

U. S. DEPARTMENT OF COMMERCE

Harry L. Hopkins, Secretary

NATIONAL BUREAU OF STANDARDS

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WASHINGTON

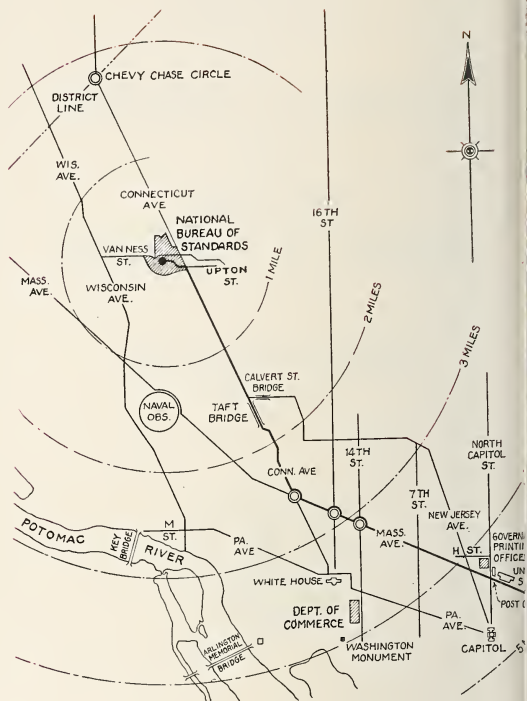
SCIENTIFIC
AND
TECHNICAL POSITIONS
IN THE
NATIONAL
BUREAU OF STANDARDS

Miscellaneous Publication M163

(Supersedes M152)



The National Bureau of Standards is charged by law with the development, construction, custody, and maintenance of reference and working standards and their intercomparison, improvement, and application in science, engineering, industry, and commerce.



SCIENTIFIC AND TECHNICAL POSITIONS
in the
NATIONAL BUREAU OF STANDARDS ¹

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¹ Prepared by William C. Fewell, Personnel Officer.

DIVISIONS AND SECTIONS OF BUREAU

Electricity

Resistance Measurements
Inductance and Capacitance
Electrical Instruments
Magnetic Measurements
Photometry
Radio
Underground Corrosion
Electrochemistry
Telephone Standards

Weights and Measures

Length
Mass
Time
Capacity and Density
Gas Measuring Instruments
Thermal Expansivity, Dental Research, and Identification
Weights and Measures Laws and Administration
Large-Capacity Scale Testing
Limit Gages

Heat and Power

Thermometry
Pyrometry
Heat Measurements
Heat Transfer
Cryogenics
Fire Resistance
Automotive Power Plants
Lubrication and Liquid Fuels
Aviation Engines and Accessories

Optics

Spectroscopy
Polarimetry
Colorimetry and Spectrophotometry
Optical Instruments
Radiometry
Atomic Physics, Radium, and X-Rays
Photographic Technology
Interferometry

Chemistry

Paints, Varnishes, and Bituminous Materials
Detergents, Cements, Corrosion, Etc.
Organic Chemistry
Metal and Ore Analysis, and Standard Samples

Chemistry—Continued

Reagents and Plating Metals
Electrochemistry (Plating)
Gas Chemistry
Physical Chemistry
Thermochemistry and Constitution of Petroleum

Mechanics and Sound

Engineering Instruments and Mechanical Appliances
Sound
Aeronautic Instruments
Aerodynamics
Engineering Mechanics
Hydraulics

Organic and Fibrous Materials

Rubber
Textiles
Paper
Leather
Testing and Specification
Fiber Structure
Organic Plastics

Metallurgy

Optical Metallurgy
Thermal Metallurgy
Mechanical Metallurgy
Chemical Metallurgy
Experimental Foundry

Clay and Silica Products

Whiteware
Glass
Refractories
Enameled Metals
Heavy Clay Products
Cement and Concreting Materials
Masonry Construction
Lime and Gypsum
Stone

Simplified Practice

Wood, Textiles, and Paper
Metal Products and Construction Materials
Containers and Miscellaneous Products
Materials Handling Equipment and Ceramics

DIVISIONS AND SECTIONS OF BUREAU—Continued

rade Standards

Wood, Wood Products, Paper, Leather, and Rubber
Metal Products
Textiles
Apparel
Petroleum, Chemical, and Miscellaneous Products

odes and Specifications

Safety Codes
Building Codes
Building Practice and Specifications
Producer Contacts and Certification
Consumer Contacts and Labeling

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Finance
Personnel
Purchase and Stores

Office—Continued

Property and Transportation
Mail and Files
Library
Information
Editorial

Shops

Design and Drafting
Instrument
Woodworking
Glassblowing
Shop Tools and Equipment
Materials and Supplies

Operation of Plant

Power Plant
Electrical
Piping
Grounds
Construction
Guard
Janitorial

PURPOSE OF THIS CIRCULAR

The National Bureau of Standards desires to keep in touch with men and women who are well qualified to fill positions on its scientific staff. The aim of this circular is to answer queries received in the daily mail and give general information to prospective applicants who are interested in the scientific and technical work of the Bureau.

INFORMATION CONCERNING BUREAU

Location of Bureau.

The Bureau's location is pleasant, about 3½ miles from the center of Washington, at Connecticut Avenue and Upton Street. The Bureau comprises a group of laboratory buildings on a 56-acre site, arranged like a university, situated on a natural hill.

Laboratory Facilities.

The Bureau's facilities make it one of the best-equipped physical laboratories in the world for carrying on scientific research.

Scientific and Technical Work.

The work of the Bureau includes many branches of physics, chemistry, and engineering, such as mechanics, heat, optics, electricity, sound, metrology, metallurgy, radio, electronics, thermodynamics,

aerodynamics, engineering (aeronautical, automotive, electrical, gas, hydraulic, mechanical, structural), also industrial technology (ceramics, leather, paper, petroleum, rubber, and textiles), including research and standardization, and offers valuable experience in these professions, combining as it does theoretical, experimental, and practical work.

Training in the Bureau.

The Bureau affords an excellent opportunity for training in scientific work, and its close connection with the industries makes Bureau experience valuable in industrial research. Many employees have found a Bureau position the stepping stone to some more highly remunerative one outside. Others who have remained in the service have been rewarded with steady advancement. It is generally recognized that the Government scientific and technical service is an excellent postgraduate training ground and outside interests are ever on the alert to secure successful Government research workers.

Educational Opportunities.

Educational opportunities are afforded by the weekly meetings of the Bureau staff, meetings of the various divisions and sections, cooperative postgraduate study courses in physics, chemistry, mathematics, etc., conducted by members of the staff and others outside of official hours, special lectures by visiting scientists, and meetings of national societies. The advanced courses at the Bureau are accepted by several universities as credits toward a higher degree when combined with a moderate amount of additional work taken in residence at the university selected. In some cases facilities can be provided at the Bureau for carrying out an experimental research which can be used for a thesis. Junior assistants are offered the opportunity of continuing their college work at local universities. In fact, employees appointed to positions in the subprofessional service are expected to prepare themselves for suitable education in some branch of the Bureau work for the broader field represented in positions of higher grades. The university courses are largely arranged to suit the convenience of persons in the Government service, and classes in most subjects are given in the late afternoon or evening.

Library Facilities.

The National Bureau of Standards has a highly specialized scientific library of 45,000 volumes

and free use of the other scientific collections in Washington.

INFORMATION REGARDING APPOINTMENTS

Mode of Entrance.

All positions on the staff of the National Bureau of Standards are subject to the competitive requirements of the civil-service rules and regulations. Only those candidates can be considered who have passed appropriate examinations and who are certified by the United States Civil Service Commission among the three highest eligibles on the register, and who have eligibility for transfer or reinstatement.

Needs of the Service.

For original appointment the demand is always much greater for junior assistants than for the higher grades, principally because, wherever possible, vacancies in the higher grades are filled through promotion. The Bureau staff comprises approximately 930 professional, subprofessional, clerical, administrative, fiscal, and custodial positions. Naturally, in a force of this size, vacancies often occur. The staff is also gradually increasing, so that there is frequent opportunity for the employment of young college men and women in scientific work.

Entrance Salary.

All appointments are made at the entrance salary of the grade for which eligibles have qualified through civil-service examination.

Duties.

No definite statement can be made as to the specific nature of the duties of a particular grade or position prior to offer of appointment. The duties are usually in connection with original investigations or testing in some field of the Bureau's work. While experimental testing usually forms the major part of the early work of new appointees in the junior grades, opportunities for research are afforded.

Application.

Formal applications for examination in any of the several grades cannot be accepted until after an examination has been announced. Application is made on standard prescribed forms issued by the United States Civil Service Commission.

Examination.

Examinations for positions in the lower grades are held occasionally throughout the country in practically every city of considerable size. Examinations for the higher grades are held from time to time as the needs of the service require. Applicants for the junior and assistant professional and subprofessional positions are required to report for a written examination. Applicants for positions of higher grade are not required to report for a written examination but are rated on their education, training, experience, writings (publications, reports, or thesis), and corroborative evidence.

Notice of Examination.

Persons who desire to be notified of the announcement of an examination for a position of any grade or in any specialty in the National Bureau of Standards may place their names on file for the purpose with the United States Civil Service Commission or the National Bureau of Standards, Washington, D. C.

Announcements giving full information regarding the requirements, places of examination, etc., will be mailed to interested persons approximately one month in advance of the examination dates.

Physical Examination.

In view of the benefits granted employees under employees' compensation and retirement legislation, persons appointed will be required to pass a physical examination by a physician in the Federal service before entering on duty. They must have such health and freedom from physical defects as will enable them to meet the physical standard which the Civil Service Commission deems necessary to perform the duties of the position.

Proof of Date of Birth.

Applicants who attain eligibility and are selected for appointment must furnish proof of date of birth to the appointing officer at the time of reporting for duty.

Members of Family Already in Government.

Where there are already two members of a single family (living under the same roof) in the service of the District of Columbia or the United States, additional members of that family will not be appointed.

Senior Students.

Applications will be accepted from senior students in college and high school when an examination is announced, subject to their furnishing proof of actual graduation before entering on duty in case appointment is made.

Citizenship and Sex.

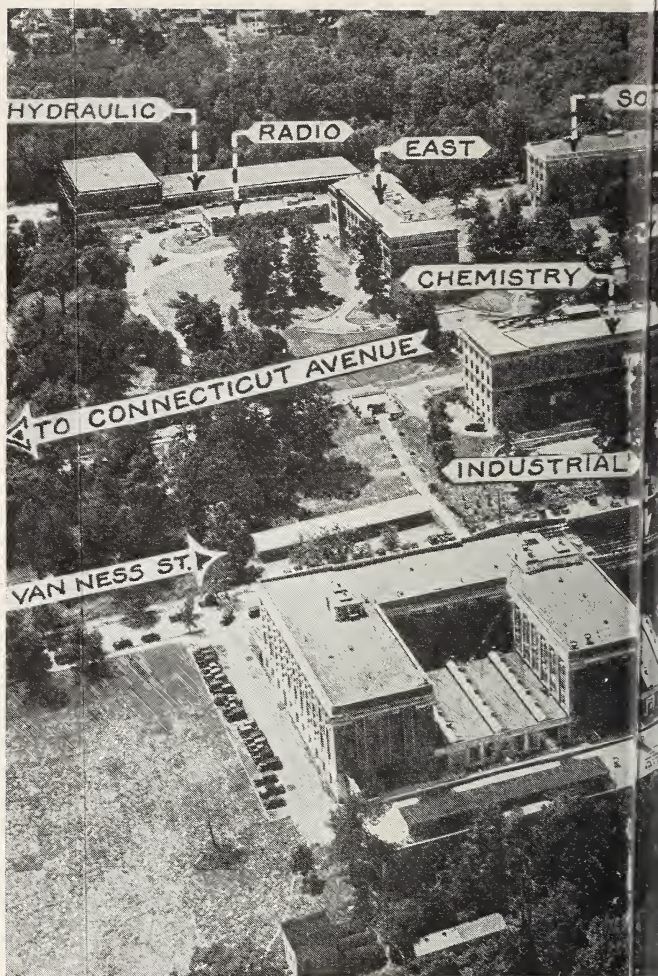
All citizens of the United States, both men and women, who meet the requirements may enter these examinations; appointing officers, however, have the legal right to specify the sex desired in requesting certification of eligibles.

Residence.

To be eligible for permanent appointment to the apportioned service in Washington, D. C., applicants must show legal or voting residence for at least one year next preceding the closing date for receipt of applications, in the State or Territory claimed. Practically all positions on the Bureau staff are in the District of Columbia and are, therefore, subject to the above residence requirement.

Temporary Appointment.

Temporary appointments are also made through civil-service examination and certification; that is, if there are eligibles on civil-service registers who are willing to accept temporary appointment, they must be given first opportunity for such positions. Temporary appointment of others may be authorized by the United States Civil Service Commission in the event that there are no eligibles available for certification from existing lists, pending the announcement of an examination and the establishment of a new register of eligibles. There is, however, usually a surplus of civil-service eligibles available for certification, and there is seldom opportunity for such temporary appointment of others except in positions requiring highly specialized training and experience.



Airplane view of the Naval Engineering Laboratory
 [Looking south.]

The names of the principal buildings are shown. The main entrance to the laboratory is on the right. Visitors a trip through the laboratories starts at 1:45 p. m. from room 300.

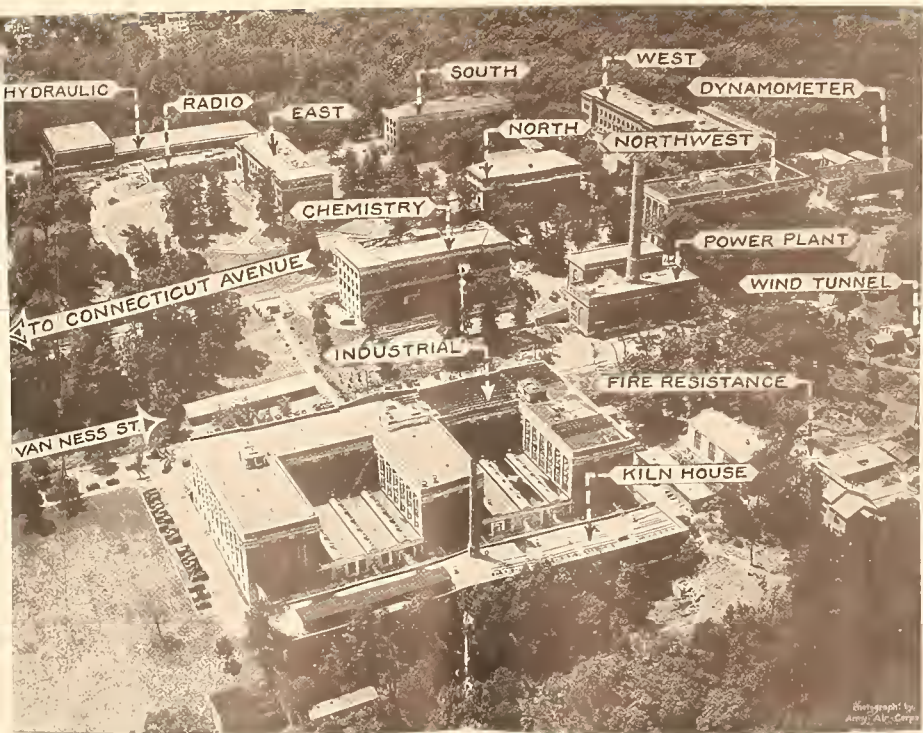


Photograph by
Army Air Corps

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reau's grounds is on Connecticut Avenue, to the left of this picture. For
om 300, South Building, shown near the top center.





Airplane view of the National Bureau of Standards.
 [Looking south.]

The names of the principal buildings are shown. The main entrance to the Bureau's grounds is on Connecticut Avenue, to the left of this picture. For visitors a trip through the laboratories starts at 1:45 p. m. from room 200, South Building, shown near the top center.

Photograph by
 Army Air Corps

Summer Appointment.

There are no special provisions for appointments to cover the summer-vacation period. A few such appointments can sometimes be made, but, in general, the statements above regarding civil-service requirements for temporary appointments apply to the summer positions as well. The Bureau's operations have to be conducted under a budget providing for fairly uniform maintenance of its work and staff throughout the year. Furthermore, most of the work requires a considerable amount of experience before it can be carried on independently. The time required from experienced members of the staff in instructing and supervising new appointees makes employment for short periods uneconomical. In view of all these conditions, it is necessary to limit rather closely the number of summer appointments made.

Research Associate Positions.

Technical problems arise in every industry. Some are of such pressing importance that an industry or group of technicians concerned may apply to the Bureau for cooperation. If facilities and other conditions are favorable, the Bureau may authorize the appointment of a research associate. The industrial or technical group allots funds for the purpose. A research worker is then sought either by the Bureau or the employing organization. If mutually acceptable, he is appointed as a research associate by the Director of the National Bureau of Standards. Usually the appointee is a technical or scientific graduate qualified to initiate and conduct research. The employing organization is usually an association of an entire industry or a specialized scientific or technical group. These appointments are made without reference to civil-service examination, rules, and regulations. In view of the small number of research associate assignments, in comparison with the regular staff, vacancies seldom arise in these positions.

Nontechnical Positions.

There are also other classes of positions on the staff of the National Bureau of Standards, such as clerical, stenographic, administrative, mechanical, etc., but calls for such eligibles are infrequent and there is usually a sufficient supply of eligibles available to meet the demand of the service from current examinations conducted by the United States Civil Service Commission for the entire Government

service. Requests for information concerning these positions should be addressed to the United States Civil Service Commission, Washington, D. C.

Probationary Period.

All civil-service appointees to positions in this Bureau are required to serve a probationary period of one year. At the expiration of the probationary period, the appointment becomes permanent if the employee's work and conduct have been satisfactory.

QUALIFICATIONS REQUIRED FOR ENTRANCE

The general requirements necessary for admittance to the examinations for the regular scientific and technical positions are given below. It is, of course, occasionally necessary to announce other special examinations, but these are usually of a highly specialized nature. Detailed requirements for each position are given when an announcement is issued by the United States Civil Service Commission.

Junior Professional Grade (salary range, \$2,000 to \$2,600).

Physicist.—Applicants must have successfully completed a full 4-year course leading to a bachelor's degree in a college or university of recognized standing, including the completion of at least 24 semester-hours' study in physics. (By semester-hour is meant one lecture recitation hour or two laboratory hours per week per semester.) Applicants are examined and rated on the subjects of general physics and mathematics through calculus, and practical questions on the optional subject chosen (electricity, heat, mechanics, optics, radio, sound).

Chemist.—Applicants must have successfully completed a full 4-year course leading to a bachelor's degree in a college or university of recognized standing, including the completion of at least 30 semester-hours' study in chemistry. Applicants are examined and rated on the subjects of general chemistry, and practical questions in the optional subject chosen (advanced inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry).

Engineer.—Applicants must have successfully completed a full 4-year course leading to a bachelor's degree in engineering in a college or university of recognized standing. Applicants are examined and rated on the subjects of engineering fundamentals (including mathematics, physics, mechanics, chem-

istry, engineering materials, etc.), and practical questions in the optional subject chosen (aeronautical, ceramics, chemical, civil, electrical, mechanical, petroleum, structural steel, and concrete).

Assistant Professional Grade (salary range, \$2,600 to \$3,200).

In addition to meeting the preliminary requirements for the junior professional grade, applicants must have had at least two years of subsequent experience in work of a research or scientific character in the optional selected, showing a fair degree of progression in duties and responsibilities and some aptitude for investigative work; provided, that one year of graduate work will be accepted in lieu of each year of the required experience.

Associate Professional Grade (salary range, \$3,200 to \$3,800).

In addition to meeting the preliminary requirements for the junior professional grade, applicants must show that they have had at least three years of subsequent experience in specialized research or developmental work and should submit evidence to show the quality of work accomplished and their ability to assume important responsibilities and to carry on difficult scientific work in the optional under which they apply. Appointment in this grade requires professional attainment of a high order. Applicants may substitute one year of postgraduate work for each year of the required experience, but in order to qualify entirely on the basis of academic work an applicant must have received the doctor's degree.

Full Professional Grade (salary range, \$3,800 to \$4,600).

In addition to meeting the preliminary requirements for the junior professional grade, applicants must show that they have had at least five years experience subsequent to graduation and of a scientific or investigative nature in the optional selected. The training and experience must have been sufficient to demonstrate ability to perform highly specialized and extremely difficult scientific or investigative work, must show a high degree of progression, scientific research successfully accomplished, and ability to assume increasingly important responsibilities. Applicants may substitute, year for year, up to a maximum of 3 years, for the above

prescribed experience, postgraduate study in a college or university of recognized standing, with major study in the appropriate optional.

Higher Professional Grades (salary range, \$4,600 to \$9,000).

Vacancies in the higher professional grades are usually filled by promotion, and it is seldom necessary to make appointments in these grades. Applicants for these positions must show broad fundamental scientific education, extended experience, demonstrated proficiency in the field of science involved, and exceptional executive ability. Examinations in the higher grades are announced only as the needs of the service require, and then only in highly specialized fields.

Minor Subprofessional Grade (salary range, \$1,020 to \$1,380).

Applicants for the position of minor laboratory apprentice must show that they have graduated from a 4-year high-school course or completed 14 units of high-school work accepted for college entrance, and that their high-school work included at least a 1-year course in either physics or chemistry. Applicants are examined and rated on the subjects of elementary algebra and geometry and elementary physics or chemistry.

Under Subprofessional Grade (salary range, \$1,260 to \$1,620).

Applicants for the position of under laboratory apprentice must have completed at least 30 credit-hours of college work, which shall have included as a minimum either a 6-hour course in college physics or a 6-hour course in college chemistry. Applicants are examined and rated on the subjects of general chemistry or elementary physics, mathematics through trigonometry, and education and experience.

Junior Subprofessional Grade (salary range, \$1,440 to \$1,800).

Applicants for the position of junior physical science aid must have completed at least 60 credit-hours of college work, such college course to have included as a minimum either a 6-hour course in college physics or a 6-hour course in college chemistry. Applicants are examined and rated on the subjects of general chemistry or elementary physics, mathematics through trigonometry, and education and experience.

Assistant Subprofessional Grade (salary range \$1,620 to \$1,980).

Applicants for the position of assistant physics science aid must show that they have completed at least 90 credit-hours of study in a college or university of recognized standing and that they have majored in the optional subject selected in the examination (advanced general physics, ceramics, chemical engineering, chemistry, civil and mechanical engineering, electrical engineering, paper technology, physical metallurgy, physics and chemistry, textile technology). Applicants are examined and rated on the subjects of general chemistry and elementary physics, mathematics including differential calculus and education and experience.

Higher Subprofessional Grades (salary range, \$1,800 to \$3,200).

It is seldom, if ever, necessary to hold examination in the higher subprofessional grades except in unusual cases where special training and experience are required. Employees in the subprofessional service engaged in laboratory work are usually promoted from the assistant subprofessional grade to the junior professional grade upon receiving a college degree. The higher subprofessional grades are composed principally of mechanical or other types of positions not in line for promotion to the professional service.

GENERAL INFORMATION

Working Hours.

The regular hours for employees on the scientific staff of the National Bureau of Standards are from 8:30 a. m. to 4 p. m., with one-half hour out for luncheon. On Saturdays the working hours are from 8:30 a. m. to 12:30 p. m. without intermission.

Leave of Absence.

Employees of the National Bureau of Standards are granted 26 days, exclusive of Sundays and holidays, of annual leave in each year: *Provided*, That the part unused in any year shall be accumulated for succeeding years until it totals not exceeding 90 days. During sickness, employees are entitled to sick leave at the rate of $1\frac{1}{4}$ days a month, and such leave is not used it shall accumulate: *Provided*, That the total accumulation shall not exceed 90 days.

Advancement.

The positions on the scientific staff form a continuous series from the entrance grade to the highest subject to the limitations placed by the number of vacancies occurring. Promotion is possible from one grade to another, subject, of course, to the individual employee's efficiency, training, and accomplishments and to the funds available for making promotion.

Retirement.

Classified employees who have reached the retirement age and have served 15 years are entitled to retirement with annuity. A deduction of $3\frac{1}{2}$ percent is made from monthly salary toward this annuity, which will be returned with 4-percent interest, compounded annually, to persons leaving the service before retirement. The retirement age for professional employees is 70 years, with optional retirement at 68 years.

Specimen Examination Papers.

The National Bureau of Standards does not distribute specimen sets of previous examination papers. The character of the examinations for the various classes of positions is sufficiently indicated under the separate headings in this publication.

Transportation to New Appointees.

Persons accepting appointments must report to Washington, D. C., or assigned post of duty without cost to the Government.

Welfare.

Provision is made for the individual welfare of the Bureau employees. Voluntary first aid is rendered in all principal buildings, and for those injured in line of duty care is provided in accordance with the provisions of the Federal Compensation Act.

Recreation.

There are tennis courts at the Bureau, and facilities for golf, tennis, bathing, baseball, polo, skating, and other sports are provided in the public parks. The Potomac River is much used for canoeing, swimming, and its banks for camping and hiking. The Library of Congress, National Academy of Sciences, National Museum, art galleries, Zoological Park, and many other civic institutions peculiar to the National Capital afford unusual opportunities for culture and recreation.

Cost of Living in Washington.

The cost of living in Washington is about the same as in other large cities of the country. The average cost of room and board in the vicinity of the National Bureau of Standards is approximately \$40 to \$50 per month, including two meals per day. Rentals for apartments and houses would probably range from \$55 per month and upward, depending upon the size, location, etc.

Salary Ranges.

The following table gives the salary steps attached to the various grades and positions under the classification act:

Professional service

Grade	Descriptive title	Salary rates in dollars							
1	Junior.....	2000	2100	2200	2300	2400	2500	2600	
2	Assistant.....	2600	2700	2800	2900	3000	3100	3200	
3	Associate.....	3200	3300	3400	3500	3600	3700	3800	
4	Full.....	3800	4000	4200	4400	4600			
5	Senior.....	4600	4800	5000	5200	5400			
6	Principal.....	5600	5800	6000	6200	6400			
7	Head.....	6500	7000	7500					
8	Chief.....	8000	8500	9000					

Subprofessional service

Grade	Descriptive title	Salary rates in dollars							
1	Minor.....	1020	1080	1140	1200	1260	1320	1380	
2	Under.....	1260	1320	1380	1440	1500	1560	1620	
3	Junior.....	1440	1500	1560	1620	1680	1740	1800	
4	Assistant.....	1620	1680	1740	1800	1860	1920	1980	
5	Main.....	1800	1860	1920	1980	2040	2100	2160	
6	Senior.....	2000	2100	2200	2300	2400	2500	2600	
7	Principal.....	2300	2400	2500	2600	2700	2800	2900	
8	Chief.....	2600	2700	2800	2900	3000	3100	3200	

Clerical, administrative, and fiscal service

Descriptive title	Salary rates in dollars						
Under.....	1260	1320	1380	1440	1500	1560	1620
Junior.....	1440	1500	1560	1620	1680	1740	1800
Assistant.....	1620	1680	1740	1800	1860	1920	1980
Main.....	1800	1860	1920	1980	2040	2100	2160
Senior.....	2000	2100	2200	2300	2400	2500	2600
Principal.....	2300	2400	2500	2600	2700	2800	2900
Assistant administrative.....	2600	2700	2800	2900	3000	3100	3200
Associate administrative.....	2900	3000	3100	3200	3300	3400	3500
Full administrative.....	3200	3300	3400	3500	3600	3700	3800
Senior administrative.....	3500	3600	3700	3800	3900	4000	4100
Principal administrative.....	3800	4000	4200	4400	4600		
Head administrative.....	4600	4800	5000	5200	5400		
Chief administrative.....	5600	5800	6000	6200	6400		
Executive.....	6500	7000	7500				
Senior executive.....	8000	8500	9000				

Custodial service

Descriptive title	Salary rates in dollars						
Junior messenger.....	600	660	720	780	840		
Office laborer.....	1080	1140	1200	1260	1320	1380	
Minor.....	1200	1260	1320	1380	1440	1500	
Under.....	1320	1380	1440	1500	1560	1620	1680
Junior.....	1500	1560	1620	1680	1740	1800	1860
Assistant.....	1680	1740	1800	1860	1920	1980	2040
Main.....	1860	1920	1980	2040	2100	2200	2300
Senior.....	2000	2100	2200	2300	2400	2500	2600
Principal.....	2300	2400	2500	2600	2700	2800	2900
Chief.....	2600	2700	2800	2900	3000	3100	3200

