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 is also included. (RC)
Development of USES APTITUDE TEST BATTERY FOR DRAFTER
Technical Report on Development of USES Specific Aptitude Test Battery

For

Drafter, Civil (profess. & kin.) 005.281
Drafter, Geological (petrol. production) 010.281
Drafter, Mechanical (profess. & kin.) 007.281
Drafter, Structural (profess. & kin.) 005.281

Developed in Cooperation with the
Alabama, California, Connecticut, Georgia,
Illinois, Michigan, Nevada, New Jersey
and New York State Employment Services

U. S. DEPARTMENT OF LABOR
Peter J. Brennan, Secretary

Manpower Administration
William H. Kolberg
Assistant Secretary for Manpower

October 1974
Development of USES Specific Aptitude Test Battery S-26074

For

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Drafter, Civil (profess. & kin.)
Drafter, Geological (petrol. production)
Drafter, Mechanical (profess. & kin.)
Drafter, Structural (profess. & kin.)

RESEARCH SUMMARY

This report describes the research which resulted in the development of the following Specific Aptitude Test Battery for use in selecting inexperienced or untrained individuals for training as Drafters:

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>Cutting Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - General Learning Ability</td>
<td>95</td>
</tr>
<tr>
<td>&quot; - Numerical Aptitude</td>
<td>100</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>100</td>
</tr>
<tr>
<td>C - Clerical Perception</td>
<td>90</td>
</tr>
</tbody>
</table>

Sample:
Validation sample: 320 Civil, Geological, Mechanical and Structural Drafters (200 males and 30 females) from the North, South and West. A total of 125 were minority group members (45 Blacks, 30 Spanish Surnamed, 30 Orientals and 5 American Indians) and 261 were nonminority group members.

Cross-validation sample: 35 Mechanical and Structural Drafters (34 males and 1 female) from the North. A total of 15 were minority group members (7 Blacks, 1 Oriental and 3 Spanish Surnamed) and 10 were nonminority group members.

Criterion:
Supervisory ratings. Criterion data were collected during the period 1966 through 1973 for the validation sample and during 1973 for the cross-validation sample.

Design:
Concurrent (test and criterion data were collected at approximately the same time).
Concurrent Validity:
Validation Sample:
Phi coefficient for total sample = .37 (P/2 < .0005)
Phi coefficient for Black subsample = .32 (P/2 < .025)
Phi coefficient for Spanish Surnamed subsample = .48 (P/2 < .005)
Phi coefficient for Oriental subsample = .13 (P/2 < .25)
Phi coefficient for nonminority subsample = .34 (P/2 < .0005)
Phi coefficient for male subsample = .37 (P/2 < .0005)
Phi coefficient for female subsample = .71 (P/2 < .10)

Cross-validation Sample:
Phi coefficient for total sample = .53 (P/2 < .005)

Effectiveness of Battery for Total Validation Sample:
For the total validation sample, 66% of the non-test-selected individuals in this study were in the high criterion group; if they had been test-selected, 77% would have been in the high criterion group. 34% of the non-test-selected individuals were in the low criterion group; if they had been test-selected 23% would have been in the low criterion group. The effectiveness of the battery is shown in Table 1.

TABLE 1
Effectiveness of Battery for Total Validation Sample

<table>
<thead>
<tr>
<th>Without Tests</th>
<th>With Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion Group</td>
<td>66%</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>34%</td>
</tr>
</tbody>
</table>

Comparison of Minority and Nonminority Groups for the Validation Sample:
No differential validities for this battery were found. The differences between the phi coefficients for minority and nonminority groups (above) are not statistically significant (CR Black-nonminority = -.12, CR Spanish Surnamed-nonminority = .94, CR Oriental-nonminority = -.10).
The battery is fair to minority group members since the proportion of Blacks, Spanish Surnamed and Orientals who met the cutting scores approximated the proportion who were in the high criterion group. 60% of the Blacks met the cutting scores and 60% were in the high criterion group; 70% of the Spanish Surnamed met the cutting scores and 63% were in the high criterion group; and 87% of the Orientals met the cutting scores and 77% were in the high criterion group.

The battery is fair to females since the proportion of females who met the cutting scores approximated the proportion who were in the high criterion group. 73% met the cutting scores and 67% were in the high criterion group.

JOB ANALYSIS

A job analysis was performed by observation of the workers' performance on the job and in consultation with the workers' supervisors for each occupation included in the research. A comparison of these job analysis schedules indicated that the critical job duties for each of the four occupations were similar enough to permit combination of the workers in these occupations.

On the basis of the job analyses, the job descriptions shown in Appendix 4 were prepared. These job descriptions were used to (1) select an experimental sample of workers who were performing the job duties; (2) choose an appropriate criterion or measure of job performance; (3) determine which aptitudes are critical, important or irrelevant to job performance (see Tables 2 and 6); and (4) provide information on the applicability of the test battery resulting from this research.

TABLE 2

Qualitative Analysis

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - General Learning Ability</td>
<td>Required in determining scale to be used by analysis of specifications and data and organizing and arranging data into logical sequence for drafting.</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>Required in determining scale to be used through analysis of data.</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>Required to draw and plot detailed graphic representations to scale in conformity with specifications, computed dimensions and spatial relationships.</td>
</tr>
</tbody>
</table>
P - Form Perception

Required to differentiate minor variances in shading.

Q - Clerical Perception

Required to observe fine detail in checking work to perceive errors.

EXPERIMENTAL TEST BATTERY

All 12 tests of the CATB, B-1002B, were administered during the period from 1966 to 1973 to the validation sample and during 1973 to the cross-validation sample.

CRITERION

The immediate supervisor rated each worker. The ratings were obtained by means of personal visits of State test development analysts who explained the rating procedure to the supervisors. Two ratings were obtained from each supervisor with an interval of two weeks between the ratings. Since sample members' test scores are confidential, supervisors had no knowledge of the test scores of the workers.

Validation Sample:

A descriptive rating scale was used. The scale (see Appendix 3) consists of ten items. Nine of these items cover different aspects of job performance. The tenth item is a global item on the Drafter's "all-around" ability. Each item has five alternative responses corresponding to different degrees of job proficiency. For the purpose of scoring the items, weights of 1 to 5 were assigned to the responses. The total score on the rating scale is the sum of the weights for the ten items. The possible range is 10-50.

A review of the job descriptions indicated that the subjects covered by the rating scale were directly related to important aspects of job performance.

A - Amount of work: Satisfactory production must be achieved in order to maintain desirable progression of work projects.

B - Accuracy of work: Plans and drawings must be accurate in order to be acceptable.

C - Quality of work: Workmanship must be high quality in order to produce plans and drawings which are readily used and durable.

D - Amount of knowledge: Drafter must have sufficient knowledge to produce satisfactory plans and drawings.
E - Facility for work: Drafter must be able to integrate broad and specific knowledge of principles in order to produce satisfactory work.

F - Knowledge of mathematics: Drafter must have specific knowledge of mathematics in order to produce acceptable plans and drawings.

G - Analysis of source data: Drafter must determine validity of source data and separate them into components for drafting.

H - Judgment: Drafter must analyze problems and make sound judgments without constant supervision.

I - Checking of finished work: Drafter must verify completed plans and drawings for completeness and accuracy without checking by supervisor.

J - "All-around" ability: Drafter's value to employer involves a combination of the aspects of job performance listed above.

A reliability coefficient of .94 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. Therefore, the final criterion score consists of the combined scores of the two ratings. The possible range for the final criterion is 20-100. The actual range is 27-94. The mean is 65.2 and the standard deviation is 15.3. The relationship between the criterion and age, education and job experience is shown in Table 3.

TABLE 3
Validation Sample

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

<table>
<thead>
<tr>
<th>Total Sample</th>
<th>Mean</th>
<th>SD</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>34.3</td>
<td>9.7</td>
<td>.006</td>
</tr>
<tr>
<td>Education (years)</td>
<td>13.5</td>
<td>1.4</td>
<td>-0.40</td>
</tr>
<tr>
<td>Total Experience (months)</td>
<td>108.4</td>
<td>83.0</td>
<td>.161**</td>
</tr>
</tbody>
</table>

**Significant at the .01 level
About one third of the workers are considered to be marginal workers. Therefore, the criterion distribution was dichotomized so as to include as close as possible to one third of the sample in the low criterion group and the remainder in the high criterion group. The criterion cutting score was set at 39 which places 34% in the low criterion group and 66% in the high criterion group.

**Cross-validation Sample:**
A descriptive rating scale was used. The scale (see Appendix 3) consists of six performance items. Five of these items cover different aspects of job performance. The sixth item is a global item on the Drafter's "all-around" ability. Each item has five alternative responses corresponding to different degrees of job proficiency. For the purpose of scoring the items, weights of 1 to 5 were assigned to the responses. The total score on the rating scale is the sum of the weights for the six items. The possible range is 6-30.

A review of the job descriptions indicated that the subjects covered by the rating scale were directly related to important aspects of job performance.

A - Amount of work: Satisfactory production must be achieved in order to maintain desirable progression of work projects.

B - Quality of work: Workmanship must be high quality in order to produce plans and drawings which are readily used as well as durable.

C - Accuracy of work: Plans and drawings must be accurate in order to be acceptable.

D - Amount of knowledge: Drafter must have specific mathematical and design knowledge in order to produce satisfactory plans and drawings.

E - Variety of job duties: Drafter should be able to handle a large variety of tasks without specific instruction.

F - "All-around" ability: Drafter's value to employer involves a combination of the aspects of job performance listed above.
A reliability coefficient of .89 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. The final criterion score consists of the combined scores of the two ratings. The possible range is 12-60. The mean score on the final criterion was 39.8 with a standard deviation of 8.0.

The relationship between the criterion and age, education and job experience is shown in Table 4.

<table>
<thead>
<tr>
<th>TABLE 4</th>
<th>Cross-validation Sample</th>
<th>Means, Standard Deviations (SD) and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age (years)</td>
<td>29.7 10.4 .037</td>
</tr>
<tr>
<td></td>
<td>Education (years)</td>
<td>13.5 1.4 -.285</td>
</tr>
<tr>
<td></td>
<td>Experience (months on current job)</td>
<td>62.1 70.2 .022</td>
</tr>
</tbody>
</table>

About one-third of the workers are considered to be marginal workers. Therefore the criterion distribution was dichotomized so as to include as close as possible to one-third of the sample in the low criterion group and the remainder in the high criterion group. The criterion cutting score was set at 38 which places 34% in the low criterion group and 66% in the high criterion group.

SAMPLE

Validation Sample:
The validation sample consisted of 326 Civil, Geological, Mechanical and Structural Drafters (296 males and 30 females) employed at various companies in the North, South and West (see Appendix 2). A total of 105 were minority group members (40 Blacks, 30 Spanish Surnamed, 30 Orientals and 5 American Indians) and 221 were nonminority group members. The means and standard deviations for age, education and experience of the sample members are shown in Table 3. State Civil Service tests were used for selection of
some sample members. All workers had been employed at least one month in a job whose duties are similar to those found in the job descriptions in Appendix 4.

Cross-validation Sample:
The cross-validation sample consisted of 35 Mechanical and Structural Drafters (34 males and 1 female) employed at various companies in the North (see Appendix 2). A total of 16 were minority group members (12 Blacks, 1 Oriental and 3 Spanish Surnamed) and 19 were nonminority group members. The means and standard deviations for age, education and experience of sample members are shown in Table 4. All workers had been employed at least four months in a job whose duties are similar to those found in the job descriptions in Appendix 4.

STATISTICAL RESULTS

TABLE 5

Statistical Results for Total Validation Sample

\[ N=326 \]

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Mean</th>
<th>SD</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - General Learning Ability</td>
<td>114.6</td>
<td>14.3</td>
<td>.466**</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>106.8</td>
<td>13.5</td>
<td>.333**</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>109.8</td>
<td>14.8</td>
<td>.416**</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>119.9</td>
<td>14.8</td>
<td>.339**</td>
</tr>
<tr>
<td>P - Form Perception</td>
<td>118.8</td>
<td>19.3</td>
<td>.237**</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>117.6</td>
<td>15.1</td>
<td>.224**</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>107.9</td>
<td>17.5</td>
<td>.124*</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>94.9</td>
<td>18.2</td>
<td>.074</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>103.4</td>
<td>19.5</td>
<td>.135*</td>
</tr>
</tbody>
</table>

*Significant at the .05 level
**Significant at the .01 level
The information in Table 6 indicates that the following aptitudes should be considered for inclusion in the battery: G, V, N, S, P, Q, K and M. The objective is to develop a battery of 2, 3 or 4 aptitudes with cutting scores set at five point intervals at the point (a) where about the same percent will meet the cutting scores as the percent placed in the high criterion group and (b) which will maximize the relationship between the battery and the criterion. The cutting scores are set at approximately one standard deviation below the mean aptitude scores of the sample, with deviations above or below these points to achieve the objectives indicated above.

The following battery was developed:

<table>
<thead>
<tr>
<th>Aptitudes</th>
<th>Cutting Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Learning Ability</td>
<td>85</td>
</tr>
<tr>
<td>Numerical Aptitude</td>
<td>100</td>
</tr>
<tr>
<td>Spatial Aptitude</td>
<td>100</td>
</tr>
<tr>
<td>Clerical Perception</td>
<td>90</td>
</tr>
</tbody>
</table>
VALIDITY OF BATTERY

TABLE 7
Validity of Battery for Total Validation Sample

<table>
<thead>
<tr>
<th>Below Meeting</th>
<th>Cutting Scores</th>
<th>Cutting Scores</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion Group</td>
<td>35</td>
<td>180</td>
<td>215</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>57</td>
<td>54</td>
<td>111</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>234</td>
<td>326</td>
</tr>
</tbody>
</table>

Phi coefficient = .37
Significance level = P/2 < .0005

TABLE 7a
Validity of Battery for Black Validation Subsample

<table>
<thead>
<tr>
<th>Below Meeting</th>
<th>Cutting Scores</th>
<th>Cutting Scores</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion Group</td>
<td>6</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>24</td>
<td>40</td>
</tr>
</tbody>
</table>

Phi coefficient = .32 (Yates' corrected)
Significance level = P/2 < .025

TABLE 7b
Validity of Battery for Spanish Surnamed Validation Subsample

<table>
<thead>
<tr>
<th>Below Meeting</th>
<th>Cutting Scores</th>
<th>Cutting Scores</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion Group</td>
<td>2</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>7</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>21</td>
<td>30</td>
</tr>
</tbody>
</table>

Phi coefficient = .48 (Yates' corrected)
Significance level = P/2 < .005
TABLE 7c
Validity of Battery for Oriental Validation Subsample

<table>
<thead>
<tr>
<th></th>
<th>Below Meeting</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cutting Scores</td>
<td>Cutting Scores</td>
<td>Total</td>
</tr>
<tr>
<td>High Criterion Group</td>
<td>2</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>26</td>
<td>30</td>
</tr>
</tbody>
</table>

Phi coefficient = .13 (Yates' corrected)
Significance level = P/2 < .25

TABLE 7d
Validity of Battery for Nonminority Validation Subsample

<table>
<thead>
<tr>
<th></th>
<th>Below Meeting</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cutting Scores</td>
<td>Cutting Scores</td>
<td>Total</td>
</tr>
<tr>
<td>High Criterion Group</td>
<td>24</td>
<td>121</td>
<td>145</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>37</td>
<td>30</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>160</td>
<td>221</td>
</tr>
</tbody>
</table>

Phi coefficient = .34
Significance level = P/2 < .0005

TABLE 7e
Validity of Battery for Male Validation Subsample

<table>
<thead>
<tr>
<th></th>
<th>Below Meeting</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cutting Scores</td>
<td>Cutting Scores</td>
<td>Total</td>
</tr>
<tr>
<td>High Criterion Group</td>
<td>32</td>
<td>163</td>
<td>195</td>
</tr>
<tr>
<td>Low Criterion Group</td>
<td>52</td>
<td>49</td>
<td>101</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>212</td>
<td>296</td>
</tr>
</tbody>
</table>

Phi coefficient = .37
Significance level = P/2 < .0005
TABLE 7f
Validity of Battery for Female Validation Subsample

<table>
<thead>
<tr>
<th></th>
<th>Below Cutting Scores</th>
<th>Meeting Cutting Scores</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion</td>
<td>3</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Criterion</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>22</td>
<td>30</td>
</tr>
</tbody>
</table>

Phi coefficient = .29 (Yates' corrected)
Significance level = P/2 < .10

TABLE 8
Validity of Battery for Cross-validation Sample

<table>
<thead>
<tr>
<th></th>
<th>Below Cutting Scores</th>
<th>Meeting Cutting Scores</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Criterion</td>
<td>5</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Criterion</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>20</td>
<td>35</td>
</tr>
</tbody>
</table>

Phi coefficient = .53 (Yates' corrected)
Significance level = P/2 < .005

OCCUPATIONAL APTITUDE PATTERN

This occupation was incorporated into OAP-34 in Section II of the 1970 edition of the Manual for the USES General Aptitude Test Battery with a double asterisk (**) because the battery did not contain the same aptitudes as included in OAP-34 but a significant phi coefficient was obtained between the criterion and the OAP-34 cutting scores of N-90, S-95 and P-90. A phi coefficient of .30 (P/2 < .0005) was obtained for the validation sample and a phi coefficient of .41 (P/2 < .01) was obtained for the cross-validation sample.

APPLICABILITY OF BATTERY

The aptitude test battery may be used in the selection of inexperienced applicants for the jobs described in Appendix 4.
Descriptive Statistics for Black, Spanish Surnamed, Oriental and Nonminority Subgroups

### Black (N=40)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aptitude G</td>
<td>100.5</td>
<td>12.6</td>
<td>71-120</td>
<td>112.0</td>
<td>12.1</td>
<td>84-137</td>
</tr>
<tr>
<td>Aptitude V</td>
<td>93.0</td>
<td>11.7</td>
<td>74-115</td>
<td>104.9</td>
<td>10.2</td>
<td>84-131</td>
</tr>
<tr>
<td>Aptitude N</td>
<td>99.6</td>
<td>11.7</td>
<td>75-127</td>
<td>106.9</td>
<td>11.2</td>
<td>80-125</td>
</tr>
<tr>
<td>Aptitude S</td>
<td>113.3</td>
<td>14.2</td>
<td>74-137</td>
<td>118.9</td>
<td>12.6</td>
<td>94-143</td>
</tr>
<tr>
<td>Aptitude P</td>
<td>113.4</td>
<td>17.5</td>
<td>82-155</td>
<td>118.9</td>
<td>16.1</td>
<td>81-148</td>
</tr>
<tr>
<td>Aptitude Q</td>
<td>109.7</td>
<td>14.8</td>
<td>87-153</td>
<td>115.8</td>
<td>13.0</td>
<td>93-139</td>
</tr>
<tr>
<td>Aptitude K</td>
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Validation Sample

Descriptive Statistics for Male and Female Subgroups

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APPENDIX 2

Validation Sample

Geographic Distribution of Sample:

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COMPANIES CONTRIBUTING SAMPLES

Validation Sample

North:
- Consulting Engineers Associates, Inc., Detroit, Michigan
- Giffels Associates, Detroit, Michigan
- Rossen/Neumann Associates, Southfield, Michigan
- Rossetti Associates, Detroit, Michigan
- Sidney Shorter & Associates, Detroit, Michigan
- Smith, Hinchman & Gryllis Associates, Inc., Detroit, Michigan
- Bell Telephone Laboratories, Whippany, New Jersey
- New Jersey Department of Transportation, Trenton, New Jersey

South:
- Alabama Dry Docks and Shipbuilding Co., Mobile, Alabama
- Mobile Pulley & Machine Works, Mobile, Alabama
- Palmer and Baker Engineers, Mobile, Alabama
- U.S. Army Corps of Engineers, Mobile, Alabama
- Atlanta Gas Light Company, Atlanta, Georgia
- City of Atlanta Planning Department, Atlanta, Georgia
- City of Atlanta Water Department, Atlanta, Georgia
- Georgia Department of Transportation, Atlanta, Georgia

West:
- A. C. Martin and Associates, Los Angeles, California
- Alderman and Swift Consulting Engineers, South Pasadena, California
- Atlantic Richfield Company, Long Beach, California
- Amerada Petroleum Corporation, Los Angeles, California
- Bechtel Corporation, Vernon, California
- Ben Schmid Structural Engineer, Pasadena, California
- Brandow and Johnson Associates, Los Angeles, California
- California State Division of Water Resources, Los Angeles, California
- City of Signal Hill, Signal Hill, California
- Daniel, Mann, Johnson & Mendenhall Engineers, Los Angeles, California
- Engineering Service Corporation, Los Angeles, California
- Fluor Corporation, Ltd., Los Angeles, California
- Humble Oil and Refining Company, Los Angeles, California
- John A. Martin, Structural Engineer, Los Angeles, California
Johnson & Nielsen Consulting Engineers, Los Angeles, California
King-Benloff-Steinman-King Consulting Engineers, Sherman Oaks, California
Long Beach Department of Oil Properties, Long Beach, California
Los Angeles City Department of Public Works, Bridge Division, Los Angeles, California
Los Angeles City Department of Water and Power, Los Angeles, California
Marathon Oil Company, Los Angeles, California
McIntyre and Quiros, Inc., Monterey Park, California
Metropolitan Water District of Southern California, Los Angeles, California
Mobil Oil Corporation, Los Angeles, California
Montgomery Construction Engineers, Inc., Pasadena, California
Quinton Engineering, Los Angeles, California
Ralph M. Parsons Company, Los Angeles, California
Shell Oil Company, Los Angeles, California
Signal Oil and Gas Company, Los Angeles, California
Southern Pacific Company, Los Angeles, California
Standard Oil Company, Western Operations, La Habra, California
Suburban Water Systems, Valinda, California
Texaco, Incorporated, Los Angeles, California
Thums Long Beach Company, Long Beach, California
Union Oil Company of California, Los Angeles, California
United Concrete Pipe Corporation, Baldwin Park, California
Wheeler and Gray Consulting Engineers, Los Angeles, California
Nevada State Highway Department, Carson City, Nevada

Cross-validation Sample

Automatic Electric Company, Northlake, Illinois
Consolidated Edison Company, New York, New York
General Dynamics, Electric Boat Division, Groton, Connecticut
Saelye, Stephenson, Value & Knecht, New Rochelle, New York
Descriptive Rating Scale for Validation Sample

Directions: Please read the sheet "Suggestions to Raters" and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of worker

How long have you supervised this worker and how familiar are you with his job performance?

☐ Under one month.
☐ One to two months.
☐ Three to five months.
☐ Six months or more.
☐ See him at work all the time.
☐ See him at work several times a day.
☐ See him at work several times a week.
☐ Seldom see him in work situation.

Rated by

(Signature) (Title) (Date)
A. How much work can he accomplish? (Volume of acceptable work produced.)

☐ 1. Capable of low work output. Can perform only at a less than satisfactory rate.

☐ 2. Capable of fair work output. Can perform at a satisfactory rate.

☐ 3. Capable of good work output. Can perform at a fairly fast rate.

☐ 4. Capable of high work output. Can perform at a very fast rate.

☐ 5. Capable of extremely high work output. Can perform at highest rate.

B. How accurate is he in his work? (The correctness with which work is performed. Freedom from errors.)

☐ 1. Makes many errors. Work needs constant checking.

☐ 2. Makes frequent errors. Work needs more checking than is desirable.

☐ 3. Makes errors occasionally. Work needs only normal checking.


C. How good is the quality of his work? (Nature of workmanship. Ability to do high-grade work which meets quality standards.)

☐ 1. Performance is usually acceptable, but only meets minimum standards.

☐ 2. Performance is acceptable, but usually not superior in quality.

☐ 3. Performance is usually superior in quality.

☐ 4. Performance is almost of the highest quality.

☐ 5. Performance is outstanding, meets maximum standards.

D. How much does he know about his work? (Understanding of the fundamentals that have to do directly or indirectly with his immediate and related jobs.)

☐ 1. Has very limited knowledge of fundamentals. Does not know enough to do his work adequately.

☐ 2. Has limited knowledge of fundamentals. Knows enough to "get by".

☐ 3. Has fair knowledge of fundamentals. Knows enough to do adequate work.

☐ 4. Has good knowledge of fundamentals. Knows enough to do good work.

☐ 5. Has excellent knowledge of fundamentals. Outstanding in work.
5. How much aptitude or facility does he have for this kind of work? (Natural adeptness or knack for performing work easily and well.)

☐ 1. Has great difficulty doing his work. Not suited to this kind of work.

☐ 2. Usually has some difficulty doing his work. Not too well suited to this kind of work.

☐ 3. Does his work without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his work without difficulty. Well suited to this kind of work.

☐ 5. Does his work with great ease. Exceptionally well suited to this kind of work.

6. How complete is his understanding of mathematics associated with his work? (Ability to make necessary computations required to perform his work.)

☐ 1. Fair understanding. Able to deal with the less difficult mathematics involved in his work.

☐ 2. Satisfactory understanding. Able to deal with most of the mathematics involved in his work.

☐ 3. Very good understanding. Able to deal with all but the most difficult mathematics involved in his work.

☐ 4. Excellent understanding. Able to deal with some of the most difficult mathematics involved in his work.

☐ 5. Superior understanding. Able to deal with all of the mathematics involved in his work.

7. How accurately and well does he analyze source data? (Ability to mentally separate information contained in source data into its component elements for drafting.)

☐ 1. Has great difficulty in analyzing and distinguishing component elements.

☐ 2. Usually has some difficulty in analyzing and distinguishing component elements.

☐ 3. Analyses and distinguishes component elements without too much difficulty.

☐ 4. Analyses and distinguishes component elements with ease.

☐ Analyses and distinguishes component elements with the greatest of ease.
H. How much judgment does he exercise? (Ability to analyze a problem, grasp essentials, and make a decision to reach a sound conclusion.)

☐ 1. Can't reach a decision. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Makes quick, erratic decisions. Often has difficulty and needs help on all but simple problems.

☐ 3. Eventually comes to right conclusion. Deals with most problems that are not too complex.

☐ 4. Often makes right decisions at the right time. Needs help only on complex problems.

☐ 5. Always makes right decisions at the right time. Rarely needs help, even on complex problems.

I. How well does he check his finished work? (Ability to perceive errors in work and to make correct revisions.)

☐ 1. Misses major errors. Work needs constant checking by supervisor.

☐ 2. Has difficulty locating errors. Work needs more checking than is desirable by supervisor.

☐ 3. Misses some errors. Work needs only normal checking by supervisor.

☐ 4. Checks work well. Seldom needs checking by supervisor.

☐ 5. Is very observant. Work almost never needs checking by supervisor.

J. Considering all the factors just rated, and only these factors, how acceptable is his work? (*All-around ability to do his work.)*

☐ 1. Performance somewhat inferior. Prefer not to have this worker.

☐ 2. Performance only generally acceptable. Hesitant to have this worker.

☐ 3. Performance is acceptable. Satisfied to have this worker.

☐ 4. Performance usually excellent. Pleased to have this worker.

☐ 5. Performance is outstanding. Particularly desire to have this worker.
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APPENDIX 3

U.S. DEPARTMENT OF LABOR • MANPOWER ADMINISTRATION

DESCRIPTIVE RATING SCALE FOR CROSS-VALIDATION SAMPLE

SCORE

RATING SCALE FOR

D.O.T. Title and Code

Directions: Please read the “Suggestions to Raters” and then fill in the items which follow. In making your ratings, only one box should be checked for each question.

SUGGESTIONS TO RATERS

We are asking you to rate the job performance of the people who work for you. These ratings will serve as a “yardstick” against which we can compare the test scores in this study. The ratings must give a true picture of each worker or this study will have very little value. You should try to give the most accurate ratings possible for each worker.

These ratings are strictly confidential and won’t affect your workers in any way. Neither the ratings nor test scores of any workers will be shown to anybody in your company. We are interested only in testing the tests. Ratings are needed only for those workers who are in the test study.

Workers who have not completed their training period, or who have not been on the job or under your supervision long enough for you to know how well they can perform this work should not be rated. Please inform the test technician about this if you are asked to rate any such workers.

Complete the last question only if the worker is no longer on the job.

In making ratings, don’t let general impressions or some outstanding trait affect your judgment. Try to forget your personal feelings about the worker. Rate only on the work performed. Here are some more points which might help you:

1. Please read all directions and the rating scale thoroughly before rating.

2. For each question compare your workers with “workers-in-general” in this job. That is, compare your workers with other workers on this job that you have known. This is very important in small plants where there are only a few workers. We want the ratings to be based on the same standard in all the plants.

3. A suggested method is to rate all workers on one question at a time. The questions ask about different abilities of the workers. A worker may be good in one ability and poor in another: for example, a very slow worker may be accurate. So rate all workers on the first question, then rate all workers on the second question, and so on.

4. Practice and experience usually improve a worker’s skill. However, one worker with six months’ experience may be a better worker than another with six years’ experience. Don’t rate one worker as poorer than another merely because of a lesser amount of experience.

5. Rate the workers according to the work they have done over a period of several weeks or months. Don’t rate just on the basis of one “good” day, or one “bad” day or some single incident. Think in terms of each worker’s usual or typical performance.

6. Rate only the abilities listed on the rating sheet. Do not let factors such as cooperativeness, ability to get along with others, promptness and honesty influence your ratings. Although these aspects of a worker are important, they are of no value for this study as a “yardstick” against which to compare aptitude test scores.
NAME OF WORKER (Print) _______________ (Last) _______________ (First)

SEX: MALE____ FEMALE____

Company Job Title: _______________________

How often do you see this worker in a work situation?

☐ All the time.
☐ Several times a day.
☐ Several times a week.
☐ Seldom.

How long have you worked with this worker?

☐ Under one month.
☐ One to two months.
☐ Three to five months.
☐ Six months or more.

A. How much can this worker get done? (Worker’s ability to make efficient use of time and to work at high speed.) (If it is possible to rate only the quantity of work which a person can do on this job as adequate or inadequate, use #2 to indicate “inadequate” and #4 to indicate “adequate.”)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
☐ 2. Capable of low work output. Can perform at a slow pace.
☐ 3. Capable of fair work output. Can perform at an acceptable pace.
☐ 4. Capable of high work output. Can perform at a fast pace.
☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of work? (Worker’s ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.
☐ 2. Performance is usually acceptable but somewhat inferior in quality.
☐ 3. Performance is acceptable but usually not superior in quality.
☐ 4. Performance is usually superior in quality.
☐ 5. Performance is almost always of the highest quality.

C. How accurate is the work? (Worker’s ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.
☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.
☐ 3. Makes mistakes occasionally. Work needs only normal checking.
☐ 5. Rarely makes a mistake. Work almost never needs checking.
D. How much does the worker know about the job? (Worker’s understanding of the principles, equipment, materials and methods that have to do directly or indirectly with the work.)

☐ 1. Has very limited knowledge. Does not know enough to do the job adequately.
☐ 2. Has little knowledge. Knows enough to get by.
☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.
☐ 4. Has broad knowledge. Knows enough to do good work.
☐ 5. Has complete knowledge. Knows the job thoroughly.

E. How large a variety of job duties can the worker perform efficiently? (Worker’s ability to handle several different operations.)

☐ 1. Cannot perform different operations adequately.
☐ 2. Can perform a limited number of different operations efficiently.
☐ 3. Can perform several different operations with reasonable efficiency.
☐ 4. Can perform many different operations efficiently.
☐ 5. Can perform an unusually large variety of different operations efficiently.

F. Considering all the factors already rated, and only these factors, how good is this worker? (Worker’s all-around ability to do the job.)

☐ 1. Performance usually not acceptable.
☐ 2. Performance somewhat inferior.
☐ 3. A fairly proficient worker.
☐ 4. Performance usually superior.
☐ 5. An unusually competent worker.

Complete the following ONLY if the worker is no longer on the job.

G. What do you think is the reason this person left the job? (It is not necessary to show the official reason if you feel that there is another reason, as this form will not be shown to anybody in the company.)

☐ 1. Fired because of inability to do the job.
☐ 2. Quit, and I feel that it was because of difficulty doing the job.
☐ 3. Fired or laid off for reasons other than ability to do the job (i.e., absenteeism, reduction in force).
☐ 4. Quit, and I feel the reason for quitting was not related to ability to do the job.
☐ 5. Quit or was promoted or reassigned because the worker had learned the job well and wanted to advance.
APPENDIX 4

Drafter, Civil (profess. & kin.) 005.281

JOB DUTIES

Prepares working plans and drawings used in connection with design, construction, alteration, maintenance and operation of highways, streets, river and harbor improvements, flood control, drainage and sewage disposal systems, lighting and water installations, airport runways and other civil engineering projects:

*Determines or ascertains scale to be used by analysis and computation of specifications and data through consultations with engineer responsible for project or from specifications and data furnished by supervisor.

Organizes and arranges data into logical sequence for drafting. Obtains and fastens on drafting table specified size and type of drawing paper, cloth or vellum.

*Draws and plots detailed graphic representations of data to scale in conformity with specifications, computed dimensions and spatial relationships using T-squares, straight edges, triangles, compasses, scribers, curve templates and drafting pens and pencils.

Delineates and identifies dimensions drawn with engineering symbols and mathematical data. Letters drawing as specified to identify project and component parts using freehand and/or lettering machine. Checks completed work for accuracy and submits drawing to supervisor. Performs related clerical work to file drawing, tabulate reports and data and index survey field notes.

*These job duties were designated as critical job duties as they must be performed competently if the job is to be performed in a satisfactory manner. Civil Drafters spend about 80% of their working hours performing these job duties.
Drafter, Structural (profess. & kin.) 005.281

JOB DUTIES

Prepares working plans and drawings used in connection with design and construction of buildings, bridges, industrial facilities and other structural projects:

*Determines or ascertains scale to be used by analysis and computation of specifications and data through consultation with engineer responsible for project or from specifications and data furnished by supervisor.

Organizes and arranges data into logical sequence for drafting. Obtains and fastens on drafting table specified size and type of drawing paper, cloth or vellum.

*Draws and plots detailed graphic representation of data to scale in conformity with specifications, computed dimensions and spatial relationships using T-squares, triangles, straight edges, compasses, dividers, scribers and drafting pens and pencils.

Delineates and identifies dimensions drawn with engineering symbols and mathematical data. Letters drawing as specified to identify project and component parts using freehand and/or lettering machine.

*These job duties were designated as critical job duties as they must be performed competently if the job is to be performed in a satisfactory manner. Structural Drafters spend about 80% of their working hours performing these job duties.
Drafter, Geological (petrol. production) 010.281

JOB DUTIES

Prepares maps, cross sections and profiles to show geological formations, strata and subsurface conditions. Drafts new base maps and alters existing maps to supply informative data concerning geological formations, mineral right owners, locations of existing and abandoned oil and gas wells, and man-made structures and roads:

* Determines scale to be used by analysis of data, consultations with geologist or from specifications received from chief drafter.

* Draws and plots detailed graphic representations of data to scale using T-squares, triangles, straight edges, compasses, dividers, scribers and drafting pens and pencils.

Delineates and identifies dimensions drawn with geological symbols and color shading. Letters drawing to identify work. Checks completed work for accuracy and submits drawing to supervisor. Performs related clerical work to file drawings, tabulate reports and data and index survey field notes.

* These job duties were designated as critical job duties as they must be performed competently if the job is to be performed in a satisfactory manner. Geological Drafters spend about 80% of their working hours performing these job duties.
Drafter, Mechanical (profess. & kin.) 007.281

JOB DUTIES

Prepares working plans and drawings of machinery and mechanical devices to scale according to specified dimensions and/or rough or detailed notes for engineering or manufacturing purposes:

* Determine scale to be used from specifications and data furnished by supervisor.

* Draws and plots detailed multiple view assembly and subassembly drawings as required for repairing and manufacturing of mechanisms using triangles, straight edges, compasses, templates, drafting pens and pencils and mechanical inking pens.

Delineates and identifies dimensions and tolerances, fasteners, joining requirements and other engineering data. Letters drawing to identify work. Prepares stocklist of items required for assembly and indicates this on drawing. Checks completed work for accuracy and submits drawing to supervisor. Performs related clerical work.

* These job duties were designated as critical job duties as they must be performed competently if the job is to be performed in a satisfactory manner. Mechanical Drafters spend about 80% of their working hours performing these job duties.