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Common occupational classification system amendments for Accelerator Science and Engineering workforce

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Contents

1.0 Executive Summary

A common system to classify occupations and skills is essential to support accelerator workforce planning between the Department of Energy (DOE) National Laboratories.

In 2025, ten DOE laboratories conducted a census of their accelerator science and engineering workforce and projected their accelerator workforce needs for the next ten years. To support this, revision 3 of the "Common Occupational Classification System"[1] (COCS) was used as a common taxonomy. Modifications were made to include accelerator-specific skills and specialisms.

COCS was originally developed for DOE Office of Environmental Restoration and Waste Management in 1996. The framework provides a high-level functional structure that can be expanded with further occupations and specialisms and remains well aligned to DOE laboratory roles nearly 30 years later.

Accelerator occupations and specialisms were added to the framework for the 2025 effort to quantify the accelerator workforce. This document is a companion document to COCS and provides a definition for these new occupations and specialisms that do not appear in COCS.

Proceeding with a stable taxonomy is seen as essential such that its use becomes easier each year; the taxonomy as used for the 2025 effort is recommended to be continued.

2.0 Overview of methodology

For original definitions and guidance, see [1] the "Common Occupational Classification System" (COCS). In this document, we capture occupations of relevance to the accelerator science and engineering (AS&E) workforce. Definitions are copied from [1] where occupations are accelerator workforce relevant, and new classes and specialisms are added as needed to capture occupations of strategic importance.

2.1. Structure

Each resource has a COCS reference comprising a letter and a two-digit number and a final single digit which is always 0.

- The letter differentiates between the broad categories of "managers", "engineers", "scientists", "professionals", "administrative", "technicians", "crafts", "operators" and "laborers".
- The first digit and the second digit provide additional breakdown within that category, representing the class.
- The third digit is always 0 in the COCS. Labs may choose to use this third digit for an internal reason.

Sometimes there is also a specialism. The specialism comes after the main COCS reference after a decimal point. E.g. [1] defines T040.2 where the ".2" denotes a specialism ("corrective actions") for the Environmental Sciences Technicians class.

This hierarchal structure accommodates both generalists and specialists. In the Accelerator Science and Engineering workforce effort, we use specialisms only where there is a distinct strategic purpose. In most cases, there is no specialism defined, or the resource may not specialize in which case the class alone is used to capture their role. E.g. an Engineering Technician categorized as T030 would be skilled in all specialisms in their class. An Engineering Technician that specializes in mechanical work and does not do vacuum work would be T030.3.

Use of 000 to describe a person or resource need is greatly discouraged. 000 indicates that it is not possible to distinguish at a finer level, which is an unlikely circumstance.

Use of Other is also discouraged. If the resource falls into Other, it could indicate that a new class should be added for future iterations to capture the skill set.

2.2. Criteria for category/class inclusion

For our effort to capture the accelerator workforce to assist in coordination between institutions, we must have a taxonomy that:

- Is detailed enough to be of strategic use
- Covers all critical and endangered skillsets (e.g., very specialized skills rarely found outside the labs)
- Covers high risk/high-turnover positions (e.g., widely employed skills in high demand outside the labs)
- Is readily mapped onto labs' local taxonomies

- Is readily mapped onto university programs

We evaluated those principles against categories and classes in COCS [1] and identified categories and classes in [1] that provided low strategic value. These categories and classes are de-emphasized in our taxonomy (and presented in gray italics in this document) to stream-line data collection and reduce effort in areas where it is not as useful.

Categories in gray italics are not considered to be part of the accelerator workforce. They are listed in gray in this document and are not presented with the definition (though this is available in [1]) to discourage their use and to focus efforts on occupations that are specifically part of the accelerator workforce.

Conversely, classes and specialisms that are of value to our analysis of a modern accelerator workforce, but not in [1], are added. These added classes and specialisms are listed below with the words AS&E addition in the dictionary definition column.

2.3. Engineer vs Scientist

Resources may identify themselves as a scientist or an engineer but be occupied in a role that does not match that. An engineer can act in the role of a scientist and a scientist can act in the role of an engineer.

The definition of Scientist in COCS [1] is:

> *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*

The definition of Engineer is:

> *Engineers apply physical laws and principles for the development and use of machines, materials, instruments, structures, processes, and services.*

Alternate terms such as “Researcher” and “Implementer” can be exchanged for “Scientist” and “Engineer” to avoid the connotations to perceived identities. The Scientist and Engineer division is already present in National Laboratories and the definitions are closely aligned to the roles that they perform but recognizing the sensitivities associated with the labels will be important when communicating outside of our group. For this reason, Engineer/Implementer and Scientist/Researcher are used.

3.0 Definitions

3.1. M000 Managers

Code	Label	Dictionary (more details available in [1])
M000	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.
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 that are 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.
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.
M040	Other Managers	

3.2. E000 Engineers/Implementers

Please note that this category does not necessarily need to be filled by someone with an Engineering qualification – the resource in this case could have a non-engineering education e.g. a science degree. Their role is in implementation as opposed to research.

Code	Label	
E000	Engineers/ Implementers	Implementers that 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 include the preparation of drawings, specifications, and cost estimates, and participation in verification tests. They may lead others in projects of moderate or small scope that are closely related to their area of technical specialty.
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.
E020	Civil Engineers	Plan, design, and direct construction and maintenance of structures and facilities such as buildings, roads, dams, and irrigation and sanitary systems.
E030	*Not used*	
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.
E040.1	RF and Pulsed Power Engineers	*AS&E addition* Design and oversee construction of high-power RF amplifiers e.g. klystrons, modulators and solid-state amplifiers, or high-voltage pulsed electronics. Can have technical experience in LLRF and control systems, cryogenics and superconducting RF systems, particle accelerator design, engineering and operations.
E040.2	RF Structure and Design Engineers	*AS&E addition* Design and development of RF cavities, RF couplers, RFQs, HOM dampers and feedthroughs. Includes SRF. EM modelling expertise.
E040.3	Instrumentation	*AS&E addition*

	and Controls Engineers	Including LLRF, motion control and robotics, magnet (DC power supply) controls. Industrial controllers and PLC system design, design of instrumented systems, PID control loops, ASICs and FPGA fabrication. Includes data acquisition for the accelerator diagnostics. Specialist computing and networking for accelerator controls. This person may also write specifications for programming. In many cases, the person will also be the programmer but for someone that programs without writing the specification (i.e. without an engineering foundation), please consider S100 (Computer Science).
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.
E060	Industrial Engineers	*AS&E Note: Cable Plant engineer is another term for this* 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.
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. *AS&E Note*: Includes component conceptualization, analysis, development of 3D models through Computer Aided Design (CAD), materials selection, determination/application of appropriate standards, tolerancing, detailing, vendor interfacing, procurement, and documentation preparation in compliance with standards. Includes management of the engineering process from conception through design, construction, and field installation. This includes interfacing with both physicists and scientists to develop project requirements and mechanical technicians to ensure proper component assembly and installation. Produces design reports, design reviews, cost estimates, schedules, system documentation and test reports for individual projects will be the responsibility of this engineer.
E080	*Nuclear Engineers*	
E090	*Petroleum/Mining Engineers*	
E100	*Plant Engineers*	
E110	Quality	Plan and direct activities concerned with quality standards

	assurance/Quality control engineers	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.
E120	Safety Engineers	*AS&E Note: Use for Safety Systems Engineer* 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.
E130	Other Engineers	
E140	Construction Engineers	*AS&E Note: Field Construction Manager is another term for this* 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 blueprints, and general construction activities.
E150	Laser Engineers	*AS&E addition* Design, construct and operate lasers and laser systems used in accelerators e.g. for photocathodes, diagnostics or in advanced accelerator concepts.
E160	Vacuum Engineers	*AS&E addition* Design and fabricate ultra-high vacuum systems and components compatible with particle free, ultra-high vacuum requirements. Includes everything from out gassing calculations and pump sizing to RGA analysis and clean room procedures.
E170	Magnet Engineers	*AS&E addition* Design, specify and oversee construction of magnets used in accelerators, beam transport lines and for pulsed power applications. Specific expertise in electromagnetic simulations.
E170.1	Superconducting Magnets	*AS&E addition* Applies developed principles and modelling to the construction of magnets with superconducting wires. Develops superconducting wire technology from proof of concept to deployment in an accelerator environment. Manages deployment in accelerator environments.
E170.2	Normal Conducting Magnets	*AS&E addition* Applies developed principles and modelling to the construction of normal conducting electromagnets. Develops new magnet configurations e.g. combination magnets. Manages deployment in an accelerator environment.
E180	Cryogenics Engineers	*AS&E addition* Designs cryostats and cryogenic transport systems for

		superconducting magnet and RF devices. Includes advanced computation of cryogenic fluid dynamics with the application to accelerator systems and cryoplants, heat load estimates and process cycles.
E190	Accelerator Systems Integration	*AS&E addition* This engineer applies systems integration principles to an accelerator beamline. The role of a systems engineer involves working with multiple disciplines to interface distinct systems together such as RF structures, mechanical supports, diagnostics, electronics, feedbacks, cabling, and takes into account human ergonomics and space layouts (e.g. ability to perform maintenance, fire safety codes). The systems integration engineer likely has another skill set but has unique capabilities to working across disciplines to understand how systems work together and to manage interfaces. Note that this is distinct from an Industrial Engineer who applies Systems Integration specifically to facility layouts.
E190.1	Superconducting RF	*AS&E addition* Superconducting RF (SRF) systems engineering integrates individual engineered elements into an operational system. Includes cryomodule design - an integration of mechanical and cryogenic disciplines that may require assistance of specialists in those areas, considering human ergonomics and space layouts. Includes integration of RF systems and the development of those interfacing subsystems (e.g. resonance control).
E190.2	Normal Conducting RF	*AS&E addition* Normal conducting accelerator systems engineering. Includes integration of RF systems and the development of those interfacing subsystems (e.g. resonance control). Takes into account space layouts, ergonomics (access for humans to perform maintenance and repairs).
E200	Accelerator Physicist	*AS&E addition* Application of Accelerator and beam physics principles to operating accelerators. The physicist may have abilities similar to the Scientist Physicist S070 role but is substantially more engaged with the operation of accelerators and the practical implementation of new techniques past a proof of principle stage to being part of regular operations. The physicist may be part of the system that is responsible for the delivery of beam to users by developing procedures for operations staff and taking responsibility for a beamline that requires in-depth accelerator physics expertise.
E210	Alignment Engineering	*AS&E addition* Alignment systems engineering. Develops the hardware and tools necessary to survey and map items and installations. Note: Surveying and Mapping Technicians category is T100.

3.3. S000 Scientists/Researchers

Please note that this category does not necessarily need to be filled by someone with a science qualification – the resource in this case could have a non-scientific education e.g. an engineering degree. Their role is in research as opposed to implementation.

Code	Label	
S000	Scientists/ Researchers	Researchers that 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. May lead projects of moderate or small scope closely related to their area of technical specialty.
S010	*Chemists*	
S020	*Environmental Scientists*	
S030	*Geologists*	
S040	*Life Scientists*	
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.
S060	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.
S070	Physicists	*AS&E Note: We use this to mean Accelerator Physicists by default when there is no further specialism. Please note that Health/Radiation Physicist is P080.* 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.
S070.1	Particle Sources and Targets	*AS&E addition* Develops particle sources by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Includes ion sources (Penning, EBIS, LIS, ECRIS, H) and injector systems (for any species). Includes techniques to increase brightness e.g. through ionization cooling, and decrease emittance. Development and integration of targets. Development and integration of photocathodes. Person is likely to use simulation and modelling tools, be involved in writing specifications, and commission new sources. This role can develop new capabilities, operating modes and techniques. Person is likely to collaborate with Material Scientists but the role of Material Scientist (S050) should be

		for materials science expertise that is not application specific.
S070.2	Light Sources	*AS&E addition* Performs work towards developing and optimizing light sources by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Includes studying loss mechanisms of space charge and instabilities, developing theoretical models and computer simulation codes, specifying future machine designs, investigating high intensity beam effects spanning transverse space charge, half integer errors, image effects, higher order non-linear errors and instabilities, seeding and SASE, higher harmonics generation, attosecond light sources. Person is likely to use simulation and modelling tools, be involved in writing specifications, and commission new light sources. This role is able to develop new capabilities, operating modes and techniques.
S070.3	Cyclotrons	*AS&E addition* Performs work towards developing and optimizing cyclotrons by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Person is likely to use simulation and modelling tools, be involved in writing specifications, and commission new cyclotrons. This role is able to develop new capabilities, operating modes and techniques.
S070.4	Colliders	*AS&E addition* Performs work towards designing colliders by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Experts in the beam delivery, machine-detector interfaces, and interaction region physics (bremsstrahlung, beam-beam interactions, backgrounds modelling) and optics and feedbacks needed for high luminosity. Person is likely to use simulation and modelling tools.
S070.5	Accelerator and beam physics	*AS&E addition* Accelerator and beam physics is the science of the motion, generation, acceleration, manipulation, prediction, observation, and use of charged particle beams, addressing challenges in beam intensity, beam quality, beam control, and beam prediction. This person develops theories and laws for this based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Involves accelerator modelling and computation, expertise in beam dynamics, collective effects and tracking. Includes the development of algorithms and

		methods to model and simulate accelerators. Includes the development of virtual particle accelerators and application of computer science (such as high-performance simulation tools and AI methods).
S070.6	Advanced Accelerator Concepts	*AS&E addition* Develops advanced acceleration concepts by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Advanced acceleration concepts are based on beam-, laser- and structure-wakefields. Experts in simulations and/or experimental demonstrations and analysis. Person is likely to use simulation and modelling tools, be involved in writing specifications, and develop proofs of concept including experimental verification and the diagnostics and methods needed for such experimental verifications.
S070.7	Normal Conducting RF acceleration technology	*AS&E addition* Works to understand and improve the performance of RF cavities in normal conducting phase and to develop novel surface treatments towards high quality factors and high accelerating gradients by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Includes development of breakdown theory, cavity processing and surface inspection, and development of advanced surface processes and novel or cooled materials. Work with electromagnetic, mechanical, and thermal behavior in various environments of temperature, electric and magnetic fields, and mechanical loading. Can include knowledge about the physics of superconductivity and the relationships between properties, components, and structures in different environments.
S070.8	SRF acceleration technology	*AS&E addition* Works to understand and improve the performance of SRF cavities and to develop novel surface treatments towards high quality factors and high accelerating gradients by developing theories and laws based on experiment and observation and devises methods to apply the resulting principles with experimental proofs of concept. Includes niobium material research, SRF cavity processing and surface inspection, and development of advanced surface processes and novel SRF materials. Work with electromagnetic, mechanical, and thermal behavior of superconductors in various environments of temperature, electric and magnetic fields, and mechanical loading. Can include knowledge about the physics of superconductivity and the relationships between properties, components, and structures in different environments.

S070.9	Superconducting magnet technology	*AS&E addition* Develops materials and new ideas for accelerator magnets. Works with electromagnetic, mechanical, and thermal behavior of superconductors in various environments of temperature, electric and magnetic fields, and mechanical loading. Can include knowledge about practical metallic and composite superconductors, their methods of manufacture, and their constituent components and structures. Can include knowledge about the physics of superconductivity and the relationships between properties, components, and structures in different environments. Note the design and implementation of magnets in an accelerator past proof-of-concept stage is captured under Magnet Engineer E170. Note: distinction from a materials scientist is the targeted application- use S050 for the very specific development of superconductivity models that aren't accelerator application specific.
S070.10	Instrument and Controls	*AS&E addition* Develops new diagnostics, instruments and controls for accelerators. Takes ideas to proof-of-concept level and performs experimental testing, gathering data and analyzing performance. Works in a multidisciplinary field of materials, computing, LLRF and digital electronics, often leveraging e.g. electronic engineers in category E040.3, but specializes in understanding the applications to accelerators and the experimental testing against accelerator needs.
S080	*Social Scientists*	
S090	Other Scientists	
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.
S100.1	Software and Operating Systems	*AS&E addition* Develops software and computer operating systems. Includes technical database creation and management. Note that a person may program as part of their primary role- they should not appear here (e.g. a physicist that writes an analysis program or an electrical engineer that produces firmware).
S100.2	Machine Learning and AI	*AS&E addition* Experts in ML/AI methods, researchers in that field, as it applies to an accelerator workforce. Performs research and development on the use of machine learning to address modeling, optimization, and data analysis problems in particle accelerators. Note, accelerator operators (R090), or accelerator physicists (S070 and E200) may deploy AI/ML as

		part of their job function but not as a core research activity.
S100.3	Computation, modelling and simulation	*AS&E addition* Experts in computation for modelling and simulation of accelerators. Includes using high-performance computing (HPC), and implementing relevant physics in the codes, and optimization. Resource has knowledge of programing, parallel implementation and GPUs.
S110	Laser Scientist	*AS&E addition* Develops materials, components and new techniques for laser technology specifically for the advancement of accelerator technology, including experimental proof of concept demonstrations.

3.4. T000 Technicians

Code	Label	
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.
T010	Computer Operator/Coder	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.
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 design (CAD) operators, designers, engineering drafters, and architectural assistants.
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.

T030.1	Technicians - Vacuum	*AS&E addition* Ultra-high vacuum technicians working in assembly or in the field on maintenance. Also includes technical support for vacuum systems such as pumps.
T030.2	Technicians - SRF cavities and cryomodules	*AS&E addition* Cryomodule assembly and maintenance, cavity fabrication and assembly.
T030.3	Technicians - Mechanical	*AS&E addition* Mechanical assembly and maintenance not on cryomodule or ultra-high vacuum (UHV) systems.
T040	*Environmental Sciences Technicians*	
T050	Health Physics Technicians	*AS&E Note: Also known as Rad Techs or Radiation Protection Field Operation* 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.
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.
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.
T070.1	Instrument and Control Technicians: Field	*AS&E addition* Field installation, repair and maintenance of analog or electronic measurement, calibration, or calculating devices. Include cable installation technicians.
T070.2	Instrument and Control Technicians: Fabrication	*AS&E addition* Fabrication of electronics and other items associated with controls such as chassis and cables.
T080	Laboratory Technicians	*AS&E Note: Also known as Chemistry 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.
T090	*Media Technicians*	
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.
T110	Other Technicians	
T120	Laser Technicians	*AS&E addition* Laser technicians install, operate, service, and test laser systems and fiber optics equipment. They work under the direction of engineers or physicists who conduct laboratory activities.
T130	RF and Pulsed Power Technician	*AS&E addition* Apply basic engineering and scientific principles and technical skills, largely in the field, to assist RF and Pulsed Power engineers for repair and maintenance.

3.5. R000 Operators

Code	Label	
R000	*Operators*	
R010	*Chemical Systems Operators*	
R020	*Drillers*	
R030	*Material Moving Equipment Operators*	
R040	*Nuclear Plant Operators*	
R050	*Nuclear Waste Process Operators*	
R060	*Production Systems Operators*	
R070	*Utilities Operators*	
R080	Other Operators	
R090	Accelerator Operators	*AS&E addition* Routinely operate and control accelerator for beam delivery to an end-user within a beam authorization/safety framework. May also coordinate operations of auxiliary equipment. Often involved in projects that improve

		efficiency or standardize controls and procedures, may involve using machine learning techniques in an existing framework, as a small part of the role. Not usually involved with development of new capabilities at a significant scale that rely on accelerator science and engineering specialisms (S070 or E200 physicist may be more appropriate for resources that are pursuing their own research or have a high level responsibility for the application of accelerator science even if they do, as a small part of their role, establish beam parameters for another end-user).
R100	Cryoplant Operators	*AS&E addition* Operate and control cryoplants, and systems to ensure delivery of cryogens to accelerator components.
R110	Remote Handling	*AS&E addition* Operate and control robotics used in the remote handling of highly radioactive materials such as used for targets.

3.6. P000 Professional

Note: Most categories are grey and not expected to be used due to our evaluation that they are not accelerator workforce specific roles. The one exception is P080 Health (Radiation) Physicist which should be captured.

Code	Label	
P000	*Professional Administrative and Related Occupations*	
P010	*Accountants and Auditors*	
P020	*Architects*	
P030	*Buyers, Procurement Specialists and Contracting Specialists*	
P040	*Communications Specialists*	
P050	*Compliance Inspectors*	
P060	*Computer Systems Analysts*	
P070	*Cost Estimators and Planners and Schedulers*	
P080	Health Physicists	*AS&E Note: Radiation Physicist is another term for this* 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.
P090	*Industrial Hygienists*	
P100	*Lawyers*	
P110	*Personnel and Labor Relations Specialists*	
P120	*Physicians*	
P130	*Physician Assistants, Nurses and Other Medical Support*	
P140	*Safeguards and Other Security Specialists*	
P150	*Trainers*	
P160	*Technical Writers and Editors*	
P170	*Other Professional Administrative and Related Occupations*	

3.7. C000 Crafts

This category is not expected to be used due to our evaluation that they are not accelerator workforce specific roles.

Code	Label	
C000	*Crafts*	
C010	*Carpenters*	
C020	*Electricians*	
C030	*Heating, Air-conditioning, and Refrigeration Mechanics (HVAC)*	
C040	*Machinists*	
C050	*Masons*	
C060	*Millwrights*	
C070	*Painters*	
C080	*Plumbers and Pipefitters*	
C090	*Structural and Metal Workers*	
C100	*Vehicle and Mobile Equipment Mechanics*	
C110	*Welders*	
C120	*Other Crafts*	

3.8. G000 General

This category is not expected to be used due to our evaluation that they are not accelerator workforce specific roles.

Code	Label	
G000	*General Administrative, Secretarial, and Clerical Support Staff*	
G010	*Administrative Assistants*	
G020	*Office Clerks (General)*	
G030	*Office Clerks (Specialized)*	
G040	*Secretaries*	
G050	*Typist and Word Processors*	
G060	*Other General Administrative, Secretarial, and Clerical Support Staff*	

3.9. L000 Laborers

This category is not expected to be used due to our evaluation that they are not accelerator workforce specific roles.

Code	Label	
L000	*Laborers and General Services Workers*	
L010	*Firefighters*	
L020	*Food Service Workers*	
L030	*Janitors and Cleaners*	
L040	*Laundry Workers*	
L050	*Handlers, Helpers, and Laborers (General)*	
L060	*Handlers, Helpers, and Laborers (Specialized)*	

L070	*Light Vehicle Drivers*	
L080	*Security Guards*	
L090	*Other Laborers and General Services Workers*	

Bibliography

[1] E.J. Stahlman and R.E. Lewis, “Common occupational classification system - revision 3”, May. 1996. https://doi.org/10.2172/243454