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Secretary of the Commission  
U. S. NUCLEAR REGULATORY COMMISSION  
Washington, D. C. 20555

Attention: Docketing and Service Branch

Gentlemen:

NUREG/CR-1750  
"ANALYSIS, CONCLUSIONS, AND RECOMMENDATIONS  
CONCERNING OPERATOR LICENSING"

This letter is in response to Mr. D. G. Eisenhut's letter of January 27, 1981 which requested comments on the subject report. It is noted that the January 27 letter states that this "report provides an independent perspective to the U. S. Nuclear Regulatory Commission regarding the requirements and practices for control room operator licensing". Our review indicates that NUREG/CR-1750 goes well beyond "control room operator licensing" and we are, therefore, including comments related to the broader scope of the report as well.

The comments contained in Enclosure I have been developed by the staff of the Point Beach Nuclear Plant, a two-unit pressurized water reactor plant which has been in commercial operation for over ten years. During that time, the plant has had an exemplary record for reliable service and its operation has been consistently rated among the best in the country; the plant manager is also probably the most experienced in the country having been in the nuclear power field since the beginning of the naval reactors program. General comments are provided in Part A, followed by specific comments in Part B.

Very truly yours,

**POOR ORIGINAL**

C. W. Fay, Director  
Nuclear Power Department

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Enclosure

COMMENTS ON NUREG/CR-1750  
"ANALYSIS, CONCLUSIONS, AND RECOMMENDATIONS  
CONCERNING OPERATOR LICENSING"

PART A - GENERAL COMMENTS

1. NUREG/CR-1750 is a useful document to the industry because for the first time it collects together under "one roof" references to the many documents, regulations, guides, and papers which as "bits and pieces" regulate this facet of the industry. A similar "bits and pieces" hardship exists with respect to nuclear plant incident reporting, which we have pointed out in our letters of June 4, 1980 and December 8, 1980 to the Commission.
2. NUREG/CR-1750 is a wide-ranging document with detailed, prescriptive conclusions and recommendations on many aspects of nuclear plant personnel selection and training, the NRC Operator Licensing Branch, instruction, simulators, and published documents. To be so critical, and yet have credibility, the authors must have extensive qualifications and immaculate objectivity. Therefore, we suggest that an addendum to NUREG/CR-1750 be published which presents the credentials of Analysis & Technology, Inc. and the authors, identifying any relationship with other businesses that might present a conflict of interest. Experience, if any in the operation of commercial nuclear power plants should be noted.
3. NUREG/CR-1750 appears to be a thorough investigation; however, the report could have been less wordy and repetitious by combining such sections as "Conclusions" and "Recommendations".
4. NUREG/CR-1750 should include a glossary with precise and detailed definitions of new terms.
5. NUREG/CR-1750 appears to promote over-regulation which will further demotivate the regulated plant personnel. Further, it is our opinion that the NRC is focusing too much on operators and too little, at this time, on designers and design flaws which have created challenging reactor responses for the licensees and their operators.
6. NUREG/CR-1750 in "Summary of Recommendations", Table 5.2, illustrates a lack of appreciation for the present work load created by existing NRC backfit requirements. In the table, most recommended implementations are tabulated as "near term" or "suitable for completion within one year of NRC approval". These recommended "near term" implementations are not realistic considering the current shortage of qualified and experienced people.

7. In numerous areas, the report is too prescriptive in delineating requirements for personnel training; rather, the results should be emphasized and specific methods should only be listed as recommendations. In many cases, the report does not adequately consider the industrial relations problems which are certain to be created by the recommendations. We also note that there are few, if any, recommendations which provide positive motivation for well-performing operators.
8. Any changes to be made by the NRC in the area of operator training, qualifications, selection, or job requirements should be done in close cooperation with the activities of INPO, and thoroughly studied for impact prior to implementation.

PART B - SPECIFIC COMMENTS

1. Section 2

- a. Section 2.3 would be more complete if a correlation could be made between college scores and operator skills. One must be careful, however, in drawing correlation between college education and exam scores because all that can be inferred is that some people are exam-wise. One correlation made is the fact that in-plant experience makes a better operator than one who is paper-qualified. This points to the problem that NRC requirements for more licensed people on shift is counterproductive, because it tends towards Auxiliary Operators being rushed towards licensing without being able to obtain the requisite practical experience.
- b. West Germany practice is briefly tabulated on Page 2-56; Wisconsin Electric particularly agrees with their practices and use of generic simulators or accident trainers versus control room and plant-specific simulators.

FAA and airline simulator practice is reported upon on Page 2-60 but differs from our understanding of simulator design and training. It is our understanding that present-day aircraft simulators are not "cockpit-specific" for an individual airline carrier but are more generic to the particular model of aircraft. NUREG/CR-1750 uses the term "aircraft-specific" (without a glossary of terms or precise definition) and then concludes these are not "generic". In our opinion, a Boeing 757 simulator relates in detail to a Westinghouse two-loop PWR and neither

simulator/trainer should be "cockpit-specific". If either of these were to be "cockpit-specific", it should be the aircraft simulator and not the nuclear reactor since time for thought and reasoning, versus robot action, favors the nuclear reactor operator.

The definitions of "plant-specific simulator" and "generic simulator" on Page 2-70 lack specificity and detail, and therein may lie the basis for much of our disagreement on this subject with NUREG/CR-1750. We endorse what we label a "generic, non-cockpit-specific" or "control board-specific" simulator for the purpose of training operators to assess the accidents and transients which they will be likely to experience during normal operation. We do not endorse "control board-specific" simulators for accident training for the reason of avoiding robot-type thoughtless action, which may occur with some people in a highly stressful situation. We consider in the normal course of reactor unit construction, start-up testing, low-power operation, shut-downs, and initial training and retraining that operating personnel become thoroughly familiar with the "cockpit specifics" of their control board to the extent that they need.

We employ many ex-nuclear Navy personnel (about 80% of our Operations group) and we consider their position to be that the Navy should also endorse generic simulators. Any argument that a plant-specific simulator is needed to provide start-up experience ignores the fact that some utilities schedule start-up training on actual operating units. We wish to emphasize that simulators should be used to enhance operators' perception and reasoning abilities. Plant-specific simulators are not needed for this purpose. Military and commercial reactor history indicates that accidents may develop in ways not foreseen by procedure writers. The operator's proper action depends on his knowledge of his plant's design and his ability to analyze plant response as provided by instrumentation. There is a real danger in assuming, as the authors appear to do, that a qualified operator can only function using a specific procedure; if this were true, one must wonder what he does when procedures do not fit the circumstances.

- c. We disagree with a concept that "plant-specific job task analysis" should be developed for every job. This would be an extensive people cost and time burden with virtually no benefits. We consider that generic job analyses for a "Licensed Control Room Reactor Operator, Westinghouse PWR", for example, are all that is appropriate. We recommend that the NRC consult with INPO concerning their effort on job analysis and that microstructure detail be avoided in the interest of accomplishing the job in a timely manner.



- d. NUREG/CR-1750 mentions, but does not strongly endorse or give principal importance to nuclear plant operator selection testing before employment. We strongly endorse mechanical comprehension, logical reasoning, and intelligence quotient testing and consider that in the future the NRC should promote such aptitude testing. In our opinion an operator lacking strong mechanical comprehension and logical reasoning may, in a stressful crisis, fail to "spin the valve in the right direction"; a strong mechanical aptitude will sustain the ability to perform. In addition, properly selected nuclear plant workers will have better inherent skills of leadership, communications, and reasoning, all of which tend to promote safer operation.
- e. We agree with NUREG/CR-1750 that licensee training programs have, in the past, focused too much on NRC license examinations. However, this has been the result of NRC examinations and examiners who have emphasized memorization ability versus the whole person as a capable operator. Therefore, we disagree with Item 9 on Page 2-92 which recommends more involvement of the NRC in prescribing training. The best source of appropriate training recommendations are the licensed operators themselves. Further, we recommend that INPO be allowed to prescribe training since INPO is in the best position to receive and weigh inputs and produce objective and balanced requirements for training.

Another example is on Page 2-100 where "the NRC should require that hot and cold license programs submitted for review in the FSAR be developed from a fully detailed systematic approach". This is an impractical recommendation since the document would likely become obsolete before use.

Page 2-100 of NUREG/CR-1750 recommends the NRC exercise strong management approach to and involvement in training. We disagree and strongly recommend the NRC focus upon the examinations and results of training and that INPO be the principal party for defining and modeling training.

- f. We agree with the conclusion on Page 2-120 and the recommendations on Pages 2-120 through 2-123 that job seniority should not be the sole criterion for selection to progress in operator and licensed operator and senior positions. We have always practiced the use of supervisory evaluations and written skills and aptitude examinations for advancement at Point Beach Nuclear Plant. However, great care must be exercised in maintaining the confidentiality of the information.

- g. We agree with NUREG/CR-1750, as we interpret its position on Pages 2-141 and 2-145, that the recent NRC requirement for "the highest level of corporate management responsible for plant operation ... must sign certifications in license applications" is "purely administrative". We disagree with NUREG/CR-1750 that the highest level of management "consider the overall makeup of the individual". The overall makeup is best left to first-line supervisors and plant managers who observe the individual's performance frequently and to industrial relations professionals involved in testing of skills and characteristics.
- h. Pages 2-151 and 2-153 endorse an "up through the ranks" formula for progression to SRO. If an SRO candidate is to have served as a licensed RO for one year before advancing, then he, in effect, had to be a union member. Therefore, it is unlikely that any engineering or science graduates (generally non-union and not attracted to beginning at the bottom and "up through the ranks") would ever in the future become licensed SRO's. This is in conflict with NRC desires and appropriate need to have more college graduates with SRO's in higher operating positions. This NUREG endorsement serves to block the achievement of professional graduates to SRO licenses. We do, however, agree with NUREG/CR-1750, Page 2-153, where it concludes "that a college degree in engineering or related fields is not a necessary requirement for the shift supervisor position". The effects of requiring a college degree to be a shift supervisor would be devastating on the motivation of personnel desiring to become licensed operators as illustrated by the quotation on Page 2-252. We strongly advocate that the best shift supervisors are "up through the ranks" people who have experienced the location of and have operated every valve in the facility.
- i. Page 2-514 alludes to accreditation of programs teaching college-level subjects. Care needs to be exercised to ensure that satisfactory programs, such as provided to nuclear-Navy personnel, are not "discredited". Any "accreditation" should be voluntary and the results of the training should be the acceptance criteria.
- j. Section 2.6 and its subsections recommends more examinations and demonstrations; more is not needed but "more astute" examining is in order. The industry is experiencing terminations caused by excessive regimentation which stifles and demotivates personnel.
- k. On Page 2-209, Section 2.7.1.7, the authors again attempt to make a case for plant-specific simulators. A generic simulator is not "a deterrent to effective training" if your goal is to develop thinking, capable operators: for developing robots it may be a deterrent to being able to qualify.

1. Page 2-217 recommends "formal assessment" or requalification training programed to ensure adequate training. We disagree, depending upon the meaning of "formal assessment". NUREG/CR-1750, throughout its pages, tends to build the activity of training to a purpose onto itself, rather than a supporting activity to licensed safe operation of the plant. NUREG/CR-1750 recommends and pictures the training organization as the largest and most important activity in a nuclear plant. This is hardly in proper focus since it is the result of the training activity, the quality of actual plant operation, which is of paramount interest.

NUREG/CR-1750 on Page 2-218 recommends simulator retraining at six-month intervals. Since we believe simulators should be used to teach reasoning and plant response, rather than operator robot reaction, such an interval for simulator retraining is inappropriately short.

- m. Upgrade training as presented on Page 2-224 appears to be a terrible waste of time. I would require the operating crews to be increased by at least one. If the classroom sessions last more than four months (like the six suggested), the crew would have to be requalified because they were training instead of operating. We are aware of nothing similar in the Navy, FAA, or foreign nuclear power programs. Evaluation of a team of operators is ill-conceived. If one of the team is transferred, sick, on vacation, or terminates, can another person take his place or does the team lose its certification?
- n. On Page 2-235 it is recommended "operator errors due to deficiencies in skills ... should be the responsibility of the facility to provide corrective action". We could agree to this but "deficiencies in skill" may relate to a design that is too challenging to operate.
- o. On Pages 2-238 and 2-239 it is recommended that SRO candidates meet the requirement for "30 semester hours of college level instruction (450 hours of instruction) in related technical subjects ...". We are opposed to this for two reasons. One reason is the specifics of "college level" are not identified, and in our opinion, do not need to be "university campus" or "university professor" administered. We believe "technically-related" subjects of math, physics, chemistry, etc., can better be taught at the plant site by qualified people (from wherever) when the instructor understands operating nuclear reactors. Certifications by INPO of the "related technical" training and the instructor should be the appropriate route.

A second reason is we feel 450 hours of strictly "related technical subjects" is too much. We consider 120 hours as very adequate based on our experience. In any case, content and operator understanding are more important than a specific training time.

- p. The recommendation for extensive college level instruction for SRO candidates does not appear to appropriately recognize the existence of a shift technical advisor ncr the worth of operating experience.
- q. Subsection 2.9 on "Compensation, Status, and Motivation" is the basis of NUREG/CR-1750. It should, however, recognize at the outset that two years of post-TMI regulatory activity may have caused irreparable damage to nuclear power plant licensed and key personnel motivation. We particularly note one sentence on Page 2-247 in Section 2.9.2.1 which reads "more than one of every four responses were concerned with excessive requirements and over-regulation ...". However, this very telling fact is not mentioned in the "Conclusions", 2.9.3.1. Almost all recommendations in this document suggest more requirements and regulation, not less.
- r. One of our most serious problems of motivation is the onus and actuality of shift work; the authors of NUREG/CR-1750 have not addressed this subject. However, we strongly endorse the NUREG's position that compensation, status, and motivation do not lend itself to regulation. It is a field of industrial relations which can best be handled by experienced industry experts working in conjunction with EEI and INPO.
- s. NUREG/CR-1750 recommendations on Pages 2-274 and 2-275 are too prescriptive and extensive. The lead persons in charge of a training (instructor) group and those responsible for training programs, reviews, and trainee evaluation and progression should be certified for a high level of qualifications and experience, not "all training personnel". We believe that the person in direct charge of a training group could be qualified by having instructor certification, and either a related engineering or science degree with experience, or SRO equivalency. It is not industry-beneficial that "all training personnel" meet all of these requirements. In fact, it is better if a mix of instructors of various nuclear plant orientations and qualifications be used; their certification for "classroom technique" is unnecessary so long as appropriate results are obtained.



At Point Beach Nuclear Plant we rotate SRO shift supervisors as instructors through the training group (to function under training group leadership) so as to provide better coupling of regular training group personnel to the real world of operations. Therefore, NUREG/CR-1750 prescriptive regimentation recommendations for "all" instructors should not be adopted. Here again INPO should be the vehicle for certifying instructors or defining the need for certification. The NRC regulatory staff can judge the results by examination of the applicants.

2. Section 3

With regard to non-licensed personnel, we agree that most plant personnel perform tasks which potentially affect safe operation and public health and safety. However, we disagree that NRC regulation and certification of training for most of the personnel is desirable or necessary. Detailed and regimented certification can serve to demotivate, and whenever it is not needed it should be avoided. All non-licensed personnel work in most nuclear plants is directed, overseen, and functionally tested by supervisors or licensed personnel. We take issue with much of Table 3.1 ascribing key activities to non-licensed personnel. For instance, at Point Beach non-licensed personnel do not approve maintenance requests for safety-related equipment. Reviews are performed by operating people through the chain of command, and approved by senior licensed personnel. Testing and acceptance for return to service is performed in a similar manner. We consider that the NRC present practice regarding non-licensed personnel qualification requirements coupled with resident inspector review of senior, non-licensed personnel and side-by-side audits of craftsmen work is more than adequate for assurance, particularly when verified as it is by return-to-service testing.

3. Section 4

- a. On pages 4-3 and 4-12 we recommend that the selection of examiners also be based on their having scored at a certain plateau or above on mechanical comprehension and logical reasoning aptitude tests. For an examiner with a three percentile score in mechanical comprehension to be placed in the position of determining the fate of an examinee, particularly on oral or walk-through testing, is nothing short of a miscarriage of judging justice.
- b. On Page 4-4 in Section 4.2.2, the authors state that examiners should not have to memorize Technical Specifications. Similar consideration should be made for

license candidates regarding certain areas such as limiting conditions for operation where decisions are not made from memory but rather from checking the document. That section of the exam should be "open book" as should sections where procedure adherence is required as contrasted with testing of logical reasoning.

- c. As we have stated previously, we encourage the adoption of new, not additional, standards which would make initial licensing examinations and requalifications more job-oriented. OLB examiner qualifications, training, and staffing should be evaluated on this basis.
- d. Nowhere in Section 4 is there expressed the need for licensee feedback on the strengths and weaknesses of examiners or examination content.
- e. One Page 4-18 in Section 4.3.3, the authors state that the NRC should give all requalification exams. In previous sections it had been stated the NRC would not administer all requalification exams. We believe that requalification examinations should be an individual plant function with NRC audits of the program and results.

#### Section 5

One Page 5-2 in Section 55.10 the authors state that a psychological evaluation should be submitted with the candidate's application. This would involve serious problems and violate personal rights since such information is considered to be very confidential.

#### Appendix D

This appendix is a critique of NUREG/CR-1280. We received NUREG/CR-1280 sometime ago and performed an in-house review of it and developed in-house written comments. It is interesting to note that many of our unpublished comments on NUREG/CR-1280 are nearly precisely those written by the authors of NUREG/CR-1750. Such critical phrases as "NUREG/CR-1280 does not present a balanced view or comparison between Navy nuclear programs and civilian utility programs" also appear in our critique. We agree with most NUREG/CR-1750 comments on NUREG/CR-1280, except those on Page D-9. We again recommend that the NRC should impose basic aptitude testing for mechanical comprehension and logical reasoning for both nuclear plant personnel and examiners.