technical Specifications and 10 CFR 21 requirements) to ensure that nuclear safety concerns are properly reported. NPRDS is a long term statistical data base developed by the industry, and it is inappropriate to suggest or consider enforcement penalties. As stated in the response to Question 7 and reemphasized here, NPRDS should not be used as a regulatory tool.

Qeustion No.9 - What improvements should be made to the NPRDS Manual or other guiding vehicle to enhance uniformity of reportable scope, completeness and accuracy of reporting, and usability of the data?

Response: Uniformity of reporting can best be accomplished by demonstrating to those doing the work that the data is useful and is being used to improve the safety, performance and reliability of their plants. The primary problem with reportable scope has been the lack of an appropriate guide which can be referenced in the procedures manual. This problem was recognized from the outset and it was hoped that appropriate standards would be forthcoming. The Unique Identification of Plant Equipment (UNID) now being developed by an electric industry committee for approval as an IEEE Standard should provide more of the detailed guidance and instruction to insure more consistent reporting.

In 1978 the ANSI N18-20 Subcommittee established a Task Force to review, clarify, define and recommend rules and procedures to the ANSI N18-20 Subcommittee in the following areas:

1. Improved quality of data.
2. Standardized reportable scope and failure reporting.
3. Increased usage of data.
4. Improved rules for reporting and maintaining the data base.
5. Expanded scope of audits of data.
6. Implementation of computer terminal access for special reports.
7. Other areas as directed by the ANSI N18-20 Subcommittee.

Progress is being made in each of these areas as mentioned in response to some of the other questions, and as this work is completed it will be incorporated in the Reporting Procedures Manual for NPRDS. The analyses which will be performed by NSAC, INPO and the NRC (see Question #3) will contribute to the demonstration of usefulness and will accelerate added uses within the utilities, A/E's and Manufacturers.

Question No.10 - Any data-gathering system needs feedback to maintain and upgrade system capability in the face of changing events, methodological advances, and other factors. Feedback is particularly necessary to modify data-gathering activity upon which the whole analytical system rests. What feedback features, if any, should be addressed by rulemaking?

Response: There have been a number of changes to the NPRDS procedures manual and reporting forms since the system went into operation in July 1974, all as a result of feedback to the ANSI N18-20 Subcommittee. With the expected usage of the data base by NSAC, NRC, and INPO, there will be additional valuable feedback. We see no need for this subject to be addressed further.

Question No.11 - Should the NPRDS and LER systems be restructured to avoid overlapping data-gathering requirements or should present systems formats be retained?

Response: LER's are designed for rapid reporting of significant events, both equipment related and non-equipment related. NPRDS is designed for assessment of long term reliability of systems and components. Although data may overlap, the functions are independent. Restructuring should be limited to satisfying the intent of the LER system and should not be tied to NPRDS.

Question No.12 - In the event you recommend eliminating duplication between LER and NPRDS reporting, how would you restructure each system's reporting requirements? Comment specifically on the idea expressed in summary Paragraph 8 of limiting LER reporting to items of major safety significance. Should such restructuring be done simultaneously with making NPRDS reporting mandatory or should ongoing NPRDS and LER upgrading efforts continue separately?

Response: See response to Question 11. We do recommend eliminating duplication to the extent possible while preserving the independent functions of the LER and NPRDS systems. We agree that LER's should be limited to items of major safety significance to the extent that "significance" can be determined. Since the purpose of NPRDS is long term reliability data, we do not agree that a mandatory system is a necessary precursor for such a change.

Question No.13 - Do you agree with the summary paragraph 2 estimate of a minimum of 3500 components as an appropriate scope? Assuming a reportable scope of 3500 components, how many NPRDS failure reports should be expected per month per operating plant?

Response: As noted in the response to Question 9, the N18-20 Subcommittee is presently working on a new listing of reportable scope and it is premature to second guess what an appropriate number might be or what the variation might be from one design to another.

The number of failures per month in a plant is small enough so that a meaningful average could only be established over a number of years, especially with the effects of higher failure reporting during surveillance periods. The N18-20 Subcommittee objects to any implication that benchmarks such as failures/month can or should be used in evaluation.

Question No.14 - Should the scope of systems and components presently summarized by the NPRDS Manual be expanded or contracted and, if so, what areas?

Response: Some change in the scope of reporting to NPRDS is expected as a result of the ANSI N18-20 Subcommittee efforts described in the responses to Question 9 and 13. TMI-2-related investigations have indicated the need to look carefully at various currently non-reportable components in proximity to the primary system or ECCS. This is being considered in the studies now underway.

The resulting change in the NPRDS scope is expected to be fairly minor, however, since the existing data collecting systems, described in our response to Question 1, adequately cover those systems and components outside the scope of NPRDS.

Question No.15 - Does the cost of preparing and submitting failure reports differ between the LER and the NPRDS systems? What do you estimate these costs to be?

Response: This response will have to come directly from the utilities.

Question No.16 - Are the per plant figures of $75,000 to $200,000 for one time development of NPRDS engineering data and $50,000 for annual NPRDS reporting considered valid or are these figures understated or overstated?

Response: This response will have to come directly from the utilities.

Question No.17 - What alternatives to mandatory reporting would provide the data necessary for complete and accurate reliability analyses and at what level of assurance?

Response: It is a fundamental flaw to assume that for a data base to be useful it must represent 100% of the potential data base. While this is probably true for a regulatory data base upon which enforcement actions are based, it very definitely is not true for a long term statistical data base such as NPRDS.

The ANSI N18-20 Subcommittee fully supports the concept of 100% enthusiastic reporting by the utilities, but not at the expense of involving this long term reliability data base in the regulatory process with attendant legal, political, inspection, enforcement, etc., activities.

Response to NPRDS has been rapidly improving as evidenced by the attached graph of NPRD 2 (Engineering Data) data sets in the data base. With the expected usage of NPRDS data by NRC, NSAC, and INPO, we expect response from the utilities will further improve and be completely adequate without any regulatory involvement.

Accuracy of the data is, of course, of prime importance. The ANSI N18-20 Subcommittee and the NPRDS contractor, Southwest Research Institute, have taken steps to enhance the accuracy of data submittals. A few of these efforts include an edit check of the engineering data via computer, a comprehensive, 100% check of failure reports by the NPRDS contractor, conducting yearly training seminars for utilities and other interested parties, and establishing working groups (N18-20) Task Force) to specifically address both program quality assurance and NPRDS data usage. Further improvements in accuracy will come with feedback resulting from the increased usage of the data by NRC, INPO, and NSAC.

Question No.18 - Do the benefits to the utility and the public of improved availability and increased reactor safety warrant the cost of NPRDS or is there a less costly way to realize equivalent benefits in regulatory action?

Response: As addressed in Question 1, the NPRDS effort is and should continue to be directed at improving nuclear plant safety. It is our best judgment that this system has a positive cost-benefit ratio although it is not possible to determine the exact value. The utilities have spent considerable time, effort, and money to develop and support this system. Making the NPRDS mandatory may increase its benefits, but will certainly increase its cost.

In addition, the utilities have demonstrated that they perceive the need for improved power plant information systems through their voluntary support of availability related systems such as GADS and EPRI's National Data Base development effort. This has all been accomplished without regulatory intervention.

Question No.19 - How should the NPRDS be funded? Should industry fund fully or should the NRC contribute funds to support the industry system?

Response: We believe that NPRDS funding should continue to come primarily from the utilities but partial funding from the NRC is appropriate in recognition of their participation and use of the system. Moreover, partial funding by the NRC will guarantee the NRC a measure of control over the system's operation. The major cost of NPRDS is that of supplying data to the system and the utilities bear that cost in addition to the annual funds provided to the NPRDS contractor.

Question No.20 - Should the six early design plants, excluded when the NPRDS commenced, continue to be excluded or should all plants be required to participate?

Response: The six early design plants were excluded when the NPRDS commenced because of technical reasons. These early plants were unique in design and were each one of a kind. Inclusion of data from these plants would not truly represent subsequently built plants. Therefore, it would not be proper to include these plants.

Question No.21 - Certain operator errors must now be reported within the scope of the LER system. Furthermore, NPRDS reports sometimes include corresponding human error information. To what extent, if any, should an improved NPRDS collect man-machine interface data and perform reliability analyses which consider human factors?

Response: NPRDS is designed to collect detailed failure data on safety related systems and components within the reportable scope. If such failures are caused by operation or maintenance errors, the system is designed to record that cause and its effects. Human errors which do not result in a system or component failure belong in a separate human factors engineering reliability data base. The N18-20 Subcommittee will review the NPRDS instructions to assure that human errors resulting in loss of safety related functions are properly recorded in the data base.

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OPERATIONAL DATA

Principal Data

- Licensee Event Reports
- Monthly Operating Status Reports

Secondary Data

Utility Reports

- Licensee Event Reports (LER)
- Monthly Operating Unit Status Reports (Information on Outages and Power Reductions)
- 10 CFR 50.59 (Reports on Changes to Facility)
- NPDES
- Semi-Annual Effluent Reports
- Radiation Exposure Reports
- Startup Test Reports
- 10 CFR 50.55 (e) Reports (Construction Deficiencies)
- Miscellaneous Reports

NRC Reports

- Inspection Reports
- Daily Reports and Preliminary Notifications
- I.E. Bulletins, Circulars and Information Notices
- Transfers of Lead Responsibility/Interoffice Action Items
- Intraoffice Memoranda and Generic Letters
- Technical Reports

Foreign Information

- Exchange Agreements
- Committee for the Safety of Nuclear Installations (CSNI)

Miscellaneous Sources

- 10 CFR Part 21 Reports
- NRC Staff-Industry Meetings
- Vendor/Nuss Bulletins
- Nuclear Safety Information Center (NSIC)

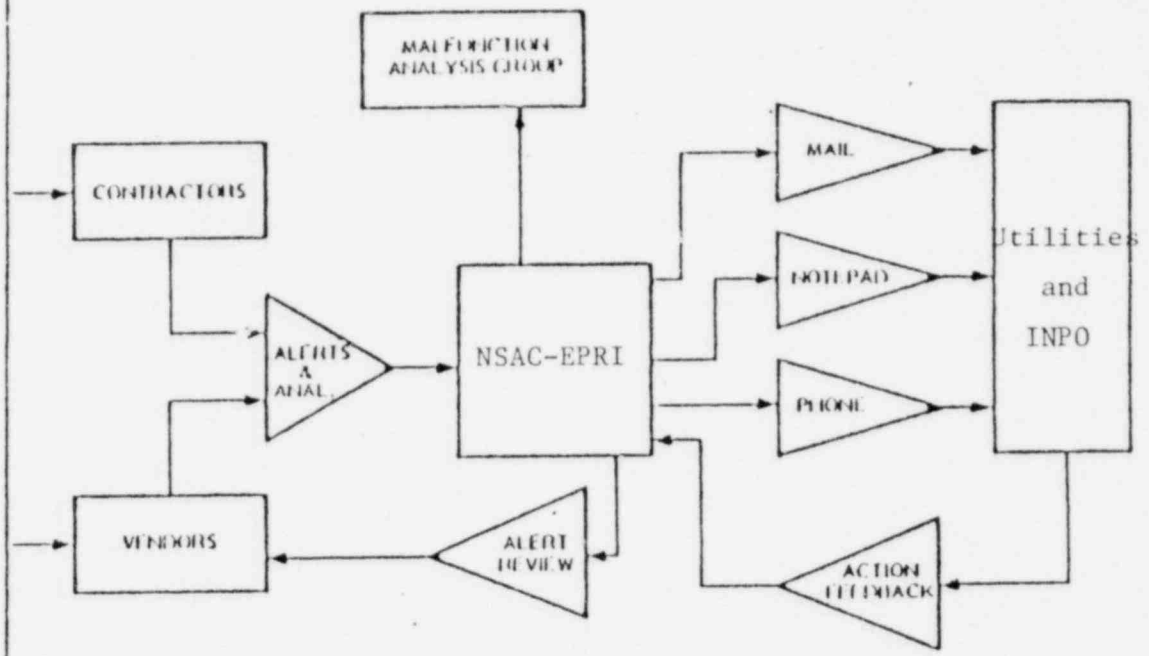

FIGURE 1

SIGNIFICANT EVENT INFORMATION NETWORK

Attachment D