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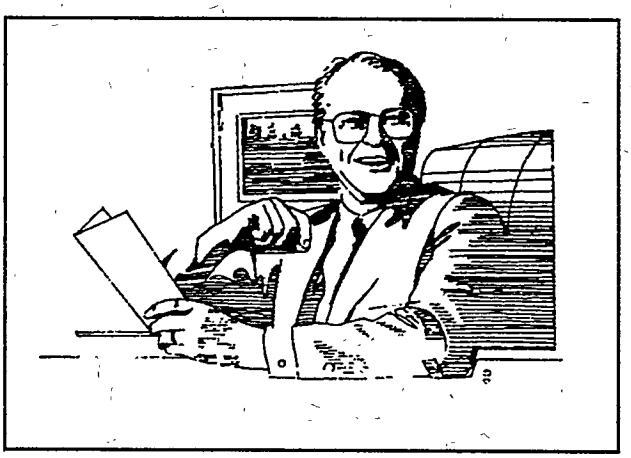
Environmental Restoration/Waste Management Activities

Common Occupational Classification System

Revision 3 - May 1996



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Common Occupational Classification System - Revision 3

E. J. Stahlman
R. E. Lewis

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Prepared for
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Pacific Northwest National Laboratory
Richland, Washington 99352

Summary of Guidelines for Using the Common Occupational Classification System

Following is a summary of key points to keep in mind when classifying individuals into Common Occupational Classification System (COCS) occupations.

- DO become familiar with the full COCS before beginning to classify individuals.
- DO classify based on each worker's actual work performed and the knowledge, skill, and ability (KSA) levels required to perform this work.
- DO assure that the job title accurately reflects the work performed.
- DO assign interdisciplinary positions by one code only.

- DON'T consider academic degree, exempt/non-exempt, or bargaining unit status (COCS is a functional categorization based on current job assignment only).
- DON'T consider short courses, on-the-job-training, or continuing education (these may be acquired relatively cheaply and quickly by others as well).
- DON'T assign based purely on job title (titles often do not accurately reflect the current work performed or KSAs required of a job).
- DON'T use "Other" categories more often than necessary (for planning purposes, these data are unusable).
- DON'T strive for 100% accuracy (since COCS data are aggregated across the U.S. Department of Energy complex, this is neither expected or required for effective high-level planning).

Preface to the Third Revision

The third revision to the COCS is primarily based on feedback from contractors participating in DOE's development of the Workforce Information System (WFIS). Changes include the introduction of one new occupation (Construction Engineer), modification of several occupation titles, and enhancements of several occupation definitions.

Comments on the applicability of the COCS are welcome and will be incorporated into future revisions.

Preface to the Second Revision

The second revision to the COCS added knowledge, skill, and ability (KSA) levels to the occupations and expanded-some occupational titles and codes to reflect differences between entry-level and senior positions and well recognized specializations within occupations. There were no changes to the number of occupations and slight changes to some occupational definitions and Dictionary of Occupational Titles/ Standard Occupational Classification System crosswalks to more accurately specify DOE needs.

Preface to the First Revision

The first revision of the COCS is based on feedback from contractors who have used the COCS for their Roadmaps reporting activities and human resource planning exercises. The major change is the addition of a coding scheme to make the system easier to place in a computer database. The Operators' family has been expanded to emphasize precision operations occupations and include productions systems operations typically found in the DOE's defense production sites. Finally, occupational definitions have been clarified.

Acknowledgments

The COCS is the result of several years of application and revision. Helpful reviews and critiques were offered by technical and human resources professionals too numerous to name from across the DOE complex. Their comments greatly increased the accuracy and usability of the job definitions and KSAs.

Funding and management support of this revision of the COCS was provided by Debby Swichkow (Office of Worker and Community Transition). Particular thanks are due to Walt Lips, Sharon Hall, Connie Hettel, Larry Bundy, and Dan Pond for their support and contributions.

Common Occupational Classification System

Workforce planning has become an increasing concern within the DOE community as the Office of Environmental Restoration and Waste Management (ER/WM or EM) seeks to consolidate and refocus its activities and the Office of Defense Programs (DP) closes production sites. Attempts to manage the growth and skills mix of the EM workforce while retaining the critical skills of the DP workforce have been difficult due to the lack of a consistent set of occupational titles and definitions across the complex. Two reasons for this difficulty may be cited. First, classification systems commonly used in industry often fail to cover in sufficient depth the unique demands of DOE's nuclear energy and research community. Second, the government practice of contracting the operation of government facilities to the private sector has introduced numerous contractor-specific classification schemes to the DOE complex. As a result, sites/contractors report their workforce needs using unique classification systems. It becomes difficult, therefore, to roll these data up to the national level necessary to support strategic planning and analysis.

The Common Occupational Classification System (COCS) is designed to overcome these workforce planning barriers. The COCS is based on earlier workforce planning activities and the input of technical, workforce planning, and human resource managers from across the DOE complex. It provides a set of mutually-exclusive occupation titles and definitions that cover the broad range of activities present in the DOE complex.

The COCS is not a required record-keeping or data management guide. Neither is it intended to replace contractor/DOE-specific classification systems. Instead, the system provides a consistent, high-level, functional structure of occupations to which contractors can crosswalk (map) their job titles. To that end, the system includes a specific definition for each job title, the knowledge, skills, and abilities (KSAs) required for competent performance in the job, and three aids for matching contractor/DOE classification schemes to the jobs listed in the COCS. The first aid is a series of methods and guidelines for matching jobs. Second, most occupation title definitions are followed by a list of job titles that commonly match the description. Third, a matrix is provided that details the relationship of many COCS titles to the major job classification systems: the Dictionary of Occupational Titles (DOT) (DOL 1991b), the Occupational Employment Survey (OES) (DOL 1991a), and the Standard Occupational Classification System (SOC) (DOC 1980).

The use of the system yields a common occupational taxonomy that can be used to plan workforce flows, needs, and mobility in a meaningful way at the national, regional, and local level. It will undoubtedly undergo revision as the scope of environmental restoration and waste management activities are more clearly defined, as activities proceed from the characterization to construction to waste processing phase, as the programs of other offices within the DOE are deactivated, and as technical innovations in the EM area are implemented in the field. Changes in this classification system will reflect changes in DOE needs while providing an "audit trail" back to the standard reference documents.

General Guidelines on Options for "Crosswalking" or Matching Job Titles to the Common Occupational Classification System

Several techniques and guidelines are available to guide crosswalk efforts. The characteristics of each corporate-specific classification scheme will determine the method by which it can be best matched to the COCS. Contractor systems that are more detailed and based on standard reference manuals, for instance, may be crosswalked more easily and rigorously than those based on vague administrative classifications. The following general guidelines and methods are presented to facilitate site-specific crosswalk efforts.

General Guidelines

- Familiarize yourself with the entire classification system before attempting to match occupations. You will get a better feel for the structure of the classifications and will be more likely to avoid misclassifications.

- Minimize emphasis on distinctions such as degreed/non-degreed, exempt/non-exempt, and union/non-union. The COCS is functional--it classifies based on what individuals do in their occupation, not, for example, on the degrees they hold. For example, classify a person working in the personnel department as a "Personnel and Labor Specialist" even thought they may have a degree in Botany.

- Disregard short specialty training courses required to perform a job when assigning occupations, especially if the training is regulatory in nature. The reason for this is that this type of training is easily acquired and thus does not significantly distinguish between occupations.

- Use the "Other" categories sparingly. Reserve them for unique or "niche" positions generally not found in defense production or Environmental Restoration and Waste Management.

- Ignore distinctions in grade level used for compensation or other administrative purposes. For instance, the occupations Project Manager and Senior Project Manager can be classed together if they do roughly the same work.

Methods

- Classification systems that are general may be crosswalked to the COCS in several ways. The effort, however, is likely to be labor intensive. Some classification systems rely on general titles such as Scientist, Senior Scientist, etc., which offer no detailed functional description of the work performed. In these cases, it will generally

be necessary to rely on Activity Data Sheets and organizational charts to infer the program area, and possibly the occupation, of the individual.

- Some human resource information systems will include degree majors which, along with program or department information, can be used to estimate occupations. Such a tactic is not possible for craft workers and others likely to lack college degrees. In these cases, it may be necessary to survey the organization in order to determine occupations. Surveys should be directed to first-line supervisors or those who complete Activity Data Sheets, depending on who can provide more accurate data. The survey should include the COCS and direct the supervisors to translate their Activity Data Sheet (ADS) estimates into the appropriate COCS categories. It is more effective to bring supervisors together to complete the survey in a workshop format rather than to simply mail it to them.

- Contractors/sites with classification systems based on job families may crosswalk their systems by starting with a family-to-family match where possible and then proceeding to match jobs within families.

Selected parts of a classification system based on job families currently used by a contractor are presented below in the left column and matched to the COCS family classes in the right. A family-to-family match first yields the following:

Contractor	COCS
Technicians	Technicians
Operatives	Operators

The family groups Technician and Operator/Operatives seemingly match. Job-to-job matches within those families, however, reveal an apparent mismatch.

Operatives--Contractor	Technicians--COCS
Health Physics Tech	Health Physics Tech

In this example, the contractor classified jobs into families primarily on the basis of whether the job was covered by a bargaining unit agreement (Operatives) or not (Technician). As a result, the contractor placed the Health Physics Technician job, which is functionally a technician position, in the Operatives family. Because the COCS is designed to capitalize on functional differences between jobs, the Health Physics Technician job should be reclassified in the Technician family.

Program or project managers often consider occupational classifications differently than human resource managers. Organizations faced with developing this type of crosswalk will benefit by having

their technical project managers collaborate with human resources personnel to ensure the proper classifications.

Organizations that have the advantage of a classification system that is both detailed and based on standard reference manuals may capitalize on the coding scheme these manuals employ to simplify the crosswalk. A system based on the Dictionary of Occupational Titles (DOT), for instance, may use the DOT codes to collapse titles. As an example, the following job titles all have the same first six digits 015.061 in their DOT code:

Nuclear Equipment Design Engineer
Nuclear Engineer
Nuclear Equipment Research Engineer
Nuclear Equipment Test Engineer
Nuclear Fuels Reclamation Engineer
Nuclear Fuels Research Engineer

These titles may be collapsed into the 015.061 occupational code included in the COCS--Nuclear Engineer. The codes used in the Standard Occupational Classification and Occupational Employment Survey may be employed in a similar manner. The crosswalk matrix provided in Table 1 will expedite these crosswalks.

Crosswalking DOE Positions

DOE does not generally hire technical experts to perform the same types of work as contractors. Engineers and scientists employed by DOE tend to spend a considerable amount of time overseeing the technical work of contractors without necessarily managing people or projects. They need the background and training of an engineer or scientist with some administrative skills, but not those required of the managers of large programs. For that reason, they are not easily classified into functional categories.

There are advantages and disadvantages to any method of resolving this dilemma. The following guidelines are offered as the most workable:

- Classify individuals in division director positions and above (those with Labor Management Relations (LMR) codes of "M") as general managers and executives.

- Classify individuals in branch chief positions (those with "S" or "L" LMR codes) as first-line supervisors.

- Classify individuals who generally perform unique, special assignments that have an impact on management decisions as program/project managers. Their LMR codes will be "P".

- Classify technical professionals in entry-level or oversight positions who are below the branch chief level and do not participate in the management of programs according to their technical specialty (e.g., chemical engineer, chemist).

Occupational Codes

The COCS uses an alphanumeric coding system to facilitate matching COCS categories to human resources databases. Full COCS codes are of the form:

FOOC.SG

where:
- F designates job FAMILY using an alphabetic code; family codes are M (manager), E (engineer), S (scientist), P (professional administrative), G (general administrative), T (technicians), C (crafts), R (operators), and L (laborers)
- OO designates a specific OCCUPATION with a two-digit code
- C designates a one-digit numeric code for CORPORATE-specific use
- S designates an occupational SPECIALTY with a one-digit code and
- G indicates GRADE or seniority level with a one-digit numeric code. Occupational grade levels are: student/trainee (0), junior/entry level (2), skilled veteran/journeyman (4), and advanced/senior (6).

Please note that the only code left up to the discretion of individual contractors is C. This slot may be used for budget purposes to assign different charge out or overhead rates or to designate sub-contractors. It is limited to one digit only.

Since the COCS will undoubtably undergo future revisions, guidelines for adding new occupations or modifying existing COCS codes are necessary to limit the impact of the changes. The following guidelines are offered as the most workable:

- New occupations will be assigned the next available COCS code in their designated family.

- When an occupation is deleted, its COCS code will be marked "Occupation Deleted" and not used in future revisions. This will enhance traceability and avoid reuse of previously used codes which may lead to confusion.

- When an occupation is consolidated into another occupation, the COCS code of the consolidated occupation will be marked "Occupation Consolidated: See FXXX" where FXXX is the COCS code of the other occupation. The old code will not be used in future revisions to enhance traceability and avoid reuse of previously used codes which may lead to confusion.

- When an occupation is moved to a different family, the old code will be marked "Occupation Recoded: See FXXX" where FXXX is the new code assigned to the occupation in its new family. The old code will not be used in future revisions to enhance traceability and avoid reuse of previously used codes which may lead to confusion.

- Occupations should not be reassigned COCS codes within a family.

Knowledge, Skills, and Abilities

There is much debate regarding the level at which knowledge, skill and ability (KSA) requirements should be written. The structure of KSA listings in this document is based on the assumption that there is not one, but several levels to which KSAs should be written, each of which serve a different purpose. Commonly, KSA lists will detail the attributes required for a particular position. Managers often find these of great use when selecting among applicants for that position, but they are not useful when the environment surrounding the job or the job itself changes. Furthermore, KSAs written at this level serve to emphasize differences among jobs and can make it difficult to determine how readily workers in one occupation may be retrained to (or replaced by) another.

For these purposes, KSAs must be written more generally. They must define broader job requirements that are meaningful for planning activities at the national level and expandable for site-specific staffing needs. Figure 1 illustrates one possible hierarchy of KSA requirements and their uses at each level. COCS KSAs are intended to provide DOE and its contractors with a complex-wide reference for more specific KSA lists; to further distinguish occupational titles; and to provide elementary, national-level data for planning workforce transitions. They may be used to help plan investments in educational programs, facilitate matching job seekers with job openings, and provide initial guidelines for career planning. They are not intended to adequately describe the KSAs needed for a given position at a particular site. Furthermore, they are not intended to provide certification information, training needs or requirements, or task lists.

The KSAs listed for each occupation are based on data in the DOT, the *Complete Guide for Occupational Exploration* (Farr 1993), and task/job analyses obtained from the Institute of Nuclear Power Operators (INPO) and several contractors in the DOE complex. These data were adjusted as necessary to meet the specific requirements of DOE.

General and specific KSAs are detailed for each occupation. General KSAs correspond closely to the general education development (GED) metrics contained in the DOT. These specify the reasoning, math, and language competencies needed by a veteran performer to attain average performance in an occupation. Thus, they are written to the G = 4 (skilled veteran or journeyman) level of the COCS code. Where possible, KSAs for other levels are detailed. The meaning of each level, its numerical code, and estimated educational equivalent for the purposes of this document are presented in Table 2.

Specific KSAs detail the occupation-specific competencies required of an incumbent. Also included are specific vocational preparation considerations, such as where training is typically acquired and the average time to achieve competency in the occupation.

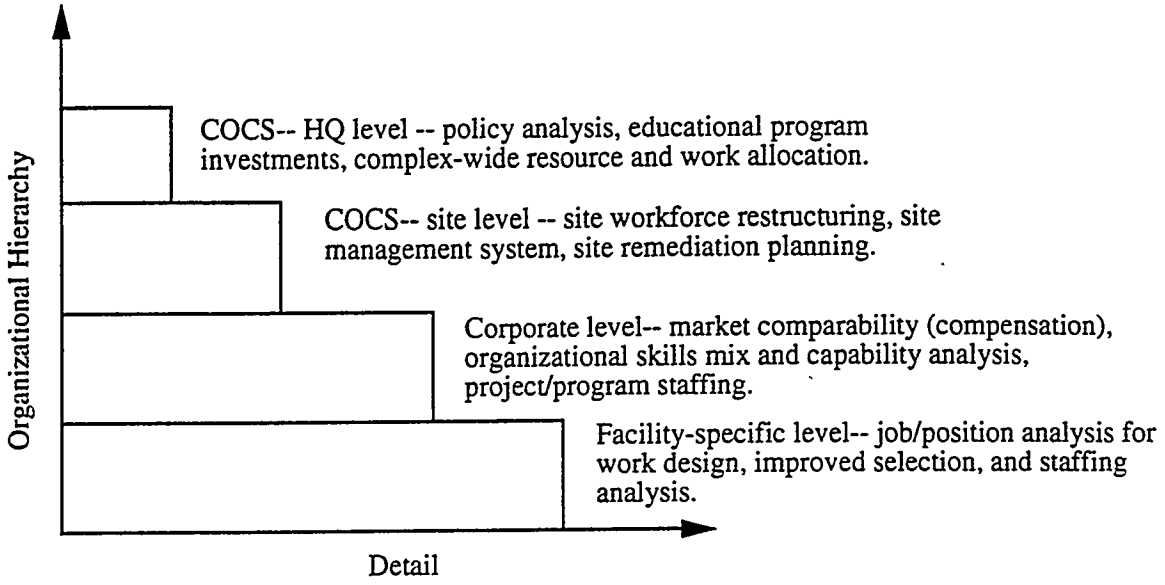

Figure 1. Hierarchy of KSA Levels and Uses

Table 1. COCS Occupational Crosswalk

	Title	SOC	OES	DOT
M000	**General Managers, Executives, First Line Supervisors and Program/Project Managers**			
M010	First Line Supervisors		81000	
M020	General Managers and Executives		19005	
M030	Project and Program Managers			
M040	Other Managers			
E000	**Engineers**			
E010	Chemical Engineers	1626	22114	008.061-018
E020	Civil Engineers	1628	22121	005.061-014
E030	Occupation Recoded: See S100			
E040	Electrical Engineers	1633	22126	003.061-010 (030)
E050	Environmental Engineers			
E060	Industrial Engineers	1634	22128	012.167-030
E070	Mechanical Engineers	1635	22135	007.167-014
E080	Nuclear Engineers	1627	22117	015.061-014
E090	Petroleum/Mining Engineers	1624	222111, 22108	010.061-018(014)
E100	Plant Engineers			007.167-014
E110	Quality Assurance/Control Engineers			033.262-010, 012.167-054
E120	Safety Engineers		22132	012.061-014, 012.167-026
E130	Other Engineers			
E140	Construction Engineers			
S000	**Scientists**			
S010	Chemists	1845	24105	022.061-010
S020	Environmental Scientists		24108, 24302	029.081-010
S030	Geologists	1847	24111	024.061-018(030)
S040	Life Scientists	1854	24300, 24308	041.061-030
S050	Materials Scientists			029.081-014
S060	Mathematicians	173	25310, 25312	020.067-014, 020.167-026
S070	Physicists	1843	24102	023.061-014

Note: SOC = Standard Occupational Classification System.
OES = Occupational Employment Survey.
DOT = Dictionary of Occupational Titles.

Table 1. (contd)

	Title	SOC	OES	DOT
S080	Social Scientists	191	27100	
S090	Other Scientists			
S100	Computer Scientists	1636	22127, 25105	030.062-010, 033.167-010
P000	**Professional Administrative and Related Occupations**			
P010	Accountants and Auditors		21114	160.162-018
P020	Architects	161	22302	001.061-010
P030	Buyers, Procurement and Contracting Specialists		21302	162.157-018
P040	Communications Specialists	331	34008	165.167-014
P050	Compliance Inspectors	147		168.264-014
P060	Computer Systems Analysts		25102	
P070	Cost Estimators and Planners and Schedulers	4752	21117, 58008	169.267-038
P080	Health Physicists			015.021-010
P090	Industrial Hygienists			079.161-010
P100	Lawyers	211	28108	110.107-010
P110	Personnel and Labor Relations Specialists	143	21511	166.167-018
P120	Physicians	261	32102	070.101-022
P130	Physician Assistants, Nurses, and Other Medical Support Occupations	304	32502, 32508	079.364-018
P140	Safeguards and Other Security Specialists			189.167-034
P150	Trainers	239		166.227-010
P160	Technical Writers and Editors	398	34002	
P170	Other Professional Administrative and Related Occupations			
G000	**General Administrative, Secretarial, and Clerical Support Staff**			169.167-010
G010	Administrative Assistants			169.167-010
G020	Office Clerks (General)	463	55347	209.562-010
G030	Office Clerks (Specialized)	471		
G040	Secretaries	462	55108	201.362-030
G050	Typists and Word Processors		55307	203.582-066, 203.582-382(030)

Note: SOC = Standard Occupational Classification System.
OES = Occupational Employment Survey.
DOT = Dictionary of Occupational Titles.

Table 1. (contd)

	Title	SOC	OES	DOT
G060	Other General Administrative, Secretarial, and Clerical Support Staff			
T000	**Technicians**			
T010	Computer Operator/Coders	397		213.362-010
T020	Drafters	372	22514	005.281-010
T030	Engineering Technicians	370	22500	007.161-026
T040	Environmental Sciences Technicians			029.261-014
T050	Health Physics Technicians			199.167-010
T060	Industrial Safety and Health Technicians			168.161-014
T070	Instrument and Control Technicians		22505	003.261-010
T080	Laboratory Technicians	380	24505	559.382-046
T090	Media Technicians	320, 325, 6	34028, 34038	141.061-022
T100	Surveying and Mapping Technicians	373	22521	018.167-046
T110	Other Technicians			
C000	**Crafts**			
C010	Carpenters	642	87102	860.381-022
C020	Electricians	643	87202	824.261-010
C030	Heating, Air-Conditioning, and Refrigeration Mechanics	616	85902, 89132	637.261-014
C040	Machinists	6813	89108, 89102	600.028-022
C050	Masons		87302, 87305	Term
C060	Millwrights	6178	85215	638.281-018
C070	Painters	644	87402	144.061-010
C080	Plumbers and Pipefitters	645	87502	862.381-030(281-022)
C090	Structural and Metal Workers	6473	87814	
C100	Vehicle and Mobile Equipment Mechanics	611	85000	
C110	Welders		93914	810.384-014, 811.684-014
C120	Other Crafts			

Note: SOC = Standard Occupational Classification System.
OES = Occupational Employment Survey.
DOT = Dictionary of Occupational Titles.

Table 1. (contd)

	Title	SOC	OES	DOT
R000	**Operators**			
R010	Chemical System Operators	694	92935	559.382-018
R020	Drillers	6474	87902	930.382-018
R030	Material Moving Equipment Operators		97000	952.362-022
R040	Nuclear Plant Operators		95026	913.663-018
R050	Nuclear Waste Process Operators			955.382-014
R060	Production System Operators	696	92900	556.685-022
R070	Utilities Operators	692,693	95032	554.685-014
R080	Other Operators			
L000	**Laborers and General Services Workers**			
L010	Firefighters	6308		373.364-010
L020	Food Service Workers			
L030	Janitors and Cleaners	524		382.664-010
L040	Laundry Workers		92726	
L050	Handlers Helpers, and Laborers (General)		98000	
L060	Handlers Helpers, and Laborers (Specialized)		98000	
L070	Light Vehicle Drivers		97102	859.683-010
L080	Security Guards		63407	372.667-038
L090	Other Laborers and General Services Workers			

Note: SOC = Standard Occupational Classification System.
OES = Occupational Employment Survey.
DOT = Dictionary of Occupational Titles.

Table 2. General Reasoning, Math, and Language Competencies and Estimated Educational Equivalents

DOT Code	Reasoning	Math	Language	Estimated Educational Equivalent
6	Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals. Speak clearly and persuasively.	Post Undergraduate Level
5	Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.	University Graduate Level
4	Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to high school level.	Read at the high school level, prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.	High School Graduate
3	Apply common sense understanding to carry out written, oral, or diagrammatic instructions. Deal with problems that arise using standard solutions.	Compute discount, interest, profit and loss. Calculate: surfaces, volumes, weights, and measures; plane and solid figures; circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, procedures; write short reports of activities or events. Interpret instructions in written, oral or schematic forms.	Junior High School Level
2	Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th grade level.	Primary School Level

Table 2. (contd)

DOT Code	Reasoning	Math	Language	Estimated Educational Equivalent
1	Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	Perform all basic arithmetic operations on two digit numbers. Perform operations with units of measure, such as cup, pint, inch, and ounce.	Read with a vocabulary of 2,500 (two or three syllable) words. Compare similarities and differences between words and between series of numbers. Write and speak sentences that convey the status of moved or stored materials sufficient to promote a safe shift change.	

Contents

M000 General Managers, Executives, First Line Supervisors, and Program/Project Managers

General managers, executives, first line supervisors, and program/project managers engage in activities related to planning, scheduling, monitoring, coaching, overseeing, and evaluating the work of others. Individuals in these occupations also are responsible for controlling and distributing resources within their organizational unit, program or project, and often are involved in coordinating resource allocation efforts across organizational units, programs, or projects.

M010 First Line Supervisors

Directly supervise and coordinate activities of production, construction, destruction, extraction, transportation, maintenance and related workers and their helpers. Generally supervise non-exempt individuals engaged in these and related activities. Exclude work leaders who spend 20% or more of their time at tasks similar to those of employees under their supervision and exclude work leaders who do not have formal performance appraisal responsibilities. Report them in the occupations that are most closely related to their specific work duties. Include construction coordinator, foreman, and group leader.

General KSAs

General KSAs for first line supervisors are generally the same as those for the occupations they supervise. Because this occupational category can contain so many backgrounds and occupational specialties, no attempt is made to list general KSAs.

Specific KSAs

Ability to manage workers with similar backgrounds, to train new workers, to schedule assignments, communicate with higher management levels to ensure the completion of work, and mentor incumbents to improve performance or product quality.

Specific vocational preparation is generally obtained via short courses and on-the-job experience. Approximate time to competence is over two years up to and including four years.

M020 General Managers and Executives

Manage the general organizational activities of line and staff functions and plan, organize, direct, coordinate, and *formally evaluate* the work of other managers, professionals, and other staff. Include in this category executives involved in activities such as setting organizational goals and strategies and

providing top-level guidance and direction for the organization. Exclude individuals who also hold Program/Project Manager responsibilities if more than 80% of their time is spent performing project and/or program management functions.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals. Speak clearly and persuasively.

Specific KSAs

Ability to, and skilled at, as exhibited by an increasingly responsible work history, directing, coordinating, and formally evaluating activities of the organization, including line and staff functions. Ability to define organizational goals, and to implement strategies for addressing these goals, which are consistent with maximizing organizational efficiency and performance; that is, doing things faster, better, and cheaper. Ability to align departmental and division goals and strategies with organizational goals and strategies. Ability to, and skilled at, providing guidance and coordinating activities of managers, technical staff, and projects, as well as divisions and departments.

Specific vocational preparation is generally obtained primarily from on-the-job experience but also short courses and graduate management classes. Approximate time to competence is over four years up to and including ten years.

M030 Project and Program Managers

Spend the greatest proportion of their time in "managerial work" for which a background consistent with that described for engineers and scientists is required. They often do not have formal line authority (e.g., performance appraisal responsibility) over individuals working under their direction. Generally direct and manage large-scale, resource intensive activities that often cut across formal organizational boundaries and are oriented toward specific technical or DOE programmatic activities. Include individuals who also have general managerial responsibilities if more than 80% of their time is spent performing project and/or program management functions. Exclude scientists and engineers who lead a task or small to moderate projects in their specialty area and engage in a considerable degree of technical work.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms) and calculus (analytic geometry, differentiations and integration of algebraic functions).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others.

Specific KSAs

Specific subject matter knowledge applicable to the program/project; knowledge of supervisory and program/project management practices as taught in approved DOE courses; and the potential to perform the following management skills: supervision, organization/management, decision making, communication, personal motivation, affirmative action, and leadership, as demonstrated via experience obtained over a four- to eight-year period.

Specific vocational preparation is described in DOE Order 4700.4 (DOE 1992), which specifies four to eight years of increasing management responsibility and an engineering or science degree or equivalent. Approximate time to competence is over four years up to and including ten years.

M040 Other Managers

Manager occupations not listed above that may be involved in ER/WM activities.

E000 Engineers

Engineers apply physical laws and principles for the development and use of machines, materials, instruments, structures, processes, and services. Typical specializations are research, design, construction, testing, procurement, production, operations, and sales. Skills in the engineers job family also include the preparation of drawings, specifications, and cost estimates, and participation in verification tests. Engineers may lead other engineers and professionals, technicians, craft workers, and laborers in projects of moderate or small scope that are closely related to their area of technical specialty.

General engineering is not a functional specialty. Hence, it is not categorized here. General engineers should be classified by the area they spend most of their time in. Project engineers should be classified similarly except when they spend a considerable (80%) amount of their time managing. In these cases they should be classified as project managers.

Grade Levels

Engineering societies typically have well-developed professional grade descriptions that are directly transferable to the government complex. For the purposes of this document, the descriptions developed by the American Society of Civil Engineers (ASCE 1992) will be tied to the G codes found in the COCS. These, in turn, will be tied to Federal General Schedule (GS) levels. The increases in responsibilities and knowledge at each level are also addressed.

COCS Code	ASCE Grade	Federal GS
0	I	5-7
2	III	9
4	V	12
6	VII	14

Engineers with the COCS G code 0 are generally students working in cooperative or part-time arrangements. Engineers-in-training are designated with a G code of 2. The KSAs developed for the engineering occupations are pegged to G code 4. Engineers performing at this level of competence will generally have, or be eligible for, the Professional Engineer (PE) license. Progress to G level 6 requires increasing experience and ability to apply skills toward a broad variety of engineering and scientific problems, the ability to mentor and manage junior staff, and increasing recognition for technical accomplishments.

E010 Chemical Engineers

Design equipment and develop processes for manufacturing or decomposing chemicals and related products and materials using principles and technology of chemistry, physics, mathematics, engineering, and related physical and natural sciences. Analyze procedures, oversee workers, design equipment, and perform tests. Do not include those employees with chemical engineering backgrounds who work primarily or exclusively as environmental engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of chemistry, industrial operations, and process control normally obtained via undergraduate and graduate study. Knowledge and ability to develop new and improved chemical manufacturing processes; oversee and design workers and projects related to construction, control, and improvement of chemical processes; and analyze operating procedures, equipment, and machinery for the reduction of operating costs. Knowledge of chemical packaging and storage practices. Ability to plan and design chemical control/measurement systems for chemical plants. Knowledge of chemical sampling and measurement techniques, and ability to take measurements throughout various stages of production to control variables. Ability to determine most effective unit operation (i.e., mixing, evaporation, etc.). Knowledge of equipment used for chemical processes/processing.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E020 Civil Engineers

Plan, design, and direct construction and maintenance of structures and facilities such as buildings, roads, dams, and irrigation and sanitary systems. Include sanitary engineers and transportation engineers.

Do not include occupations concerned with the design and construction of hazardous waste sites when those occupations are commonly known as environmental engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms) and calculus (analytic geometry, differentiations and integration of algebraic functions).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Apply principles of surveying, geology, structural systems, environmental design, industrial hygiene, and plant design normally learned during undergraduate and graduate study. Knowledge and ability to plan, design, and direct the construction of structures and facilities. Ability to analyze and/or generate reports, maps, drawings, blueprints, tests, and aerial photographs or topographical and geologic data for project planning and design. Knowledge of cost/benefit analysis and the ability to calculate the cost and feasibility of projects. Knowledge of requirements for the preparation of reports, specifications, plans, construction schedules, environmental impact studies, and designs for project. Knowledge of safety and construction standards, and the ability to inspect construction sites to monitor progress and ensure conformance to engineering plans and specifications.

Specific vocational training generally includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E030 Occupation Recoded: See S100

The occupation Computer Engineers was renamed Computer Scientists and moved from the Engineers family to the Scientists family to more accurately reflect its definition. Computer Scientists are assigned the COCS code S100.

E040 Electrical Engineers

Apply the laws of electrical energy and the principles of engineering for the generation, transmission and use of electricity. May design, manufacture, and/or test electrical or electronic systems or components. Include electronic engineers, computer engineers, and project/design engineers when electrical engineering principles are used primarily.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of electricity and magnetism, mechanics, electromagnetic theory, energy conversion, and electronics generally obtained via undergraduate and graduate study. Knowledge of research and design techniques, and the ability to research, develop, design, and test electrical components, equipment, and systems. Knowledge of principles and techniques used for the generation, transmission, and use of electricity. Ability to design and determine methods, conditions, and procedures for the fabrication and testing of electrical equipment. Skill in directing personnel in the fabrication, installation, maintenance, and repair of electrical/electronic equipment.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E050 Environmental Engineers

Apply engineering knowledge and technology to identify, solve, or alleviate environmental problems. Include engineers with formal training in civil and chemical engineering who specialize in environmental problems and do not hold the title of chemical engineer or civil engineer. Include industrial health

engineers, pollution control engineers, environmental research engineers, and waste management engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems involving the environment. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of chemistry, civil engineering, ecology, geology, and fluid mechanics generally obtained via undergraduate and graduate study. May specialize in the design and/or study of particular environmental areas, such as pollution control or water treatment.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E060 Industrial Engineers

Plan the use of production facilities and personnel to improve efficiency of operations in industrial establishments. Coordinate and integrate human and machine components of a system. Establish work measurement programs, analyze the use of workforce, and plan space layout of facilities. Include system engineers, ergonomists, human factors engineers, and management engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms) and calculus (analytic geometry, differentiations and integration of algebraic functions).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of systems engineering, including systems control, queuing theory, linear and goal programming, and management science. Knowledge and ability to design plant layout, analyze jobs for efficiency gains, and develop scheduling or production rules to be implemented by Planner/Scheduler.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over two years up to and including four years.

E070 Mechanical Engineers

Plan and design mechanical and/or electromechanical systems or products. Plan and direct engineering personnel in the fabrication of equipment and test-control apparatus (heat-transfer engineers, controls and instrumentation engineers, or hydraulic engineers; product design engineers or test engineers when mechanical engineering principles are used primarily).

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms) and calculus (analytic geometry, differentiations and integration of algebraic functions).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of machine design, mechanical vibration, power engineering, kinematics, physical metallurgy, and mechanics. Knowledge of mechanical and electromechanical products and systems. Ability to research, plan, and design mechanical and electromechanical products and systems. Knowledge and skills required to research and analyze mechanical specifications and determine feasibility of design or application. Ability to plan and direct engineering personnel in the development, testing, installation, and fabrication of mechanical and electromechanical components, products, and systems. Knowledge of equipment and operations, and ability to coordinate activities related to operations, maintenance, and repair, to fully utilize machines and equipment.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E080 Nuclear Engineers

Design, develop, and test nuclear equipment and systems; monitor testing, operation, and maintenance of nuclear reactors. Study nuclear fuel cycle to define most economical uses of nuclear material and safest means of waste products disposal. Include nuclear-fuels reclamation engineers, nuclear-criticality engineers, nuclear-fuels research engineers, and nuclear decontamination engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of nuclear physics, nuclear reactor design, electrical generation, radiation physics, and power engineering. Knowledge of nuclear reactor products and systems. Ability to research, plan, and design reactor components and systems. Knowledge and skills required to research and analyze reactor specifications and determine feasibility of design or application. Ability to plan and direct

engineering personnel in the development, testing, installation, and fabrication of nuclear reactor components and fuels. Knowledge of equipment and operations, and ability to coordinate activities related to operations, maintenance, and repair, to fully utilize machines and equipment.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

E090 Petroleum/Mining Engineers

Apply engineering principles to the extraction of minerals from the earth. Plan and develop mining excavations and well drillings. Accessory techniques include those used in metallurgy and geology. Direct engineering and technical personnel through the drilling, boring, cutting, excavating, and grading processes. Typical specializations are according to the activities or substance involved. Include geological engineers, engineering geologists, exploration engineers, coal engineers, and mineral extraction engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of petroleum and mining engineering including geology, hydrology, and structural engineering. Knowledge of mining, drilling, rigging, and pressurized pumping/extracting systems. Ability to research, plan, and design mining/drilling components and systems. Knowledge and skills required to research and analyze specifications and determine feasibility of design or application. Ability to plan and direct engineering personnel in the development, testing, installation, and fabrication of rigging, hoisting, or structural construction. Knowledge of equipment and operations, and ability to coordinate activities related to operations, maintenance, and repair, to fully utilize machines and equipment.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over two years up to and including four years.

E100 Plant Engineers

Apply general engineering principles, typically learned on the job, to the fabrication, modification, installation, and maintenance of machinery or equipment. This occupational classification generally refers to non-degreed individuals who have engineering skills gained through experience and tenure. Include production engineers and maintenance engineers.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Familiar with assigned facility/operation to provide support to management on processes, equipment, and upgrade projects. Ability to write maintenance/repair procedures; review, investigate, and analyze basic systems/components; and provide solutions. Knowledge of standard operating procedures. Ability to analyze equipment and systems problems, and provide corrective action plans. Knowledge of preventative maintenance procedures, checklists, and equipment and systems standards. Knowledge of special fabrication requirements involving complex equipment and systems. Ability to develop and conduct acceptance test procedures. Ability to communicate/prepare/review mechanical or engineering related procedures, repair requests, data, drawings, maps, graphics, records, etc. Knowledge of preventative maintenance procedures, product design for economy in fabrication, design constraints, and methods to improve efficiencies. Knowledge of equipment and operations, and ability to direct and schedule replacement part stores and routine equipment maintenance.

Specific vocational preparation is generally obtained via on-the-job experience in entry-level, craft, or operator positions. Approximate time to competence is over two years up to and including four years.

E110 Quality Assurance/Control Engineers

Plan and direct activities concerned with quality standards for production processes, software goods, or service delivery. May sample outputs or processes, compare with user requirements, procedures, or specifications, and recommend corrective actions. Include quality assurance analysts.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Apply statistical principles to design sampling schedules and analyze resulting data. Audit procedures to determine compliance and root causes of quality errors. Demonstrate the ability to compare products with specifications to determine acceptance. Ability to coordinate with industrial and mechanical engineers to investigate, analyze, and resolve production issues.

Specific vocational preparation is generally obtained from experience in other engineering specialties. Formal study of applied statistics is often required. Approximate time to competence is over four years up to and including ten years.

E120 Safety Engineers

Apply knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety to prevent or correct injurious operations or environmental conditions. Analyze both human and equipment performance to minimize hazards to life and property and maintain high worker morale and efficiency. Include fire protection engineers, nuclear safety engineers, and emergency management specialists.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of biology, engineering, psychology, and management related to safety systems and operations. Knowledge of industrial health and safety laws and requirements. Ability to audit procedures, programs, and management directives to determine if they incorporate safe practices. Ability to work with other engineers to ensure that designs and/or modifications are safe for users.

Specific vocational preparation can be obtained in university courses or via experience gained from other engineering or professional occupations. Approximate time to competence is over four years up to and including ten years. Certification typically requires four years of experience in addition to education equivalency requirements.

E130 Other Engineers

Engineer occupations not listed above that may be involved in ER/WM activities.

E140 Construction Engineers

Plan, schedule, and manage activities of designers, contractors, subcontractors, and client representatives. Work primarily in the field supervising construction activities. May perform construction tasks including surveying, revising blue prints, and general construction activities. Do not include occupations concerned with the design and construction of hazardous waste sites when those occupations are commonly known as environmental engineers. Include occupations with background in construction engineering and management, and construction science.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Familiar with construction techniques including plumbing, masonry, electronics, and carpentry. Familiar with project estimating, surveying, planning, and scheduling. Experience in field and office management. Familiar with business and legal principles of construction contracting and ability to discuss contracts with contractors and subcontractors. Ability to plan, schedule, and implement construction projects.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S000 Scientists

Scientists apply the scientific method to investigate the laws of natural, physical, and social phenomena and their application to problems in such fields as engineering, medicine, production, and environment. Scientists may lead scientists and other professionals, technicians, craft workers, and laborers in projects of moderate or small scope closely related to their area of technical specialty.

Grade Levels

Scientist grade levels are often comparable to those used in universities. For the purposes of this document, university faculty levels will be used to generally describe COCS grade levels. These, in turn, will be tied to Federal GS levels. The increases in responsibilities and knowledge at each level are also addressed.

COCS G Code	Academic Equivalent	Federal GS
0	Student/Intern	5-7
2	Lecturer	9
4	Assistant/Associate Professor	12
6	Associate/Full Professor	14

Scientists with the COCS G code 0 are generally students working in cooperative or part-time arrangements. Bachelor-degree-level scientists are designated with a G code of 2. The KSAs developed for the scientist occupations are pegged to G code 4. Progress to G level 6 requires increasing experience and ability to apply skills toward a broad variety of engineering and scientific problems, the ability to mentor and manage junior staff, and increasing recognition for technical accomplishments.

S010 Chemists

Conduct research, analysis, synthesis, and experimentation on chemical compounds for purposes of developing new processes, compounds, and analytical techniques. Include process chemists, hazardous materials chemists, and geochemists.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems in chemistry. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical principles (at or beyond college level).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of basic concepts in organic and inorganic chemistry. Ability to compute formula and composition calculations. Ability to calculate chemical reactions, including, but not limited to, acid-base reactions and oxidation-reduction reactions. Knowledge of organic synthesis and organic reactions. Skilled at wet lab analyses and techniques and the use of analytic instrumentation including gas chromatograph/mass spectroscopy (GC/MS), nuclear magnetic resonance (NMR), ultraviolet/infrared (UV/IR) spectroscopy, and atomic absorption (or analyses and techniques that are equivalent to those found in a four-year chemistry program).

Specific vocational training includes university or graduate-level course work in chemistry, or equivalent. May specialize in a particular branch of chemistry based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S020 Environmental Scientists

Use knowledge of principles and concepts of various scientific and engineering disciplines to develop methods of studying the environment or abating or controlling sources of environmental pollutants. Include meteorologists, oceanographers, soil scientists, range managers, and ecologists.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of the principles of meteorology, soil science, range management, and ecology. Ability to do fieldwork including sample gathering and possibly moderately strenuous walking and climbing.

Specific vocational training includes university or graduate-level course work in an environmental field, or equivalent. May specialize in a particular branch of environmental science based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S030 Geologists

Study the composition, structure, and physical and biological history of the earth's crust. Apply knowledge of chemistry, physics, biology, hydrology, and mathematics to explain these phenomena and to help locate mineral, geothermal, and petroleum deposits and underground water resources or track their movement. Include hydrologists, hydrogeologists, geophysicists, and seismologists.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems in geology. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Generally include knowledge of and ability to apply principles of statics and dynamics basic to advanced hydrology. Ability to classify rock formations and analyze data to determine structural integrity of soil and rock formations, location of fluid deposits, or migration of fluid through the soil. Ability to perform fieldwork including sample gathering and possibly moderately strenuous walking and climbing.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch of geology, such as hydrogeology, based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S040 Life Scientists

Study the reproduction, growth and development, structure, life processes, behavior, chemical processes, and classification and organization of living organisms. Apply these findings to prevent disease and maintain and promote health in plant and animal life. Include biologists, botanists, entomologists, physiologists, biochemists, zoologists, and cytologists.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems in biology, biochemistry, and related areas. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge and ability to apply principles of chemistry, biology, anatomy, and/or botany. Ability to dissect specimens, run chemical assay and analytical equipment, and perform fieldwork, including sample gathering and possibly moderately strenuous walking and climbing.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S050 Materials Scientists

Conduct scientific studies to understand, characterize and develop materials leading to potential uses for the benefit of science and emerging technologies. Include metallurgists when not engineering-oriented.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of and ability to apply principles of inorganic chemistry, calculus, physics of heat treating, and material structure. Knowledge of metallurgy and techniques of destructive and non-destructive testing.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

SO60 Mathematicians

Conduct research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields. Include applied mathematicians, research mathematicians, statisticians, and operations researchers.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems in architecture. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering/art journals, and speak clearly and persuasively.

Specific KSAs

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S070 Physicists

Conduct research into phases of physical phenomena; develop theories and laws on basis of observation and experiments; and devise methods to apply laws and theories of physics to industry, medicine, and other fields. Include nuclear physicists, experimental physicists, and atomic physicists.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of and ability to apply the principles of motion, energy, force, and mass. Ability to calculate equations to explain physical processes, etc.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch of physics (nuclear physics, solid state physics, space physics) based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S080 Social Scientists

Conduct research on human society and its characteristic elements, such as origin or age, and with economic and social relations and institutions which characterize membership in an organized community. Include economists, psychologists, sociologists, political scientists, and anthropologists.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems in any of the social research areas. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical calculations and understand theory at the post-college level.	Read and write reports of moderate length, including research analyses and recommendations to managers or policy makers. Ability to speak extemporaneously and in lecture format on the training subject.

Specific KSAs

For all specializations, advanced skills in applied statistics, systems, and policy analysis. Knowledge of and ability to research and apply theories of social systems, such as economic behavior, small group behavior, or individual differences.

Specific vocational training includes university or graduate-level course work. Will specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

S090 Other Scientists

Scientist occupations not listed above that may be involved in ER/WM activities.

S100 Computer Scientists

Develop software and computer operating systems. Make extensive use of mathematics, statistics, logic, and computer programming languages. Include computer programmers, programmer/analysts, software developers, and software engineers.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of computer programming languages, algorithms, and data structures used to write computer applications. Ability to translate programming requirements into efficient code using the appropriate algorithms and data structures. Knowledge of data storage and memory management techniques and the ability to use them efficiently. Ability to research and develop new algorithms to solve application requirements. Knowledge of and ability to conform to structured programming standards.

Specific vocational training includes university or graduate-level course work. May specialize in a particular branch based on advanced formal training or on-the-job experience. Approximate time to competence is over four years up to and including ten years.

P000 Professional Administrative and Related Occupations

Professional administrative and related occupations are generally found in support and/or staff organizations and functions. Individuals engaged in these occupations conduct activities such as providing services and professional advice; inspecting operations and facilities; and maintaining computer, communications, and financial systems. These individuals are often indirect labor, however, do not include individuals working in infrastructure support or staff functions if their primary work activities make it possible to classify them into occupations in the other eight families. Also, do not include administrative assistants (see General Administrative, Secretarial, and Clerical Support Staff).

P010 Accountants and Auditors

Examine, analyze, and interpret accounting records for the purpose of giving advice or preparing statements and installing or advising on systems of recording costs or other financial and budgetary data. Include business managers, financial analysts, finance auditors, and budget analysts.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including financial analyses, procurement regulations, and contracting details. Negotiate with audited individuals to obtain information. Speak clearly and persuasively.

Specific KSAs

Knowledge and understanding of general business and accounting concepts, theories, practices, and awareness of applicable state and federal laws. Ability to analyze historical trends in audit accounting data to ensure appropriate use of funds. Ability to analyze and report on complex accounting transactions. Ability to administer training programs to assure uniform understanding of accounting methods and procedures. Ability to prepare forecasts and special studies using interpretation and analysis of information for various departments, including cost, employee benefits, ledger, and payroll. Ability to respond to crises with limited instruction or guidance. At least partial competence of above KSAs may be

assumed by successful completion of the Certified Public Accountant (CPA), Certified Internal Auditor (CIA), or Certified Management Accountant (CMA) exams.

Specific vocational preparation generally includes college-level course work (or equivalent experience) in general, intermediate, financial, managerial, and cost accounting and auditing. Preparation also includes business and financial law. Approximate time to competence is over four years up to and including ten years.

P010.02 Associate Accountant/Auditor

Entry level position generally characterized by the ability to use concepts of the accounting discipline to make independent judgments, complete assignments, and solve problems. Ability to perform general accounting assignments and review work of, and provide functional guidance to, clerical staff.

P010.06 Senior or Advanced Accountant/Auditor

Position attained after on-the-job experience (generally five years) during which the individual obtains knowledge and understanding of general business and accounting language, concepts, practices, and applicable state and federal laws. Ability to provide guidance/liaison/coordination to assure procedures between organizations and consistency of accounting policies across departments. Ability to provide analysis and interpretation for local, state, and federal taxing authorities. Ability to draft and present recommendations of interpretations to management. Skilled at persuading and negotiating with auditors to gain acceptance of company interpretations of new or existing laws. Ability to apply principles of accounting/finance/auditing to a wide range of intellectual and practical problems, and to establish facts and draw conclusions.

P020 Architects

Develop plans, blueprints, schematics, and other documents related to the construction of office buildings, factories, and other structures. Plan and design development of land areas. May specialize in a particular type of structure or project.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems in architecture. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform advanced algebraic, calculus, and statistical principles (at or beyond college level).	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering/art journals, and speak clearly and persuasively.

Specific KSAs

Ability to use manual and computer drafting and sketching tools.

Specific vocational preparation includes principles of structural engineering, design, history of structures, and practicum work in architectural design. Approximate time to competence is over four years up to and including ten years.

P030 Buyers, Procurement and Contracting Specialists

Develop, negotiate, and administer contracts, subcontracts, and buying agreements. Do not include individuals whose primary responsibilities include providing general administrative and project management support. Include property management professionals and purchasing specialists.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Compute prices, commission, markup, interest, and profit and loss.	Read and write reports of moderate length, including buying and financial analyses, procurement regulations, and contracting details. Negotiate with buyers, representatives, or sales specialists.

Specific KSAs

Knowledge of specialized contract and/or procurement rules, regulations, and practices obtained principally on the job. Knowledge of business law and/or business finance usually obtained in formal training settings.

Specific vocational preparation is generally obtained in an entry-level position and through related occupations and responsibilities. Approximate time to competence is over two years up to and including four years.

P040 Communications Specialists

Communicate with internal and external individuals, groups, or organizations by writing or selecting publicity material, releasing information through various communications channels including the media, preparing and arranging displays, making speeches, and conducting interviews and workshops. Include individuals who develop and support public involvement plans for various activities. Include public involvement specialists, public relations specialists, and freedom of information (FOI) specialists.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read and write reports of moderate length, including public relations brochures, press releases, and information memos. Negotiate with professionals in the press and trade literature to present ideas, market and represent the organization, and coordinate media exposure for the organization.

Specific KSAs

Knowledge of public relations vehicles and the advantages of various modes of communication. Ability to speak publicly and persuasively. Ability to convey complex concepts. Ability to switch tasks/activities and respond to events quickly.

Specific vocational preparation is generally obtained in an entry-level position and through related occupations and responsibilities. Approximate time to competence is over two years up to and including four years.

P050 Compliance Inspectors

Enforce and advise on health, safety, and other regulations such as those pertaining to people, animals, plant life, products, and establishments. Include environment, safety, and health (ES&H) auditors, professional lab safety inspectors, and regulatory analysts whose primary function is related to records management.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read at the high school level, prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of safety rules and regulations and human physiology. Knowledge of auditing principles. Ability to trace, retrieve, and analyze documents. Ability to compare practices with prescribed rules or procedures and draw conclusions regarding compliance. Ability to relay conclusions, causes, and recommendations from inspection data to management. Approximate time to competence is over one year up to and including two years.

P060 Computer Systems Analysts

Analyze scientific, engineering, business, and other technical problems, and formulate mathematical models of problems to programmable form for application to electronic data-processing systems. Include local area network (LAN) managers and network analysts.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including analyses of computer needs, recommendations, and implementation approaches. Speak clearly and persuasively.

Specific KSAs

Knowledge of principles of computer operation and design, electronic and electrical engineering, and capabilities and uses of computer equipment. Knowledge of data structures, systems programming, and statistics. Ability to ascertain computer user needs and match with hardware/software to develop a computer system.

Specific vocational preparation includes experience with a variety of hardware and software configurations and work environments obtained in entry-level positions. Approximate time to competence is over two years up to and including four years.

P070 Cost Estimators and Planners and Schedulers

Develop and examine budget estimates for completeness, accuracy, and conformance with procedures and regulations. Examine requests for budget revisions, recommend approval or denial, and draft correspondence. Provide technical assistance in the preparation of budgets. Duties may also involve coordinating and expediting the flow of work and materials within or between departments of an establishment according to production or other operational schedules.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions. Deal with problems that arise using standard solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge in the use of at least one current major scheduling system. Ability to produce computer generated schedules. Ability to compile weekly personnel assignment schedules and staffing tables in accordance with changing organizational factors (e.g., worker availability, seniority, job classification etc.). Ability to adjust work schedules to meet emergencies and other organizational demands. Ability to analyze work documents for proper classification, priority, and description. Ability to prioritize, estimate, and establish manhours, material, and manpower needed for job completion. Ability to estimate and compute budget and cost factors with accuracy and completeness, and in conformance with procedures and regulations. Ability to prepare budget estimates for management purposes such as planning, organizing, and scheduling work. Ability to assess the cost effectiveness of budget estimates, work schedules, and plans. Skilled at reviewing estimates for omissions/incorrect assumptions. Ability to maintain filing system(s) for cost data used in the preparation and/or review of cost estimates.

Specific vocational preparation is generally obtained on the job. Average time to competence is over six months up to and including one year.

P080 Health Physicists

Develop, implement, and evaluate research, training, and monitoring programs to protect personnel from the effects of ionizing radiation. Recommend and develop policies and procedures related to health physics issues.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read and write reports of moderate length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of physics, nuclear physics, and biology, as low as reasonably achievable (ALARA) principles, and radiation detection theory. Knowledge of biological effects of radiation, radiation protection standards, and internal and external exposure control. Ability to apply experimental methods to research problems related to human exposure to radiation. Skilled use of statistics and experimental techniques.

Specific vocational preparations generally include undergraduate and graduate training in biology, physiology, physics, radiation physics, and public health. Approximate time to competence is over four years up to and including ten years.

P090 Industrial Hygienists

Conduct health programs to recognize, eliminate, and control occupational health hazards and diseases. Evaluate exposure to ionizing and non-ionizing radiation, toxins, noise, heat, and other occupational hazards and recommend measures to ensure maximum employee protection. Prepare reports, participate in educational meetings, and collaborate with occupational physicians.

General KSAs

Reasoning	Math	Language
Apply principles of logical and scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read and write reports of moderate length, including analyses of workplace audits, the effect of organization policies in industrial safety and health, and procedures and memos. Speak clearly and persuasively.

Specific KSAs

Knowledge of occupational health principles (human biology and chemistry), safety rules, and Occupational Safety and Health Administration (OSHA) regulations. Ability to recognize potentially toxic substances or dangerous conditions in the environment of workers. Skilled use of measurement tools such as meters and calipers.

Specific vocational preparation generally includes public health, occupational safety and health, safety principles, and experience gained from entry-level occupations or internships. Approximate time to competence is over four years up to and including ten years.

P100 Lawyers

Give advice to individuals or business enterprises on legal problems and draw up legal documents; examine legal data to determine advisability of defending or prosecuting lawsuits. May represent client in court, or before quasi-judicial or administrative agencies of government. May specialize in a single area of law. May represent individual citizens in lawsuits and other legal matters.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Perform practical math operations and algebraic and trigonometric operations to the high school level. Perform descriptive statistics and illustrate graphically.	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering/art journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of laws, regulations, precedents, and legal principles. May require knowledge of scientific and engineering concepts and principles depending on specializations, such as environmental regulations, patent law, or tribal rights. Ability to represent and advise client in legal matters. Skilled use of data gathering, legal research, negotiation, and argumentative techniques.

Specific vocational preparation is obtained through training in law school and demonstrated by certification. Approximate time to competence is over four years up to and including ten years.

P110 Personnel and Labor Relations Specialists

Primarily implement and administer management policies related to personnel administration and labor relations by performing activities such as representing management or labor in collective bargaining procedures; participating in a program of recruitment, selection, placement, training, welfare, safety, compensation, and promotion; conducting job analyses to provide occupational information; and interviewing and counseling job applicants and employees to determine suitability for employment, rehabilitation, and other employment development programs. Do not include individuals whose primary responsibilities are to develop and/or deliver technical training (see Trainers). Include training coordinators, employee relations specialists, and equal employment opportunity (EEO) specialists.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level. Perform descriptive statistics and illustrate graphically.	Read and write reports of moderate length, including analyses, of personnel policies, staffing needs, and company personnel practices. Negotiate with individuals.

Specific KSAs

Knowledge of personnel regulations and company management and personnel policies. May require specialized knowledge in an area of personnel management, such as employee relations, industrial relations, training, management analysis, etc. Ability to explain policies to employees, negotiate contracts and work agreements with unions, help prevent and resolve grievances, and write clearly. Skills may also include computer database skills.

Specific vocational preparation includes training in business law, personnel management, and applied mathematics. Experience is gained from entry-level positions. Approximate time to competence is over one year up to and including two years.

P120 Physicians

Conduct activities involving diagnosis, prevention, and treatment of human diseases and injuries. Includes conducting medical examinations, prescribing and giving treatment, and performing surgical operations. May conduct research in the causes, transmission, and control of disease and other ailments.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to intellectual and practical problems. Deal with nonverbal symbolism in its most difficult phases. Operate on concrete and abstract variables.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Demonstrate very high competence in language skills, including the ability to write detailed reports and books, read scientific/engineering/art journals, and speak clearly and persuasively.

Specific KSAs

Knowledge of medical theories, remedies, and preventive actions. May obtain particular expertise and become certified in a specialty.

Specific vocational preparation is obtained through training in medical school and demonstrated by a license. Approximate time to competence is over four years up to and including ten years.

P130 Physician Assistants, Nurses and Other Medical Support Occupations

Render a broad range of medical services including management of illnesses, preventive and in-patient emergency services, and personal and family counseling. Includes all non-MD medical professionals. Include nurses, paramedics, and emergency medical technicians.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level. Perform descriptive statistics and illustrate graphically.	Read and write reports of moderate length, including trade and medical publications and analyses of patient needs

Specific KSAs

Knowledge of human biology, physiology, anatomy, nutrition, first aid, disease prevention, and organic chemistry.

Specific vocational preparation is generally obtained via a two- or four-year college program or Registered Nurse/Licences Practical Nurse(RN/LPN) specialization and demonstrated via licensure. Approximate time to competence is over two years up to and including four years.

P140 Safeguards and Other Security Specialists

Develop, conduct, monitor, and/or maintain security-related programs including physical and information security and nuclear material auditing and safeguards. Document control duties are assigned to these positions in some organizations. Do not include individuals whose primary responsibilities involve security guard-related activities.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level. Perform descriptive statistics and illustrate data graphically.	Read and write reports of moderate length, including analyses of personnel policies, staffing needs, and company personnel practices. Negotiate with individuals.

Specific KSAs

Knowledge of the handling, investigation, and inspection of special nuclear materials. Safeguards specialists will apply basic statistics and accounting sufficient to inspect inventory records. Knowledge of rules and regulations related to the maintenance, transportation, and accessibility of regulated or classified materials, ideas, papers, or secrets. Knowledge of storage and transportation and nuclear accountability policies and security regulations and procedures. Ability to apply quantitative and qualitative methods of risk, threat, and vulnerability assessments. Ability to write reports, analyze situations based on incomplete or possibly erroneous data, make decisions, and determine courses of action.

Specific vocational preparation is generally obtained in military or civil security positions. Certification is required in DOE. A two- or four-year college program and on-the-job experience and

training are also appropriate. Approximate time to competence is over two years up to and including four years.

P150 Trainers

Teach, instruct, and train individuals. Include individuals whose primary responsibilities involve the development and/or delivery of technical training courses. Also, include individuals who may be on rotational or temporary assignments from line organizations if training responsibilities account for 80% or more of work for at least a calendar year. Include technical trainers.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read and write reports of moderate length, including training needs analyses and training course outlines and curricula. Ability to speak extemporaneously and in lecture format on the training subject.

Specific KSAs

Knowledge of principles of curriculum development, instructional technology, job/task analysis, and training needs analysis and evaluation. Ability to communicate concepts to students, demonstrate skills, coach skill development, and mentor. Skilled use of training materials such as flipcharts and videotapes.

Specific vocational preparation for trainers includes curriculum development and instructional technology. In addition, technical trainers are generally highly experienced in the field; that is, they have achieved competence as a performer of a given job before they train others in it. Approximate time to competence is over four years up to and including ten years.

P160 Technical Writers and Editors

Write or edit technical materials, such as equipment manuals, appendices, and operating and maintenance instructions. May oversee the preparation of illustrations, photographs, diagrams, charts and assist in layout work. Develop, write, and edit material for reports, manuals, and related technical and administrative publications.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read, write, and edit reports of moderate length and edit reports/books of substantial length, including engineering analyses and reports, cost engineering analyses, and instructions to others. Speak clearly and persuasively.

Specific KSAs

Knowledge of grammar and language at the college level: may require knowledge in a technical area, such as science or engineering. Ability to interview experts to obtain technical knowledge and structure that knowledge so it is clear to non-experts in the form of informative articles or to experts in the form of procedures, speeches, or publications. Ability to read a report and suggest changes to make it clearer, more readable, shorter, and/or more detailed. Moderate use of computer-based word processing software. Approximate time to competence is over four years up to and including ten years.

P170 Other Professional Administrative and Related Occupations

Administrative and professional occupations not listed above that may be involved in ER/WM activities.

G000 General Administrative, Secretarial, and Clerical Support Staff

General administrative, secretarial and clerical support staff generally provide office support services to managerial, scientific, engineering, and professional staff throughout the organization. Primary activities include typing, word processing, making appointments, answering phones, and serving as central point of contact for information flow within and across organizations.

G010 Administrative Assistants

Provide specialized administrative assistance to individuals engaged in managerial, professional, engineering, and scientific activities. Often provide assistance by tracking budgets for project managers, composing periodic project or business reports, providing business and technical information to project members and staff, and serving as a central point of contact for business and project activities. Also, provide routine information to other professionals and clients regarding business and technical activities. Include project administrators and project clerks.

General KSAs

Reasoning	Math	Language
Apply principles of logical thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of instructions or data in mathematical or diagrammatic form.	Compute discount, interest, profit, and loss. Calculate: surfaces, volumes, weights, and measures; plane and solid figures; circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read reports, journals, and technical and legal documents. Write and help edit reports. Speak persuasively and effectively.

Specific KSAs

Knowledge and understanding of legal, policy, and/or regulatory issues germane to business. Ability to take transcription both by hand and machine. Ability to read, write, and communicate orally at a college level. Ability to interpret, apply, and recommend changes to policies and procedures; provide inter-departmental communication; proofread technical documents; assemble, prepare, and maintain routine reports; develop proposals and cost estimates; and coordinate office services.

Specific vocational preparation generally includes several years experience as a secretary, executive assistant, coordinator, or projects liaison. Experience is generally obtained on the job. Approximate time to competence is over two years up to and including four years.

G020 Office Clerks (General)

Conduct varied and diverse general clerical tasks. Clerical duties may be assigned in accordance with the office procedures of individual establishments and may include a combination of bookkeeping, typing, stenography, office machine operation, and filing. Do not include individuals with specialized clerical responsibilities (see Office Clerks, Specialized).

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to operate office equipment. Deal with problems that arise with office equipment using standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of filing systems (alphabetical or numerical ordering, by subject, etc.) and the ability to file, log, and maintain files (i.e., update, repair, and dispose of obsolete files). Ability to read and sort material according to filing system, and locate and retrieve material from filing system upon request. Knowledge of office equipment (i.e., photocopy machine, word processor, calculating machine, and typewriter) and word processing and database management software. Ability to use office equipment for file and record maintenance, correspondence, forms, graphs, logs, and charts. Ability to type and proofread correspondence, forms, reports, and other documents, and proofread own work. Ability to answer telephones, take messages, and direct visitors. Average time to competence is over one month up to and including three months.

G030 Office Clerks (Specialized)

Conduct specialized, relatively uniform, and often repetitive clerical activities generally in support of the primary function of their organizational unit. Include finance clerks, legal clerks, medical records clerks, stock clerks, procurement clerks, property clerks, shipping and receiving clerks, and mail clerks.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read at the high school level, prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

In addition to the KSAs for Office Clerk (General), knowledge of filing systems (alphabetical or numerical ordering, by subject, etc.) and the ability to file, log, and maintain files (i.e., update, repair, and dispose of obsolete files) particular to a specialty, such as project management and legal/medical clerking. Ability to track budgetary expenditures, inform project managers, engineers, scientists, and others of project budget status, contractual needs and restrictions, and administrative requirements.

Specific vocational preparation includes experience in an Office Clerk (General) position. Average time to competence is over six months up to and including one year.

G040 Secretaries

Provide support to individuals engaged in managerial, professional, engineering, and scientific activities in the form of clerical work and minor administrative and business detail by scheduling appointments, giving information to callers, taking dictation, composing and typing routine correspondence (using typewriter or word processor), reading and routing incoming mail, and filing correspondence and other records. May perform various other assigned clerical duties.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read at the high school level, prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of office, filing, and business procedures. Knowledge of standard word processing, database, and spreadsheet software packages. Ability to use office equipment (i.e., word processor, typewriter, computer, photocopier, calculating machine) to compose or transcribe from rough draft, correspondence, memorandums, reports, charts, graphs, or other documents. Ability to take dictation; schedule appointments; file, log, and maintain records; take telephone messages; and direct visitors. Ability to coordinate and maintain office procedure and work flow needs, arrange business itineraries and coordinate travel arraignments, and assist in budget and travel reports. Ability to perform clerical duties in the absence of clerical staff. Average time to competence is over six months up to and including one year.

G050 Typist and Word Processors

Use typewriters or word processing equipment to type letters, reports, other straight copy material from rough draft, corrected copy, or voice recording. May perform other clerical duties as assigned.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out instructions and deal with practical problems that have standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, procedures; and write short reports of activities or events.

Specific KSAs

Ability to type, format, and print reports using desktop computers and printers. May also draw graphics, bar charts, or other illustrations to include in reports.

G060 Other General Administrative, Secretarial, and Clerical Support Staff

General administrative, secretarial, and clerical support staff occupations not listed above that may be involved in ER/WM activities.

T000 Technicians

Occupations which involve the application of scientific, technical, or engineering principles to the solution of basic problems; the repair, maintenance, or basic operation of tools or equipment; or the collection and/or basic analysis of data via field sampling and laboratory analysis.

Technician occupations generally require math skills equivalent to a two-year college or certification program. Detail work with complex machinery, surveying equipment, measuring instruments, and computers can be required. Required also is the ability to employ scientific hypotheses and concepts as well as advanced scientific instrumentation and manipulation techniques. Technicians vary widely in terms of formalized educations. Some will have advanced degrees, others will have taken courses in specific areas, but all will possess substantial contextual, hands-on experience. Many work independently under the nominal guidance of a scientist, engineer, or lab director.

T010 Computer Operator/Coders

Convert the statement of a problem to detailed flow charts and/or coded computer language for solution by automatic data processing equipment. Generally work under the instruction of a computer scientist or computer analyst. May also use general knowledge of computers to assist in the operation of a computer system. Include computer programmers, network operators, and system administrators.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of computer operations, including start-up, troubleshooting, back-up, and shut-down procedures. Ability to monitor computer operations, operate peripheral equipment (such as tape or cartridge drives), and communicate with computer users and other operators to convey information, coordinate operations, and respond to user requests for help or information. Approximate time to competence is over one year up to and including two years.

T020 Drafters

Prepare clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions. May draft using blueprint or computers. Include computer-aided drafting and design (CADD) operators, designers, engineering drafters, and architectural assistants.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read at the high school level and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Ability to use drafting and drawing tools in a precise manner and make scale conversions. Required to use computers to create prints and schematics. CADD operators will have the same basic reading, math, and language skills as traditional drafters, but will require specialized training in computer-based drafting tools.

Specific vocational preparation generally requires training in mechanical drawing and drafting principles at the post-secondary level. Upon attaining basic competence, a drafter may obtain a drafting specialty through study or on-the-job experience. Approximate time to competence is over two years up to and including four years.

T030 Engineering Technicians

Apply basic engineering and scientific principles and technical skills, largely in the field, to assist engineers and scientists. May obtain field samples and assist in field tests; perform basic analytical and calibration activities; or perform maintenance, modifications, and repairs. Do not include instrument and control or environmental sciences technicians. Include quality assurance technicians, field technicians, quality control technicians, engineering assistants, and mechanical technicians.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read at the high school level and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of general engineering principles and use of engineering tools, such as drafting tools or instruments (e.g., stress-test instruments). Specific positions may require knowledge of metal forming, circuit analysis, electronic devices, and optics, among others. Knowledge of quality assurance principles and field safety standards and procedures. Ability to follow the instructions of an engineer and apply independent thought. Skilled use of tools appropriate to the engineering specialty.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Approximate time to competence is over two years up to and including four years.

T040 Environmental Sciences Technicians

Conduct tests and field investigations to obtain data for use by environmental, engineering, and scientific personnel in determining sources and methods of controlling pollutants in air, water, and soil. Use knowledge of agriculture, chemistry, meteorology, and engineering principles as well as applied technologies. May work under the supervision of civil, chemical, or environmental engineers or physical or earth scientists. Include samplers and environmental samplers. Do not include individuals whose primary job responsibility is the physical unearthing, removal, or transportation of waste. Classify these individuals as material handlers or operators as appropriate.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read at the high school level and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of sampling techniques and the equivalent of chemistry and biology to the junior college level. Ability to draw soil, water, air, or other samples as required; record detailed notes, log sheets, and files; follow procedures; and recognize and respond to hazards or other environmental conditions. Skilled use of scientific equipment to determine the physical and chemical properties of samples.

Specific vocational preparation may be obtained on the job, through formal education in two-year college, and/or short vocational courses. Approximate time to competence is over one year up to and including two years.

Specializations. The growth and breadth of the Environmental Sciences Technician field has led to the development of several technician specialties.

T040.2 Corrective Activities

Technicians who specialize in corrective activities sample air, water, and building conditions to assess the extent to which systems or buildings meet environmental standards for emissions or operations. They may plan, direct, and participate in the removal, upgrading, and/or installation of new systems or equipment to address deficiencies. Particularly strong knowledge of environmental (Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)) and occupational regulations (OSHA) is necessary.

T040.4 Water Treatment and Management Activities

Technicians in this area ensure that effluent streams are managed to comply with regulatory requirements.

T040.6 Transportation Activities

Individuals specializing in transportation issues certify that hazardous materials have been packed, labeled, and stored properly for transportation to repositories. Specialized knowledge of transportation regulations and hauling requirements is necessary.

T050 Health Physics Technicians

Monitor personnel, plant facilities, and work environments to detect radioactive contamination using radiation detectors and other instruments. Assess worker exposure, operating practices, and material contamination in hazardous waste disposal areas. May work with a health physicist to determine exposure limits of personnel and decontamination recommendations. Include radiation protection specialists, radiation monitors, and hot cell technicians.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read at the high school level and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of basic mathematics and algebra, physical sciences, and nuclear physics to the junior college level or equivalent, ALARA principles, and radiation detection theory. Knowledge of biological effects of radiation, radiation protection standards, and internal and external exposure control. Ability to determine sources of radiation; log records; sample air, soil, and/or water; conduct dosimetry calculations; and properly ship and receive radioactive materials. Skilled use of radiation detection equipment, radiation survey instruments, and air sampling and counting room equipment.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Approximate time to competence is over one year up to and including two years.

T060 Industrial Safety and Health Technicians

Assist in safety and health activities to evaluate and control environmental hazards. Test noise and air levels, maintain and calibrate instruments, administer hearing tests, and monitor emergency action plans. May assist in the investigation of accidents and preparation of accident reports. Include environmental protection specialists.

General KSAs

Reasoning	Math	Language
Apply principles of logical or scientific thinking to define problems, collect data, establish facts and draw valid conclusions. Deal with several abstract and concrete variables.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read at the high school level and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of relevant OSHA regulations and site-specific safety policies, accident mitigation procedures, and auditing standards and procedures. Ability to administer tests to employees and prepare reports, logs, and budgets. Skilled use of equipment used to monitoring and diagnose hearing, sight, noise, and air quality levels.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Approximate time to competence is over one year up to and including two years.

T070 Instrument and Control Technicians

Apply electronics, physical science, and mathematical knowledge to fabricate, repair, test, or modify analog or electronic measurement, calibration, or calculating devices. Include electronics technicians, electrical technicians, and computer repair technicians.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, and procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

A basic knowledge of the principles of instrumentation including transducing, procedures of calibration, the measurement of physical quantities, operation of test equipment, and detecting and receiving devices. Knowledge of and ability to apply basic electronics to include: AC-DC theory and fundamentals, Ohm's law, simple and complex series, and parallel circuit analyses. Knowledge of solid-state electronics including semiconductor fundamentals, diodes, transistors, biasing, amplifiers, and power supplies. Ability to operate and test electronic equipment including oscilloscopes, signal generators, and ohm meters. Ability to build and troubleshoot common logic circuits. Knowledge of instrumentation and the interface with software and hardware, programmed control systems, and simulation. Ability to apply knowledge of instrumentation and electronic theory and fundamentals to monitor, control, troubleshoot, and correct systems.

Specific vocational preparation includes military, vocational, or two-year college training in electronics repair. Approximate time to competence is over two years up to and including four years.

T080 Laboratory Technicians

Conduct chemical and physical tests, largely in the laboratory, to assist scientists and engineers in making qualitative and quantitative analyses for work involving experimental, theoretical, or practical application of chemistry and related sciences. Include science technicians, chemical technicians, chemical technologists, and technical specialists.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out instructions and deal with practical problems that have standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events.

Specific KSAs

Knowledge of sampling techniques, scientific equipment use, and the equivalent of chemistry and biology to the junior college level. Ability to record detailed notes, log sheets, and files; maintain analytical equipment; and follow procedures. Ability to draw samples from production or reactor processes or lab specimens. Ability to note and respond appropriately to abnormal or emergency situations. Skilled use of scientific equipment to standardize instruments; prepare reagents and samples; and determine the physical, biological, and/or chemical properties of samples.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Average time to competence is over six months up to and including one year.

T090 Media Technicians

Use principles of communication, graphic arts, visual illustration, and broadcasting/print media to design communication and public relations vehicles such as brochures, reports, and videos. Include photographers, illustrators, graphic artists, video technicians, and video editors.

General KSAs

Reasoning	Math	Language
Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Deal with several abstract and concrete variables.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read at the high school level, and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Depending on specialization, requires knowledge of graphic arts and illustration, the set-up and operation of video equipment, copy writing, and photography.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Approximate time to competence is over two years up to and including four years.

T100 Surveying and Mapping Technicians

Perform surveying and mapping duties to obtain data pertaining to angles, elevations, points, and contours used for construction, mapmaking, boundary location, mining, or other purposes. Calculate mapmaking information from field notes using reference tables. Include civil engineering technicians and surveyors.

General KSAs

Reasoning	Math	Language
Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Deal with several abstract and concrete variables.	Apply college-level concepts of algebra (linear equations, exponents and logarithms), calculus (analytic geometry, differentiations and integration of algebraic functions), and statistics (probability, experimental design, statistical inference).	Read at the high school level, and prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of surveying techniques including physical geography and topographic drafting. Knowledge of physical sciences to the junior college level. Ability to manually operate equipment and measurement devices, keep accurate notes, and draw maps and topographical illustrations.

Specific vocational preparation may be obtained on the job or through formal education in two-year college or short vocational courses. Approximate time to competence is over two years up to and including four years.

T110 Other Technicians

Technician occupations not listed above that may be involved in ER/WM activities.

C000 Crafts

Crafts occupations are primarily involved in constructing, destructing, altering, and maintaining buildings, bridges, pipelines, and other projects. Crafts occupations are also involved in fabricating materials and fabricating and maintaining equipment and machinery. Individuals in these occupations are often union represented and include skilled and semi-skilled craft designations.

Individuals in craft occupations perform skilled hand and/or machine work that generally requires a two- to four-year training/education period. Education in these occupations is generally obtained via apprenticeship, on-the-job training, military, or vocational school. Nearly all these occupations involve the ability to estimate lengths, volumes of material, and costs; measure and cut to specific dimensions; read blueprints or structural drawings; and skillfully use hand and power tools. All involve the ability to use practical mathematics at the sixth- to twelfth-grade level and apply the principles of rational analysis to concrete, practical problems.

Grade Levels. Craft worker bargaining units typically have well-developed grade descriptions that denote seniority and level of training. COCS G codes are compared to typical bargaining unit job descriptors:

COCS G Code	Typical Bargaining Unit Designation
0	Student
2	Apprentice
4	Journeyman

Craft workers with the COCS G code 0 are generally students enrolled in community college or vocational programs working in cooperative or part-time arrangements. Craftworkers completing their apprenticeships are designated with a G code of 2. The KSAs developed for the craft occupations are pegged to G code 4, which assumes a journeyman status.

C010 Carpenters

Erect and repair wooden structures, and install fixtures, floors, and drywall using saws, planes, hammers, and other carpentry tools.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to construct wooden structures. Solve practical problems and/or deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate: surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, and procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Ability to use power and hand tools. Ability to lift moderately heavy to heavy loads. Ability to visualize shapes and cut materials to fit.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two up to and including four years.

C020 Electricians

Erect, install, and repair wiring in buildings and equipment for electrical transmission and distribution.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations related specifically to the construction, maintenance, and troubleshooting of electrical systems that have few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, and procedures; write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of AC-DC theory and fundamentals, Ohm's law, and simple and complex series and parallel circuit analyses. Ability to apply these fundamentals to concrete situations that involve installing, troubleshooting, repairing, and/or maintaining circuits, power lines, and motors. Ability to follow building codes. Ability to lift moderately heavy loads. Able to coordinate with other craft professions to ensure the integrity of the electrical, fire safety, and other systems.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C030 Heating, Air-Conditioning, and Refrigeration Mechanics (HVAC)

Install, repair and maintain the operating condition of heating, air-conditioning, and refrigerating systems. Include production sheetmetal workers and field sheetmetal workers.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations related specifically to the construction, maintenance and troubleshooting of HVAC systems that have few standard approaches/solutions. Interpret instructions in written, oral or schematic forms.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Able to sketch ductwork designs for fabrication in a shop. Able to coordinate with other craft professions to ensure the integrity of the electrical, fire safety, and other systems.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform

the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C040 Machinists

Precision shape metal parts or products by milling, turning, planing, abrading, boring, chipping, sawing, and shaving with a variety of metal-working machines. Include tool and die makers.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and/or deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Ability to shape tools and dies on lathes or other machines using near vision and fine motor coordination.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C050 Masons

Lay materials such as brick, structural tile, concrete, cinder, glass, gypsum, and terra cotta block to construct or repair walls, partitions, arches, sewers, and other structures.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out instructions and deal with practical problems with standard solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific KSAs

Ability to use hand and power tools to cut brick, concrete, or stone. Ability to lift moderately heavy to heavy loads. Knowledge of the principles of bricklaying and varying brick patterns. Ability to sketch out a brick pattern and cut materials to fit.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C060 Millwrights

Install, repair, and maintain complex industrial machinery and systems. Include industrial machinery repairer.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and/or deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of the principles of electrical and mechanical systems sufficient to inspect, diagnose, install, remove, maintain, and repair machinery, appliances, and production tools. Knowledge of regulations and safety procedures and practices concerning the use and disposal of hazardous substances such as freon and lubricants. Ability to inspect, diagnose, and maintain by repairing or replacing parts of compressors, pumps, motors, blowers, gear units, bridge cranes, and similar units. Ability to use as necessary bridge cranes, manual and powered hand tools, bench tools, and precision instruments such as gauges and optical alignment equipment. Ability to read and interpret blueprints, engineering specifications, and repair manuals; make sketches for repair or fabrication; and follow oral and written instructions. Include maintenance mechanics.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Individuals may also receive on-the-job training. Approximate time to competence is over two years up to and including four years.

C070 Painters

Apply paint and related materials to the surfaces of structures or equipment using brushes or spray guns.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out instructions and deal with practical problems with standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific KSAs

Ability to safely construct, install, and use scaffolds, platforms, or ladders. Knowledge of how to ventilate various solvents or paints. Ability to lift moderately heavy loads.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C080 Plumbers and Pipefitters

Install and repair plumbing and related fixtures and fittings for water, gas, steam, or similar systems.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and/or deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of plumbing system principles and plumbing/pipe fitting basics such as pipe size, specification, and material requirements. Ability to layout, assemble, and install pipe systems from blue print; maintain pipe systems and supports and related hydraulic and pneumatic equipment; use shop and hand tools to cut, thread, bend, and wield pipe to specifications; perform tests on installed systems to check for leaks and ensure specifications are met; and inspect work site and structure to ensure that holes cut for plumbing will not weaken structure.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C090 Structural and Metal Workers

Raise, position, and join prefabricated structural metal parts by bolting, screwing, riveting, or welding to form or repair frameworks or structures for buildings, bridges, tanks, or similar works. Include metal construction workers and steelworkers.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out instructions and deal with practical problems that have standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of safety principles involved in working at extreme heights. Ability to weld or rivet structural steel members. Ability to lift heavy weights.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C100 Vehicle and Mobile Equipment Mechanics

Repair and maintain the operating condition of light and heavy mobile equipment, automotive vehicles, trucks, and buses. Include light equipment mechanics, heavy equipment mechanics, vehicle mechanics, and automotive mechanics.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and/or deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of internal combustion system principles and repair basics such as removal, repair, replacement, specification, and material requirements. Ability to diagnose operating problems of gasoline or diesel powered engines, troubleshoot difficulties, and consult with factory experts to ascertain problems/ solutions. May specialize in certain types of mechanic repair, such as locomotive or jet engines.

Specific vocational preparation includes formal training in high school or vocational shop classes. May progress via on-the-job training. Approximate time to competence is over two years up to and including four years.

C110 Welders

Operate machines and equipment to join or bond together parts of fabricated metal products and metal components such as panels, frames, yokes, tubes, pipes, and containers according to specifications and blueprints.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations related specifically to welding tasks that have few standard approaches/solutions. Interpret instructions in written, oral, or schematic forms.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge and skilled use of welding and cutting techniques for a variety of materials (aluminum, carbon, titanium, etc.) and torches (arc, oxy-acetylene, plasma, etc.) as well as the safe operation of shop equipment such as hand tools, drills, shears, hoists, cranes, saws, and grinders. Knowledge of welding permitting and safety practices. May specialize in the use of specific materials or torches or the work of certain craft specialties.

Specific vocational preparation generally involves completing a union internship or post-secondary vocational program. Entrance to these programs usually requires a demonstration of the ability to perform the reasoning, math, and language operations noted above. Approximate time to competence is over two years up to and including four years.

C120 Other Crafts

Craft occupations not listed above that may be involved in ER/WM activities.

R000 Operators

Operators control and operate vehicles, machines, systems, equipment, and plants for the purposes of producing, destroying, moving, and storing materials and supplies. These occupations require a high degree of precision in the tasks performed and the ability to interpret detailed instructions and specifications. The time needed to achieve proficiency in these occupations is often several years.

R010 Chemical System Operators

Operate and control equipment, systems, and plants for the purposes of processing, altering, or decomposing chemicals and/or chemical compounds. May also separate isotopes, enrich products, and perform chemical analysis. Include hazardous waste process operators and chemical plant operators.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions. Deal with problems that arise using standard solutions.	Compute discount, interest, profit and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific KSAs

Knowledge of elemental chemistry and physics, electrical and mechanical systems, drafting, and power technology, principles of chemical processing systems and safety, facility layout, and procedures.

Specific vocational preparation generally includes a formal and informal on-the-job training. Approximate time to competence is over two years up to and including four years.

R020 Drillers

Operate a variety of drills to tap sub-surface water and salt deposits, to remove core samples during mineral exploration or soil testing, and to facilitate the use of explosives in mining or construction.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to operate drilling equipment. Deal with problems that arise in the drilling environment using standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Interpret statistical graphs for quality control purposes.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific KSAs

Ability to lift heavy loads. Ability to recognize land types and match drilling equipment to needs.

Specific vocational preparation for the driller occupation is generally obtained on the job or via apprenticeship. May require hazardous materials training depending on work environment. Average time to competence is over six months up to and including one year.

R030 Material Moving Equipment Operators

Operate mobile equipment designed to move or transport materials such as building materials, earth, and wastes. Material moving may also include operation of equipment such as conveyors, cranes, and hoists. Include semi-trailer drivers, bulldozer operators, crane operators, earth mover operators, backhoe operators, and heavy equipment operators.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to operate heavy equipment. Deal with problems that arise with heavy equipment using standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Interpret statistical graphs for quality control purposes.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific KSAs

Ability to comprehend and follow site specific safety and operating practices.

Specific vocational preparation may include formal training in heavy equipment operation or an apprenticeship. Preferred skills in addition to operator skills are engine repair, cable splicing, and welding. May require hazardous materials training depending on work environment. Average time to competence is over six months up to and including one year.

R040 Nuclear Plant Operators

Operate and control nuclear reactors that produce steam for generation of electric power or nuclear materials. May also coordinate operation of auxiliary equipment.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to operate some aspect of a nuclear plant. Solve practical problems and deal with concrete situations with few standard approaches/solutions.	Practical applications of fractions, ratios, percentages, calculating rules, and high school algebra and geometry.	Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Knowledge of chemistry and physics, electrical and mechanical systems, drafting, algebra, and power technology, principles of nuclear reactor systems and safety, facility layout, and procedures, generally obtained in a combination of on-the-job and formal settings.

Specific vocational preparation generally includes a two-year college science degree. Approximate time to competence is over two years up to and including four years.

R040.02 Entry level position generally designated Auxiliary Operator
R040.04 Generally designated Reactor Operator
R040.06 Generally designated Senior Reactor Operator; Requires Senior Reactor Operator license; may have dual role as Shift Technical Advisor

R050 Nuclear Waste Process Operators

Operate and control equipment, plants, and systems to decontaminate, neutralize, and dispose of radioactive waste and mixed waste including liquids collected from chemical processing operations. Tests samples for radioactivity and records data. May monitor panelboard to control operation of recovery systems that treat, store, or dispose of radioactive waste.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform practical math operations and algebraic and trigonometric operations to the high school level.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Possess the basic knowledge and fundamental concepts of chemistry needed to work safely with hazardous materials. Knowledge of the principles of radiation and radiation protection, and the interaction of radiation with matter, both animate and inanimate. Know the fundamental concepts of dosimetry, radiation protection criteria, shielding calculations, and radiation measurements. Know the basic concepts of toxicology as they apply to the work place and have a basic understanding of toxicology such that exposure to potential toxic effects can be minimized. Skilled at conducting safe field operations for dealing with hazardous substances in accordance with 29 CFR 1910.120 and OSHA requirements.

Specific vocational preparation is generally obtained through the military or college and formal on-the-job training. Average time to competence is over six months up to and including one year.

R060 Production Systems Operators

Operate or tend presses, vacuum or blow molding machines, furnaces, or glass molding machines to fabricate parts. Include also skilled assemblers who are not engineering or laboratory technicians. Do not include skilled machine tool workers (machinists) or individuals who perform semi- or low-skilled assembly tasks (handlers, helpers, and laborers, general).

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to craft or assemble standardized yet precise components.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Interpret statistical graphs for quality control purposes.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic form.

Specific KSAs

Specific KSAs vary greatly depending on the systems operated. Generally these positions require fine motor coordination, the ability to perform detail work for long periods of time, and the skilled use of machinery or manipulators.

Specific vocational preparation for these occupations is generally obtained on the job, sometimes via an apprenticeship. In a few cases, such as precision glass blowers, formal vocational preparation will be necessary. Approximate time to competence is over one year up to and including two years.

R070 Utilities Operators

Operate and control equipment, plants, and systems to produce and ensure delivery of power, water, steam, gas, and other utility services. Include gas plant operators, power plant operators, steam plant operators, electricity generation station operators, and water plant operators.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to operate utilities systems by reading and interpreting gauges, meters, and instrumentation tools. Solve practical problems and deal with concrete situations with few standard approaches/solutions.	Practical applications of fractions, ratios, percentages, calculating rules, and high school algebra and geometry.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Include understanding shop math, geometry, algebra, physics, electrical and mechanical systems, drafting, and power technology at the high school level. Knowledge of the principles of power systems and safety, facility layout, and procedures, generally obtained in a combination of on the job and formal settings.

Specific vocational preparation includes high school or vocational school courses in mechanics. Approximate time to competence is over two years up to and including four years.

R080 Other Operators

Operator occupations not listed above that may be involved in ER/WM activities.

L000 Laborers and General Services Workers

Laborers and general service workers are a combination of two general categories of workers. Laborers encompass all occupations in which manual labor, often heavy, characterizes the majority of work activities. Laborers may work on or around machines and other equipment; however, their primary responsibilities do not include operating or controlling such equipment. Laborers may also occasionally use general hand tools in accomplishing tasks. Service workers are a general category of workers that tend to encompass those occupations involved in general infrastructure support activities. They are often in facilities organizations and their primary duties revolve around conducting various activities to ensure that services are provided to other workers and that site facilities are clean and safe from security and/or fire hazards.

L010 Firefighters

Control and extinguish fires. Protect life and property from fire hazards.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Ability to lift very heavy weights. Specific vocational preparation generally includes military or volunteer fire fighting experience.

Approximate time to competence is over one year up to and including two years.

L020 Food Service Workers

Prepare and serve food and beverages. Include cooks, cafeteria workers, food servers, and kitchen workers.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to operate kitchen equipment. Deal with problems that arise with kitchen equipment using standard solutions.	Compute discount, interest, profit, and loss. Calculate: surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.
Note: General KSAs may be lower for food service workers less skilled than cooks. Servers, for instance, are characterized by RML codes of 2-2-1.		

Specific KSAs

Specific vocational preparation is generally obtained on the job. Average time to competence is over one month up to and including three months.

L030 Janitors and Cleaners

Primarily clean building interiors and equipment, perform minor maintenance, and provide other related services.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to operate cleaning equipment. Deal with problems that arise with cleaning equipment using standard solutions.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read safety rules, instructions, schedules, and procedures. Write short reports of activities or events. Interpret instructions in written, oral, or schematic forms.

Specific KSAs

Average time to competence is over one month up to and including three months.

L040 Laundry Workers

Operate or tend washing or dry cleaning machines to clean industrial clothing and other cloth articles (may include contaminated articles).

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Perform all basic arithmetic operations on two digit numbers. Perform operations with units of measure, such as cup, pint, inch, and ounce.	Read with a vocabulary of 2,500 (two or three syllable) words. Compare similarities and differences between words and between series of numbers. Write and speak sentences that convey the status of moved or stored materials sufficient to promote a safe shift change.

Specific KSAs

Average time to competence is a short demonstration period up to and including one month.

L050 Handlers, Helpers, and Laborers (General)

Perform *non-machine* tasks of a routine nature. These workers help the technician, operator, and crafts workers covered in other sections. Although they do not operate or tend the machinery or equipment directly, these workers assist in the work of the establishment by machine feeding and offbearing, moving materials (manually), or loading and unloading. They may also perform routine (semi or low skill) assembly tasks. Do not include individuals whose primary responsibilities involve handling hazardous, mixed, or nuclear wastes.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standard situations encountered on the job.	Perform all basic arithmetic operations on two digit numbers. Perform operations with units of measure, such as cup, pint, inch, and ounce.	Read with a vocabulary of 2,500 (two or three syllable) words. Compare similarities and differences between words and between series of numbers. Write and speak sentences that convey the status of moved or stored materials sufficient to promote a safe shift change.

Specific KSAs

Ability to lift heavy loads.

Average time to competence involves a short demonstration period only.

L060 Handlers, Helpers, and Laborers (Specialized)

Workers whose duties and responsibilities are similar to general materials handlers, helpers, and laborers, except primary responsibilities involve working with hazardous, mixed, or nuclear wastes and generally require specialized certification training. Include certified waste handlers and asbestos removal specialist.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out written, oral, or diagrammatic instructions to pack, move, or store hazardous waste. Deal with problems that arise in this environment using standard solutions. Recognize codes and symbols and relate them to specific instructions and handling techniques.	Perform all basic arithmetic operations on two digit numbers. Perform operations with units of measure, such as cup, pint, inch, and ounce.	Read with a vocabulary of 2,500 (two or three syllable) words. Compare similarities and differences between words and between series of numbers. Write and speak sentences that convey the status of moved or stored materials sufficient to promote a safe shift change.

Specific KSAs

Ability to lift heavy loads.

Specific vocational preparation includes specialized OSHA, hazardous material, and confined work spaces training, generally obtained in formal job initiation training. This training results in certification of the demonstrated ability to follow procedures and safety rules while handling, packaging, moving, or storing hazardous waste. Approximate time to competence is over one month up to and including 3 months.

L070 Light Vehicle Drivers

Operate vehicles used to transport people or materials on roads, runways, warehouses, and similar environments. Include vehicle drivers, bus drivers, truck drivers, delivery drivers, and forklift operators.

General KSAs

Reasoning	Math	Language
Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Perform addition, subtraction, multiplication, and division on whole numbers as well as fractions and decimals. Compute rate, ratio, and percent.	Read and understand instructions, safety bulletins, and other job-related materials to the 8th-grade level.

Specific vocational preparation may involve a union apprenticeship or a special operator or commercial driver's license. Average time to competence is over one month up to and including three months.

L080 Security Guards

Stand guard at entrance gate or walk about premises of business or industrial establishment to prevent theft, violence, or infractions of rules; guard property against fire, theft, vandalism, and illegal entry; direct patrons or employees and answer questions relative to services of establishment; and control traffic to and from buildings and grounds. Include workers who perform these functions using a car patrol.

General KSAs

Reasoning	Math	Language
Apply principles of rational systems to solve practical problems and deal with concrete situations with few standard approaches/solutions.	Compute discount, interest, profit, and loss. Calculate surfaces, volumes, weights, and measures; plane and solid figures; and circumference and area. Understand kinds of angles and properties of pairs of angles. Calculate ratio and proportion variables.	Read at the high school level, prepare reports that conform to rules of grammar, exposition, and style. Speak to audiences in discussions.

Specific KSAs

Knowledge of the principles of the management and transportability of special materials. Ability to follow procedures closely and use independent judgment. Knowledge of basic chemistry and principles of detecting radioactive materials. Knowledge of search and seizure procedures and the laws of the local jurisdiction.

Specific vocational preparation generally includes experience in the military. Average time to competence is over six months up to and including one year.

L090 Other Laborers and General Services Workers

Laborer and general services worker occupations not listed above that may be involved in ER/WM activities.

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