The Education, Experience, Training, and Certification
of
Reactor Operators at AEC-Owned Reactors

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1.0 Introduction

The AEC's Division of Operational Safety has collected statistical data from 13 operating contractors which deal with the education, experience, training, and certification procedures for several hundred reactor supervisors, operators and trainees employed at AEC-owned reactor facilities. These data were collected from questionnaires completed by reactor managers, and by qualified, full-time reactor supervisors, operators, and trainees assigned to the respective AEC-owned reactors for the purpose of maintaining the normal weekly reactor operating schedules as of February 1963.

This paper presents average data on reactor supervisor and operator education, experience, and training, and on certification procedures by reactor category following the conventions and abbreviations employed in TID-8200 (7th Rev.), (Nuclear Reactors Built, Being Built, or Planned in the United States, as of December 31, 1962, United States Atomic Energy Commission, Division of Technical Information) except for the Process Development Reactors which are included as Special Test Reactors.

2.0 Summary

AEC reactor operating contractors are obligated by contract and are inspected by the AEC to assure maintenance of acceptably high standards in

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the selection, training, examination, and certification of operators. Contractors certify reactor operators, and maintain continuing surveillance of operational proficiency and safety. The contractors also provide recertification training for supervisors and operators either through formal training programs or informally under the tutelage of a qualified supervisor. In most instances, formal written and/or manipulative examinations are required at regular intervals for operator and supervisor recertification.

Contractors generally differentiate between reactor supervisors and reactor operators and generally strive for higher achievement levels among supervisors than among operators. Usually supervisor training and experience tends more toward the engineering, technical, and administrative aspects, while the operator training tends toward the control room, laboratory and equipment manipulative skills. Both supervisors and operators must demonstrate their operating proficiency through formal written, oral and/or manipulative examinations, or through informal demonstrations to qualified supervisors.

The data Tables represent the averages obtained from questionnaires received from 362 reactor supervisors, 393 reactor operators, 44 reactor supervisor trainees and 139 reactor operator trainees. Differentiation between supervisors, operators, and trainees was based upon the designation of the respective contractors.

3.0 Education and Experience Background

3.1 General

Tables 1, 2, and 3 illustrate the average educational and experience

backgrounds of reactor supervisors (Supv.), operators (Tech.), and trainees in each of the nine reactor categories. The Tables show the percentage of reporting supervisors, operators, and trainees who are high school graduates, have attended technical school and/or college, and have received baccalaureate or advanced degrees. Operator educational data encompasses high school, technical school, college, and graduate school. The average education in each category was determined by summing all education and dividing by the number of supervisors, operators, or trainees in the respective categories. The total education spread shows the individual highest and lowest educational background in each reactor category.

Experience backgrounds listed in Tables 1-3 include three types of experience. The first is actual reactor operating experience as a member of an operating crew or full-time operator of a reactor facility. Second, is other nuclear experience which encompasses operation, research, analysis or design in such fields as accelerators, nuclear weapons, chemical separation plants, etc. Finally, non-nuclear experience is tabulated, and encompasses all industrial and professional experience in areas of endeavor, which each operator considered important to his job as reactor operator. Reactor operating experience spread shows the highest and lowest experience background in reactor operations of individuals in each reactor category.

TABLE 1

REACTOR OPERATOR EDUCATION
AND
EXPERIENCE BACKGROUND *

		PRODUCTION REACTORS		EXPERIMENTAL POWER REACTORS		REACTOR EXPERIMENTS	
		Supv	Tech	Supv	Tech	Supv	Tech
OPERATORS	EDUCATION						
	No. of Operators**	48	66	34	44	33	62
	HS Graduate - %	98	61	100	91	97	92
	Tech. School - %	10	15	41	73	27	31
	College Attend. - %	83	86	82	43	91	37
	College Degree - %	83	0	68	7	82	3
	Advanced Degree - %	2	0	12	0	12	0
	Tot. Ed. Spread -yrs	11.0-20.0	8.0-15.5	11.0-21.0	9.0-17.0	11.0-19.0	9.0-18.0
OPERATORS	Average Ed. - yrs	15.7	11.3	16.6	13.8	16.1	13.1
	EXPERIENCE						
	Rea.Op.Exp.Sprd-yrs	1.0-15.0	1.0-18.0	0.5-21.0	0.5-10.0	0.5-16.0	0.8-11.3
	Avg.Rea.Op.Exp.-yrs	7.9	6.9	5.7	4.0	6.9	5.3
	Avg.Other Nuc.Exp. yrs	0.6	0.1	2.2	1.2	3.2	2.2
	Avg.Non-Nuc.Exp.-yrs	3.7	0.5	6.6	6.6	2.4	2.8
	EDUCATION						
	No. of Trainees **	3	7	2	14	8	17
TRAINEES	HS Graduate - %	100	86	100	93	100	94
	Tech. School - %	33	0	0	86	50	53
	College Attend. - %	100	0	100	29	75	65
	College Degree - %	100	0	100	7	38	6
	Advanced Degree - %	0	0	0	0	0	0
	Tot.Ed.Spread - yrs	16.0-17.0	9.0-12.0	16.0-16.5	12.0-18.5	12.0-19.0	10.0-17.0
	Avg. Education - yrs	16.7	11.6	16.3	14.4	15.1	14.0
	EXPERIENCE						
TRAINEES	Rea.Op.Exp.Sprd- yrs	1.0-4.5	1.0-14.0	0.5-3.1	0.3-4.8	0.8-6.8	0.8-4.0
	Avg.Rea.Op.Exp. -yrs	3.7	2.7	1.8	1.6	3.3	1.6
	Avg.Other Nuc.Exp.- yrs	0.7	0.6	8.1	1.8	3.2	4.0
	Avg.Non-Nuc.Exp.-yrs	2.3	0.7	9.5	5.4	3.6	5.8

* Data reported as of February 1963

** Number of completed Questionnaires returned to AEC

TABLE 2
REACTOR OPERATOR EDUCATION
AND
EXPERIENCE BACKGROUND *

		GENERAL IRRADIATION TEST REACTORS		RESEARCH REACTORS		REACTOR SYSTEM EXPERIMENTS	
		Supv	Tech	Supv	Tech	Supv	Tech
OPERATORS	EDUCATION						
	No. of Operators**	16	32	120	122	14	8
	HS Graduate - %	100	100	98	88	100	100
	Tech. School - %	19	22	26	45	36	63
	College Attend. - %	100	97	84	27	93	75
	College Degree - %	100	94	72	6	86	0
	Advanced Degree - %	0	0	22	2	14	0
	Tot. Ed. Spread -yrs	16.0-19.0	13.5-19.0	11.5-21.0	8.0-20.5	14.0-18.0	12.5-15.0
OPERATORS	EXPERIENCE						
	Rea.Op.Exp.Sprd-yrs	3.3-8.6	0.8-11.0	0.2-19.0	1.0-19.0	0.6-11.6	1.5-7.2
	Avg.Rea.Op.Exp.-yrs	5.4	3.0	6.0	6.1	3.8	3.0
	Avg.Other Nuc.Exp. yrs	0.4	0.2	3.1	2.7	1.6	1.9
	Avg.Non-Nuc.Exp.-yrs	1.6	1.4	2.6	3.3	3.7	3.4
TRAINEES	EDUCATION						
	No. of Trainees**	1	19	8	23	9	17
	HS Graduate - %	100	100	100	96	100	94
	Tech. School - %	100	11	50	74	56	71
	College Attend. - %	100	100	100	61	89	47
	College Degree - %	100	100	100	13	56	29
	Advanced Degree - %	0	0	50	0	0	0
	Tot.Ed.Spread - yrs	18.0	16.0-18.0	16.0-20.0	10.0-18.0	16.0-20.0	11.0-17.0
TRAINEES	EXPERIENCE						
	Rea.Op.Exp.Sprd- yrs	4.3	0.6-1.4	0.5-1.0	0.1-4.1	0.2-10.0	0.4-11.5
	Avg.Rea.Op.Exp. -yrs	4.3	0.7	0.6	0.8	1.5	1.4
	Avg.Other Nuc.Exp.- yrs	0	0.2	1.6	1.9	2.2	1.7
	Avg.N. Nuc.Exp.-yrs	4.0	0.8	1.8	2.9	8.4	5.3

* Data reported as of February 1963

** Number of completed Questionnaires returned to AEC

TABLE 3
REACTOR OPERATOR EDUCATION
AND
EXPERIENCE BACKGROUND *

		TEACHING REACTORS		CRITICAL FACILITIES		SPECIAL TEST REACTORS		
		Supv	Tech	Supv	Tech	Supv	Tech	
OPERATORS	EDUCATION	No. of Operators**	3	6	46	27	47	27
		HS Graduate - %	100	100	100	93	100	93
		Tech. School - %	0	50	24	48	1	22
		College Attend. - %	100	83	98	85	100	37
		College Degree - %	100	67	96	60	100	15
		Advanced Degree - %	67	33	63	15	38	4
		Tot. Ed. Spread -yrs	17.0-20.0	15.0-19.5	15.0-24.0	12.0-20.0	16.0-21.0	8.0-19.0
		Average Ed. - yrs	19.0	16.8	18.3	16.2	17.5	13.2
	EXPERIENCE	Rea.Op.Exp.Sprd-yrs	4.9-11.5	0.3-5.0	0.3-12.5	0.5-12.7	0.5-12.5	0.5-15.0
		Avg.Rea.Op.Exp.-yrs	8.9	3.4	3.2	2.9	3.5	4.2
		Avg.Other Nuc.Exp. yrs	7.7	4.7	6.7	3.4	4.5	4.7
		Avg.Non-Nuc.Exp.-yrs	10.0	4.2	2.4	3.7	2.5	2.3
TRAINEES	EDUCATION	No. of Trainees**	6	1	4	18	3	23
		HS Graduate - %	100	0	100	94	100	100
		Tech. School - %	83	100	50	61	0	56
		College Attend. - %	100	0	100	78	100	74
		College Degree - %	67	0	100	61	100	56
		Advanced Degree - %	17	0	0	50	67	13
		Tot.Ed.Spread - yrs	16.0-19.0	11.0	16.0-21.0	13.0-20.0	17.0-19.0	12.0-19.0
		Avg. Education - yrs	16.7	11.0	16.5	16.9	18.0	15.3
	EXPERIENCE	Rea.Op.Exp.Sprd- yrs	2.5-8.1	0.8	0.5-1.4	0.3-7.0	0.1-1.9	0.1-6.0
		Avg.Rea.Op.Exp. -yrs	4.3	0.8	1.1	1.7	0.3	0.3
		Avg.Other Nuc.Exp.- yrs	4.9	0	0	2.8	2.3	3.8
		Avg.Non-Nuc.Exp.-yrs	3.1	1.0	4.3	4.7	3.0	4.8

* Data reported as of February 1963

** Number of completed Questionnaires returned to AEC

3.2 Supervisor Backgrounds

Reactor supervisors currently employed by AEC contractors generally possess a college or equivalent educational background. The average educational background for all supervisors within a reactor category ranges from 15.7 years at the Production Reactors to 19.0 years at the Teaching Reactors. Formal education of individual reactor supervisors currently supervising operations ranges from 11.0 years at several facilities to 24.0 years at one of the Critical Facilities. The educational background for supervisors is much higher at the smaller, less complex Teaching and Critical Facilities. This is to be expected, because of the academic atmosphere prevalent at the Teaching and Critical Facilities.

Reactor operating experience background of reactor supervisors complements their formal educational backgrounds. Those who possess less formal education than the average generally possess a large amount of reactor operating experience. Highest and lowest average reactor operating experience of 8.9 years and 3.2 years exists among the reactor supervisory groups in the Teaching and Critical Facility reactor categories, respectively. However, the Teaching Reactor data has a small statistical basis, since the AEC owns only two reactors in this category. Therefore, 7.9 years of reactor operating experience at the Production Reactors is more representative of the highest experience background.

While the reactor operating experience background is generally higher for the supervisors at the large, complex facilities, it is interesting to note that the total nuclear and non-nuclear experience does not vary greatly among the reactor categories. These data indicate that AEC contractors generally employ mature, experienced supervisors with good educational backgrounds.

3.3 Operator Backgrounds

Qualified individual reactor operators who are currently operating AEC reactors possess formal education ranging from 8.0 years at several facilities to 20.5 years at one of the Research Reactors. The average educational background for reactor operators ranges from 11.3 years at the Production Reactors to 16.8 years at the Teaching Reactors.

Average reactor operating experience ranges from 2.9 years at the Critical Facilities to 6.9 years at the Production Reactors. Here also, as in the case of the supervisory personnel, it can be noted that the educational backgrounds are higher for the operators of the smaller facilities than for the larger, complex reactors, and that the operating experience is generally higher at the larger, more complex facilities.

Tables 1-3 show that AEC contractors employ operators with good education and experience backgrounds. Where the education background is slightly low, the experience background is correspondingly high, providing a balanced background between education and experience at each facility.

3.4 Trainee Backgrounds

Generally, a college degree or equivalent experience is the present day minimum educational requirement for reactor supervisors. The average educational background for supervisor trainees ranges from 15.1 years at the Reactor Experiments to 18.0 years at the General Irradiation Test Reactors and Special Test Reactors. The spread in educational level for individual reactor supervisor trainees who are currently in training ranges from 12.0 years at one of the Reactor Experiment Facilities to 21.0 years at one of the Critical Facilities.

The average reactor operating experience of supervisor trainees varies from 4 months at the Special Test Reactors to 4.3 years at the General Irradiation Test Reactors and Teaching Reactors. Those supervisor trainees who do not have a college degree possess an average of 6.7 years reactor operating experience and 8.9 years of other nuclear and non-nuclear experience.

Generally, a high school diploma or equivalent experience is the present day minimum for reactor operators. The average education varies from 11.0 years at the Teaching Reactors to 16.9 years at the Critical Facilities. Average operating experience among operator trainees ranges from 4 months at the Special Test Reactors to 2.7 years at the Production Reactors. The spread in education background for individual reactor operator trainees ranges from 9.0 years at one of the Production Reactors to 20.0 years at several of the Critical Facilities. Reactor operator trainees who are not high school graduates have an

average of 2.8 years reactor operating experience and 8.0 years of other nuclear and non-nuclear experience.

It is evident from these data that supervisory and operator trainees who do not possess the minimum educational background, do possess operating experience that is greater than the average for all trainees.

It is also evident from the above that the academic and developmental nature of the small reactors requires a higher educational standard than that employed for the large, complex facilities where operations are more or less routine.

Due to the small number of supervisor and operator trainees, these data do not provide the same statistical accuracy as that for the qualified operators and supervisors. However, they do illustrate the general trend in each reactor category toward increasing the minimum educational requirements for operating and supervisory applicants.

4.0 Training

4.1 Formal Training

Formal lecture training programs are generally provided for operator and supervisory trainees at the more complex facilities, to a lesser extent at the small, simpler reactors, and are usually tailored to the trainee's needs for performing his assigned duties at the reactor facility. The formal programs generally consist of instructions in reactor physics, instrumentation and controls, standard and emergency operating procedures, radiological safety, facility design and general safety criteria for reactor operations and testing programs with greatest emphasis on the first three.

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Training programs vary in length from 1 to 23 weeks for both supervisory personnel, and for reactor operators, depending on the complexity of the facility.

Tables 4, 5, and 6 illustrate the training programs in effect at AEC-owned reactors, and show the average hours actually spent on formal training in each of the several topics. In most cases, the total length of the formal program is longer. Few formal training programs are carried on a full-time basis, since the services of the trainees is often required in other capacities.

4.2 On-the-Job Training

On-the-job training is provided for supervisory personnel and reactor operators at all AEC-owned reactors. Tables 4, 5, and 6 illustrate these programs, and show the average hours devoted to training in several topics. At some facilities, training under the direct tutelage of a qualified supervisor is preferred to formal on-the-job training programs.

The training programs generally consist of training in control manipulations and reactor startups, equipment and fueling operations, instrumentation testing and operation, and reactor maintenance. The length and scope of on-the-job training is determined by the needs of the trainees, the complexity of the operations and varies from 1 week to 3 years for supervisors, and 1 week to 4 years for operators.

TABLE 4

REACTOR OPERATOR TRAINING
AND
QUALIFICATION PROGRAMS*

		PRODUCTION REACTORS		EXP. PWR REACTORS		REACTOR EXPERIMENTS	
		Supv	Tech	Supv	Tech	Supv	Tech
	Number of Reactors	13	13	5	5	5	5
FORMAL TRAINING	Training Prog. - %	100	62	80	100	100	100
	Total Hours Spread	94-130	30	114-902	90-902	148-500	52-440
	Total Hours Average	109	30	377	321	219	195
	Tot.Hrs Avg.Rea.Phys.	53	10	117	96	49	42
	Tot.Hrs Avg.Rad.Saf.	16	9	12	12	16	15
	Tot.Hrs Avg.Inst.& Control	7	2	34	30	17	16
	Tot.Hrs Avg.Proced.	21	4	119	99	46	46
	Tot.Hrs Avg.Fac.Des.	6	2	34	31	38	28
	Tot.Hrs Avg.Misc.	6	3	61	53	53	48
ON-THE-JOB TRAINING	Training Prog. - %	100	100	100	100	100	100
	Total Hours Spread	940-8500	500-8500	30-1400	530-1400	210-1030	122-1030
	Total Hours Average	5666	5425	766	948	686	521
	Tot.Hrs Avg.Control Manipulations	2510	2280	178	274	220	173
	Tot.Hrs Avg.Equip.& Fuel Operations	1510	1630	238	368	253	220
	Tot.Hrs Avg.Inst.& Testing Op.	615	540	43	30	47	32
	Tot.Hrs Avg.Reactor Maintenance	281	0	85	90	43	15
	Tot.Hrs Avg.Misc.	750	975	222	186	123	81
QUALIFICATION	Written Exam. - %	62	62	80	100	60	80
	Oral Exam. - %	62	0	60	80	80	80
	Manipulative Exam.-%	0	0	80	100	80	80
REQUALIFICATION	Training Prog. - %	100	100	100	100	60	60
	Training Avg.Hrs	59	47	130	55	67	50
	Written Exam. - %	0	0	0	0	67	67
	Avg.Freq. - yrs	--	--	--	--	0.5	0.5
	Manipulative Exam.-%	0	0	0	40	0	0
	Avg.Freq. - yrs	--	--	--	--	--	--

*Data reported as of February 1963

TABLE 5

REACTOR OPERATOR TRAINING
AND
QUALIFICATION PROGRAMS*

		GEN. IRR. TEST REA.		RESEARCH REACTORS		REACTOR SYS. EXPS.	
		Supv	Tech	Supv	Tech	Supv	Tech
	Number of Reactors	2	2	17	17	9	9
FORMAL TRAINING	Training Prog. - %	100	100	77	77	100	100
	Total Hours Spread	172	172	36-146	32-179	44-170	36-176
	Total Hours Average	172	172	92	77	127	114
	Tot.Hrs Avg.Rea.Phys.	80	80	17	17	19	14
	Tot.Hrs Avg.Rad.Saf.	9	9	14	17	13	12
	Tot.Hrs Avg.Inst.& Control	14	14	17	7	15	14
	Tot.Hrs Avg.Proced.	38	38	13	10	25	22
	Tot.Hrs Avg.Fac.Des.	8	8	12	9	37	36
	Tot.Hrs Avg.Misc.	23	23	19	17	18	16
ON-THE-JOB TRAINING	Training Prog. - %	100	100	100	100	100	100
	Total Hours Spread	1589-1594	1589-1594	62-1420	62-1600	90-965	90-750
	Total Hours Average	1593	1593	753	772	617	458
	Tot.Hrs Avg.Control Manipulations	167	167	209	219	140	122
	Tot.Hrs Avg.Equip.& Fuel Operations	38	38	172	195	131	101
	Tot.Hrs Avg.Inst.& Testing Op.	10	10	64	66	115	78
	Tot.Hrs Avg.Reactor Maintenance	120	120	86	95	28	21
	Tot.Hrs Avg.Misc.	1258	1258	222	197	203	136
QUALIFICATION	Written Exam. - %	100	100	65	71	100	100
	Oral Exam. - %	100	100	59	88	56	56
	Manipulative Exam.-%	100	100	71	100	78	78
REQUALIFICATION	Training Prog. - %	100	100	81	81	78	78
	Training Avg.Hrs	250	250	26	23	2	10
	Written Exam. - %	0	0	31	31	71	71
	Avg.Freq. - yrs	--	--	1.0	1.0	2.0	2.0
	Manipulative Exam.-%	0	0	0	0	71	71
	Avg.Freq. - yrs	--	--	--	--	2.0	2.0

*Data reported as of February 1963

TABLE 6
REACTOR OPERATOR TRAINING
AND
QUALIFICATION PROGRAMS*

		TEACHING REACTORS		CRITICAL FACILITIES		SP. TEST REACTORS	
		Supv	Tech	Supv	Tech	Supv	Tech
	Number of Reactors	2	2	20	20	17	17
FORMAL TRAINING	Training Prog. - %	0	0	28	41	29	35
	Total Hours Spread	0	0	1-30	9-170	30-137	32-216
	Total Hours Average	0	0	20	52	72	117
	Tot.Hrs Avg.Rea.Phys.	0	0	3	22	12	41
	Tot.Hrs Avg.Rad.Saf.	0	0	1	6	9	15
	Tot.Hrs Avg.Inst.& Control	0	0	3	6	15	17
	Tot.Hrs Avg.Proced.	0	0	3	3	13	13
	Tot.Hrs Avg.Fac.Des.	0	0	3	6	14	18
	Tot.Hrs Avg.Misc.	0	0	7	9	9	13
ON-THE-JOB TRAINING	Training Prog. - %	100	100	100	100	100	100
	Total Hours Spread	39	261-282	44-6133	44-3740	120-5760	150-2105
	Total Hours Average	39	272	1542	860	1912	948
	Tot.Hrs Avg.Control Manipulations	2	71	370	202	429	221
	Tot.Hrs Avg.Equip.& Fuel Operations	2	80	330	205	163	123
	Tot.Hrs Avg.Inst.& Testing Op.	1	20	92	48	329	107
	Tot.Hrs Avg.Reactor Maintenance	3	20	90	69	101	83
	Tot.Hrs Avg.Misc.	31	81	660	336	890	414
QUALIFICATION	Written Exam. - %	0	0	35	47	18	29
	Oral Exam. - %	0	100	30	37	53	59
	Manipulative Exam.-%	0	100	20	26	47	59
REQUALIFICATION	Training Prog. - %	0	100	72	71	88	100
	Training Avg.Hrs	0	2	13	14	14	10
	Written Exam. - %	0	0	31	16	14	12
	Avg.Freq. - yrs	--	--	2.0	2.0	2.0	2.0
	Manipulative Exam.-%	0	0	23	33	36	31
	Avg.Freq. - yrs	--	--	2.0	2.0	1.5	1.5

*Data reported as of February 1963

The length of the training is usually greater for supervisory personnel than for reactor operators, and stresses the analytical, diagnostic and control aspects of reactor operations for supervisors. A total breakdown of on-the-job training is difficult to obtain, since all time spent in operations by the trainee is usually considered training until the actual assignment of definite responsibility is made to the operator and/or supervisor. Therefore, the average figures for on-the-job training presented in Tables 4-6 only reflect the amount of training in the listed topics.

5.0 Certification

Qualification examinations are required by AEC operating contractors, and are commensurate with the functions and responsibilities that will be assigned to reactor operators and supervisors. The examinations consist of written, oral and/or manipulative demonstration of those aspects of reactor operations where the operator or supervisor trainee will have assigned responsibilities, and where the trainee has received training or possess previous experience or education. Successful completion of the examinations and formal certification by the operating contractor is required at all facilities as a prelude to assignment of full responsibility as a supervisor or reactor operator.

Formal written, oral, and manipulative examinations are required by most of the large, complex reactor facilities, while a significantly smaller percentage of the Critical Facilities, and Special Reactors require formal examinations in all three areas. These reflect the multiple and complex

responsibilities of supervisors and operators in the large facilities, and reflect the higher educational achievement and specialized operation generally characteristic of the small reactor facilities.

6.0 Recertification

All operating contractors provide supplementary and refresher training for previously qualified reactor operators and supervisors. In some cases, the program consists of formal lecture and on-the-job supplementary training and, in other cases, the refresher training is provided under the tutelage of a qualified supervisor on an informal, as needed, basis.

Tables 4-6 reflect data only for those facilities which have formal supplementary training programs in effect. It can be seen from the Tables that many facilities require formal examination as a prelude to recertification. However, this practice is relatively new, and is not in effect at all facilities. The greatest majority of AEC-owned reactor facilities recognize retraining and continued proficiency as a prime requirement of operations supervision and, therefore, the immediate qualified supervisor is charged with the responsibility for supplementary training and recertification of reactor operators and supervisors. This is generally accomplished on an informal basis with a letter from the supervisor to the facility management as evidence of recertification.

In addition to the constant surveillance of the operating contractor's management and internal safety review committees, the performance of operators and supervisors at AEC-owned reactor facilities is also subject to AEC inspection at any time. Formal operational inspections are completed

for AEC-owned reactors at least once per year, and more frequently on facilities having high operational and/or construction activity. Consequent to this fact, in many facilities less emphasis is placed upon formal re-examination and recertification of previously certified operators, as compared to the continuing surveillance and audit of proficiency and safety of operations by direct supervision, internal safety committees, and by the AEC.

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