

Position Classification Standard for Agricultural Engineering Series, GS-0890

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SERIES DEFINITION

This series includes professional positions which require primarily the application of the principles of engineering in combination with knowledge of one or more fields of agriculture. The work involves research, development, design, test, evaluation, and application of the fundamentals of engineering to aid in the solution of agricultural problems in such areas as farm structures, soil and water conservation, mechanical power and machinery, and electric power and processing.

This standard supersedes the standard for the Agricultural Engineering Series, GS-0890, issued in July 1948 under the code of P-804, and the amendment dated October 1959.

COVERAGE

Agricultural engineering positions are characterized by required knowledge of agricultural elements of a soil, water, and land use program, e.g., agronomy, biology, soil conservation, and soil science. The engineering applications are characteristically so closely connected with questions of agricultural technique, economy, or planning that the engineer is required either (1) to integrate the engineering considerations and judgments with the agricultural problems or techniques involved, or (2) to apply a knowledge of those techniques as engineering plans are developed and executed.

Agricultural engineering is performed in a number of Federal programs with functions such as the following:

1. Providing direct technical assistance and professional advice to:
 - a. Farmers, ranchers, landowners, and others in the conservation and use of soil and water resources;
 - b. Farm groups, rural communities, and other bodies regarding programs of financial assistance for the improvement of rural areas;
 - c. Managers of Government-owned or Government-leased lands.
2. Research, development, evaluation, and advisory service concerning:
 - a. Crop production including
 - interrelationships of soil properties and the characteristics of tillage, traction, and transport equipment;
 - methods and equipment for handling crop residues, seedbed preparation, seeding, planting, fertilizer applications, and for controlling weeds, pests, and plant diseases;

- engineering phases of plant environment control under artificial conditions of temperature, humidity, light, and air movement and composition.
- b. Livestock production including
 - optimum environmental conditions for animal growth, maintenance, and reproduction;
 - methods and equipment for the efficient feeding and handling of livestock.
- c. Farm electrification including
 - application of electric power to farm use;
 - effects of electromagnetic radiation on growth and production responses of plants, animals, and insects;
 - solar energy collectors and storage devices for agricultural applications.
- d. Mechanical harvesting and processing of crops;
- e. Soil and water conservation;
- f. Farm structures including
 - structures and materials for production, preparation, handling, and storage of farm products;
 - plans for farm housing and service buildings.

EXCLUSIONS

The following categories of positions are excluded from this series:

1. Professional engineering positions which do not require a well-developed knowledge of the principles of one or more of the agricultural sciences. These positions are classified in the appropriate series of the Engineering and Architecture Group, GS-0800, such as the [Civil Engineering Series, GS-0810](#), or the [Mechanical Engineering Series, GS-0830](#).
2. Positions involving professional work in the biological sciences which require a general practical knowledge of engineering equipment, terminology, and an understanding of engineering plans and specifications, but do not require professional knowledge and competence in the physical, mathematical, and engineering sciences fundamental to

engineering. These positions are classified in the appropriate series of the Biological Sciences Group, GS-0400, e.g., [Soil Conservation Series, GS-0457](#).

3. Positions which involve engineering work that does not require full professional knowledge and competence. Such positions are classified in the appropriate technician series, e. g., the [Engineering Technician Series, GS-0802](#). (See [Introduction to GS-0800 Group](#) for a detailed discussion of the distinctions between professional engineer and engineering technician positions.)

CLASS TITLES

The approved titles for positions in this series are *Agricultural Engineer* and, for those positions which include significant supervisory responsibilities, *Supervisory Agricultural Engineer*.

EVALUATION PLAN

Grade levels are determined and defined under two broad classification factors:

Nature of the Assignment, and
Level of Responsibility.

Nature of the assignment

This factor primarily is concerned with the degree of difficulty and complexity involved in the assignment. Elements of this factor include:

- (1) knowledge and skills which the agricultural engineer must possess to accomplish the work;
- (2) degree of planning and coordinating involved in the assignment; and
- (3) precedents, methods, and techniques available.

In evaluating skills and knowledge, consideration should be given to the need of the engineer to modify or deviate from established engineering standards and criteria. This usually requires both a theoretical and practical knowledge of principles and precedents in applying a variety of methods and techniques to solve agricultural and engineering problems.

In evaluating the degree of planning and coordination, consideration should be given to:

- (a) need to divide the assignment into separate phases;
- (b) variety of activities involved; and
- (c) problem of coordinating the several phases to form an integrated solution that reflects adequate treatment of the economic, safety, and functional aspects of the overall assignment.

In evaluating the element concerning precedents, methods, and techniques utilized, consideration should be given to:

- (a) the degree of modification which may be required; and
- (b) whether, in fact, the engineering develops such material to be used later by others.

Level of responsibility

This factor includes consideration of:

- (1) supervisory control exercised over the work;
- (2) personal work contacts; and
- (3) recommendations, decisions, commitments, and conclusions.

In evaluating supervisory control over the position, consideration should be given to:

- (a) extent to which the supervisor indicates to the employee the guides, techniques, procedures, source material, lines of approach, and variables to be considered;
- (b) extent to which the supervisor assists in overcoming difficulties that arise in the course of the work;
- (c) limits placed on the assignment; and
- (d) kind, frequency, and degree of technical and/or administrative review given to completed phases of the work.

In evaluating personal work contacts, consideration should be given to their nature, purpose, and scope. For example, some contacts may be made simply for the purpose of exchanging information while others may be to solicit support for essential but controversial programs.

In evaluating recommendations and decisions, consideration should be given to:

- (a) their influence on other activities; and
- (b) the extent to which these factors commit the organization to a specific course of action.

EVALUATION NOTES

1. Research positions should be evaluated by reference to the [Research Grade-Evaluation Guide](#). The research guide may also be used to evaluate the research portion of mixed positions.
2. Development positions should be evaluated by reference to the [Equipment Development Grade Evaluation Guide](#). The development engineering guide may also be used to evaluate the development aspects of mixed positions.
3. Supervisory positions should be evaluated by reference to the [General Schedule Supervisory Guide](#).
4. There are very few nonsupervisory, nonresearch positions at GS-13 and above. Those which do exist at such levels are highly individualized or involve primarily specific program responsibilities. Therefore, the development of grade-level criteria for their evaluation is not considered practicable. Positions at GS-13 and above may be evaluated by extension of criteria presented in this standard, by use of the appropriate guides listed above, and by use of the [General Grade-Level Standard for Nonsupervisory Professional Engineering Positions](#).
5. References in the grade-level descriptions to work situations are included to illustrate the grade-level values of work assignments. Users should consider the essence of the grade-level concepts in the work situations and avoid evaluation of positions on the basis of superficial resemblances. Assignments described at one grade level may be performed at higher or lower levels when there are significant differences in the other classification elements.

GRADE DESCRIPTION LEVELS

AGRICULTURAL ENGINEER, GS-0890-05

Nature of assignment

Work assignments are given principally to:

- provide experience and progressive training in the policies, regulations, technical programs, techniques, and operating methods of the agency;
- orient the employee in the application of academic theory and basic principles to agricultural engineering tasks;
- ascertain interests and aptitudes as a basis for developing the engineer for more responsible assignments;
- increase his familiarity with sources of material applicable to the work.

Precedents and methods are numerous, detailed, and directly applicable to the work situation. Some judgment and accuracy of observations is required in determining when standard methods are not applicable.

Level of responsibility

Detailed instructions are usually provided on an individual job basis. Work is checked during progress and upon completion for accuracy and validity. Work relationships are chiefly with other trainees or the immediate supervisor. On occasion the GS-5 engineer may accompany others in making contacts outside the organization.

AGRICULTURAL ENGINEER, GS-0890-07

Nature of assignment

GS-7 agricultural engineers typically perform work on minor projects or on limited phases of larger projects. Assignments are normally organized in such a manner as to provide progressive experience and are screened to eliminate difficult or unusual problems.

Methods and precedents are usually numerous, sufficiently detailed, and applicable to the work situation. GS-7 engineers differ from those at GS-5 in that they are expected to select the most applicable techniques within the framework of their assignments.

GS-7 agricultural engineers perform tasks typified by the following:

- . Meet with farmers to explain simple engineering practices such as tile drainage, terraces, and diversions.

- . Assist higher grade engineers in the design and technical overseeing of construction of water developments for stock, diversions, waterways, dikes, ditches, land leveling, irrigation systems, and other structures.
- . Make topographic maps and compute runoff information in relation to flood control projects.

Level of responsibility

Detailed instructions as to job requirements, probable results, and methods of accomplishing work are provided for new assignments. The primary difference in responsibility between GS-7 and GS-5 is that at GS-7, work of a repetitive nature is performed independently. These repetitive tasks are spot checked upon completion for accuracy and adherence to standards.

Personal work relationships outside the organization are usually with individuals or groups with which contacts were initiated by higher grade employees.

Recommendations are usually in the form of suggesting practices which, if accepted, will not have a major impact on a given project. Decisions are limited to the selection of the most appropriate guides to consult.

AGRICULTURAL ENGINEER, GS-0890-09

Nature of assignment

GS-9 agricultural engineers are typically assigned the full range of professional tasks in areas involving a limited variety of engineering or agricultural problems. In contrast with GS-7 work, the GS-9 employee is required to accomplish a full sequence of tasks to complete a total assignment.

GS-9 engineers select and, as required, make minor modification to established guides, policies, precedents, and procedures. This requires an understanding of agricultural engineering principles, practices, and techniques from both a theoretical and practical standpoint.

GS-9 employees perform a variety of work operations consisting of relatively simple complete projects or total phases of larger projects. Complete projects normally relate to conventional types of planning, construction, and/or fabrication methods covered by established precedents. On phases of larger projects, instructions as to limits of multiple tasks to be performed are usually given. For example, the GS-9 agricultural engineer:

Provides agricultural engineering assistance on soil and water problems to farmers, landowners, and others in a geographic location having fairly uniform soil and water conditions. Plans, designs, coordinates, and oversees construction of terraces, diversions,

farm ponds, sod waterways, small grade stabilization structures, surface drainage systems, and small irrigation systems. Projects require the engineer to determine such factors as:

- roughness coefficients for channel designs;
- types of engineering materials applicable to a particular project;
- types of vegetation required to stabilize completed work;
- permissible velocities in vegetated channels.

Level of responsibility

The GS-9 agricultural engineer works more independently than does the GS-7 and has more responsibility for selecting methods, arriving at conclusions, and completing work. Normal assignments are made in terms of objectives to be achieved, as contrasted with the GS-7 where more detailed guidance on each phase of the project is given. When working on projects with no directly applicable guides or precedents, GS-9 engineers are provided with specific instructions as the work progresses.

At GS-7, personal contacts are usually restricted to members of the immediate organization and farmers and farm groups; at GS-9, contacts are more likely to include counterpart engineers and scientists in other Federal and State organizations. Contacts at GS-9 are made not only to exchange information, but to coordinate work projects.

Recommendations, decisions, conclusions, and commitments are limited to those within the scope of the actual assignment. GS-9 engineers are responsible for recognizing those problems which exceed their authority and for referring them to higher grade employees.

AGRICULTURAL ENGINEER, GS-0890-11

Nature of assignment

Agricultural Engineers GS-11 perform the full range of standard work assignments. While GS-9 engineers typically coordinate phases of projects, at the GS-11 level complete projects are more usually assigned and require the engineer to plan and coordinate work of significant scope and complexity.

Agricultural Engineers GS-11 are full operating specialists in all the conventional aspects of their profession. The technical methods they employ involve a thorough knowledge of available literature and techniques. While the GS-9 engineer must select and use standard methods and techniques efficiently and effectively, the GS-11 must apply ingenuity in modifying and adapting standard procedures. For example, the GS-11 engineer:

1. Provides agricultural engineering assistance on soil and water problems to farmers, landowners, and others in a geographic location having a variety of engineering problems. Plans, designs, coordinates, and oversees construction of work similar to but usually larger than that described at GS-9, e.g., large grade stabilization structures and

internal drainage systems. These projects are more complex than those at GS-9 in that they involve planning and constructing:

- drainage systems where lack of suitable outlets require modification of standard drainage practices;
- erosion control works involving problem soils;
- water control structures where unstable foundation soils require alternative design approaches;
- earthfill structures where substandard fill material requires modification of standard construction practices;
- irrigation systems where soils present difficulties, where quantity of water may be inadequate, or where quality of water requires facilities for special treatment.

These features of the work generally occur throughout a large portion of the assigned geographic area in varied combinations.

2. Provides technical engineering assistance to Federal officials, farmers, and others interested in Federal loans and grants for farm and/or rural development and improvement. The area served is large (e.g., statewide) and has varied agricultural, climatic, and socioeconomic conditions. The work involves evaluating proposals for engineering feasibility as well as cost and probable profit to the farmer for such proposed projects as farm water storage structures, water treatment plants, and related structures or systems. In addition, the work includes advising on the agricultural engineering aspects of comprehensive land development plans for rural groups. The GS-11 engineer develops instructions, plans, and schedules for the agricultural engineering phases of the overall program.

Level of responsibility

Except in very difficult cases where a number of deviations from existing practices must be made, GS-11 engineers are expected to determine the methods of accomplishment and sources of information without supervisory direction. In these cases, such direction is given in the planning stages of the project rather than, as at GS-9, as the work progresses. Completed work is spot checked for technical adequacy and conformance with policy and regulations.

Work relationships and contacts are made to exchange ideas or information concerning projects and to assure that assigned work ties in with related activities of engineers in other bureaus or agencies. There are typically contacts with contractors, State agencies, and private groups to explain required procedures and obtain cooperation. GS-11 engineers must use tact and diplomacy to obtain agreement on controversial issues with contractors and outside groups.

AGRICULTURAL ENGINEER, GS-0890-12

Nature of assignment

Agricultural Engineers GS-12 are recognized as mature and specialized workers equipped to deal with advanced aspects or problems of their profession. GS-12 engineers are distinguished from GS-11 by the broader scope, greater depth of treatment, more varied subject matter, application of more critical judgment, and the increasing number of considerations which must be taken into account to make accurate decisions. Work is characterized by the occurrence of many variables which require application of a knowledge of diversified agricultural engineering principles and practices in a broad area of assignment.

Methods and techniques frequently appear to be similar to those at the GS-11 level, but GS-12 engineers must apply a high degree of judgment and originality in planning work, modifying procedures, and evaluating and making compromises with a number of alternate solutions.

A typical assignment at this level is the following:

Is responsible for broad technical guidance and coordination of activities aimed at the solution of difficult specialized agricultural engineering problems throughout a large geographic area (e.g., a State). Advises agricultural engineers, conservationists, and others on complex problems such as those associated with drainage and irrigation or the upland treatment phases of a comprehensive soil and water program. Develops standards, techniques, and criteria for guiding the agricultural engineering phases of soil conservation operations in a number of and resource areas with a wide variety of soils, topography, and agricultural enterprises.

Level of responsibility

Instructions are given in terms of broad objectives and relative priority for completion of work. Engineers GS-12 work with considerable freedom from technical control. They are responsible for selecting the proper engineering methods and for carrying assignments through to completion. Very little technical guidance is provided except for controversial issues which may have an impact on agency policy. Completed work is reviewed for adequacy in terms of meeting broad organizational objectives and for compliance with established policies.

Agricultural Engineers GS-12 maintain liaison with officials in other Federal departments and bureaus, State and local governments, universities, private contractors, and the general public. These activities often constitute a considerable portion of the work of positions at GS-12. As compared with the GS-11 level, there are considerably more contacts at GS-12 to resolve problems which involve basic program differences.

Decisions and recommendations based on the application of standard engineering practices are rarely changed by higher authority other than for reasons of policy, public relations, or budgetary considerations.