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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB) first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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Development of USES Aptitude Test Battery for Radiologic Technologist

[medical ser.] 078.368

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U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION
BUREAU OF EMPLOYMENT SECURITY

Technical Report on Development of USES Aptitude Test Battery

For.....

Radiologic Technologist (medical ser.) 078.368

S-80

U. S. Employment Service
in Cooperation with
California, Michigan and Pennsylvania
State Employment Services

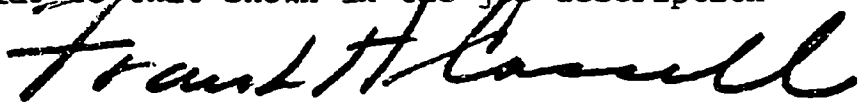
July 1967

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.



Frank H. Cassell, Director
U. S. Employment Service

GATB Study Nos. 2074
2389, 2410 and 2647

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Radiologic Technologist (medical ser.) 078.368-030

This report describes research undertaken for the purpose of validating and cross-validating General Aptitude Test Battery (GATB) norms for the occupation of Radiologic Technologist 078.368. The following norms were established:

GATB Aptitude	Mininum Acceptable GATB Scores
G - General Learning Ability	95
V - Verbal Aptitude	95
S - Spatial Aptitude	80

RESEARCH SUMMARY

Sample:

75 (16 male and 59 female) workers employed as Radiclogic Technologists by various doctors and at various hospitals in Pennsylvania.

Criterion:

Supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiences.

Concurrent Validity:

Phi Coefficient (ϕ) = .44 ($P/2 < .0005$)

Effectiveness of Norms:

Only 68 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-80 norms, 83 percent would have been good workers. 32 percent of the non-test-selected workers used for this study were poor workers, if the workers had been test-selected with the S-80 norms, only 17 percent would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	68%	83%
Poor Workers	32%	17%

VALIDATION SAMPLE DESCRIPTION

Size:

N = 75

Occupational Status:

Employed workers

Work Setting:

Workers were employed by various doctors and in various hospitals throughout the State of Pennsylvania.

Employer Selection Requirements:

Education: High school graduation is generally required for acceptance into training.

Experience: Registration with the American Society of X-Ray Technicians requires two years of training in an accredited school or on-the-job training before the registration examinations can be taken. (These requirements may vary in different hospitals.)

Tests: No tests used for acceptance for training.

Principal Activities:

The job duties for each worker are those shown in the Appendix.

Minimum Experience:

All workers had twenty months of on-the-job training.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

	Mean	SD	Range	r
Age (years)	28.3	7.3	19-45	.264*
Education (years)	13.1	1.5	#9-17	.195
Experience (months)	80.3	54.8	22-264	.243*

#Two trainees with less than 12 years of education included.
*Significant at the .05 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002A were administered during March and April 1955.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency. Radiologic Technologists employed by a private doctor were rated by the doctor; those employed at a hospital were rated by the supervisor. Ratings were made at approximately the same time as the tests were administered.

Rating Scale:

A preliminary rating scale consisted of items based on pertinent job factors taken from the job analysis schedule. The preliminary scale was reviewed by a prominent doctor before the final scale was set up. The final descriptive rating scale consisted of thirteen ratable traits. (The scale is not available but the items were similar to items in the scale for Check Study #2 [Michigan] shown in the Appendix.) The doctors and supervisors were instructed to rate each person on each item in relation to the "average technologist" as above average, average, or below average. Numerical ratings were assigned arbitrarily to correspond to the qualitative categories, for each item, as follows:

Above average = 35
Average = 20
Below average = 5

Reliability:

Since only one set of ratings was obtained, no measure of criterion reliability is available.

Criterion Distribution:

Possible Range:	65-455
Actual Range	110-455
Mean:	386.8
Standard Deviation:	88.1

Criterion Dichotomy:

The criterion distribution was dichotomized into high and low groups by placing 32% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score was 231.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes S and Q which do not have a significant correlation with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that an above average or high degree of Aptitude S is required for satisfactory job performance; Aptitude Q had a relatively high mean score and a relatively low standard deviation. With employed workers, a relatively low standard deviation indicates that some pre-selection may have taken place and this restricted range of scores (low standard deviation) will depress the correlation between the aptitude and the criterion. A relatively high mean score with employed workers may also indicate some sample pre-selection. Tables 3, 4 and 5 show the results of qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis the aptitudes indicated appear to be important to the work performed)

Aptitude	
G - General Learning Ability	Required to comprehend, learn and apply the basic principles and procedures of Radiologist Technology during formal and on-the-job training; to understand and accurately carry out written or verbal instructions of the radiologists, physcian or supervising technician; to exercise judgment when applying principles of radiology in the use of X-Ray equipment and in caring for the patient.
V - Verbal Aptitude	Required to understand, learn and use medical and technical terminology during training period; to understand, give and follow written and verbal instruction regarding specific Radiology or Fluoroscopy requests and examinations; to converse effectively with patients and medical personnel.
S - Spatial Aptitude	Required to visualize the location, size and shape of internal organs and bone structures in order to properly position patients and equipment for X-Ray and Fluoroscopy; to estimate thickness of part of anatomy to be radiographed.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude				
G - General Learning Ability	104.7	13.8	77-138	.295*
V - Verbal Aptitude	109.8	15.0	82-147	.283*
N - Numerical Aptitude	101.4	13.7	74-130	.428**
S - Spatial Aptitude	97.3	17.2	65-147	-.043
P - Form Perception	108.4	16.3	69-157	.100
Q - Clerical Perception	116.5	14.2	88-150	.168
K - Motor Coordination	111.9	17.6	62-159	.211
F - Finger Dexterity	108.3	17.8	61-163	.099
M - Manual Dexterity	105.4	19.2	34-143	.198

*Significant at the .05 level
**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X	X		X					
Irrelevant									
Relatively High Mean		X				X	X		
Relatively Low Standard Deviation	X	X	X			X			
Significant Correlation with Criterion	X	X	X						
Aptitudes to be Considered for Trial Norms	G	V	N	S		Q			

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, S and Q at trial cutting scores were able to differentiate between the 68% of the sample considered good workers and the 32% of the sample considered poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms,

minimum cutting scores slightly higher than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude trial norms, cutting scores slightly lower than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of G-95, V-95 and S-80 provided optimum differentiation for the occupation of Radiologic Technologist 078.368. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .44 (statistically significant at the .0005 level)

TABLE 6

Concurrent Validity of Test Norms G-95, V-95 and S-80

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	40	51
Poor Workers	16	8	24
Total	27	48	75

Phi Coefficient (ϕ) = .44 Chi Square (X^2) = 14.38
Significance Level = P/2 less than .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-8 which is shown in Section II of the Manual for the General Aptitude Test Battery. The OAP-8 norms of G-100, V-100 and S-90 yield a Phi Coefficient of .34.

GATB Study # 2410 S-80

Radiologic Technologist (medical ser.) 078.368

Check Study #1 Research Summary

Sample:
62 (36 male and 26 female) workers employed as Radiologic Technologists at 8 hospitals in Los Angeles, California.

TABLE 7

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, Experience and the Aptitudes of the GATB

	Mean	SD	Range	r
Age (years)	29.6	5.7	21-45	-.095
Education (years)	13.8	1.4	12-18	-.075
Experience (months)	70.4	41.3	24-204	.060
G - General Learning Ability	103.5	16.5	75-146	.570**
V - Verbal Aptitude	104.8	15.5	82-145	.496**
N - Numerical Aptitude	96.8	16.8	63-136	.573**
S - Spatial Aptitude	103.6	19.1	61-153	.393**
P - Form Perception	103.3	19.7	58-150	.282*
Q - Clerical Perception	107.7	18.6	77-184	.351**
K - Motor Coordination	107.7	16.4	74-153	.311*
F - Finger Dexterity	99.1	19.3	47-141	.127
M - Manual Dexterity	107.1	21.1	60-158	.105

*Significant at the .05 level
**Significant at the .01 level

Criterion:
Supervisory ratings obtained in 1962.

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Principal Activities:
The job duties for each worker are comparable to those shown in the Appendix for the validation sample.

Concurrent Validity:
Phi Coefficient (ϕ) = .35 ($P/2 < .005$)

Effectiveness of Norms:

Only 68% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-80 norms, 81% would have been good workers. 32% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-80 norms, only 19% would have been poor workers. The effectiveness of the S-80 norms when applied to this independent sample is shown graphically in Table 8:

TABLE 8

Effectiveness of S-80 Norms (G-95, V-95, S-80) on Check Study Sample #1

	Without Tests	With Tests
Good Workers	68%	81%
Poor Workers	32%	19%

TABLE 9

Concurrent Validity of the S-80 Norms (G-95, V-95, S-80) on Check Study Sample #1

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	12	30	42
Poor Workers	13	7	20
Total	25	37	62

Phi Coefficient (ϕ) = .35 Chi Square (X^2) = 7.46

Significance Level = $P/2 < .005$

GATB Study #2647 S-80

Radiologic Technologist (medical ser.) 078.368

Check Study #2 Research Summary

Sample:
50 workers employed as Radiologic Technologists by various doctors and at various clinics and hospitals in Michigan and Windsor, Ontario, Canada.

TABLE 10

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, Experience and the Aptitude of the GATB

	Mean	SD	Range	r
Age (years)	22.7	3.3	19-35	.020
Education (years)	14.2	.7	14-18	-.118
Experience (months)	31.1	18.1	6-90	.093
G - General Learning Ability	109.6	11.8	85-136	.209
V - Verbal Aptitude	107.3	12.3	82-139	-.029
N - Numerical Aptitude	108.5	12.8	82-132	.184
S - Spatial Aptitude	106.6	14.0	78-147	.060
P - Form Perception	114.7	14.2	83-148	.018
Q - Clerical Perception	117.0	12.2	94-148	.072
K - Motor Coordination	112.7	14.0	78-149	.036
F - Finger Dexterity	108.6	17.3	69-147	-279*
M - Manual Dexterity	117.4	17.4	76-159	-.119

*Significant at the .05 level

Criterion:
Supervisory ratings obtained in 1967.

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Principal Activities:
The job duties for each worker are comparable to those shown in the Appendix for the validation sample.

Concurrent Validity:
Phi Coefficient (ϕ) = .28 ($P/2 < .025$)

Effectiveness of Norms:

Only 70% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-80 norms, 77% would have been good workers. 30% of the non-test-selected workers were poor workers; if the workers had been test-selected with the S-80 norms, 23% would have been poor workers. The effectiveness of the S-80 norms when applied to this independent sample is shown graphically in Table 11:

TABLE 11

Effectiveness of S-80 Norms on Check Study Sample #2

	Without Tests	With Tests
Good Workers	70%	77%
Poor Workers	30%	23%

TABLE 12

Concurrent Validity of the S-80 Norms (G-95, V-95, S-80) on Check Study Sample #2

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	30	35
Poor Workers	6	9	15
Total	11	39	50

Phi Coefficient (ϕ) = .28 Chi Square (X^2) = 4.03

Significance Level = $P/2 < .025$

GATB Study #2389 S-80

Radiologic Technologist (medical ser.) 078.368

Check Study #3 Research

Sample:
40 (16 male and 24 female) students in the school of X-Ray Technology at Charity Hospital in New Orleans, Louisiana.

TABLE 13

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criteria (r_1-Supervisory Ratings , r_2-Average Course Grades) for Age, Education, Experience and the Aptitudes of the GATB.

	Mean	SD	Range	r_1	r_2
Age (years)	19.3	2.0	17-28	.148	-.053
Education (years)	12.2	.5	12-14	-.059	.013
Experience (months)	12.0	7.2	6-24	.134	.201
G - General Learning Ability	108.1	14.8	74-156	.471**	.458**
V - Verbal Aptitude	104.2	14.4	76-147	.479**	.500**
N - Numerical Aptitude	104.4	14.1	80-138	.480**	.377*
S - Spatial Aptitude	112.9	16.7	74-166	.137	.163
P - Form Perception	111.9	16.0	69-152	.204	.133
Q - Clerical Perception	119.9	13.6	81-152	.411**	.182
K - Motor Coordination	114.5	13.8	82-140	.135	.049
F - Finger Dexterity	107.6	17.4	74-157	.180	.127
M - Manual Dexterity	101.3	17.0	55-141	.222	.005

*Significant at the .05 level
**Significant at the .01 level

Criterion:
Supervisory ratings and Average course grades obtained in 1961.

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Principal Activities:
The job duties for each worker are comparable to those shown in the Appendix for the validation sample.

TABLE 14

Concurrent Validity of the S-80 Norms
(G-95, V-95, S-80) on Check Study Sample #3

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Students	8	18	26
Poor Students	6	8	14
Total	14	26	40

Phi Coefficient (ϕ) = .12 Chi Square (X^2) = .58
Significance Level = $P/2 < .25$

NOTE: The correlation is not at an acceptable level of significance although norms appear to make some differentiation between good and poor workers.

A-P-P-E-N-D-I-X

Descriptive Rating Scale - Check Study #1 (California)

Person to be rated _____

HOW RESOURCEFUL IS HE WHEN SOMETHING DIFFERENT COMES UP OR SOMETHING OUT OF THE ORDINARY OCCURS? (Worker's ability to apply what he already knows to a new situation.)

( ) Very unresourceful. Almost never is able to figure out what to do. Needs help on even minor problems.

( ) Unresourceful. Often has difficulty handling new situations. Needs help on all but simple problems.

( ) Fairly resourceful. Sometimes knows what to do, sometimes doesn't. Deals with most problems that are not too complex.

( ) Resourceful. Usually handles new situations. Needs help on only complex problems.

( ) Very resourceful. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

HOW GOOD IS THE QUALITY OF HIS WORK? (Worker's ability to do high-grade work which meets quality standards.)

( ) Very poor. Does work of unsatisfactory grade. Performance is inferior and almost never meets minimum quality standards.

( ) Not too bad, but the grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

( ) Fair. The grade of his work is mediocre. Performance is acceptable but usually not above average in quality.

( ) Good. but the grade of his work is not outstanding. Performance is usually better than average in quality.

( ) Very good. Does work of outstanding grade. Performance is almost always of the highest quality.

HOW QUICKLY DID HE LEARN THE JOB DUTIES AND NEW TASKS OR OPERATIONS? (Worker's ability to learn rapidly the work he has to to.)

( ) Learned very slowly. Needed careful and repeated instructions.

( ) Somewhat slower than most in learning the job and in grasping new phases of his job.

( ) Learned most things about his job in the usual amount of time.

( ) Caught on quickly to most of the job duties he had to learn.

( ) Learned rapidly. Needed only the minimum amount of training or instructions for even the difficult job duties.

HOW ACCURATE IS HE IN HIS WORK? (Worker's ability to avoid making mistakes.)

( ) Very inaccurate. Makes very many mistakes. Work needs constant checking.

( ) Inaccurate. Makes frequent mistakes. Work needs more checking than is desirable.

( ) Fairly accurate. Makes mistakes occasionally. Work needs only normal checking.

( ) Accurate. Makes few mistakes. Work seldom needs checking.

( ) Highly accurate. Rarely makes a mistake. Work almost never needs checking.

HOW MUCH ABILITY DOES HE HAVE FOR THIS KIND OF WORK? (Worker's adeptness or knack for performing his job easily and well.)

( ) Very low ability. Has great difficulty doing his job. Not at all suited to this kind of work.

( ) Low ability. Usually has some difficulty doing his job. Not too well suited to this kind of work.

( ) Moderate ability. Does his job without too much difficulty. Fairly well suited to this kind of work.

( ) High ability. Usually does his job without difficulty. Well suited to this kind of work.

( ) Very high ability. Does his job with great ease. Usually well suited for this kind of work.

HOW WELL AND ACCURATELY DOES HE COMMUNICATE WITH OTHERS? (Worker's ability to understand and give instructions or to ask and answer appropriate questions in discussion of his work with co-workers or supervisor.)

( ) Has a good deal more difficulty than most in maintaining clear communication with others.

( ) Has a little trouble along this line. Sometimes is confused, or confuses others.

( ) Satisfactory. Usually gives and takes information fairly accurately.

( ) Better than average. Seldom gets mixed up.

( ) Excels in understanding and making himself understood.

HOW MUCH DOES HE KNOW ABOUT HIS JOB? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

( ) Has very limited knowledge. Does not know enough to do his job adequately.

( ) Has little knowledge. Knows enough to "get by."

( ) Has moderate amount of knowledge. Knows enough to do fair work.

( ) Has broad knowledge. Knows enough to do good work.

( ) Has almost complete knowledge. Knows enough to do outstanding work.

HOW MUCH WORK DOES HE GET DONE? (Worker's ability to make efficient use of his time and to work at high speed.)

( ) Very low work output. Performs only at an unsatisfactory pace.

( ) Low work output. Performs at a slow pace.

( ) Fair work output. Performs at an acceptable but not a fast pace.

( ) High work output. Performs at a fast pace.

( ) Very high work output. Performs at an unusually fast pace.

CONSIDERING ALL THE FACTORS ALREADY RATED, AND ONLY THESE FACTORS, HOW SATISFACTORY IS HIS WORK? (Worker's "all-around" ability to do his job.)

( ) Definitely unsatisfactory. Would be better off without him. Performance usually not acceptable.

( ) Not completely satisfactory. Of limited value to the organization. Performance somewhat inferior.

( ) Satisfactory. A fairly proficient worker. Performance generally acceptable.

( ) Very good. A valuable worker. Performance usually better than average.

( ) Outstanding. An unusually competent worker. Performance almost always top notch.

Rated by_____ Title_____ Date_____

How long have you supervised this worker or been familiar with his job performance?

RATING QUESTIONNAIRE FOR RESEARCH STUDY: RADIOLOGIC TECHNOLOGIST (medical ser.) 078.368

Directions: Rate each technician from "1" to "5" on each question. Rate all the technicans on the first question, then rate all technicians on the second question, and so on.

RATING SCALE
1 = Inferior
2 = Below Average
3 = Average
4 = Above Average
5 = Superior

NAME OF TECHNICIAN													
How many months have you worked with this individual?													
1. Rate his ability to manipulate and position the patient properly.													
2. Rate his ability to evaluate necessary exposure for each patient.													
3. How well does he handle X-ray equipment?													
4. How accurate is he in recording factors such as time, field, filtration and distance?													
5. How quickly does he grasp new ideas or instructions?													
6. How well does he understand anatomy with reference to transmissibility of X-ray?													
7. How well does he apply theoretical principles to everyday work?													
8. How good is his knowledge of medical terminology and ethics?													
9. Rate his ability to maintain accurate and complete records, and attention to detail.													
10. How good is his knowledge of darkroom techniques and photographic processes?													
11. How good is the overall quality of radiographs made by the technician?													
12. Considering only the above factors, how good is his job performance?													

NAME OF RATER _____ TITLE _____ DATE _____

COMPANY OR ORGANIZATION _____ LOCATION _____

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A-P-P-E-N-D-I-X
Rating Scale - Check Study #2 (Michigan)

July 1967 S-80

FACT SHEET
(Validation Sample)

Job Title: Radiologic Technologist (medical ser.) 078.368-030

Job Summary: Operates X-ray equipment to take radiographs, give therapy, or produce fluoroscopic images by positioning the subject and adjusting the equipment to provide proper beam duration, intensity, and direction.

Work Performed: Takes radiographs. Determines size and type of radiograph to take from X-ray request and report form, observes patient to see if any X-ray opaque materials or objects are in area to be X-rayed and directs patient to dressing booth for gown if necessary. Loads film holder in bucky (grid) drawer and cocks bucky. Instructs patient to take position or lifts patient, with the help of others, into place. Measures thickness of area to be X-rayed using calipers, or estimates size and observes patient and patient's record for factors such as skin pigmentation or old osteomyelitis which might modify exposure factors. Consults exposure data chart for machine settings for particular area and kind of radiograph to be taken and adds or subtracts to compensate for individual differences in transmissibility of radiation. Requests patients to keep still or to hold breath as necessary, presses trigger to make exposure and observes readings of meters to make sure correct exposure has been made. Removes exposed film, places in pass box to darkroom for processing by Darkroom Girl. Examines films (after development) for over or under exposure, movement on part of subject, or processing defects and requests return of patient for second exposure if films are below quality standards. May hold disturbed or very young patients, using lead-impregnated gloves and apron for protection, if absolutely necessary to avoid movement during exposure. May take two rapidly succeeding exposures on special device to produce stereoscopic image.

Assists in fluoroscopy. Observes patient and follows instruction of Radiologist to determine positioning of patient and setting of machine for fluoroscopic examination. Instructs patient to change to gown to avoid interference by X-ray of opaque objects. Mixes barium solution for patient to drink or gives enema of X-ray opaque solution for examination of digestive tract. May prepare other fluids and assist in their introduction into the body to provide contrast in the radiographs of specific organs or areas. Inserts film holder in spot film device and makes radiographs, following radiographic procedure.

Operates Therapy Machine. Receives written and verbal instructions from Radiologist on area to be treated, size of mask, filtration, and dosage. Changes cones to control beam size, filters to provide desired wave lengths, and selects or cuts masks to limit radiation to area specified. Directs or assists patient to table and positions patient and lead masks under tube, using a knowledge of beam size and direction. Closes doors to complete trigger circuit, sets dials, checks filters by observing light on panel and closes trigger circuit to start treatment. Watches meters and time and stops treatment. Records time, filtration, and area treated on printed form, using rubber stamp outlining human form and marking area treated on outline.

Keeps records. Records tube time on therapy machine and records on printed forms numerical data and other pertinent information regarding work completed by department, such as numbers of examinations made and procedures followed. May file films in absence of file girl.

Inspects equipment. Observes by reading meters, by noting odors from overheated electrical elements, or by examining resultant radiographs, whether equipment is operating properly. Notifies repairman when his services are required. Makes sure all switches are off each night. Cleans equipment by washing, dusting and waxing. Cleans film holders with solvent by wiping them with gauze.

Effectiveness of Norms: Only 68 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-80 norms, 83 percent would have been good workers. 32 percent of the non-test-selected workers used for this study were poor workers, if the workers had been test-selected with the S-80 norms, only 17 percent would have been poor workers.

Applicability of S-80 Norms: The aptitude test battery is applicable to jobs which included a majority of duties described above.

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DEPARTMENT OF LABOR
UNITED STATES OF AMERICA


PUBLIC EMPLOYMENT SERVICE
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