Physical Science Competency Model

GS-1301 General Physical Science

GS-1313 Geophysics

GS-1315 Hydrology

GS-1320 Chemistry

GS-1350 Geology

GS-1360 Oceanography

GS-1370 Cartography

GS-1373 Land Surveying

GS-1399 Physical Sciences Student Trainee

U.S. Department of the Interior

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Physical Science Competency Model Study Summary

The DOI Office of Human Capital (OHC) conducted a comprehensive study to identify the critical competencies and tasks for successful performance of physical sciences work across the Department. OHC worked with physical science subject matter experts from across the Department in order to create a thorough and accurate representation of the work performed by DOI physical scientists and the knowledge, skills, and abilities required to perform that work. The approach used for this project allowed for the examination of multiple occupations at the same time. The occupations included in the study were:

- GS-1301 – General Physical Science
- GS-1313 – Geophysics
- GS-1315 – Hydrology
- GS-1320 – Chemistry
- GS-1350 – Geology
- GS-1360 – Oceanography
- GS-1370 – Cartography
- GS-1373 – Land Surveyor
- GS-1399 – Physical Science Student Trainee

The study involved a variation of the U.S. Office of Personnel Management's Multipurpose Occupational Systems Analysis Inventory – Closed-Ended (MOSAIC) method for gathering and analyzing information about work. The MOSAIC approach has been utilized to study and describe work performed within the Federal Government for over 25 years. The study included a wide-ranging literature review to build lists of tasks and competencies used to describe physical science work across the Department. Next, focus groups with DOI physical science subject matter experts were held to ensure these lists were complete and accurately represented the job. Trained job analysts also linked competencies to each task to confirm they were indeed required to perform the work. DOI physical scientists rated the tasks and competencies to demonstrate the importance and utility of each component of the study. Finally, physical science subject matter experts reviewed the results of the study to ensure its accuracy.

The results of this study establish a common set of physical science tasks and competencies across the Department, which can be used to create assessment and selection techniques and tools and establish common practices and terminology for recruitment, performance management, workforce planning, training, and employee development. This work provides DOI with current, validated information that can be used to ensure its physical science workforce has the tools to meet future challenges.

Please reference the Competency Model Interpretive Guidance for assistance in interpreting and applying the results of this study.

Table 1: General Competencies by Grade[1]

The following general competencies are valid for assessment and selection, performance management, and other related human capital functions across the physical science occupational series included in this study at the grade levels listed below.

GS-5	GS-7	GS-9	GS-11
• *Attention to Detail* • *Integrity/Honesty* • *Interpersonal Skills* • *Teamwork*	• Attention to Detail • Integrity/Honesty • Interpersonal Skills • Teamwork	• *Accountability* • Attention to Detail • *Flexibility* • Integrity/Honesty • Interpersonal Skills • *Problem Solving* • *Reasoning* • Teamwork • *Technical Competence*[2] • *Writing*	• Accountability • Attention to Detail • *Compliance* • *Creative Thinking* • *Customer Service* • Flexibility • Integrity/Honesty • Interpersonal Skills • *Oral Communication* • *Organizational Awareness* • Problem Solving • Reasoning • Teamwork • Technical Competence • Writing
GS-12	**GS-13**	**GS-14**	**GS-15**
• Accountability • Attention to Detail • Compliance • Creative Thinking • Customer Service • *Entrepreneurship* • Flexibility • Integrity/Honesty • Interpersonal Skills • Oral Communication	• Accountability • Attention to Detail • Compliance • Creative Thinking • Customer Service • Entrepreneurship • Flexibility • Integrity/Honesty • Interpersonal Skills • Oral Communication	• Accountability • Attention to Detail • Compliance • Creative Thinking • Customer Service • Entrepreneurship • Flexibility • Integrity/Honesty • Interpersonal Skills • Oral Communication	• Accountability • Attention to Detail • Compliance • Creative Thinking • Customer Service • Entrepreneurship • Flexibility • Integrity/Honesty • Interpersonal Skills • Oral Communication

[1] Italics represent the lowest grade at which the competency appears.
[2] Technical competencies needed for specialized positions, as appropriate. Technical competencies are listed in Table 5 and defined in Appendix A.

Physical Science Competency Model – Scientific Occupations

• Organizational Awareness • Problem Solving • *Project Management* • Reasoning • Teamwork • Technical Competence • Writing	• Organizational Awareness • Problem Solving • Project Management • Reasoning • Teamwork • Technical Competence • Writing	• Organizational Awareness • Problem Solving • Project Management • Reasoning • Teamwork • Technical Competence • Writing	• Organizational Awareness • Problem Solving • Project Management • Reasoning • Teamwork • Technical Competence • Writing

Table 2: Required Proficiency Levels by Grade Level

Proficiency Level Scale Definitions		
Proficiency Level	**General Competencies**	**Technical Competencies**
5 = Expert	• Applies the competency in exceptionally difficult situations • Serves as a key resource and advises others	• Applies the competency in exceptionally difficult situations • Serves as a key resource and advises others • Demonstrates comprehensive expert understanding of concepts and processes
4 = Advanced	• Applies the competency in considerably difficult situations • Generally requires little or no guidance	• Applies the competency in considerably difficult situations • Generally requires little or no guidance • Demonstrates understanding of concepts and processes
3 = Intermediate	• Applies the competency in difficult situations • Requires occasional guidance	• Applies the competency in difficult situations • Requires occasional guidance • Demonstrates understanding of concepts and processes
2 = Basic	• Applies the competency in somewhat difficult situations • Requires frequent guidance	• Applies the competency in somewhat difficult situations • Requires frequent guidance • Demonstrates familiarity with concepts and processes
1 = Awareness	• Applies the competency in simplest situations • Requires close and extensive guidance	• Applies the competency in simplest situations • Requires close and extensive guidance • Demonstrates awareness of concepts and processes

Table 2: Required Proficiency Levels of General Competencies[3]								
	GS-5	**GS-7**	**GS-9**	**GS-11**	**GS-12**	**GS-13**	**GS-14**	**GS-15**
Accountability	2	2	**3**	**3**	**4**	**4**	**5**	**5**
Attention to Detail	**3**	**3**	**4**	**4**	**4**	**5**	**5**	**5**
Compliance	1	2	3	**3**	**4**	**4**	**5**	**5**
Creative Thinking	1	2	2	**3**	**4**	**4**	**4**	**5**
Customer Service	1	2	3	**3**	**4**	**4**	**5**	**5**
Entrepreneurship	1	1	2	2	**3**	**3**	**4**	**5**
Flexibility	2	2	**3**	**3**	**4**	**4**	**4**	**4**
Integrity/Honesty	**3**	**3**	**4**	**4**	**4**	**5**	**5**	**5**
Interpersonal Skills	**3**	**3**	**3**	**4**	**4**	**4**	**5**	**5**
Oral Communication	1	2	3	**3**	**4**	**4**	**5**	**5**
Organizational Awareness	1	1	2	**3**	**3**	**4**	**5**	**5**
Problem Solving	2	2	**3**	**3**	**4**	**4**	**5**	**5**
Project Management	1	1	2	3	**4**	**4**	**5**	**5**
Reasoning	2	2	**3**	**4**	**4**	**4**	**4**	**4**
Teamwork	**3**	**3**	**3**	**4**	**4**	**4**	**5**	**5**
Technical Competence[4]	1	2	**3**	**4**	**5**	**4**	**3**	**3**
Technical Competence (Specialist)	1	2	**3**	**4**	**5**	**5**	**5**	**5**
Writing	2	2	**3**	**3**	**4**	**4**	**5**	**5**

[3] Bolded competencies are validated for use for assessment and selection purposes.
[4] Use proficiency levels for technical competence for technical competencies.

Table 3: Behavioral Examples for Competencies

Competency Name	Definitions
Accountability	**Holds self and others accountable for measurable high-quality, timely, and cost-effective results. Determines objectives, sets priorities, and delegates work. Accepts responsibility for mistakes. Complies with established control systems and rules.** • *Takes responsibility for results and work products* • *Ensures work is completed on time and at the level of quality required* • *Understands the rules and regulations of the work performed and ensures compliance with them* • *Demonstrates responsibility with important materials, critical processes, or confidential information*
Attention to Detail	**Is thorough when performing work and conscientious about attention to detail. Recalls information that has been presented previously.** • *Sets the standards for the quality of the work completed for the organization* • *Leads others in attending to detail in difficult and/or high-pressure circumstances* • *Reviews and edits work completed by others to ensure that the quality of work meets acceptable work standards* • *Independently completes thorough and accurate work*
Compliance	**Knowledge of procedures for assessing, evaluating, and monitoring programs or projects for compliance with Federal laws, regulations, and guidance.** • *Shows familiarity with the structure and terminology of various rules and regulations of the Federal Government* • *Demonstrates the ability to search for and find appropriate rules or regulations* • *Understands how to apply appropriate rules and regulations to guide direction of work or make decisions*
Creative Thinking	**Uses imagination to develop new insights into situations and applies innovative solutions to problems; designs new methods where established methods and procedures are inapplicable or are unavailable.** • *Creates a work environment that encourages creative thinking and innovation* • *Explores new ideas, methodologies, and alternatives to reach outcomes* • *Introduces new concepts or strategies that significantly improve or revise the way work is performed* • *Suggests or proposes alternative ways to view or define problems; is not constrained by conventional thinking and established approaches* • *Combines ideas in unique ways or makes connections between disparate ideas*

Customer Service	**Works with clients and customers (that is, any individuals who use or receive the services or products that your work unit produces, including the general public, individuals who work in the agency, other agencies, or organizations outside the Government) to assess their needs, provide information or assistance, resolve their problems, or satisfy their expectations; knows about available products and services; is committed to providing quality products and services.** • *Commits to serving the public and understands their advisory role* • *Utilizes outreach, needs assessment, evaluation, and other marketing skills to identify and anticipate customer needs and provide exemplary customer service* • *Understands diverse customer groups, their perspectives, issues and needs* • *Works to ensure customers' needs are met, even when those needs are outside of the typical role of the position* • *Identifies and develops metrics to assess customer service satisfaction* • *Continuously improves products and services* • *Works and plans strategically, using a systems perspective to anticipate developing customer issues and needs and to provide timely solutions that focus on long-term benefits*
Entrepreneurship	**Positions the organization for future success by identifying new opportunities; builds the organization by developing or improving products or services. Takes calculated risks to accomplish organizational objectives.** • *Is aware of organizational and programmatic goals and seeks avenues to enhance goal achievement.* • *Considers overall structures, patterns, and cycles in the organization/systems, and uses assessment, analysis, and evaluation methodologies to define metrics and standards of performance.* • *Streamlines operations for maximum efficiency, automation, and effectiveness where appropriate.* • *Incorporates an awareness of current and future management directives, required functional and technical expertise, resource requirements, and targeted stakeholders into work plans.*
Flexibility	**Is open to change and new information; adapts behavior or work methods in response to new information, changing conditions, or unexpected obstacles; effectively deals with ambiguity.** • *Effectively adjusts strategies or course of action in response to changing conditions* • *Makes quality decisions when faced with ambiguous situations* • *Is willing to incorporate new information into decision making process* • *Adapts behavior to overcome challenges*
Integrity/Honesty	**Contributes to maintaining the integrity of the organization; displays high standards of ethical conduct and understands the impact of violating these standards on an organization, self, and others; is trustworthy.** • *Takes pride in exhibiting personal and organizational integrity and honesty* • *Acts in a just, fair, and ethical manner and encourages ethical behavior among others, even when risky to do so* • *Inspires trust and confidence among stakeholders through reliability, authenticity, and accountability*

Interpersonal Skills	**Treats others with courtesy, sensitivity, and respect. Considers and responds appropriately to the needs and feelings of different people in different situations.** • *Shows respect for the values and ideas of others, even when not agreeing with them* • *Empathizes with the concerns of others* • *Demonstrates tact and courtesy when interacting with associates* • *Is proactive in defusing arguments among peers* • *Seeks feedback from others to avoid blind-spots that can cause misunderstandings* • *Explores issues with the team; shares information; solicits ideas' uses participative decision-making processes*
Oral Communication	**Expresses information (for example, ideas or facts) to individuals or groups effectively, taking into account the audience and nature of the information (for example, technical, sensitive, controversial); makes clear and convincing oral presentations; listens to others, attends to nonverbal cues, and responds appropriately.** • *Speaks honestly, effectively and with integrity* • *Makes convincing, articulate, and accurate oral presentations using non-verbal and vocal qualities that support the verbal spoken message* • *Effectively uses various communication channels, including meetings, presentations and briefings* • *Actively considers, plans for, and reacts appropriately to the audience and the contextual environment in order to minimize barriers to understanding* • *Explains complex information clearly and accurately, and seeks feedback to determine that understanding has occurred* • *Acts as an effective facilitator in group or team settings*
Organizational Awareness	**Knows the organization's mission and functions, and how its social, political, and technological systems work and operates effectively within them; this includes the programs, policies, procedures, rules, and regulations of the organization.** • *Demonstrates awareness of the mission, functions, and various levels of the organization* • *Understands how decisions or actions of one organizational component may affect other components* • *Leverages knowledge of organizational components, programs, and directions to improve products, actions, or decisions* • *Shows familiarity with the rules and regulations of the organization*
Problem Solving	**Identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives, and to make recommendations.** • *Examines problems and solutions with a long-term perspective* • *Effectively leads others in the effort of developing, identifying, and formulating problem solving strategies consistent with organizational goals* • *Uses logic to develop and implement innovative tools and techniques to resolve complex problems and issues* • *Uses logic to resolve complex, unique, or unusual problems* • *Consistently anticipates challenges that are not obvious to others* • *Determines the relevance of information in reaching effective conclusions* • *Formulates recommendations for the best course of action to address problems*

Project Management	**Knowledge of the principles, methods, or tools for developing, scheduling, coordinating, and managing projects and resources, including monitoring and inspecting costs, work, and contractor performance.** • *Schedules and keeps track of major project milestones and persons responsible* • *Communicates with various stakeholders to ensure that projects stay on time and on budget* • *Identifies and plans for external and internal barriers to project delivery* • *Delegates work to team members as necessary and ensures completion of work*
Reasoning	**Identifies rules, principles, or relationships that explain facts, data, or other information; analyzes information and makes correct inferences or draws accurate conclusions.** • *Determines the relevance of information in reaching effective conclusions* • *Uses logic to determine relationships among information in order to reach conclusions* • *Makes appropriate inferences from data, rules, or other information*
Teamwork	**Encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit; works with others to achieve goals.** • *Volunteers to assist associates with projects* • *Commits to working toward team or group goals* • *Displays team pride and empowers team pride among other group members* • *Works effectively in group settings in order to achieve team objectives*
Writing	**Recognizes or uses correct English grammar, punctuation, and spelling; communicates information (for example, facts, ideas, or messages) in a succinct and organized manner; produces written information, which may include technical material that is appropriate for the intended audience.** • *Composes clear, concise, and logical documents or correspondence involving complex technical information* • *Consistently and effectively tailors written products to a wide range of audiences and for diverse purposes in order to achieve a desired outcome* • *Proofreads and edits the writing of others* • *Effectively explains complex technical material to a non-technical audience* • *Uses correct grammar, punctuation, and spelling* • *Writes in an organized fashion that is easy to understand*

Table 4: General Competencies by Assessment Tool

Competency	Structured Resume Review	Structured Interview	Biodata	Cognitive Ability Test
Accountability	Low	High	High	Low
Attention to Detail	Medium	Medium	Low	High
Compliance	Medium	High	Low	Low
Creative Thinking	Low	High	Medium	Medium
Customer Service	Low	High	Low	Low
Entrepreneurship	High	High	Medium	Medium
Flexibility	Low	High	Medium	Low
Integrity/Honesty	Low	High	Medium	Low
Interpersonal Skills	Low	High	Low	Low
Oral Communication	Medium	High	Medium	Low

Competency	Job Knowledge Test	Personality Inventory	Situational Judgment Test	Work Sample
Accountability	Low	High	High	Low
Attention to Detail	Low	Medium	Low	High
Compliance	Low	High	Low	Low
Creative Thinking	Low	Medium	Low	High
Customer Service	Low	High	Low	Low
Entrepreneurship	Low	High	Medium	Medium
Flexibility	Low	High	Medium	Low
Integrity/Honesty	Low	High	Medium	Low
Interpersonal Skills	Low	High	Low	Low
Oral Communication	Medium	Medium	Medium	Medium

Physical Science Competency Model – Scientific Occupations

Competency	Structured Resume Review	Structured Interview	Biodata	Cognitive Ability Test
Organizational Awareness	Low	High	Low	Low
Problem Solving	Low	High	Medium	High
Project Management	Medium	High	Medium	Low
Reasoning	Low	Low	Low	High
Teamwork	Medium	Medium	Medium	Low
Technical Competence	Medium	High	Low	Low
Writing	Medium	Low	Medium	Low

Competency	Job Knowledge Test	Personality Inventory	Situational Judgment Test	Work Sample
Organizational Awareness	Medium	Medium	Medium	Medium
Problem Solving	Low	Low	Medium	High
Project Management	Low	Low	High	High
Reasoning	Low	Low	High	Medium
Teamwork	Low	Medium	Medium	Medium
Technical Competence	High	Low	Medium	High
Writing	Low	Low	Low	High

Table 5: Technical Competencies for Assessment & Selection by Series and Grade

The following technical competencies are valid for assessment and selection, performance management, and other related human capital functions for the occupational series and grade levels listed below

Table 5A: Technical Competencies for Assessment & Selection by Grade GS-1301 – General Physical Science			
GS-5	**GS-7**	**GS-9**	**GS-11**
n/a	n/a	n/a	*Data Interpretation* *Data Management* *Earth Science* *Research and Statistics*

Table 5A: Competencies for Assessment & Selection by Grade GS-1301 General Physical Science			
GS-12	**GS-13**	**GS-14**	**GS-15**
Data Interpretation Data Management Earth Science *Geographical Sciences* *Geology* *Geospatial Information Systems* Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Geospatial Information Systems Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Geospatial Information Systems *Modeling and Simulation* *Physics* *Remote Sensing* Research and Statistics	Data Interpretation Data Management Earth Science *Ecology* Geographical Sciences Geology Geospatial Information Systems Modeling and Simulation Physics Remote Sensing Research and Statistics

Table 5B: Technical Competencies for Assessment & Selection by Grade GS-1313 – Geophysics			
GS-5	**GS-7**	**GS-9**	**GS-11**
n/a	*Geology* *Geophysics*	*Earth Science* Geology Geophysics	*Data Interpretation* Earth Science Geology Geophysics *Physics* *Research and Statistics*

Table 5B: Technical Competencies for Assessment & Selection by Grade GS-1313 - Geophysics			
GS-12	**GS-13**	**GS-14**	**GS-15**
Data Interpretation *Data Management* Earth Science Geology Geophysics Physics Research and Statistics	*Computer Languages* Data Interpretation Data Management Earth Science Geology Geophysics *Modeling and Simulation* Physics Research and Statistics	Computer Languages *Data Accessibility* Data Interpretation Data Management Earth Science *Geographical Sciences* Geology Geophysics *Geospatial Information Systems* Modeling and Simulation Physics Research and Statistics	Computer Languages Data Accessibility Data Interpretation Data Management Earth Science Geographical Sciences Geology Geophysics Geospatial Information Systems Modeling and Simulation Physics Research and Statistics

Table 5C: Technical Competencies for Assessment & Selection by Grade GS-1315 – Hydrology			
GS-5	**GS-7**	**GS-9**	**GS-11**
n/a	*Hydrology*	Hydrology	*Data Interpretation* *Data Management* *Earth Science* Hydrology *Research and Statistics*

Table 5C: Technical Competencies for Assessment & Selection by Grade GS-1315 Hydrology			
GS-12	**GS-13**	**GS-14**	**GS-15**
Data Interpretation Data Management Earth Science *Geology* Hydrology *Modeling and Simulation* Research and Statistics	Data Interpretation Data Management Earth Science *Geographical Sciences* Geology *Hydraulic Engineering* Hydrology Modeling and Simulation Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Hydraulic Engineering Hydrology Modeling and Simulation Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Hydraulic Engineering Hydrology Modeling and Simulation Research and Statistics

Table 5D: Technical Competencies for Assessment & Selection by Grade GS-1320 - Chemistry			
GS-5	**GS-7**	**GS-9**	**GS-11**
n/a	n/a	*Chemistry*	Chemistry *Data Interpretation* *Research and Statistics*

Table 5D: Competencies for Assessment & Selection by Grade GS-1320 - Chemistry			
GS-12	**GS-13**	**GS-14**	**GS-15**
Chemistry Data Interpretation *Data Management* *Earth Science* *Geospatial Information Systems* *Hydrology* Research and Statistics	Chemistry *Data Accessibility* Data Interpretation Data Management Earth Science *Ecology* *Geology* Geospatial Information Systems Hydrology Research and Statistics	Chemistry Data Accessibility Data Interpretation Data Management Earth Science Ecology Geology Geospatial Information Systems Hydrology Research and Statistics	Chemistry Data Accessibility Data Interpretation Data Management Earth Science Ecology Geology Geospatial Information Systems Hydrology Research and Statistics

Table 5E: Technical Competencies for Assessment & Selection by Grade GS-1350 - Geology			
GS-5	**GS-7**	**GS-9**	**GS-11**
Earth Science *Geology*	Earth Science Geology	Earth Science Geology	*Data Interpretation* Earth Science Geology *Geospatial Information Systems* *Physical Sciences*

Table 5E: Competencies for Assessment & Selection by Grade GS-1350 - Geology			
GS-12	**GS-13**	**GS-14**	**GS-15**
Data Interpretation *Data Management* Earth Science Geology *Geophysics* Geospatial Information Systems *Research and Statistics*	Data Interpretation Data Management Earth Science *Geographical Sciences* Geology Geophysics Geospatial Information Systems Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Geophysics Geospatial Information Systems Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geology Geophysics Geospatial Information Systems Research and Statistics

Table 5F: Technical Competencies for Assessment & Selection by Grade GS-1360 - Oceanography			
GS-5	**GS-7**	**GS-9**	**GS-11**
n/a	*Earth Science* *Physics* *Research and Statistics*	*Data Interpretation* Earth Science *Modeling and Simulation* Physics *Remote Sensing* Research and Statistics	Data Interpretation *Data Management* Earth Science *Geographical Sciences* *Geospatial Information Systems* Modeling and Simulation *Oceanography* Physics Remote Sensing Research and Statistics

Table 5F: Competencies for Assessment & Selection by Grade GS-1360 - Oceanography			
GS-12	**GS-13**	**GS-14**	**GS-15**
Data Interpretation Data Management Earth Science Geographical Sciences Geospatial Information Systems Modeling and Simulation Oceanography Physics Remote Sensing Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geospatial Information Systems Modeling and Simulation Oceanography Physics Remote Sensing Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geospatial Information Systems Modeling and Simulation Oceanography Physics Remote Sensing Research and Statistics	Data Interpretation Data Management Earth Science Geographical Sciences Geospatial Information Systems Modeling and Simulation Oceanography Physics Remote Sensing Research and Statistics

Table 5G: Technical Competencies for Assessment & Selection by Grade GS-1370 - Cartography			
GS-5	**GS-7**	**GS-9**	**GS-11**
Cartography	Cartography *Geospatial Information Systems*	Cartography *Geographical Sciences* Geospatial Information Systems	Cartography *Data Accessibility* *Data Interpretation* *Data Management* Geographical Sciences Geospatial Information Systems *Remote Sensing*

Table 5G: Competencies for Assessment & Selection by Grade GS-1370 - Cartography			
GS-12	**GS-13**	**GS-14**	**GS-15**
Cartography Data Accessibility Data Interpretation Data Management Geographical Sciences Geospatial Information Systems Remote Sensing *Research and Statistics*	Cartography Data Accessibility Data Interpretation Data Management Geographical Sciences Geospatial Information Systems Remote Sensing Research and Statistics	Cartography Data Accessibility Data Interpretation Data Management Geographical Sciences Geospatial Information Systems Remote Sensing Research and Statistics	Cartography Data Accessibility Data Interpretation Data Management Geographical Sciences Geospatial Information Systems Remote Sensing Research and Statistics

Table 5H: Technical Competencies for Assessment & Selection by Grade GS-1373 – Land Surveying			
GS-5	**GS-7**	**GS-9**	**GS-11**
Surveying	Surveying	*Cartography* *Geospatial Information Systems* Surveying	Cartography *Data Interpretation* *Geographical Sciences* Geospatial Information Systems Surveying

Table 5H: Competencies for Assessment & Selection by Grade GS-1373 – Land Surveying			
GS-12	**GS-13**	**GS-14**	**GS-15**
Cartography Data Interpretation Geographical Sciences Geospatial Information Systems Surveying	Cartography Data Interpretation Geographical Sciences Geospatial Information Systems Surveying	Cartography Data Interpretation Geographical Sciences Geospatial Information Systems Surveying	Cartography Data Interpretation Geographical Sciences Geospatial Information Systems Surveying

Appendix A: Physical Science General Competencies

Accountability	Holds self and others accountable for measurable high-quality, timely, and cost-effective results. Determines objectives, sets priorities, and delegates work. Accepts responsibility for mistakes. Complies with established control systems and rules.
Attention to Detail	Is thorough when performing work and conscientious about attention to detail.
Compliance	Knowledge of procedures for assessing, evaluating, and monitoring programs or projects for compliance with Federal laws, regulations, and guidance.
Creative Thinking	Uses imagination to develop new insights into situations and applies innovative solutions to problems; designs new methods where established methods and procedures are inapplicable or are unavailable.
Customer Service	Works with clients and customers (that is, any individuals who use or receive the services or products that your work unit produces, including the general public, individuals who work in the agency, other agencies, or organizations outside the Government) to assess their needs, provide information or assistance, resolve their problems, or satisfy their expectations; knows about available products and services; is committed to providing quality products and services.
Entrepreneurship	Positions the organization for future success by identifying new opportunities; builds the organization by developing or improving products or services. Takes calculated risks to accomplish organizational objectives.
Flexibility	Is open to change and new information; adapts behavior or work methods in response to new information, changing conditions, or unexpected obstacles; effectively deals with ambiguity.
Integrity/Honesty	Contributes to maintaining the integrity of the organization; displays high standards of ethical conduct and understands the impact of violating these standards on an organization, self, and others; is trustworthy.
Interpersonal Skills	Treats others with courtesy, sensitivity, and respect. Considers and responds appropriately to the needs and feelings of different people in different situations.

Oral Communication	Expresses information (for example, ideas or facts) to individuals or groups effectively, taking into account the audience and nature of the information (for example, technical, sensitive, controversial); makes clear and convincing oral presentations; listens to others, attends to nonverbal cues, and responds appropriately.
Organizational Awareness	Knows the organization's mission and functions, and how its social, political, and technological systems work and operates effectively within them; this includes the programs, policies, procedures, rules, and regulations of the organization.
Problem Solving	Identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives, and to make recommendations.
Project Management	Knowledge of the principles, methods, or tools for developing, scheduling, coordinating, and managing projects and resources, including monitoring and inspecting costs, work, and contractor performance.
Reasoning	Identifies rules, principles, or relationships that explain facts, data, or other information; analyzes information and makes correct inferences or draws accurate conclusions.
Teamwork	Encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit; works with others to achieve goals.
Technical Competence	Uses knowledge that is acquired through formal training or extensive on-the-job experience to perform one's job; works with, understands, and evaluates technical information related to the job; advises others on technical issues.
Writing	Recognizes or uses correct English grammar, punctuation, and spelling; communicates information (for example, facts, ideas, or messages) in a succinct and organized manner; produces written information, which may include technical material that is appropriate for the intended audience.

Physical Science Technical Competencies[5]

Biology	Knowledge of the environment, plant and animal living tissue, cells, organisms, and entities, including their functions, interdependencies and interactions with each other and the environment.
Cartography	Knowledge of the concepts, principles, theories, and methods related to the research, design, development, or revision of maps, charts, and related cartographic products, and photogrammatic and cartographic processing.
Chemistry	Knowledge of the concepts, principles, and theories of the composition, structure, and properties of substances, and of the chemical processes and transformations, including uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
Civil Engineering	Knowledge of the concepts, principles, theories, and methods required to plan, design, construct, operate, and maintain facilities such as buildings, transportation systems, water and sanitary systems, and other public works systems.
Computer Languages	Knowledge of computer languages and their applications to enable a system to perform specific functions.
Data Accessibility	Knowledge of policies, procedures, and tools that support data accessibility, including but not limited to open data standards, machine readable formats, and Section 508 of the Americans with Disabilities Act compliance.
Data Interpretation	Skill in collecting, analyzing, and interpreting data and policies, to determine actions and develop and propose guidance.
Data Management	Knowledge of the principles, procedures, and tools of data management, such as modeling techniques, data backup, data recovery, data dictionaries, data warehousing, data mining, data archiving, data disposal, and data standardization processes.
Dendrology	Knowledge of the concepts, principles, and characteristics of trees, shrubs, and other woody plants.

[5] Includes competencies identified for positions by SMEs that were not considered "critical" across each occupational series. These competencies may still be used for training and development purposes.

Earth Science	Knowledge of interdisciplinary disciplines associated with the earth's composition, structure, or other physical aspects, including atmosphere.
Ecology	Knowledge of the concepts, principles, and theories of the interrelationships among organisms and their environment, including competition and predation, evolution and natural selection, population dynamics, and the impact of natural phenomena or human actions on natural systems, processes, and biota.
Economics	Knowledge of economic policy, principles, and practices, market and non-market values, and the analysis and reporting of economic data.
Environmental Engineering	Knowledge of the concepts, principles, theories, and methods to protect and improve the quality of the environment and its resources; and to monitor, control, abate, and prevent pollutants.
Field Data Collection	Ability to collect, record, and ensure accuracy of field data (for example, stream and river discharge measurements).
General Engineering	Knowledge of the concepts, principles, and theories of engineering and their practical applications.
Geographical Sciences	Knowledge of the concepts, principles, theories, and methods for describing the location and distribution of land, sea, and air masses, including their physical locations, relationships, characteristics, and what the land supports.
Geology	Knowledge of the concepts, principles, and theories of the origins and structure of the earth and other planetary bodies, including the physical forces that have shaped it and its physical and organic history.
Geophysics	Knowledge of the concepts, principles, and theories related to solid earth structure, solid earth processes, atmosphere, and the behavior of the earth's gravitational, magnetic, and electrical fields, and other forces affecting the earth and its environment.
Geospatial Information Systems	Knowledge of and skill in manipulating computer systems designed for capturing, storing, analyzing, and displaying data related to positions on the surface of the earth and other planetary bodies in order to better understand spatial patterns and relationships.

Geotechnical Engineering	Knowledge of the concepts, principles, theories, and methods related to the investigation and evaluation of subsurface soil or geologic conditions and properties for the purpose of designing stable foundation systems, earthen structures, or the remediation of subsurface conditions.
Hydraulic Engineering	Knowledge of the concepts, principles, theories, and methods applicable to analysis of the flow of fluids (open channel and pressure flow), estimation of river stages, and design of hydraulic structures, drainage structures, pipes, navigation facilities, reservoirs, locks, and dams.
Hydrology	Knowledge of the concepts, principles, theories, and methods related to the magnitude, distribution, and quality of water resources including watershed management, climatology, geomorphology, groundwater hydrology, water quality, water resource management, and groundwater/surface water interactions.
Mining Engineering	Knowledge of the concepts, principles, theories, and methods related to rock mechanics; the exploration, excavation, extraction, processing and transporting of mineral resources; and the conservation and development of mineral lands, materials, and deposits.
Modeling and Simulation	Knowledge of the tools and techniques used to develop functional, physical, or prototype models and simulations for test and evaluation programs, the prediction of behavior and phenomena, and to visually communicate concepts.
Oceanography	Knowledge of the concepts, principles, theories, and methods related to the magnitude, distribution, and quality of ocean mass, momentum, and energy including climatology, geomorphology, water quality, water resource management, and chemical, biological, geological, and physical processes in the ocean.
Petroleum Engineering	Knowledge of the concepts, principles, theories, and methods related to the exploration, development, extraction, recovery, processing, and conservation of fluid minerals, geothermal resources, organic compounds, or natural gas resources.
Physical Sciences	Knowledge of the concepts, principles, theories, and methods to investigate and apply the relations between space, time, matter, and energy in the areas of gravity, atomic principles, mechanics, heat, light, sound, electricity, magnetism, and related natural phenomena.

Physics	Knowledge and prediction of physical principles, laws, and applications including air, water, material dynamics, light, atomic principles, heat, electric theory, earth formations, and meteorological and related natural phenomena.
Remote Sensing	Knowledge of the concepts, principles, theories, and methods necessary to obtain, use, and interpret data from remote sensing sources, including ground and aerospace-based sensors.
Research and Statistics	Knowledge of scientific principles, methods, and tools of basic and applied research (for example, statistics and data analysis) used to conduct a systematic inquiry into a subject matter area.
Soil Science	Knowledge of the concepts, principles, or theories of soil composition, formation, classification, mapping, testing, and management, including erosion, pollution, conservation, and watershed management.
Surveying	Knowledge of the concepts, principles, theories, and methods used in the measurement or determination of land boundaries, distances, elevations, areas, angles, and other features of the earth's surface.

Appendix B

Physical Science Study Tasks

1 Collects, compiles, and organizes information.
2 Monitors, maintains, or updates data, records, or other information.
3 Conducts evaluations, examinations, or other studies to obtain or verify information.
4 Designs or conducts analytical studies or other research.
5 Analyzes or interprets data or other information.
6 Creates tables, charts, graphs, or diagrams to organize or show information.
7 Drafts correspondence or other written work (for example, manuals, technical reports, research or contract proposals).
8 Discusses results, problems, plans, suggestions, terms, or conditions with others.
9 Explains or justifies decisions, conclusions, findings, or recommendations.
10 Recommends or makes improvements or solutions to problems, or determines appropriate actions.
11 Evaluates the impact of changes to laws, regulations, policies, standards, case law, or procedures.
12 Writes laws, regulations, policies, standards, or procedures.
13 Interprets, evaluates, or ensures compliance with laws, regulations, policies, standards, permits, or procedures.
14 Develops, modifies, or provides input on plans, goals, or objectives for projects, programs, systems, or operations.
15 Reviews and provides feedback on the content of complex information.
16 Keeps abreast of latest technology, information, research, etc., to maintain knowledge in field of expertise.
17 Develops models or theoretical approaches.
18 Provides technical advice in subject matter area to others.
19 Prepares, revises, or updates maps.
20 Conducts environmental impact, health, or safety analyses.
21 Reads and records data obtained from technical or scientific instruments, or indicators.
22 Collects and prepares samples for laboratory testing.
23 Conducts laboratory tests.
24 Conducts quality checks or inspections to determine quality or condition.
25 Processes or analyzes data using computer systems or applications.
26 Reviews, portrays, or defines the spatial properties of earth features using maps, charts, digital information, or other cartographic products or systems.
27 Prepares written scientific publications and presentations.
28 Participates in meetings with members of the public, industry, or other Federal and state agencies (e.g., conferences).

29 Instructs classes or conducts training sessions, workshops, or seminars.
30 Designs, develops, or manages geographical information systems or global positioning systems data and/or databases.
31 Coordinates immediate and long-range objectives and plans.
32 Ensures adherence to conduct and safety protocols of employees during the performance of duties.
33 Performs peer review for outside publications or conferences.
34 Develops computer scripts and tools in a distributed source controlled environment that support data transformation, management, and analysis.
35 Explains technical or other complex information to a nontechnical audience.
36 Develops scientific proposals or programs and associated funding to further Department and Bureau missions and objectives.
37 Mentors staff members.
38 Designs, develops, and implements advanced processing workflows and tasks through the use of currently accepted techniques or the development, testing, and application of new techniques.
39 Maintains, designs, tests, calibrates, installs, troubleshoots or repairs instrumentation systems.
40 Designs, tests, calibrates, or installs technical equipment.
41 Analyzes, evaluates, and characterizes subsurface geologic data (e.g., geothermal, mineral, and water resources, earthquake and volcano hazards).
42 Evaluates hydrologic control systems and structures, water quality and quantity, hydrologic impact, interrelationships between surface and ground water, sedimentology and erosion, and other environmental factors.
43 Conducts technical review of permits, revisions, and renewal applications.
44 Develops, calibrates, assesses, and uses computer models to determine water requirements, analyze runoff, examine reservoir systems, and perform backwater analysis.
45 Analyzes and approves discharge and/or ground water data.
46 Operates and maintains technical equipment (e.g., gaging equipment, recorders and sensors).
47 Makes determinations based on data analysis (for example, the toxicity or structural components of molecules).
48 Develops, adapts, and evaluates methods for detecting, identifying, and quantifying chemical substances in water, soil, rock, vegetation, and animal tissue.
49 Conducts field site visits, measurements, and evaluations.
50 Identifies sampling, testing, and analyses necessary for investigations or evaluations.
51 Determines studies, investigations, or evaluations necessary at sites.
52 Determines resources needed for projects, such as instrumentation or borrow sources.
53 Evaluates hazards or potential for hazards, such as earthquakes or landslides.

54 Evaluates and interprets data in order to compile details of the subsurface conditions, soil types, liquefaction issues, and geologic history such as ancient landslides, alluvial fans, and stream beds.
55 Plans, directs, coordinates, and/or performs geologic investigations, surveys and activities.
56 Monitors construction activities and performs site inspections to ensure design parameters are compatible with geologic conditions.
57 Receives, processes, and performs image generation, mosaicking, bottom contact, and roughness analysis of sonar imagery data.
58 Evaluates offshore energy and mineral resources, and the geochemical processes associated with mineral formation and transformation in the marine environment.
59 Develops and reviews geospatial data content, accuracy, format, technology, and cartographic presentation.
60 Produces maps, tabular data, overlays, and analysis results.
61 Conducts land survey projects.
62 Evaluates and examines survey returns.
63 Prepares or updates survey drawings or navigation charts.
64 Plans, coordinates and executes field mapping of complex types of terrain, unique topographic features or rugged topography.
65 Establishes, investigates, and reestablishes land and property boundaries and prepares plots and legal descriptions for tracts of land.
66 Assists scientists in field or laboratory settings in data collection, sample collection, field observations, or analysis.
67 Examines and evaluates mining claims to determine if mineral deposits claimed are commercially viable.
68 Assesses costs and estimates the capabilities and economic value of mineral deposits or other assets.