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SELECTION OF PERSONNEL FOR REACTOR OPERATOR TRAINING

by

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Reactor Operations Division

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SELECTION OF PERSONNEL FOR REACTOR OPERATOR TRAINING

Over the past six years, the hiring practices of the Reactor Operations Division of Argonne National Laboratory have been conducted to determine the highest level of personnel who would be willing to remain in the position of reactor operator.

The Laboratory feels that the operators have a definite responsibility for the safety of the facility. They must understand the effect of their actions on the systems. They are not there merely to take minor corrective actions as demanded by the instruments. This philosophy is demanded by the fact that we have four entirely different reactors, none of which are being operated in a routine manner.

Our experience has shown that there is a very definite upper level of education of men who will remain on the job with an acceptable level of turnover. Our conclusions are drawn on the experience with 89 operators over the past several years. Personnel who have received degrees from accredited universities will not stay on the job of reactor operator. They generally leave during the first or second year after qualifying as an operator. The same is true to a high degree of personnel who have more than two years of college education. Men who are near the completion of requirements for a bachelor's degree will generally leave to return to college.

Of the 89 operators we have employed, we have had:

- 14 terminations
- 8 promotions or internal transfers
- 67 still operating

The educational backgrounds of those who terminated are

- 3 with B.S. degrees
- 6 technical institute graduates
- 4 with equivalent of 2 years of college
- 1 with no higher education

The educational backgrounds of those who were promoted or transferred to other positions within the division are:

- 5 with no higher education (15 yrs)
- 1 with a B.S. degree (3 yrs)
- 1 technical institute graduate (2 yrs)
- 1 with the equivalent of 2 years of college (12 yrs)

The average number of years the men have been with the Division are given in parentheses.

We lose our men primarily to colleges and universities. Of the fourteen who have terminated:

- 3 returned to full-time college work
- 7 left for work at universities with reactors
- 2 left for work in non-educational organizations
- 1 went into the Armed Services
- 1 transferred to another division of the Laboratory

In view of this experience, we have discontinued the hiring of personnel who have a bachelor's degree from an accredited institution or who are close to receiving such a degree.

We now hire men from three general categories. The first are the graduates of two-year technical institutes. In the second category are men who have had a number of years of experience in related operating jobs such as the petroleum industry or the chemical industry. Men who have served in the nuclear programs of the armed forces are in the third category.

We have found that highest ranking students from the technical institutes usually will not accept offers of employment as reactor operators. It appears that the interest in a subject that drives a man to reach the top

scholastic standing also steers him into a directly related job. This is especially true of men in the electrical or electronic field. However, we are successful in hiring men of all ranks below the upper ten percent. We have seen no correlation between the ability as an operator and scholastic standing.

Men who have had experience in similar operating jobs fit into the organization quite well. These men are on the average at least ten years older than the technical-school graduates. They are used to the requirements demanded from an operating job. Our location in the Chicago area makes it possible to hire these men. We are in the center of a petroleum and chemical processing area. Cutbacks and layoffs in these industries provide us with a continuing supply of these more mature individuals. These men at times have more difficulty with the formal training. This may be expected since they have usually been away from such training for some time. When they have advanced to the on-the-job training stage, they perform quite well.

The men from the nuclear programs of the Armed Forces are excellent reactor operators. We hired the first of these men about a year ago and have now added a total of eleven to our crews. Eight of the eleven were qualified as reactor operators in the Navy. Former operators have been very thoroughly screened and extremely well trained for the job. All they need is familiarization with our facilities and the specialized operating rules and procedures that are necessary.

All applicants for the trainee position are given pre-employment tests. These are special tests required primarily for the Reactor Operations Division and are in addition to the usual tests and examinations given all employees at the Laboratory. The tests are used to determine the applicant's ability

in mechanical reasoning, numerical reasoning, word fluency, following oral direction, and his general mental ability. The following tests are given:

Wonderlic Personnel Test¹

This test is given to all new personnel entering the Laboratory. It measures the general intelligence level of adults and is an indicator of future possibilities. The test indicates a person's ability to think in terms of words and ideas.

A score above the 43 percentile on this test is mandatory for hiring; however, anyone scoring below the 60 percentile is very carefully reviewed.

Oral Directions Test²

This test determines an individual's ability to comprehend oral directions and to execute the instructions correctly.

A score above the 80 percentile is expected of the applicant.

Mechanical Comprehension Test³

This test measures the person's ability to understand the relationship of physical forces and mechanical elements in practical situations. A person who scores low on this test would probably have difficulty learning the principles of operation of complex devices.

We expect a score above the 80 percentile on this test.

Arithmetic Reasoning Test⁴

This test measures the reasoning skill with numerical problems involved rather than actual ability to make mathematical calculations. The basic manipulations of addition, subtraction,

fractions, division, multiplication, percentage, and interest rate are all that are required on this test.

A 60 percentile score is expected on this test.

Primary Mental Abilities Test⁵

This test consists of five parts which test the candidate's ability in spacial relations, reasoning, word fluency, arithmetic, and vocabulary. We use this test primarily as a check on the other tests given.

There are no set scores on either the individual parts or the total which must be made to be acceptable.

If a man receives a lower score than listed, we try to evaluate the reason. A series of low scores will cause rejection.

Following this testing, each applicant is interviewed by at least three supervisors in the Division. At the end of each interview, the supervisor immediately writes a short opinion of the man so that we have in his file a permanent record of the original opinions. All three supervisors must concur before an offer of employment is made.

Of all the men we have, only two have failed to qualify as operators. None of those who are now in training are having any difficulty in the program. We feel that the men who we are hiring are close to the upper limit of the quality that we can expect to remain interested in the reactor operator's job. If anything, they may be slightly above the caliber who will remain for long periods of time with reasonable turnover. The experiment in determining exactly how high a caliber of man we should have is continuing. Our present practices are providing us with a sufficient quantity of well qualified personnel. Our results in the reactor training program have been very

excellent, and we have had only a few occasions where personnel have had to repeat the training or have not been able to complete the training program satisfactorily.

¹Wonderlic Personnel Test

E. F. Wonderlic, Northfield, Illinois

²Oral Directions Test

Charles Langmuir, Psychological Corporation, New York, New York

³Mechanical Comprehension Test

Psychological Corporation, New York, New York

⁴Arithmetic Reasoning Test

Science Research Corporation, Chicago, Illinois

⁵Primary Mental Abilities Test

Science Research Corporation, Chicago, Illinois

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