

MEDICAL RESEARCH DEPARTMENT



U. S. Submarine Base New London

A DESCRIPTION OF DISQUALIFICATIONS OF ENLISTED APPLICANTS FOR SUBMARINE TRAINING

Prepared by

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8 Feb 1946

Bureau of Medicine and Surgery

Research Project X-566 (Sub. No. 119)

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Analysis of Rejections in Examinations for Submarine School

Note: This is an Interim report which (1) summarizes statistics presented in five monthly tabulations previously submitted, and (2) extends the analysis to preselection and training disqualifications.

Medical Research Department
U. S. Submarine Base
New London, Conn.

8 February 1946

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I. SUMMARY

A schematic diagram of the successive steps for selecting and training enlisted submarine men is presented. Personnel attrition at each successive step is treated briefly. The aim of the paper, however, is to present a general description of the personnel selection system. Statistics are tabulated to show the overall picture from the beginning of the war until the end of June, 1945.

Only the New London system is described. During the early part of the war men were transferred to Submarine Duty from various sources, and were trained aboard submarines. The procedure was not systematic and was considered unsatisfactory. All other methods for selecting and training men were discontinued as soon as the New London school was supplying the necessary volume of trained manpower.

From the standpoint of relative numbers disqualified, medical selection seems to predominate over any other type. A man may fail somewhere in the system for any one or more of a large number of reasons. But if one knew only that a certain volunteer failed to get into submarines, he would be making a reasonable estimate if he assumed that volunteer was a medical rejection. Because medical factors have such a tremendous significance, therefore, the validity and reliability of the examination method for determining the presence of each disqualifying medical factor should be determined. Then those examination methods should be standardized.

The greatest variation in attrition is at the preselection stage. Representative disqualification data for this level are presented for one large Naval Training Center. In the opinion of the writer, these data emphasize the need for a corps of doctors and technicians especially trained in selection theory and examination techniques.

One incidental item noted in tables of attrition for pre-training and training rejections at New London since the beginning of the war was an apparent seasonal variation. This illustrates the extreme complexity of the problem; evidently even the season of the year must be borne in mind by Medical examiners in weighing the statements of applicants for submarine duty!

A DESCRIPTION OF DISQUALIFICATIONS OF ENLISTED
APPLICANTS FOR SUBMARINE TRAINING.

II. INTRODUCTION

This paper is a survey of disqualifications occurring in enlisted personnel being processed through the enlisted submarine personnel selection and training system. No attempt is made to probe the validities of any methods; the objective being simply to present the system exactly as it operates, and to make the areas requiring investigation and development stand out by showing the pattern of disqualifications.

The material for this report was gathered from several sources. In fact, if there is any value to this presentation, perhaps the first conclusion is that the submarine or any other similar activity should have a complete central file in which every examination is encoded. By maintaining such a file, weaknesses could be checked before they caused serious losses of manpower through erroneous disqualifications.

It must be emphasized that the data to follow in this paper usually relate to methods for applying principles rather than to principles themselves. This point must be borne firmly in mind in interpreting the statistics; failure to regard them in that light surely will mislead the reader. A great deal of misunderstanding has arisen in personnel work because of failure to distinguish between the validity of a principle and the validity of the method with which the principle is put into operation. The writers can recall, for example, a spirited discussion between two officials about dental examinations; one argued that dentists must revise their ways at a certain station because their disqualifications were accounting for half the rejections, and accordingly there was little room for applying any other physical or aptitude standards; his opponent, on the other hand, contended that dental examinations were essential not only in order to preclude assignments of men who later would have dental trouble but also because dental condition was a good index of general health. Undoubtedly a reconciliation of the two levels of discussion would have found them in complete agreement. Both would have agreed that the principle of rejections for certain dental conditions was sound but that the principle was not applied wisely if it was allowed to override every other consideration. To repeat, then, the data in this paper relate to methods for applying medical and psychological selection principles.

III. OVERALL PATTERN OF SUBMARINE PERSONNEL SELECTION

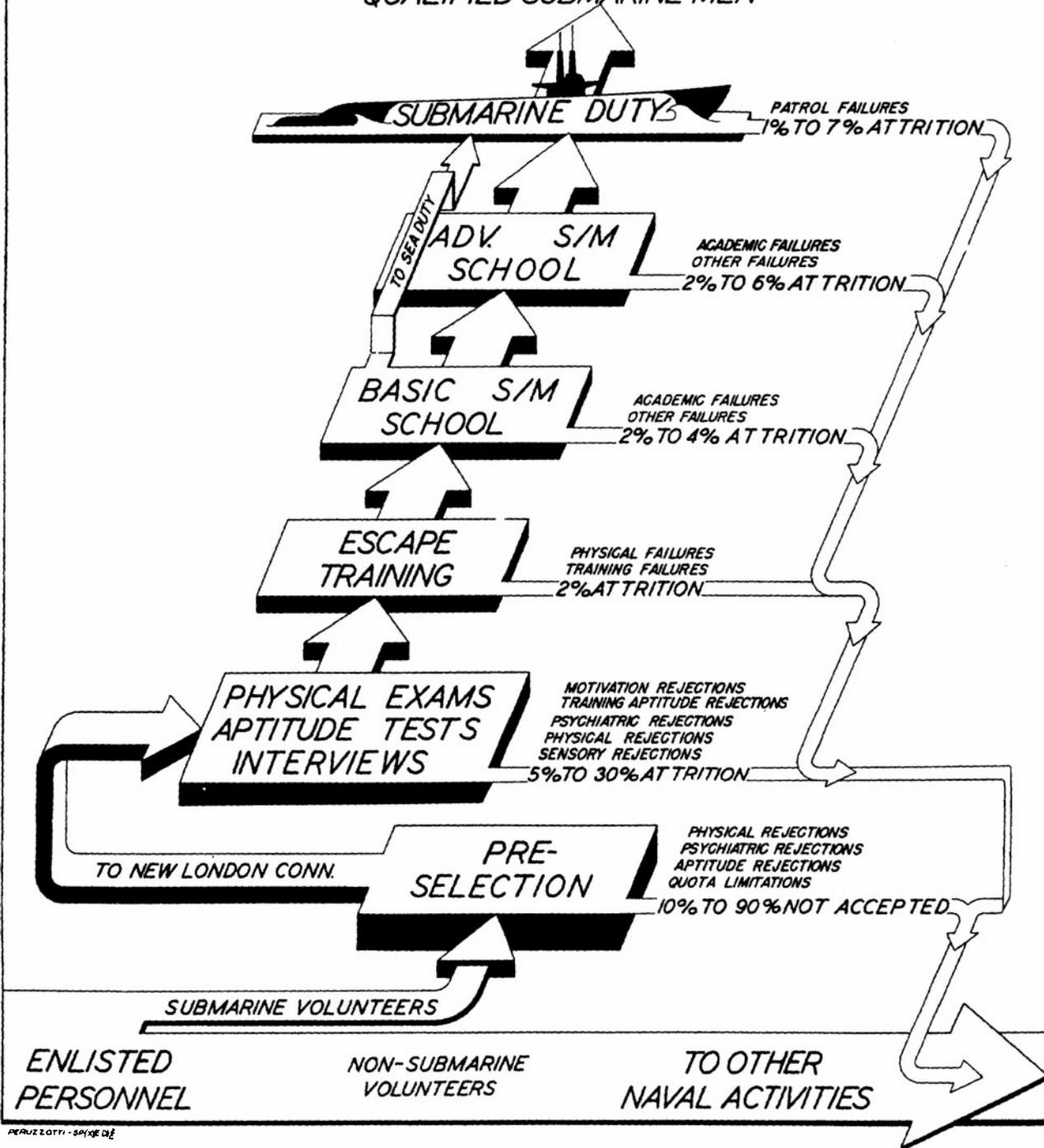
The clearest and most logical method of handling this material to be presented is to follow the candidate from his entrance into the Navy through each step in the selection and training system. A diagram (Figure 1) is a graphic tracing showing how the system functions.

To read the diagram, follow the arrows from the bottom to the top of the page. Each block represents a step in the system, and the items to the right of each block are reasons for rejections or failures at that level.

The range of percentages failing at each step are indicated. The tremendous variability will strike the reader at once. At the "Preselection" level, for example, the figure cited for the proportion not accepted is "10% to 90%". These figures are conservative estimates based on reports from various Naval stations; at times some schools have sent 90% of the volunteers to New London, whereas the proportion sent from others was only a small fraction of the total number of volunteers. Similar fluctuation in the proportions rejected characterizes the other levels, but not to the same extent. The relative proportions and the fluctuation range for failures at each step are represented fairly adequately in the Figure. Representative data on failures at each selection or training step are elaborated in the sections following.



QUALIFIED SUBMARINE MEN



PER 12 2011 - SPYGE 02

SUBMARINE PERSONNEL SELECTION

IV. REJECTIONS IN THE PRESELECTION STAGE

The majority of enlisted candidates received for submarine training since early 1942 have been assigned directly to New London from training schools. Some of these schools have been an integral part of Training Center organizations, but others were not. The bulk of the candidates, then, were preselected at several different stations, so that the overall authority covering selection at this stage was limited to the jurisdiction and direction that could be exercised from Washington by the Bureau of Naval Personnel and the Bureau of Medicine and Surgery. The remainder were sent to New London from surface ships, and so the authority that could be exercised over their preselection was even more limited.

Statistics on rejections are maintained by some of the preselection activities. Those for the Bainbridge Naval Training Center are cited in this report. Joint directives issued in October 1944 by the Bureau of Medicine and Surgery and the Bureau of Naval Personnel established Bainbridge as a station where a carefully prescribed routine of preselection should be followed.^{1,2} The statistics for that station may not be representative of those for other stations, but at least they apply to one comprehensive attempt at systematic preselection. As a matter of fact, the wide variation in preselection would lead one to suspect there is now no representative station. But the Bainbridge situation should be fairly typical of what may be expected when a comprehensive program like that prescribed in the BuPers-BuMed directives is applied. Briefly, the program specified an integrated series of (1) lectures, movies, and pamphlets explaining the submarine service and (2) a progression of medical, psychiatric and aptitude examinations to screen volunteers after the service was explained. The progression was a successive series of eliminations. If a candidate failed one step he was disqualified at that point and did not continue through the remainder of his examinations.

Table I presents some data collected by the Classification Department of the Bainbridge Naval Training Center. Each step in this table deals only with the candidates who were successful at the level above. Thus to calculate the percentage failing the Psychiatric examination one must remember the total number of men seen by the Psychiatrist department was only 1045--those who passed the medical examination.

TABLE I

Attrition in the General Submarine Selection Program
Bainbridge Naval Training Center---January through
June, 1945.

Total Number of Volunteers Processed	1548
Disqualified Medically	503
Disqualified Psychiatrically	56
Fail Personal Inventory Test	61
Disqualified in Aptitude Interviews	285
Dropped--own request	44
Total Number of Volunteers Dropped	949
Total Number Qualified for Transfer to New London	599

According to Table I, medical rejections account for more disqualifications than any other single reason in the program outlined jointly by BuMed and BuPers; and of the total number of volunteers only some 35% to 40% are certified for transfer to New London. Yet, despite the high attrition rate, more than 10% of those assigned to New London during this period failed there in the examinations for submarine training. Furthermore, many of the New London rejections are medical. This suggests that the medical examination itself should be scrutinized.

Table II is a summary of rejections, month by month, according to the reason for rejections, for submarine medical examinations at Bainbridge.

The wide fluctuation in Table II for the proportions rejected under the various headings hints of fluctuating criteria as standards for rejection; and the headings themselves represent entities that have not been studied exhaustively for their validity. However, as stated earlier, the primary aim of this paper was to furnish data on the selection system as it now operates. And Table II, for whatever one may conclude from it, is a tabulation of reasons for 811 Medical disqualifications for submarine duty. These medical examinations are presumed to have been conducted in accordance with the Manual of the Medical Department (Par. 1535) but the reasons for disqualification do not conform to our interpretation of the examination for submarine duty.

Incidentally, the discrepancies in total numbers in this table and in the numbers in Table I for men processed during the same months by the Classification Department are attributable to scheduling factors. A man counted by the Classification Department as volunteering in one month may be examined by the Medical Department in another.

TABLE II
 SUBMARINE MEDICAL EXAMINATIONS AND REASONS FOR REJECTION
 1 JANUARY 1945 to 31 AUGUST 1945
 BAINBRIDGE NAVAL TRAINING CENTER

Month	No. Examined	No. Qualified	No. Disqualified	Color Vision	Vision	Weight	Chest Measure- ments and Breathing	Orthopedics	Ear, Nose & Throat	Heart & Blood Pressure	Previous Medical History	Temperamentally Unsuited	G.U. System & Venereal	Dental
Jan.	299	93	206	41	11	61	38	21	20	6	2	6		
Feb.	260	192	68	2	7	13	10	9	11	10	1	3	2	
Mar.	216	226	90	4	6	22	7	7	30	4		4	5	1
Apr.	240	150	90	4	4	24	10	9	23	3			13	
May	311	230	81	3	20	5		24	17	10			1	1
June	327	233	94	1	15	2	5	38	27	2		4		
July	258	170	88	6		7		42	25	3		3		2
Aug.	332	238	94	6	14	13		18	29	8		4		2
TOTAL	2343	1532	811	67	77	147	70	168	182	46	3	7	22	4

This table was prepared by Lt. Comdr. G. M. Bell (MC) USNR of the Bainbridge Medical Examining Staff. 5 September 1945.

V. REJECTIONS IN PHYSICAL EXAMINATIONS, APTITUDES TESTS
AND INTERVIEWS AT NEW LONDON

All candidates assigned to submarine training are processed after arrival at New London in a program of medical and psychological tests. At the end of the examinations each is then interviewed briefly, and the Submarine Medical Examiner certifies him qualified for submarine training. An appreciable number are disqualified by the Examiner. Then qualified candidates proceed to "Escape Training", the next level of processing shown in Figure I. At this level, there is still further attrition. Only when the escape training is completed is the man assumed qualified for Submarine School.

A man may be failed by the Medical Examiner for various reasons; there are five general classes of reasons for turning candidates down at this level. A code of reasons for rejections has been drawn up, and the Examiner describes each of his rejections by that code. A code reason under one or more of the headings is assigned each rejection. Table III is a listing of the codes used since the beginning of 1944.

Table IV then presents a comparative summary of rejections by reason, month by month, according to the codes in Table III. The totals for the number rejected include those failed in escape-training. These rejections were made from a total of 3601 candidates examined in the period January-July 1945. 419 were failed at the time of interview and 45 were failed in escape-training. Altogether 464 or 12.9% were disqualified.

Table V is a breakdown of the same data according to some natural groupings of sources from which the candidates come. "Schools and Training Centers" are to be contrasted with "All Others"; "Pharmacists Mates" and "Radio Technicians" constitute special groups with different and unique selection problems.

The patterns of disqualifications for "Schools and Training Centers" and "All Others" differ from each other because of differences in the Navy experience of the candidate population. Then, too, "Schools and Training Centers" have fairly well defined programs of examinations for selecting submarine trainees from their student populations, whereas there is every kind of preselection, from good to bad, for choosing from the experienced Fleet men for transfer to New London. Furthermore, for nearly a year preceding the period represented in these data, each school received monthly reports from the Submarine Base listing the candidates from that school, and detailing the coded rejection reasons for every man failing. And medical representatives from New London endeavored to keep in close touch with every school furnishing submarine candidates. So there are a lot of reasons for expecting the

personnel attrition for "Schools and Training Centers" to look better than that for "All Others". The difference is most striking under the "Aptitudes" heading. That might be anticipated, since it is the factor that can be most readily brought under control.

TABLE III

Codes of Reasons for Rejection in New London Examinations Preliminary to Submarine Training

MOTIVATION

1. Never volunteered, doesn't desire now.
2. Volunteered to avoid other duty, doesn't desire now.
3. Originally volunteered, requests other duty now.
4. Volunteered as alternative choice, requests other duty now.
5. Family opposition to submarine duty.
6. Inadequate motivation.

APTITUDE

1. Inadequate intellectual development.
2. Limited educational background.
3. Inadequate intellectual development plus limited education.
4. Limited aptitude for duties of rate.

PSYCHIATRIC

Diseases of mind

- A. CPS Criminalism
- B. CPS Emotional instability
- C. CPS Inadequate personality
- D. Dementia Praecox
- E. Nostalgia
- F. Psychoneurosis
- G. Somnambulism
- H. Psychoneurosis, war neurosis
- J. Disease of nervous system
- M. Miscellaneous.

Tendencies indicating poor psychiatric prognosis

- N. Poor psychiatric prognosis indicated by history and background.
- O. Inadequate personality tendencies
- P. Inadequate emotional stability-indicated by interview

TABLE III (CONT'D)

- Q. Inadequate emotional stability-indicated by psychosomatic symptoms involving enuresis
- R. Inadequate emotional stability-indicated by psychosomatic symptoms not involving enuresis
- S. Immaturity
- T. Psychopathic tendency-military
- U. Psychopathic tendency-civilian
- V. Manic-depressive tendencies
- W. Schizoid tendency
- X. Miscellaneous tendencies
- Y. Cumulative psychopathic inadequacy evinced through service situations.

PHYSICAL

- A. Nasal obstructions
- B. Hypertrophied and diseased tonsils
- C. Chronic sinusitis
- D. Chronic otitis
- E. Other disqualifying ear, nose or throat conditions
- F. Combination of ear, nose and throat conditions
- G. Defective gastro-intestinal system
- H. Circulatory aberrations
- J. Disqualifying chronic respiratory condition
- K. Skeletal or muscular defect
- L. Underweight
- M. Disqualifying oral or dental condition
- O. Offensive breath
- P. Offensive or excessive perspiration
- Q. Disqualifying chronic skin condition
- R. Hernia
- S. Syphilis
- T. Obesity
- U. Disqualifying genito-urinary condition (other than those listed elsewhere)
- V. History of recent or frequent venereal disease
- W. Enuresis, no apparent psychiatric basis
- X. Miscellaneous
- Y. Under age for Navy assignment
- Z. Over age for submarine assignment

SENSORY (seeing and hearing)

1. Low visual acuity
2. Defective color discrimination
3. Low auditory acuity
4. Low visual acuity and defective color discrimination
5. Low auditory acuity and defective color discrimination
6. Low auditory acuity and low visual acuity
7. Low auditory acuity, low visual acuity and defective color discrimination

TABLE V

Breakdown of Comparative Summary of Rejections According to Source

Jan-July 1945

Source	Number Examined	Number Rejected	Percent Rejected	Motivation	Aptitude	Psychiatric	Physical	Sensory	Escape Training
Schools and Training Centers	2400	280	11.7%	89	47	139	21	66	36
Pharmacist Mates	81	26	32.0%	17	16	8	1	0	1
Radio Technicians	330	17	5.2%	4	0	10	3	3	3
All Others	790	141	17.9%	59	61	60	15	33	5
Total	3601	464	12.9%	169	124	217	40	102	45

The coding system in Table III is considered far from satisfactory, primarily because some reasons are broad categories that say very little. On the other hand the codes are ample for clear-cut cases of disqualifications. Perhaps their inadequacy lies primarily in covering rejections for questionable qualifications. The numbers listed for various letter reasons under the Psychiatric heading of Table IV emphasize this weakness. Note that of the total of 217 rejections described under this heading, 42 are O (tendencies denoting inadequate personality), 44 are R (inadequate emotional stability) and 69 are S (immaturity). At the same time there are a total of only 6 rejections under the letters A through M, for positive disease conditions. In other words the bulk of the rejections fall in the rather vague indefinite catch-all categories that do not seem to involve a completely disabling inadequacy. Many of those coded with Psychiatric deficiency also were assigned a reason under other headings. A deficiency under "Motivation" is especially likely to be assigned with a psychiatric disability.

The coding method should be revised to permit the examiner to be more explicit in his description of cases involving questionable adequacies of two or three types. In summary, then, the codes in Table III do not succeed in covering every rejection adequately; so the Table IV summary is somewhat distorted because quite a few cases involved two or three reasons, no one of which alone existed to a degree warranting disqualification.

The distortion is not so great as to invalidate the pattern of the disqualifications apparent in Table IV, however. Note that the heading with the greatest attrition is Psychiatric; and note too, that vision and hearing tests ("Sensory") together account for more than twice as many disqualifications as do the physical examinations. These results are valid descriptions of rejections at this level.

VI. ESCAPE TRAINING REJECTIONS

Every candidate is required to learn the use of the submarine escape appliance. The course of training prescribes actual underwater escapes from air-lock compartments through a column of water. During the training some men have middle-ear difficulty in adjusting to the changing air pressure; and some manifest a great deal of anxiety in making the underwater escapes. As a rough rule of thumb, one man in every hundred will be a pressure failure, and one an anxiety failure. Of the 3601 candidates described in Table IV and V, 3182 passed the examination procedure up to this level. Of the 3182, 45 were failed either

because of pressure difficulty with their ears or because they showed too much anxiety during training. Thus, for both reasons combined, 1.4% of those attempting training were disqualified. During the year 1944, of 13094 candidates received, 126 were disqualified for inability to equalize for pressure and 107 were disqualified because of poor training performance. And during the early part of the war these figures tended to run somewhat higher. But from a comparative overall attrition standpoint the escape-training program has not been very expensive of personnel.

VII. SUMMARY OF PRE-SCHOOL ATTRITION AT NEW LONDON

In Table VI the failures at the examinations and escape-training levels were combined to show the total pre-school failures, # from the beginning of the war through 30 June, 1945. The percentage rejected is calculated by dividing the number failed by the total number examined, when accurate figures for the latter were maintained. They were not maintained in convenient form before 1944, so the number received is assumed as the divisor for computing the percentage rejected for these periods.

In the 43 months covered by Table VI, 33011 men were received for training, but 6040 or 18.3% were disqualified before they were enrolled in Submarine School.

A systematic seasonal fluctuation in the percentage failed can be discerned in Table VI; there is a higher failure rate in the summer months than in the winter. This tendency has been speculated upon a great deal. Some ascribe it to a seasonal fluctuation in the calibre of men coming into the service. They assume the lower winter attrition reflects the predominance of the high school graduates who came into the Training Centers the previous June and July. However the writer favors an alternative explanation for the lower winter attrition. Since only firm volunteers are accepted for duty, the failure rate is an index of the general prevailing motivation for submarine duty and for all the prerequisite hard work which that duty involves. On cold winter days, classroom work in a warm building is a fairly appealing prospect, and sea duty promises only cold and misery. On hot days in the summer the situation is reversed. In direct contrast to the discomfort of the candidates in taking medical examinations, there are men on surface craft on the river just below them with a cool breeze and a lot of time on their hands. To the writer it is little wonder that in the summer more candidates present mixed attitudes about submarine duty. It might be simply a matter of weather. So the writer prefers to attribute the seasonal fluctuation apparent in Table VI primarily to the New England climate rather than to any differences in calibre of the candidates.

TABLE VI

NUMBERS OF MEN RECEIVED FOR SUBMARINE SCHOOL AND PRE-SCHOOL DROPS

Year	Quarter	Received	Examined	Rejected	Percent Rejected
1941	7 Dec-31 Dec	73		4	5%
1942	Jan-March	868		75	9%
1942	Apr-June	1111		128	12%
1942	July-Sept	1407		296	21%
1942	Oct-Dec	1480		230	16%
1943	Jan-March	2307		280	12%
1943	Apr-June	2571		528	21%
1943	July-Sept	2916		704	24%
1943	Oct-Dec	4036		727	18%
1944	Jan-March	4211		896	21%
1944	Apr-June	3554	3262	785	24%
1944	July-Sept	2886	2856	653	23%
1944	Oct-Dec	2443	2382	330	14%
1945	Jan-March	1830	1928	202	10%
1945	Apr-June	1318	1312	202	15%
TOTAL		33011		6040	18.3%

VIII. REJECTIONS IN BASIC AND ADVANCED SUBMARINE SCHOOL TRAINING

Basic school is a six week course in theory and operations of submersible ships. The course was required for everyone except Stewards Mates. The percentage of failures up until 1 July 1945 is shown in Table VII.[#]

TABLE VII

NUMBERS OF MEN REJECTED IN BASIC SUBMARINE SCHOOL TRAINING

<u>Year</u>	<u>Quarter</u>	<u>Graduated</u>	<u>Failed</u>	<u>Percent Failed</u>
1941	7 Dec-31 Dec.	148	5	3.3%
1942	Jan-March	403	20	4.7%
1942	Apr-June	850	33	3.7%
1942	July-Sept.	936	33	3.4%
1942	Oct-Dec.	1244	19	1.5%
1943	Jan-March	1329	54	3.9%
1943	Apr.-June	1988	51	2.5%
1943	July-Sept.	1715	49	2.8%
1943	Oct.-Dec.	3029	43	1.4%
1944	Jan-March	2919	88	2.9%
1944	Apr-June	3250	113	3.4%
1944	July-Sept.	1912	76	3.8%
1944	Oct-Dec.	2188	78	3.4%
1945	Jan-March	1443	54	3.6%
1945	Apr-June	1398	55	3.8%
<u>Total</u>		<u>24752</u>	<u>771</u>	<u>3.02%</u>

[#] Note the seasonal fluctuation in this table. As in Table VI for pre-school rejections the failure rate during warm weather tends to be greater than in cold.

It is difficult to describe the history of failures in the advanced training system because the program has been flexible, and because a description of the advanced training in one rate is not a valid history of the training in another. As a matter of fact, any analysis of failures in the advanced submarine schools emphasizes the primary dependence of attrition rates upon administrative policies.

Table VIII shows the failure rate for three populations in basic and in five advanced training schools. The populations are separated by date of receipt into three separate time periods; that is, the division into three groups is made according to the intervals when the candidate came to New London. The failures and graduations that are the basis for the statistics might not have taken place during the same interval of receipt. Note the variation in percentages rejected. The Battery & Gyro and the Ordnance Schools seldom reject a candidate, whereas the others fail about one man in twenty. Furthermore, as illustrated by the Radio drops, the percentage failed by a given school varies from time to time. Efforts on the part of this activity to identify corresponding differences in the various school populations have not been successful. It is assumed that the overall statistical differences from school to school and from period to period may simply be a matter of differences in administrative policies.

TABLE VIII

Failures in Submarine Schools for Trainees Received in Three Separate Periods

School	Feb-June 1944			July-Dec 1944			Jan-June 1945		
	Number Rec'd	Number Dropped	Percent Dropped	Number Rec'd	Number Dropped	Percent Dropped	Number Rec'd	Number Dropped	Percent Dropped
Basic	5345	173	3.2	4254	154	3.6	2671	128	4.8
Diesel Battery & Gyro	1449	61	4.2	1033	52	5.0	517	19	3.7
Ordnance	1126	10	0.89	645	10	1.6	507	5	0.98
QM-SM	1029	2	0.19	701	4	0.57	315	2	0.63
Radio	435	20	4.6	385	42	10.9	352	34	9.7
	416	21	5.0	348	22	6.3	392	45	11.5
Total of five advanced Schools	4455	114	2.6	3112	130	4.1	2083	105	5.0

TABLE IX

Reasons assigned for Training Failures in Submarine Schools
in three separate periods.

<u>Jan-June 1944</u>		Reason for failure [#]								Total	Total
School	1	2	3	4	5	6	7	8	Total	Dropped	
Basic	74	47	25	5	5	57	8	47	268	173	
Ordnance						1		2	3	2	
QM-Sig	9	14	9	3	2	1	1	8	47	20	
Diesel	35	19	1		3	15	1	10	84	61	
Battery&Gyro	3	3			2	2	1	4	15	10	
Radio	20	14		2	1	3		2	42	21	
Total	141	97	35	10	13	79	11	73	459	287	

<u>July-Dec. 1944</u>		Reason for failure								Total	Total
School	1	2	3	4	5	6	7	8	Total	Dropped	
Basic	74	75	43	8	5	30	8	24	267	154	
Ordnance			1			1		3	5	4	
QM-Sig	24	27	7	1	2	8		11	80	42	
Diesel	30	30	3	1		6	4	7	81	52	
Battery&Gyro	2	2		3	2	2	1	2	14	10	
Radio	15	16	7	1	1			3	43	22	
Total	145	150	61	14	10	47	13	50	490	284	

<u>Jan-June 1945</u>		Reason for failure								Total	Total
School	1	2	3	4	5	6	7	8	Total	Dropped	
Basic	59	60	21	23	29	9	25	15	241	128	
Ordnance							1	1	2	2	
QM-Sig	9	12	11	3	3	4	2	11	55	34	
Diesel	8	8	7	5	6	5	1	2	42	19	
Battery&Gyro	1	1	1			1	3	2	9	5	
Radio	18	27	8	5	7	3	1	4	73	45	
Total	95	108	48	36	45	22	33	35	422	233	

Codes are as follows:

1. Lack of ability to do academic work of speciality
2. Lack of ability to do practical work of speciality
3. Lack of application
4. Unwillingness to do the work assigned
5. Tempera mentally unfit due to lack of desire for Submarine Service
6. Temperamentally unfit for Submarine Duty
7. Physically unfit for Submarine Duty
8. Disciplinary Problem

For every man dropped, the Submarine School submits a report listing one or more reasons for the failure. Reasons assigned are taken from a standard list of failure reasons. Table IX is a summary of the failure reasons for the drops in Table VIII. Note that the general pattern of failures differs from school to school, and is not constant for a given school for all three periods.

IX COMMENT ON PATROL FAILURES

No detailed tabulations of data on patrol attrition for submarine school graduates have come to the attention of this activity. However, on the basis of (1) patrol reports, (2) individual comments and (3) analysis of some three thousand rating sheets for evaluating enlisted personnel that have been submitted by submarine commanding officers, it is obvious that the attrition rate is relatively low. The failure rate is probably of the order of one or two percent.

Table X is a representative sample of the state of affairs. This is a tabulation of evaluations of white enlisted men submitted by commanding officers of six submarines reporting in from patrols. The names for the men evaluated were then identified according to whether the man came into submarines through the New London selection and training system. Table X shows a breakdown of evaluations, "Transfer", "Average" and "Superior", for the two populations. "Transfer" denotes the incompetent men the commanding officer intended to transfer from the ship; these may be assumed to be the "Fail" groups. Of the nine men from the six ships who were considered unsatisfactory, six evidently never came through the system depicted in Figure (1).

TABLE X

Commanding Officers Evaluations after Patrol of 409 White Enlisted Men from Six Submarines, according to Selection Source.

<u>SOURCE</u>	<u>EVALUATIONS</u>			<u>TOTAL</u>
	Transfer	Average	Superior	
New London Selection and Training System	3	164	100	267
Source Unknown	6	90	46	142
Total	9	254	146	409

Once again, however, the patrol attrition figure, whatever it may be, is dependent primarily upon administrative policies and attitudes. Standards of performance for submarine enlisted men are set high, but their applications require judgments and evaluations by several hundred executive and commanding officers. On the whole these officers find praise for submarine school graduates. Certainly the failure rate for submarine school graduates at the level of submarine operations against the enemy may be considered negligible in proportion to the tremendous antecedent attrition in selection and training.

X OVERALL ILLUSTRATION OF THE SYSTEM AFTER PRESELECTION

The receipts during January and February 1944 from three schools were traced by studying their records on file in the Bureau of Naval Personnel in August of the next year. The three schools studied were the Electrician's Mate schools at Bainbridge, Minneapolis and Ames, and the total received was 105. Just how large a group was examined at these three stations to yield this number for transfer to New London is uncertain. As a guess, the total number of volunteers represented is probably somewhere between 200 and 500. Table XI is an historical sequence of the 22 failures that took place in the next fourteen to eighteen months after the group was received. Insofar as the service records indicated, the remaining 83 were serving satisfactorily aboard submarines. Table XI is modeled after Figure (1); to trace the successive drops from the total group of 105 received at New London, trace Table XI from bottom to top.

TABLE XI

Summary of disqualifications after preselection for 105 men received in January and February 1944, from three EM schools (Bainbridge, Minneapolis and Ames).

QUALIFIED SUBMARINE MEN

Eighty three men are on submarine duty, according to examinations of service records in August 1945.

<u>NAME</u>	<u>REASON FOR DISQUALIFICATION</u>	<u>DISPOSITION AS OF AUGUST 1945</u>
<u>PATROL FAILURES</u>		
V	Failed physical at Pearl Harbor	Surface craft
U	Did not want submarine duty	Sub tender
<u>SCHOOL FAILURES</u>		
T	Psychiatric recommendation-based on poor school performance	Surface craft
S	Did not want submarine duty	" "
<u>ESCAPE TRAINING FAILURES</u>		
R	Motivation, Nervous line performance	Surface craft
Q	Nervous performance on escape line	" "
P	Nervous performance on escape line	" "
O	Failed pressure	" "
<u>PHYSICAL DROPS</u>		
N	Defective color discrimination	Surface craft
M	Low visual acuity	" "
<u>INTERVIEW AND APTITUDE DROPS</u>		
L	Psychiatric, Physical	Surface craft
K	Training aptitude	" "
J	Psychiatric, Physical, Sensory	" "
I	Psychiatric, Physical	" "
H	Motivation, Psychiatric, Discharged USNH Newport, R.I.	6-11-45
G	Motivation, Psychiatric, Sensory	Discharged USNH Newport R.I., 7-10-45
F	Psychiatric, Physical	Surface craft
E	Psychiatric, Sensory	" "
D	Motivation, Physical	" "
C	Motivation	" "
B	Training aptitude, Psychiatric	" "
A	Training aptitude, Psychiatric, Physical	" "

TOTAL OF MEN RECEIVED: ONE HUNDRED AND FIVE

Consider this chart in conjunction with Figure (1)

XI GENERAL COMMENT

As illustrated in Figure (1) and elaborated in this paper, the total selection and training system is a progression of steps, with failures at each level. The problem of integrating the steps must now be considered.

Each of the levels in the New London phase is a self-integrated unit, with failures at a given level effected only if the overall judgment of the individual from the various points of view at the level indicates disqualification. That administrative philosophy is implemented through the interview method. For example, a final interview at the end of "Physical Examination, Aptitude Tests and Interviews" (Figure (1)) is designed to draw together all the information available for an overall judgment of whether to accept the man for training. Similarly, the assistant Officer-in-Charge of the Submarine School interviews each student who has been referred to him as a case for disqualification.

In addition to unifying each level, there is an effort to integrate the various levels. Thus, for example, if there is a question about whether a man's performance in Escape Training warrants disqualification, all the available information from previous records and examinations is consulted. And before a man is dropped from school on doubtful evidence, all the available test records for that man are assembled and utilized in the interview by the school authority.

At the preselection level, however, examinations frequently do not fit together into a single administrative unit. Instead preselection may consist of a progression of many examinations, each independent and each accounting for a sizable proportion of rejections. Integration into some unitary system would reduce the numbers disqualified for single minor defects. Incidentally, one promising technique for combining data from various types of examinations has been described³ that may prove superior to the interview method. Its superiority in situations where the interviewer cannot be familiar with the nature of all data he must evaluate is especially probable.

Medical rejections appear to predominate over all others. For this reason especial care to use standard examinations must be exercised. And research on the reliabilities of particular techniques for evaluating the presence of each disqualifying factor would seem in order. Studies of the reliabilities and validities of methods for measuring visual acuity⁷ and auditory acuity⁶ have

proven valuable in reducing the waste of personnel, and the same approach in the other areas of the medical examination seems promising. Undoubtedly large numbers have been disqualified on the basis of inadequate judgments that certain defects are present. Even if the Manual of the Medical Department is followed to the very letter there will be many such disqualifications until exact and reliable procedures can be established. Finally, extensive research in the validity of the several aspects of the medical examination should be undertaken.

In the introduction it was suggested that careful periodic accountings of reasons for rejections would reduce manpower wastes. Because Par. 1535 of the Manual (outlining the physical examination for submarine duty) is not always followed this accounting might more than pay for itself just by spotting erroneous physical qualifications. Certainly a central accounting would help in an overall integration of the system.

REFERENCES

1. Joint BuMed-BuPers directives, Pers-10111-FBH, issued 30 October 1944, in connection with BuMed Research Project X-381 (Sub. No. 70), "Experimental Application of Preliminary Selection Research Results at a Large Training Station."
2. Bartlett, N. R., "Disqualifications for Submarine School of Men Processed by the Bainbridge Procedure". Report on BuMed Research Project X-381 (Sub. No. 70), dated 19 March 1945.
3. Levin, M. M., Campbell, R. K., Keisler, E. R., Sonderman, J.B. "A Point-Score Method for Evaluating Naval Personnel". OSRD Report #5197, 12 June 1945. (Restricted).
4. Graham, C. H., Riggs, L. A., Bartlett, N. R., Berry, R. N., Verplanck, W. S., Solomon, R. L., and Mueller, C. G., "A Report of Research on Selection Tests at the U. S. Submarine Base". OSRD Report #1770, 28 June 1943. (Restricted).
5. Graham, C. H., Mote, F. A., Berry, R. N., "The Relation of Selection Test Scores to Tank Escape Performance. Submarine School". OSRD Report #3262, 31 January 1944. (Restricted)
6. Harris, J. D., "Group Audiometry". J. Accous. Soc. Amer., 1945, 17 73-76.
7. Sulzman, J. H., Cook, E. B., Bartlett, N. R., "Visual Acuity Testing with Three Commercial Screening Devices". Second Progress Report on BuMed Research Project X-493 (Av-263-p) dated 5 February 1946.