Attachment 1

Testimony of D. James J. Regan

Q. Please state your name and business location.

A. My name is James J. Regan. My business is located in San Diego, California.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to assist the Atomic Safety and Licensing Board by discussing a number of the important issues that must be examined in evaluating a training program such as one for a nuclear power plant.

Q. Please describe the work that you have done in preparing to present this testimony, including the documents that you have reviewed.

A. My work on this testimony has primarily involved the review of various documents related to the Three Mile Island licensed operator training program and to this proceeding. A list of the documents that I reviewed is attached to this testimony. The remainder of my work involved the application of my expertise to the issues before the Licensing Board, and preparing the testimony itself. I have spent a total of approximately seven and one-half days in this effort.

Q. Please describe your education and experience.

A. I received my undergraduate and graduate degrees in psychology. My Ph.D., granted by Fordham University in 1957, is

in psychology. My thesis is concerned with optimizing the relationships between hardware systems and the human beings who operate and maintain them (human engineering). During my years at Fordham, I worked for the University in some of the early research on the use of television for educational purposes.

In the years since receiving my degrees, my research interests and experience have focused on training issues, with particular emphasis on the transfer of training in training device settings and the design and measurement of personnel systems. The term "transfer of training" refers to the degree to which training facilitates the desired on-the-job performance. A "personnel system" includes a variety of activities such as selection, training, and job design, which collectively are used to manage people in a work setting. A training system is a component of a personnel system.

I was a civilian employee in the Department of the Navy for some 30 years from 1951 to 1982. My Navy experience began at the U S. Naval Training Device Center, where I worked from 1951-1963, ultimately at the level of Head of the Systems Psychology Division. I served there as principal consultant in the area of training systems research and as the technical leader of a research and development effort in the area of training system development. My research and consultation also included such areas as human engineering, educational psychology, and training system analysis.

From 1966 to 1973, I worked at the Naval Training Equipment Center as Chief Psychologist, Head of the Human Factors Laboratory, and Founding Director of the Training Analysis and Evaluation Group. The program for which I was responsible encompassed laboratory research, consultation to engineers, research and development in adaptive training and computer assisted instruction, and experimental field evaluations of training systems. As Head of the Training Analysis and Evaluation Group I directed a group of engineers, educators and psychologists whose purpose was to develop and explore new analytic techniques for the design and evaluation of training systems.

From 1973 to 1982 I served as the founding Technical Director of the Navy Personnel Research and Development Center. This center is the principal research and development facility responsible for increasing the efficiency of the U.S. Navy's military and civilian personnel systems.

In the course of my career with the Navy, I observed the practice of teaching in the Navy and elsewhere, either indirectly or directly. I have reviewed a great deal of descriptive material about various kinds of instruction in various reports, journals, and documents. Much of my knowledge is based upon my own research, the research of others as reflected in these materials, and upon discussion with knowledgeable people in the field over the years.

I retired from the Navy in 1982 and have since then served as a consultant to industrial clients, as a lecturer at the University of San Diego, and as Visiting Scientist with the Battelle Human Affairs Research Centers. Among the activities in which I have been engaged in the above assignments are the development of technical plans for personnel system research and development, technical review of simulator employment and validity, and the development of a chapter on training simulator design.

A list of my publications, symposia and seminars, and professional societies, and a more detailed discussion of my experience is contained in the attached resume.

Q. What is the scope of the Navy's training programs.?
A. The Navy has enormous and complex training requirements. There are some 800,000 persons working for the Navy as civilians or military employees. Substantial numbers of these people are undergoing training at any one time, and over 2000 training programs are typically underway to support this training.

Q. Have you ever provided advice or assistance to the NRC?
A. Yes. In 1981-1982, I served as chairman of a national advisory committee to the NRC which was asked to advise the NRC concerning whether Reactor Operators and Senior Reactor Operators should be required to have college engineering degrees. In 1983, I served as a member of a similar NRC advisory committee asked to address the question of whether each nuclear power plant should have a site-specific simulator.

Q. What are the essential elements that must be accomplished in order to develop a sound training program?

A. First, it is essential to understand that any training program exists as only one component of a larger personnel system. The larger system includes, for example, selection methods, job placement decisions, job design, and man-machine equipment design and allocation, as well as the training program itself. The ultimate goal of the personnel system as a whole and of the training system itself is to assure effective job performance. The ability to achieve this goal depends upon the interactions and trade-offs among the various components of the personnel system. Thus, the training program cannot be designed or evaluated in isolation from the other components of the personnel system.

For example, if the trainees have high aptitudes, training will be different from what it would be if the population were heterogeneous with respect to mental abilities. Thus, selection influences training. If the job is reorganized and made easier, training will again change. The trick is to balance these components to get the task done, have an effective training system, and efficiency throughout the personnel system.

Second, in order to determine how to design the training program, it is necessary to diagnose the skill and knowledge level of incoming students so that instruction can be tailored to their strengths and weaknesses. This is also necessary in order to determine the extent to which examinations and other assessments given during and at the end of training reveal what

the trainees have learned in the training program, as opposed to what they already knew. In this connection, particularly with the limited number of trainees involved at Three Mile Island, I believe that much of the training should be individualized to address strengths and weaknesses of particular students. Much of this individualized training can be done with computers, using programs that tailor the training to the specific answers given by the students and to the students' particular level and speed of learning.

Third, in order to design sound instruction, it is necessary to establish job performance requirements or standards of performance. That is, the jobs and tasks must be defined either as they are actually performed or, in the case of jobs that have not yet been performed, as they are idealized.

There is a tendency for such job or task definitions to be simply descriptions of the actual operations done by the incumbent. This is not enough. In order to make job analyses useful for the design of training systems and the measurement of the effectiveness of training, tasks must be analyzed in terms of the behaviors required of the incumbent, rather than simply the actions themselves. Thus, it is necessary to determine analytically whether the tasks involve, for example, following procedures, perceptual-mo or, or cognitive behavior. The type of behavior involved in performing the task is then used to determine the nature, extent and frequency of training.

The task analysis must address, for example, the following:

(1) A description of the job.

(2) Reduction of the job into tasks.

(3) The difficulty of the task (behavior) should be established (e.g. by measuring the length of time it takes to learn the task, and by establishing the effects of aptitude differences on the learning time).

(4) The standards to which the job must be done (speed, precision).

(5) The circumstances under which the task must be performed, including particularly the worst circumstances under which it may have to be performed. This is particularly important for a task whose most likely setting is the response to potential or actual emergencies, as is the case with reactor operators.

(6) The importance of the task. That is, in particular, what are the consequences of failure? Are they financial or life-threatening, immediate or remote, independent, team, or contingent?

(7) Identification of the stimuli that initiate the task and the response that is required.

After the task analysis is completed, the procedure that was followed should be documented, with a range of examples, to support this phase of the development of the training program.

When these analyses are complete, an array of tasks (along a time line) of each member of the crew should be made to

evaluate which are team tasks and which are individual tasks. The training program must then take this into account, and assessment tools used in the training program must differentiate between individual and team performance.

The standards of performance for each task can be those of a model performer (called behavior to mastery), or that required by the system (systems analysis is required). That is, one can set performance based on one of the best operators or teams, which can produce a very high, and sometimes unrealistic, expectation. Under the systems criterion approach, the standard is set by the job requirements. For example, if a system is capable of processing only five targets on a radar screen, that may establish the job performance standard. The standards of performance can also be established statistically by observing many performers of the same job.

Before training is set, the job itself should be inspected to see if it can be simplified or otherwise improved to enhance performance. For example, if job performance is marked by long periods of inactivity, with little or no stimulus calling for action, some technique should be devised to counteract inattention. Also, job design should be investigated to determine that jobs in a group have properly distributed functions and whether individual jobs have periods of overloads beyond the capacity of the operator (trained or not). That is, one should deal with unequal team member tasking and non-linear work loads.

Once the nature of the job performance and the performance standards for the job have been determined and

optimized, a system for reliably measuring job performance must be devised because eventually the training program must be assessed against operational performance of individuals, teams, and systems. This measurement is the only reliable means of measuring the effectiveness of training.

Job performance can be difficult to measure. It is easy to measure the performance of a key punch operator, for example, by measuring the number of keypunches per unit of time. It is more difficult to develop job performance measures for other positions, such as a scientist. Some of the most difficult performance to evaluate is that of people whose skills are not elicited fully except in an emergency (power plant operator, an airline captain) or in war (a tactical commander). Despite these difficulties, however, the development of job performance measures is necessary in order to assure that the job itself is properly designed and that the related training is both properly designed and effective.

The measurement of performance on the job can be undertaken by using one or more of the following:

1. direct recording of output, such as the number of radios completed in a day,
2. simulation of the task using a simulated performer and comparing this with an incumbent actually performing on a simulator,
3. job knowledge tests,

4. use of specially designed ratings (e.g., using behaviorally anchored rating scales), although this is an undesirable measure, particularly if used alone or if it is given significant weight,

5. use of video tapes of segments of job performance, with evaluations by an independent panel,

6. measurement of attitudes of workers about their training (what is missing, unnecessary, etc.) over several points in time.

Armed with requirements and standards of the job, it is then possible to write the training objectives. Since the training objectives have now been established, it is now possible to design the training program.

Q. Please describe the principles that must be adhered to in order to assure a sound training program for personnel such as the operators of nuclear power plants.

A. The overriding consideration for any such training program is the question of whether it adequately prepares the trainees to perform the jobs for which they are being trained. For that reason, it is essential that a sound training program include objective measures of performance at each point at which performance is to be assessed. Thus, the jobs and tasks must be thoroughly analyzed, as discussed above, and the measures of job performance must be reasonably objective so that reliance upon individual judgment is minimized. Only in this way is it possible to achieve a reasonably objective correlation between performance in training and performance on the job.

Second, the performance measures used in the training program, such as examinations, must be properly constructed and administered. They must also be validated, by which I mean that one must determine whether the performance measures actually test what they are intended to test. Ultimately, of course, they must test job performance. Only if they do that can they be relied upon as reasonably accurate predictors of job performance, which is their true purpose.

Third, the methods of instruction should be appropriate to the content of the course.

Q. What methods should be used to judge the effectiveness of a training program for nuclear power plant operators to determine whether it prepares operators to safely operate the plant?

A. The overriding criterion for determining the success of a training program is the performance of the trainees on the job. In order to correlate success in the training program with success in the job, it is necessary to know a) what the job performance measures are b) what the standards for performance of an operator are and c) what the actual performance levels are of those who receive the training.

In order to establish performance standards, it is necessary to go beyond general job descriptions. In order to develop performance standards, the behavioral content of the elements of the job must be identified in substantial detail, placed in a set of behavorial categories, and ranked by importance and difficulty.

In order to establish performance standards, one needs measures of job performance that are reliable and valid. As I mentioned earlier, there are a number of ways in which to attempt to obtain actual performance levels. The first, and probably the least reliable, are ratings or personal evaluations of job performance by a superior or peers. Raters tend to focus on irrelevant or less relevant aspects of performance such as loyalty, respectfulness and affability and tend to give higher job performance ratings to people whom they like and who exhibit these personality characteristics than to persons they don't like, even though the latter may be doing the job better.

The reliability of ratings can be improved by using behaviorally-anchored rating scales - i.e. determining a rating based on a scale, points on which (e.g.,0,3,9) are "anchored" by examples of performance appropriate to these numbers. Behavioral rating forms of this sort are superior to the factor rating form presently in use by licensee (such as those used to rate Mr. Olive on 10/25/82, 10/19/83, and 9/7/84). It is difficult to rate factors such as teamwork and leadership without some behavioral anchor. Without a behavioral anchor and standards, ratings are likely to be unreliable because it becomes very difficult to determine what the ratings actually means either as assessments of performance per se or as comparisons of performance, particularly if the raters are different people. However, in whatever form, ratings are not satisfactory as the only way of measuring job performance or as a primary means of doing so. In particular, they are of little

use in attempting to make a correlation between training, examination results, and on-the-job performance.

Other ways of measuring actual job performance include outputs inherent in the job (e.g. # of golf clubs produced), job knowledge testing, walk-throughs, and videotaping the trainee and exposing his performance to the view of a number of raters.

Short of reliably measuring job performance against objective performance standards, there are some intermediate criteria that can be used as indications of the ultimate criterion, job performance. Measures of end of course achievement through written and oral examinations can provide some indication, but only if they are properly designed and administered.

Another intermediate indication of the effectiveness of training can be gained through the process of formative evaluation (some of the above described intermediate steps can be thought of as "formative"). This process is a way to fine-tune a training program before there is an opportunity to apply the ultimate criterion of on-the-job performance. It involves a series of specific and systematic steps which permit instructors to form the training. (See, for example, Montaque, Ellis and Wulfeck, "The Instructional Quality Inventory (IQI): A Formative Evaluation Tool For Instructional Systems Development, "Navy Personnel Research and Development Center, August 1983.

Another intermediate step involves comparing the instructional techniques and methods used with the state of the

Research also shows that a) the judgment of the examiner/interviewer is influenced by the performance of the preceding individual, b) examiners can be misled by persons who are facile, or very good at being interviewed, c) examiners/interviewers tend to do too much talking, d) negative evidence is unduly weighted, and e) a "halo effect" can occur in interviews, meaning that the evaluator tends, for example, if one trait is highly rated, to rate the others high also. It is especially difficult for peers or co-workers to conduct oral examinations, particularly if untrained in administering and evaluating them.

Oral interviews are not predictive of job performance unless they are very specific and standardized, in which case some of the presumed benefits of orals are lost. In addition to the generic problems with oral exams, the oral examinations used in the TMI training program appear to have no clear criterion for the pass-fail cut-off and do not require that the same questions be asked of examinees with equivalent skills. In my opinion, the predictive value of the orals is limited, i.e., they don't tell management much about how the candidate will do on the job in the future. As with written examinations, this is an empirical question that could be answered by comparing oral examination results with measures of on-the-job performance. The results of such an exercise are problematic, however, unless the sample size is large enough, and both the examination and job performance measures sufficiently varied to permit the analysis to reveal gross differences.

Q. Please comment on the role of examinations as they are used in a training program such as the one at Three Mile Island.

A. One of the primary purposes of examinations is to determine whether trainees are qualified to perform the jobs for which they are being trained. Most training programs use achievement examinations which are criterion referenced (scored against a criterion). Thus, test-takers are not competing as much with each other as when scores are arrayed about a mean.

The fact that the purpose of these examinations is to determine whether trainees are capable of performing their intended jobs adequately places a premium on the validity of the examination. That is, it is extremely important for criterion referenced examinations such as those given at Three Mile Island to be accurate predictors of how well those taking the examinations will do in the job.

Q. What are the pitfalls of the use of oral examinations to measure competence?

A. The pitfalls of oral examinations closely parallel the problems with the use of personal interviews and my answer covers both. Oral examinations can be viewed as a special case of job interview. As with job ratings, which I discussed earlier, interviews lack both reliability and validity for a variety of reasons. The first shortcoming is the lack of standardization. In other words, it is impossible to know whether the same questions were asked of all candidates with similar knowledge profiles.

art. For example, the use of computers for individualized instruction is state-of-the-art, as is the use of computers to teach procedures and to provide an understanding of "mental models" of the underlying system (e.g. plant). This later system knowledge approach will greatly facilitate procedure learning and fault recognition and diagnosis. This is particularly important with respect to a highly complex system where it is difficult to grasp the system as a whole and the way that the components are integrated into the system.

A final intermediate measuring tool is the measurement of trainee attitudes. Here one asks those who have been through the training to state what aspects of the courses helped them to do their jobs, which hindered them, which seem irrelevant, and those that they believe they could have used but that they did not get. The importance of these measures is not so much the answers at any one time, but the trends in the answers. If the changes in the answers can be correlated with changes in the training program such as differences in curriculum or instructors, an indirect evaluation of the changes can be made.

As in all such attitude surveys, the questions should be carefully designed and the answers given anonymously. Management should not be present at interviews nor know who the respondents are. If these conditions are not present, the answers will be affected.

Q. Please describe the effort that would have to be undertaken to evaluate the TMI-1 training program in order to answer the questions and issues posed by the Appeal Board in ALAB-772 and to reach conclusions of the sort reached by the Reconstituted OARP Committee in its Special Report of June 12, 1984.

A. The Appeal Board's decision discusses a number of issues and questions, all of which relate to the fundamental question of whether the training program adequately prepares reactor operators to operate the plant safely. Among the most significant questions are those relating to whether the licensee's examinations are an effective way to measure the operator's ability to operate the plant and relating to whether or not the simulators are properly used. Cheating is, of course, an extremely troubling and significant issue. My testimony will not address such cheating-related issues as exam security. I do address cheating indirectly, however, in that cheating may be related to the quality of the overall training program, and particularly to the trainees' perceptions of whether they are being well trained to take the various examinations.

I have read the Special Report, and I am struck by the fact that the conclusions at pages 82 to 83 are quite unequivocal. The Committee concluded, for example, that, "The 'bottom line' as far as the Committee is concerned is that the GPU Nuclear training program produces qualified operators and is adequate to support the restart of TMI-1." This is quite a strong conclusion, particularly because it is not qualified or limited in any way.

I should add, with respect to the Special Report, that it is difficult, based solely on the generalized information presented in the report, for me to have an appreciation of the detailed characteristics of the training program, and therefore what the basis for their generally favorable review is, and similarly, for the selection program, the job design program, and other aspects of the personnel system.

In order to undertake an evaluation of the TMI-1 training program that would allow me to answer the questions raised by the Appeal Board and reach the type of fundamental conclusions stated in the Special Report, I would have to perform a detailed study. I would use a team of personnel with both training and nuclear expertise, and I would follow the evaluation method that I described earlier in this testimony.

The first aspect of any such effort would be to gather basic information and develop a plan of action. I expect that the initial information would come from the company's managerial personnel through briefings and documents. Beyond that initial information, however, I would review primary materials such as examinations, program documents, and interviews with appropriate personnel.

Rather than repeat what I have already said about how to evaluate a training program, I will focus here on some of the most important elements of the effort:

1. A sample of the task analyses and learning objectives would be reviewed to determine whether they are

technically accurate and whether they include the information that I identified earlier. If there were a question of whether the training materials reflected actual plant design, the review would include an examination of the question of whether the job descriptions and other information on which the task analyses were based were, in fact, consistent with the current design.

2. We would review the training materials and instruction to determine whether they were technically correct and whether they were correctly administered. This would include a detailed review of instructors' training and evaluation, as well as a review of the evaluations of instructors the evaluations of simulator performance done by instructors.

3. We would review simulator instruction through observation of the instruction itself.

4. We would analyze the degree to which any simulators replicate the plant itself. To the extent that there are any differences, and particularly to the extent that the differences are minor or subtle, we would undertake two separate efforts. First, we would review what the company had done to assure that the differences would not interfere with the operator's ability to operate TMI-1. Second, we would conduct tests appropriate to reveal whether the operators' use of the simulators had created any such interference.

5. Where, as at TMI, job incumbents and trainees are subject to frequent changes in procedures and requirements, I would be concerned about learning interference problems. These problems arise from the fact that, for example, an individual originally trained on one procedure operates under that procedure for a period of time until a new procedure is implemented. Depending upon the type and extent of the change, the prior learning and experience can significantly inhibit both initial learning and retention of the new material. The problem can become particularly acute in emergency situations, when an operator may tend to revert to previous procedures. A review of this issue would be essentially the same as the review of the problem of a simulator that does not replicate the actual reactor.

6. We would review examinations and other assessment devices for several purposes. First, do the assessment devices rely upon objective and standardized measures of performance? Second, are the questions used in the assessments properly constructed, and are the assessments as a whole properly constructed, particularly with respect to the behavior that they test and the mental processes that are required to answer them? Third, to the extent that oral assessments are used, are they controlled by the use of standardized procedures, and are complete notes of the answers kept to that they can be reviewed impartially?

Perhaps most important, how do the results of the assessment devices correlate with job performance? In order to address this issue, it is necessary to review the types of job performance evaluations that are done by the company, the extent to which the evaluations use objective measures, and the extent to which the objective measures are consistent with performance on the assessment devices. This is a fundamental step that must be undertaken to have any sound basis for an opinion as to whether the training program is producing operators who can operate the plant safely.

7. We would review how the company uses the results of its training and the results of job performance evaluations to feed back into the training program. If this is not done, the program will continue to exhibit whatever inadequacies it may have.

8. Finally, we would systematically examine the attitudes of the trainees toward the training and toward the jobs themselves. This would be done through an anonymous random sampling technique, with a standardized set of questions carefully developed by survey research experts to reveal actual attitudes. This survey would be useful in conjunction with the other assessments since behavior is sometimes modified by attitudes.

In summary, we would review the program in the light of suggestions (e.g., the use of tailored training) made elsewhere

in this testimony not only for the purpose of identifying weaknesses, but to suggest courses of action. This is a substantial undertaking, but it would be necessary to answer the Appeal Board's questions with a reasonable degree of certainty. I estimate that it would take a team of five qualified people three months to complete the effort, not including the time to write whatever report the team may produce.

List of References Reviewed by Dr. Regan In Preparation For Written Testimony

Written Testimony

Testimony of the Reconstituted OARP Committee on the TMI-1 Licensed Operator Training Program.

Licensee's Testimony of Mr. Samuel L. Newton, Mr. Bruce P. Leonard and Mr. Michael J. Ross on the Issue of Licensed Operator Training at TMI-1.

Licensee's Testimony of Dr. Robert L. Long and Dr. Richard P. Coe on the Issue of Licensed Operator Training at TMI-1

Special Report of the Reconstituted OARP Review Committee dated 6/12/84

Training Documents

Memorandum from B.P. Leonard, Operator Training Manager, to Operator Section, January 27, 1984.

"Operator Training Instructor Indoctrination / Qualification Training Program," Rev. 1, April 26, 1983.

"GPUN Instructor Development Program," Draft May 15, 1984.

"TMI Training Department Instructor Evaluation Procedure," Rev. 1 August 9, 1983.

"Replacement Operator Training Program Description" TMI-1, Rev. 1, August 31, 1981.

"TMI-1 Senior Reactor Operator Replacement Training Program," Rev. 1, March 21, 1983 6211-ADM-2622.04.

"Licensed Operator Requalification Program Description (Unit 1)", Rev. 1, June 12, 1984 6211-ADM-2611.01.

July 16, 1984, Final Certification Statement for E. Frederick 3210-84-0303.

Employee Performance Reviews of H.K. Olive dating from 1982 to 1984 listed as Exhibits 1-2 in the Deposition of Henry Hukill, Jr. on November 7, 1984.

Background: Summary Reports and Board Decisions

ALAB Decision, May 24, 1984, pp. 3-19, 62-72.

ASLB - Report of the Special Master, April 28, 1982.

ASLB PID (Reopened Proceeding), July 27, 1982.

Assessment of Selected TMI Training Programs: Data Design Laboratories Report Summary, September 10, 1982.

RHR Consultation with GPU Nuclear Management: Priority Concerns of Licensed Operator's at TMI-1 and Oyster Creek and Suggested Action Steps - Final Report. Paul F. D'Arcy, Ph.D and John R. Sauer, Ph.D, March 15, 1983.

Depositions

Deposition of Bruce P. Leonard, October 23, 1984.

Deposition of Eric Gardner, October 25, 1984.

Deposition of Dr. Richard P. Coe, October 24, 1984.

Deposition of Samuel L. Newton, October 24, 1984.

Deposition of Robert L. Long, October 24, 1984.

Deposition of Dr. Robert E. Uhrig, October 23, 1984.

Published References

"Instructional Quality Inventory," Willaim E. Montague, John A. Ellis and Wallace H. Wulfeck II., Performance and Instruction Journal, June 1983, Volume 22.

The Instructional Quality Inventory (IQI): A Formative Evaluation Tool for Instructional Systems Development, Navy Personnel Research and Development Center August 1983, William E. Montague, John A. Ellis, and Wallace H. Wulfeck II.

John Joyner et. al. Handbook for Individual Instruction, Human Resources Research Organization, Carmel, Ca., July 1983.

"Criterion - Referenced Measurement in Military Technical Training," John A. Ellis and Wallace H. Wulfeck in The Role of Training in Military Personnel Systems (tentative title), Praeger Press (in press), 1985.

RESUME

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Date of Birth: 27 August 1924

EDUCATION

Institution	Years	Degree/Date	Major	Minor
University of Detroit	1942-48	Ph.B. 1948	Psychology	English Philosophy
Fordham University	1948-57	MA 1951	Psychology	None
		Ph.D. 1957	Psychology	None

EMPLOYMENT HISTORY

(The following chronology of experience begins with my present job and works back)

EMPLOYER: University of San Diego

POSITION TITLE: Lecturer

DATES: Fall '82

DUTIES: Teach course in personnel management in School of Business Administration.

EMPLOYER: Battelle Human Affairs Research Center

POSITION TITLE: Visiting Scientist

DATES: 1/83 to present

DUTIES: Technical consultation in personnel and management Sciences and Simulation.

EMPLOYER: Self

POSITION TITLE: Consultant

DATES: 8/82 to present

DUTIES: Technical consultation with various industrial and academic organizations in the areas of personnel selection, assignment, training, productivity, appraisal, job design, and simulation for personnel training and performance measurement.

EMPLOYER: Navy Personnel Research and Development Center, San Diego, Ca.

POSITION TITLE: Member of Science Advisory Board

DATES: 1982/83

DUTIES: Assist Navy Personnel Research and Development Center on the formulation and appraisal of its research program.

EMPLOYER: Navy Personnel Research and Development Center, San Diego, California

POSITION TITLE: Founding Technical Director

DATES: 9/73 to 7/82

DUTIES: Provide executive technical direction in the planning, conduct, and coordination of research and development activities directed toward the advancement of the Navy's technological base in the social, education, psychological and management sciences.

EMPLOYER: Naval Training Equipment Center, Orlando, Florida

POSITION TITLE: Chief Psychologist and Head, Human Factors Laboratory; Founding Director, Training Analysis and Evaluation Group

DATES: 7/66 to 9/73

DUTIES: Was fully responsible for developing and managing a program of psychological research, consultation and evaluation in the area of human factors and human learning. This program included laboratory research, consultation to engineers, research and development in adaptive training and computer-assisted instruction and experimental field evaluations of training systems. The staff was made up of experimental and engineering research psychologists. Projects were accomplished both "in-house" and under contract. Originated some projects, evaluated and approved submissions from the professional staff, monitored progress and evaluated the final product. I represented the laboratory to the research community and agencies of government. I functioned as principal consultant re human factors in training equipment to various agencies of the Army and Navy. As Head of the Training Analysis and Evaluation Group, organized and directed a multidisciplinary (engineers, educators, and psychologists) group of 40 scientists whose purpose was to develop and exploit new analytic techniques from various disciplines (e.g., systems engineering) in designing and evaluating major new training systems. These systems embodied what was being learned in the area of modern educational technology and cost effectiveness techniques.

EMPLOYER: Office of Naval Research, Navy Department, Washington, D.C.

POSITION TITLE: Assistant Head, Personnel and Training Branch

DATES: 4/65 to 7/66

DUTIES: The personnel and Training Branch of ONR develops and directs the Navy's contract program in personnel research and its members function as principal advisors to the Navy and other agencies. My duties involved participation with the Branch Head in the planning and implementation of the principal fundamental personnel research program in the Navy. I served as principal consultant to various government agencies in the area of training systems research; with the Branch Head, selected research areas in need of special emphasis and organized and conducted working conferences of specialists and edited proceedings; prepared syntheses of personnel research and wrote results for publication; managed major cooperative operational research programs; and joined with Branch Head in developing the major research program the DOD had in the area of computer-aided instruction. Functioned as Scientific Officer for major programs in criterion research and automated instructional research. Served as alternate Study Director, Personnel Research Study for the Assistant Secretary of Defense(M)'s Consolidated Training and Education Program Review. This involved a DOD-wide survey of evaluation of personnel research.

EMPLOYER: U.S. Naval Training Device Center, Port Washington, New York

POSITION TITLE: Psychologist to Head, Systems Psychology Division

DATES: 10/51 to 4/65

DUTIES: In addition to the duties of Systems Psychology Division Head described immediately below, I served as principal consultant to the Chief Psychologist, Commanding Officer and Director of the Naval Training Device Center, and other agencies in the area of training systems research. I functioned as the technical leader in a Center-wide methodological R&D effort in the area of training system development; functioned with the Chief Psychologist in formulating department-wide research goals.

As Head of Systems Psychology Division, I was responsible for technical and administrative planning, development, assignment, control and evaluation of research and consultation programs. These programs were in operating areas such as special weapons, guided missiles, tactical and team operations, and nuclear power. Research and consultation were in such

areas as human engineering (human servo-systems), educational psychology, training analysis, systems analysis, information theory, decision-making, small group behavior, perceptual skills, and complex sensory motor skills. In addition, varying amounts of time were spent as Acting Chief Psychologist. Indirectly supervised about 40 contract psychologists. Prior to these duties, served as Project Manager.

EMPLOYER: Dunlap and Associates, 429 Atlantic St., Stamford, Conn.

POSITION TITLE: Junior Research Associate

DATES: 3/15 to 10/51

DUTIES: Developed experimental designs for research projects in human engineering for government and industry, implemented projects by conducting experiments, field work, writing questionnaires; organized, analyzed and reported psychological data, and wrote technical reports.

EMPLOYER: Fordham University, New York, New York

POSITION TITLE: Junior Research Associate

DATES: 6/49 to 2/51

DUTIES: Duties included statistical analysis of data, construction of systems for qualitative analysis of kinescope recordings, participation in conferences on data analysis techniques, technical report writing and editing. Conducted testing and television sessions at Kings Point Merchant Marine Academy, constructed, administered and analyzed achievement tests, observed and critiqued educational television sessions.

EMPLOYER: Fordham University, New York, New York

POSITION TITLE: Research Assistant

DATES: 9/49 to 6/50

DUTIES: This was an honorary appointment on the basis of scholastic achievement. Duties included substitute teaching, organizing graduate school entrance exams, assisting in psychological laboratory courses, and constructing college examinations.

EMPLOYER: Fordham University, New York, New York

POSITION TITLE: Research Assistant

DATES: 1/49 to 6/49

DUTIES: Honorary appointment on basis of scholastic achievement. Laboratory assistant, examination proctor and grader; reorganized test library.

PUBLICATIONS

Crissy, W. J. E. & Regan, J. J. Halo in the employment interview. Journal of Applied Psychology, 1951, 35, 338-341.

Regan, J. J., Ely, J. H. & Kelley, C.R. Flying the submarine. In Office of Naval Research, A decade of basic and applied science in the Navy. Washington: ONR, 1957. Pp. 535-539.

Regan, J. J. Tracking performance related to display control configurations. Unpublished doctoral dissertation, Fordham University, 1957.

Regan, J. J. Tracking performance related to display control configurations. Technical Report 322-1-2, January 1959, U.S. Naval Training Device Center.

Regan, J. J. Tracking performance related to display control configurations. Journal of Applied Psychology, 1960, 44, 310-314.

Regan, J. J. A method for determining training device requirements. Office of Naval Research: Proceedings of the Fifth Navy Science Symposium, April 1961. Vol. 2, Pp. 740-749.

Regan, J. J. & Bishop, C. K. Programmed instruction in the Armed Forces--an overview. In S. Margulies & L. D. Eigen (Eds.), Applied Programmed Instruction. New York: Wiley, 1962. Pp. 59-69.

Regan, J. J. Automated instructional hardware and software: An overview. Proceedings of the American Institute of Industrial Engineers, Inc., 1964. Pp. 325-330.

Regan, J. J. Navy plans for computer-assisted instruction (CAI). National Security Industrial Association: Proceedings of the Engineering Systems for Education and Training Conference, 1966. Pp. 145-147.

Regan, J. J. Computer-assisted instruction (CAI): Some facts and fancies. Washington University, School of Continuing Education, Research Publication Number 11, 1967. Pp. 38-49.

Regan, J. J. New outlooks in training: A discussion. Manpower Research, N. A. B. Wilson (Ed.) London: English University Press, Ltd., 1969. Pp. 364-375.

Regan, J. J. Special Editor, Special Issue: Adaptive Training, Journal of the Human Factors Society, Dec. 1969, Vol. II, Number 6.

Blaiwes, A. S. & Regan, J. J. An integrated approach to the study of learning, retention and transfer--a key issue in training device research and development. Technical Report IH-178, August 1970, Naval Training Device Center.

Regan, J. J. Engineering systems in education and training. A report on the 1970 (11th) Annual IEEE Man-Machine Systems Symposium, November 1970. Applied Ergonomics, London, June 1971.

Regan, J. J. A roundtable by mail. Human Factors: Theory and Practice, David Meister (Ed.). New York: Wiley-Interscience, 1971.

Bryan, G. L. & Regan, J. J. Training system design. Human engineering guide to equipment design. Washington: GPO, 1972.

Blaiwes, A. S., Puig, J. A. & Regan, J. J. Transfer of training and the measurement of training effectiveness. Human Factors, December 1973.

Regan, J. J. Components of human performance and training system design. Presentations and Technical Notes from the Applied Learning Systems Curriculum Requirements Symposium, Washington: American University, 11-12 March 1975.

Blaiwes, A. S. & Regan, J. J. Military Training Devices - Progress and Issues. Chapter in The Role of Training in Military Personnel Systems (Tentative title). New York: Praeger Press (in press), 1985.

PRESENTATIONS

1960 The Role of the Monitor in Federal Research. Paper read at the American Psychological Association Convention, Chicago, Ill.

1961 Training Analysis Methods. Paper read at Anti-Submarine Warfare Symposium, New York, N.Y.

1962 Human Engineering at the Naval Training Device Center. Paper read at the Human Factors Society meeting, New York, N.Y.

1962 A Scheme for Training Systems Analysis. Paper read at Anti-Air Warfare Symposium, Norfolk, VA.

1964 Methods for Task Analysis. Paper read at Human Factors Society annual meeting, Washington, D.C.

1966 Computer-Assisted Instruction. Presentation to American Management Association's Continuing Seminar on Management Information Systems, Boca Raton, FL.

1967 Computer-Assisted Instruction. Presentation to Naval Research Reserve Unit, Orlando, FL.

1967 Computer-Assisted Instruction. Presentation made to Industrial College of the Armed Forces/U.S. Military Academy Computer Workshop sponsored by the ICAF and USMA and held at West Point. Remarks videotaped for subsequent review by interested activities.

1967 Participated in a Symposium at the North Atlantic Treaty Organization Conference on Manpower Research in the Defense Context. London, England.

1967 Educational Technology. Presentation to Data Processing Management Association, Winter Park, FL.

1967 Changing World of Training Research. Invited lecture given at Naval Academy.

1968 Computer-Assisted Instruction--An Overview. Presentation to State Conference, American Society for Training and Development, Orlando, FL.

1968 Learning Research and Training Practice. Presentation to Central Division, American Society for Training and Development, Orlando, FL.

1969 Workshop on Programmed Instruction given at American Hospital Association Regional meeting, Miami, FL.

1969 Faculty member and lecturer, American Hospital Association seminar on Leadership for Florida Hospital Auxiliary presidents.

1970 Motivation and Interpersonal Relations in a Leadership Context. Presentation to American Hospital Association seminar, Orlando, FL.

1970 Learning and Transfer Issues in the Design of Training Systems. Presentation to the NATO Advanced Study Institute, Greenwich, England.

1972 Organized and chaired a Symposium on Special Skill Training at the annual meeting of the Southeastern Psychological Association, Atlanta, GA.

1973 Learning Theory and Training Practice. Invited address at annual meeting of American Psychological Association, Montreal, Canada.

1984/85 One-day seminars at University of Central Florida. Title: The Design of Training Systems.

PROFESSIONAL SOCIETIES

American Association for the Advancement of Science

New York State Psychological Association

Eastern Psychological Association

Senior Member, Institute of Electrical and Electronic Engineers

Human Factors Society

The American Educational Research Association

Sigma Xi

Fellow, American Psychological Association

Ergonomics Research Society

MISCELLANEOUS RECOGNITION (e.g., Honors, Awards, & Committee Appointments)

1949-51 Graduate Research Assistant; three appoints--Spring 1949, academic year 1949-50, academic year 1950-51.

1962 Chairman, Symposium on Special Training Problems, New England Psychological Association, Boston, Mass.

1962-63 Member Program Committee of the Society of Engineering Psychologists of the American Psychological Association.

1964 Chairman Program Committee of the Society of Engineering Psychologists of the American Psychological Association.

1968 Chairman of Plenary Session on Adaptive Training, New England Psychological Association annual meeting, Boston, Mass.

1969 Invited to address joint meeting of IEEE (GMMS) and Ergonomics Society held at Cambridge University, United Kingdom. (declined)

1970 General Chairman 1970 IEEE Man-Machine System Annual Symposium, Winter Park, FL.

1971 IEEE Engineer of the Year for Central Florida.

Current Registered Psychologist, New York State

1966-69 Member, Computer-Assisted Education Advisory Board, Naval Academy, Annapolis, MD.

1968-71 Member, Administrative Committee of the Systems, Man and Cybernetics Group of the Institute of Electrical and Electronic Engineers.

1970-73 Member, National Academy of Sciences, National Research Council. Armed Forces - NRC Committee on Vision: Working Group on Visual Requirements for Cockpit Simulators.

1971 Member, The U.S. Army Armor School Advisory Committee, Fort Knox, KY.

1971 Chairman, Session on the Roles and Controls of Personnel Research and Development in the DOD at a Symposium/Seminar on Personnel Research and Development Planning and Management at Temple University in Philadelphia, PA.

1972 Session Chairman, Target Acquisition Symposium, Office of Naval Research sponsored meeting, Orlando, FL.

1973-75 Member Membership Committee, Society of Engineering Psychologists, American Psychological Association.

1974 Member, Advisory Committee on Human Resources Research and Development, Naval Air Systems Command, Washington, D.C.

1974	United States Representative to 10th Applied Military Psychology Symposium, West Germany.
1975	Chairman of Symposium, Evaluation of Basic and Applied Research, American Psychological Association of Eighty-Third Annual Convention, Chicago, IL.
1980	Chairman, Fellows Committee, Society of Engineering Psychologists, American Psychological Association.
1981	Chairman, Membership Committee, Society of Engineering Psychologists, American Psychological Association.
1981-82	Chairman of National Advisory Committee to Nuclear Regulatory Commission-Committee advises on personnel qualifications matters.
1983	Member of National Advisory Committee to Nuclear Regulatory Commission; Committee addresses our simulator requirements for nuclear power plant operators.
Current	Licensed Psychologist, California.

HONORS, AWARDS IN THE FEDERAL SERVICE

Federal Service Outstanding Performance Rating:

1956	1976
1960	1977
1961	1978
1962	1979
1975	1980

Sustained Superior Performance:

1974	1979

1960 Naval Training Device Center moninee for Federal Business Association's Award for Outstanding Federal Service

1960 Naval Training Device Center nominee for William A. Jump Memorial Award

1961 Naval Training Device Center nominee for Federal Business Association's Award for Outstanding Federal Service

1961 Naval Training Device Center Alternate nominee for National Civil Service League Career Service Award

1962 Naval Training Device Center and Office of Naval Research nominee for Arthur S. Fleming Award

1982 Navy Superior Civilian Service Award

Attachment 2

UCS' Exhibit List

UCS currently intends to introduce the following documents as Exhibits at the hearing. UCS expects to attempt to limit both the number of documents and the material from particular documents to less than appears below to the extent possible.

1. July 16, 1984, Final Certification Statement of E. Frederick.

2. Employee Performance Reviews of H.K. Olive dated from 1982 to 1984, which appear as Exhibits 1 and 2 to the Deposition of Henry Hukill, Jr., on November 7,1984.

3. RHR Consultation with GPU Nuclear Management: Priority Concerns of Licensed Operator's at TMI-1 and Oyster Creek and Suggested Action Steps - Final Report, Paul F. D'Arcy, Ph.D and John R. Sauer,Ph.D., March 15, 1983.

4. Memorandum from Paul D'Arcy to Bob Arnold of May 17, 1983, Re: GPU Nuclear - TMI-1 Percentages, and accompanying statistics.

5. Written questions and answers that appear as Exhibit 1 to the Deposition of Jay Moore.

6. Written questions and answers that appear as Exhibit 1 to the Deposition of John Walsh.

7. Written questions and answers that appear as Exhibit 1 to the Deposition of Ronald Maag.

8. Written questions and answers that appear as Exhibit 1 to the Deposition of George J. Bixler.

9. Memoranda relating to repayment of D.B. Mayhew, which appear as Exhibits 4 and 5 to the Deposition of Mr. Hukill.

10. Interview Evaluation Summary related to Richard P. Coe, which appears as Exhibit 6 to the Deposition of Mr. Hukill.

11. Oral Examination Evaluation sheets for D. E. Smith for March 19, 1984, which appear as Exhibit 3 to the Deposition of Mr. Leonard.

12. Questions that appear as Exhibit 8 to the Deposition of Mr. Leonard.

13. Evaluations of Mr. Frederick, for 8-12-80, 10-22-80, and 3-8-83, which appear as Exhibits 3-5 to the Deposition of Mr. Newton.

14. Upgrade Program for H.K. Olive, July 23, 1984, which appears as Exhibit 6 to the Deposition of Mr. Newton and Exhibit 6 to the Deposition of Mr. Ross.

15. Three Mile Island Nuclear Station Unit No. 1 Abnormal Transient Procedure 1210-5, OTSG Tube Leak/Rupture, Revision 4, dated 08/28/84.

16. Three Mile Island Nuclear Station Unit No. 1 Abnormal Transient Procedure 1210-1, Reactor/Turbine Trip, Revision 6, dated 08/28/84.

17. Three Mile Island Nuclear Station Unit No. 1 Abnormal Transient Procedure 1202-2, Station Blackout, Revision 14, dated 08/28/84.

18. Three Mile Island Nuclear Station Unit No. 1 Abnormal Transient Procedure 1102-11, Plant Cooldown, Revision 47, dated 08/29/84.

19. Three Mile Island Nuclear Station Unit No. 1 Abnormal Transient Procedure 1102-16, RCS Natural Circulation Cooling, Revision 10, dated 06/20/84.

20. UCS Questions and Answer Key, November 7, 1984.

21. Pages from RO-1 Answer Key, GPU Document Id. 0639D, created 02/22/84, from which questions and answers used for the UCS Questions and Answer Key, November 7, 1984, were drawn.

22. Pages from RO-2 Key, GPU Document Id. 0640D, created 02/22/84, from which questions and answers used for the UCS Questions and Answer Key, November 7, 1984, were drawn.

23. Pages from RO-3 Key, GPU Document Id. 0641D, created 02/22/84, from which questions and answers used for the UCS Questions and Answer Key, November 7, 1984, were drawn.

24. The complete answer keys for the previous three documents.

25. The complete answer keys for the SRO-1, SRO-2, and SRO-3 Annual Written Requalification Examinations given on 3-7-84, 3-8-84, and 3-9-84.

26. Mr. Kelly's handwritten notes, identified as Exhibit 1 to his Deposition.

27. Pages 16 - 18 of the NRC Staff's First Supplemental Response to Intervenor Union of Concerned Scientists' First Set of Interrogatories to Nuclear Regulatory Commission Staff.

28. Examination results for Walsh, Moore, and Olive, Exhibits 3 - 5 to the Deposition of Mr. Ross.

29. Replacement Operator Training Program Description, TMI-1, submitted by S.L. Newton on July 21, 1984.

30. TMI-I Senior Reactor Operator Replacement Training Program, Effective Date March 21, 1984.

31. Licensed Operator Requalification Program Description (Unit 1), Effective Date 06/12/84.

32. Oral examination sheets for Jay Moore, dated 3-26-84, which appear as Exhibit 1 to the Deposition of Michael Ross.

Attachment 3

Persons Whom UCS Expects To Subpoena To Appear At The Hearing

UCS currently intends to subpoena the following individuals to appear at the hearing for various purposes. UCS hopes to limit both the number of individuals and the purposes for which particular individuals are called if possible.

1. Michael J. Ross

2. Henry Hukill, Jr.

3. Edward Frederick

4. George J. Bixler

5. Ronald Maag

6. John Walsh

7. Jay Moore

8. Paul D'Arcy or another representative of Roher, Hibler & Replogle, Inc.

9. Delores Morisseau

10. S.L. Newton

11. Robert Long

12. Richard Coe

13. Bruce Leonard

November 15, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
(Three Mile Island Nuclear Station, Unit No. 1)	)	(Restart Remand on Management)

CERTIFICATE OF SERVICE

I hereby certify that copies of the UCS' NOTICE OF TESTIMONY, EXHIBITS AND OTHER EVIDENCE, were served on those indicated on the accompanying Service List. Service was made by deposit in The United States mail, first class, postage prepaid, on November 15, 1984, except that counsel for licensee was served by hand.

William S. Jordan, III

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart Remand on
(Three Mile Island Nuclear Station, Unit No. 1)	)	Management)
	)	

SERVICE LIST

Administrative Judge
Gary J. Edles, Chairman
Atomic Safety & Licensing Appeal Bd.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
John H. Buck
Atomic Safety & Licensing Appeal Bd.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
Christine N. Kohl
Atomic Safety & Licensing Appeal Bd.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
Ivan W. Smith, Chairman
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
Sheldon J. Wolfe
Atomic Safety & Licensing Appeal Bd.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
Gustave A. Linenberger, Jr.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Jack R. Goldberg, Esq.
Office of the Executive Legal Dir.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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1011 Green Street
Harrisburg, PA 17102

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Washington, D.C. 20002

Mr. and Mrs. Norman Aamodt
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Coatesville, PA 19320

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