

EQUIPMENT DEVELOPMENT GRADE EVALUATION GUIDE CHECKLIST  
PART III – EXPERIMENTAL DEVELOPMENT

Factors	Degree A 1 pt	Degree B 2 pts	Degree C 3 pts	Degree D 4 pts	Degree E 5 pts
Nature of Assignment	<p>Problems have been isolated or defined and may be singled out of a larger investigation. Unknown factors are primarily matters of factual nature; data can be obtained by use of established analytical techniques with minor modifications; objectives are clearly identified. Work results in specific proof or demonstration of changes in or additions to a tangible product. The incumbent prepares reports to describe conditions and factors of importance to the results.</p> <p>Assignment example includes the analysis of the energy balance in alternate configurations of inertially-powered mechanisms to determine their practical limits of miniaturization in advanced missile applications, and the development and testing of design changes to improve their efficiency.</p>		<p>Involves problem definition and problem solving processes. The incumbent isolates and defines specific problems involved; determines how the work can be accomplished; carries out objectives independently; formulates concepts and hypotheses; performs theoretical analyses to predict performance characteristics; experiments to validate hypotheses; and evolves an experimental design, development model or understanding of phenomena. Assignments are generally long-range investigations but could be short range to produce a “cure” for unexpected difficulties in the evaluation and production phases of development projects. Assignments include obscure problems and in depth investigations to produce new equipment, techniques and methods; augmenting theoretical bases and criteria for the design of equipment; curing faults and improving performance; or demonstrating feasibility of changes, characteristics and methods for development of equipment and processes.</p> <p>Assignment examples include the investigation of the application of thermoelectric principles for refrigeration in a deep submergence vessel and the development of an experimental model of a proposed thermoelectric system.</p>		<p>Extensive and penetrating investigation is needed to explore new technology or to reconcile many divergent and conflicting requirements and constraints. Assignments involve team leadership responsibility for formulating and guiding development projects which involve many major technical problems. Incumbent evolves goals, concepts, and premises which guide engineers in making choices of alternatives in resolving individual technical problems. Assignments involve major proposals for solutions to problems of both depth and scope, which require team effort; for example: the establishment of foundational theoretical concepts and experimental evidence for novel automated marine power plant control systems.</p>
Supervision	<p>Supervisor outlines the nature of the problem, requirement to be met and critical features involved.</p> <p>Assignments generally involve a specific problem of a broader project, requiring the incumbent to lay out and accomplish a number of</p>		<p>Assignments are given in terms of broadly stated requirements and purposes to be met. Typically, the incumbent determines the specific technical objectives to be achieved and formulates a proposal; estimates the type and kind of effort, costs, facilities, and time schedule involved;</p>		<p>Supervision is concerned primarily with the starting and stopping of projects. Results of the work are reviewed primarily in terms of attainment of objectives and impact on the mission or overall project. Within the framework of broadly</p>

	steps, and assure the accuracy and reliability of results. Questionable points and deviations from the normal situation or practice are discussed with the supervisor, who observes the work in progress for general acceptability of methods and approach. Completed work is reviewed for compliance with instructions, accuracy of methods and data, and conformance with sound engineering and scientific practices.		independently carries out the plan of attack to resolve conflicts and obstacles, and to investigate relevant tangents. Incumbent keeps the supervisor apprized of progress; he/she recommends other courses of action for unsuccessful ventures and for promising innovations in equipment, techniques, etc. The supervisor reviews completed work for adequacy and effectiveness in meeting requirements.		defined mission and functions, the incumbent chooses the procedures to attack and the direction to pursue in accomplishing the objectives and purposes of the assignment. Advice and findings are accepted as authoritative and conclusive by management officials. Findings and evaluations are typically of fundamental significance in questions and issues broader than the assignment itself.
Guidelines and Originality	In general, technical and procedural guidelines pertaining to work assignments are available. The incumbent selects and evaluates the applicability and limitations of various analytical and experimental methods, which are known and have been applied to similar problems and subject matter. Originality is typically limited to a search for information about the use of methods and procedures and to adapt these findings to the requirements and conditions of the specific problem. The incumbent makes only minor innovations and modifications of procedures and techniques.		Technical guidelines and precedents are inadequate, controversial, or contain critical gaps in a basic area such as behavior characteristics, measurement criteria, theoretical base, or methods and techniques by which to analyze and evaluate development problems. The work requires use of advanced techniques and new approaches; adaptation and extension of techniques, methods, and processes from other fields; and exploration in advancements in knowledge of phenomena, theories, and concepts. Critical judgment in dealing with technological problems is needed to reflect valid conclusions and demonstration on which to base the design of improved and new products.		Guidelines and precedents are generally inadequate and do not provide an understanding of phenomena or means for converting knowledge or concepts into materials, equipment, processes or criteria. Assignments typically involve several major problems that require extensive experimentation to establish the feasibility of evolving and synthesizing new approaches and technology. The incumbent must chart a many-faceted development program that will explore and resolve these problems individually and collectively; and reconcile divergent and conflicting requirements and constraints. Major innovations are usually achieved that result in new equipment and substantial improvements in existing technology.
	2 points	4 points	6 points	8 points	10 points
Qualifications and Contributions	The incumbent usually assists higher graded employees by performing subsidiary investigations for a development project or general investigation in a specialized field.		The incumbent will have shown ingenuity and proficiency in utilizing complex theoretical, experimental and investigative techniques and methods. This competence typically is augmented by		The incumbent must have demonstrated the ability to plan, organize, and bring to fruition a broad attack on complex problems. Typically, he/she establishes

	<p>His/her work is independently conducted. He/she is expected to demonstrate abilities to discern how the objectives of the assignment may be accomplished, ascertain the tasks involved, select precedents and choose compatible standard guides when several are involved, carry out detailed steps and procedures in an accurate and valid way, recognize when further guidance is needed, and prepare analytical and investigative data clearly and concisely in appropriate format. Contributions are expected to be tangible showings of ability to perform a variety of experimental development activities, such as adaptation and design of instrumentation devices and circuitry when available instruments are inadequate in some aspects, simulation of theoretical concepts to perform a given equipment function, planning and performance of field tests of early experimental equipment to specific environmental data needed for further development, and comparative analyses in the laboratory of different models of equipment to identify principles and techniques used to obtain the performance characteristics and to obtain data to use in improving equipment.</p>		<p>further study leading to an advanced degree (or other means to remain abreast of the advancing technology applicable to his/her field). The incumbent uses recent advances in scientific knowledge and technological know-how to set realistic plans for complex problems, identify possible approaches, postulate hypotheses, and evolve techniques and methods. He/she is qualified to speak and deal responsibly on technical matters in his/her area of immediate specialization within and outside his/her own organization. His/her conclusions are in the form of theoretical investigations, experimental designs, and laboratory evaluations. These conclusions provide the basis for significantly advanced and improved techniques and methods for equipment, products and processes. He/she must recognize the need for and justify supplemental work to be performed by him/herself and other organizational segments, laboratories, or agencies.</p>	<p>requirements for workers in other fields whose efforts must be integrated to solve problems that are interdisciplinary in scope. The resolution of these problems results in clearly evidenced innovations which are of fundamental significance in advancing new technology and previously unattained developments. The incumbent is recognized as an expert in his/her field. Because of the incumbent's personal competence and leadership, the laboratory's reputation is such that management officials and other activities solicit proposals to resolve problems of great difficulty. The incumbent initiates proposals for far reaching developments and sells these proposals to high level management officials to obtain support to carry on the work to a more definitive stage. Because of the incumbent's consistent contribution of his/her work and recognition of his/her competence, he/she is sought to serve as a spokesman for task forces and committees on matters extending beyond his/her field. The purposes of such groups are to develop new programs, evaluate various proposals and to lay out long-range research and development plans, and evaluate highly controversial issues. Typically, the incumbent produces inventions, patents or innovations which are highly ingenious.</p>
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**Conversion Scale**

Grade	GS-9	GS-11	GS-12	GS-13	GS-14	GS-15	ST
Point Values	4-6	8-11	13-16	18-21	23-26	28-31	33+

See below for USGS developed criteria for evaluation of GS-15 and above developmental positions.

### Nature of Assignment – Degree F - 6 points

Projects are of such scope, complexity, and criticality to agency mission that they require demonstrated outstanding leadership of senior level personnel in order to pursue critical cutting edge technological developments which serve as the foundation for agency programs. Outstanding creativity, recognized technical leadership, and exceptional scientific and engineering judgment are required in coordinating and directing resources in determining and guiding pioneering investigations towards the most fruitful work in exceptionally difficult fields previously unyielding to study, unexplored fields, or fields previously considered unpromising areas of investigation. Conceives, recommends, and conducts projects or studies, the solutions of which will significantly advance the state-of-the-art and serve as a foundation for further study and development by others.

### Supervision – Degree F – 6 points

Technical supervision is nominal or non-existent. The scientist or engineer works under broad administrative supervision which is limited to budgetary approval and broad agency policies. The incumbent is expected to locate and explore the most fruitful areas of investigation in relation to the agency's program and needs and state of the science involved; to take complete responsibility for formulating the study plans and the hypotheses and for carrying them through to completion. The scientist/engineer takes full technical responsibility for interpreting findings, including their applicability to activities and interests of the agency and their broader applicability to fundamental theoretical concepts and methodology. Within the agency interpretations are accepted as technically authoritative, and become the basis for necessary administrative action. They are, of course, subject to further test and ultimate validation or modification by the scientific/engineering community.

### Guidelines and Originality – Degree F – 6 points

Guidelines and precedent are almost non-existent as the majority of systems and processes encountered are cutting edge/state-of-the-art or have not yet been fully tested and proven. As a nationally recognized expert, the incumbent provides an exceptionally high degree of creativity and ingenuity to identifying a framework for investigation or focus for study to develop solutions and/or systems of marked importance to the scientific/engineering community and agency.

### Qualifications and Contributions – Degree F – 12 points

#### Degree F - 12 points

The incumbent is recognized as a national/international scientific/engineering leader in his/her field providing direction to others who are also considered experts in their field, having addressed issues of critical importance in moving the state-of-the-art forward. The individual's personal competence, leadership, and continued contributions places the organization/laboratory at the forefront of the field and is petitioned by others outside the organization to participate on task forces and committees on matters which address major technological or socio-economic issues impacting national policy and of high societal relevance. The scientist/engineer has a sustained record of important publications, inventions, new designs, and/or techniques that are regarded as major advances and have opened the way for extensive further developments or have solved problems of great importance to the field and to the agency. The incumbent is frequently called upon by management to evaluate the significance of technological developments on the field, fundamental agency policies, objectives and plans, and to provide advice to top agency management on matters upon which leading experts disagree.

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