

U.S. DEPARTMENT OF ENERGY
DEPARTMENT-WIDE
FUNCTIONAL AREA QUALIFICATION STANDARD

DECONTAMINATION AND DECOMMISSIONING

Defense Nuclear Facilities Technical Personnel



U.S. Department of Energy
Washington, D.C. 20585

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APPROVAL

The Federal Technical Capability Panel consists of senior Department of Energy managers responsible for overseeing the Federal Technical Capability Program. This Panel is responsible for reviewing and approving the Qualification Standard for Department-wide application. Approval of this Qualification Standard by the Federal Technical Capability Panel is indicated by signature below.

Chairman
Federal Technical Capability Panel

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ACKNOWLEDGEMENTS

The DOE-EM Office of Training and Education, working with the National Environmental Training Office, (NETO) is the Sponsor for the Decontamination and Decommissioning Functional Area Qualification Standard. The Sponsor is responsible for coordinating the development and/or review of the Functional Area Qualification Standard by subject matter experts to ensure that the technical content of the standard is accurate and adequate for Department-wide application for those involved in Decontamination and Decommissioning. The Sponsor, in coordination with the Federal Technical Capability Panel, is also responsible for ensuring that the Functional Area Qualification Standard is maintained current.

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U.S. DEPARTMENT OF ENERGY FUNCTIONAL AREA QUALIFICATION STANDARD

FUNCTIONAL AREA

Decontamination and Decommissioning

PURPOSE

The Department's Federal Technical Capability Program Policy, issued by the Secretary in December 1998, commits the Department to continuously strive for technical excellence. The Technical Qualification Program, along with the supporting technical Functional Area Qualification Standards, complements the personnel processes that support the Department's drive for technical excellence. In support of this goal, the competency requirements defined in the technical Functional Area Qualification Standards should be aligned with and integrated into the recruitment and staffing processes for technical positions. The technical Functional Area Qualification Standards should form, in part, the primary basis for developing vacancy announcements, qualification requirements, crediting plans, interviewing questions, and other criteria associated with the recruitment, selection, and internal placement of technical personnel. Office of Personnel Management minimum qualifications standards will be greatly enhanced by application of appropriate materials from the technical Functional Area Qualification Standards.

The technical Functional Area Qualification Standards are not intended to replace the U.S. Office of Personnel Management's (OPM) Qualifications Standards nor other Departmental personnel standards, rules, plans, or processes. The primary purpose of the Technical Qualification Program is to ensure that employees have the requisite technical competency to support the mission of the Department. The Technical Qualification Program forms the basis for the development and assignment of DOE personnel responsible for ensuring the safe operation of defense nuclear facilities.

APPLICABILITY

The Decontamination and Decommissioning Functional Area Qualification Standard establishes common functional area competency requirements for Department of Decontamination and Decommissioning personnel who provide assistance, direction, guidance, oversight, or evaluation of contractor technical activities impacting the safe operation of defense nuclear facilities. The technical Functional Area Qualification Standard has been developed as a tool to assist DOE Program and Field offices in the development and implementation of the Technical Qualification Program in their organization. Program and Field offices may choose to use this technical Functional Area Qualification Standard as-is, or they may use parts of it to facilitate the development of their own unique Technical Qualification Standards. In either case, satisfactory and documented attainment of the competency requirements contained in this technical Functional Area Qualification Standard, or similar Standards, ensures Decontamination and

Decommissioning personnel possess the requisite competence to fulfill their functional area duties and responsibilities. Office/Facility-Specific Qualification Standards supplement this technical Functional Area Qualification Standard and establish unique operational competency requirements at the Headquarters or Field element, site, or facility level.

IMPLEMENTATION

This technical Functional Area Qualification Standard identifies the technical competency requirements for Decontamination and Decommissioning personnel. Although there are other competency requirements associated with the positions held by Decontamination and Decommissioning personnel, this Functional Area Qualification Standard is limited to identifying the specific technical competencies. The competency statements define the expected knowledge and/or skill that an individual must meet. Each of the competency statements is further explained by a listing of supporting knowledge and/or skill statements. **The supporting knowledge and/or skill statements are not requirements and do not necessarily have to be fulfilled to meet the intent of the competency.**

The competencies identify a familiarity level, a working level, or an expert level of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

Familiarity level is defined as basic knowledge of or exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

Working level is defined as the knowledge required to monitor and assess operations/activities, to apply standards of acceptable performance, and to reference appropriate materials and/or expert advice as required to ensure the safety of Departmental activities.

Expert level is defined as a comprehensive, intensive knowledge of the subject or process sufficient to provide advice in the absence of procedural guidance.

Demonstrate the ability is defined as the actual performance of a task or activity in accordance with policy, procedures, guidelines, and/or accepted industry or Department practices.

Headquarters and Field elements shall establish a program and process to ensure Decontamination and Decommissioning personnel possess the competencies required of their position. That includes the competencies identified in this technical Functional Area Qualification Standard or a similar Standard developed by the organization. Documentation of the completion of the requirements of the Standard shall be included in the employee's training and qualification record.

Equivalencies may be granted for individual competencies based upon an objective evaluation of the employee's prior education, experience, and/or training. Equivalencies shall be granted in accordance with the policies and procedures of the program or field office. The supporting knowledge and/or skill statements, while not requirements, should be considered before granting equivalency for a competency.

Training shall be provided to employees in the Technical Qualification Program that do not meet the competencies contained in the technical Functional Area Qualification Standard.

Departmental training will be based upon appropriate supporting knowledge and/or skill statements similar to the ones listed for each of the competency statements. Headquarters and Field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training courses used to provide individuals with the requisite knowledge and/or skill required to meet the technical Functional Area Qualification Standard competency statements.

EVALUATION REQUIREMENTS

Attainment of the competencies listed in this technical Functional Area Qualification Standard should be documented by a qualifying official or the immediate supervisor Decontamination and Decommissioning personnel using any of the following methods:

- Documented evaluation of equivalencies
- Written examination
- Documented oral evaluation
- Documented observation of performance

DUTIES AND RESPONSIBILITIES

The following are the typical duties and responsibilities expected of defense nuclear facility technical personnel assigned to the decontamination and decommissioning Functional Area:

- A. Maintain communication with Headquarters, field elements, regulatory agencies, the public and other stakeholders.
- B. Inform Department of Energy management of applicable decontamination and decommissioning project status, activities, and issues.
- C. Plan, observe and evaluate decontamination and decommissioning activities and contractor performance to ensure the adequacy and effectiveness of contractor programs such as:
 - Technical performance
 - Plans, policies, and procedures
 - Management controls

- Worker training and qualification programs
 - Occurrence Reporting and Corrective actions
 - Worker and public health and safety programs
 - Environmental protection & regulatory compliance
 - Waste TSD and transportation programs
- D. Develop, review, and assess decontamination and decommissioning documentation.
- E. Develop, manage, and assist in the negotiations for regulatory agreements and permits.
- F. Resolve or facilitate the resolution of decontamination and decommissioning issues.
- G. Develop, implement, and evaluate decontamination and decommissioning strategic, baseline, project, and program plans.
- H. Promote the sharing of information and technology.
- I. Conduct site-specific technology implementation evaluations.
- J. Evaluate the adequacy and effectiveness of contractor decontamination and decommissioning programs to ensure program compliance with Department Orders, standards, guides; Federal regulations, statutes, codes; and applicable state and/or local regulations.

Additional duties and responsibilities specific to the site, the facility, the operational activities, and/or the involved organizations shall be contained in the facility specific qualification standard(s).

BACKGROUND AND EXPERIENCE

The U. S. Office of Personnel Management's Qualification Standards Handbook establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements.

The preferred education and experience for Decontamination and decommissioning personnel is:

1. Education:

Bachelor of Science degree in engineering or a related discipline; or meeting the alternative requirements specified for engineers or scientists in the Qualifications Standards Handbook.

2. Experience:

Industrial, military, Federal, State or other directly related background that has provided specialized experience in Decommissioning. Specialized experience can be demonstrated through possession of the competencies outlined in this Standard.

REQUIRED TECHNICAL COMPETENCIES

Each of the competency statements defines the level of expected knowledge and/or skill that an individual must possess to meet the intent of this Standard. **The supporting knowledge and/or skill statements further describe the intent of the competency statements but are not requirements.**

Note: When regulations or Department of Energy directives are referenced in the Qualification Standard, the most recent revision should be used.

BASIC KNOWLEDGE

Chemistry

- 1. Decommissioning personnel shall demonstrate a familiarity level knowledge of chemistry fundamentals in the areas of chemical bonding and chemical reactions.**

Supporting Knowledge and/or Skills

- a. Discuss the following types of chemical bonds:
 - Ionic
 - Covalent
 - Metallic
- b. Discuss how elements combine to form chemical compounds.
- c. Discuss the following terms:
 - Mixture
 - Solvent
 - Solubility
 - Solute
 - Solution
 - Equilibrium
- d. Discuss the following terms:
 - Density
 - Molarity
 - Parts per million (ppm)
- e. Define the following terms:
 - Acid
 - Base
 - pOH

- Salt
- pH

2. Decommissioning personnel shall demonstrate a familiarity level knowledge of chemistry fundamentals in the areas of corrosion and water treatment.

Supporting Knowledge and/or Skills

- a. Explain the process of general corrosion of iron and steel when exposed to water.
- b. Discuss the two conditions that can cause galvanic corrosion.
- c. Discuss the following types of specialized corrosion:
 - Pitting corrosion
 - Stress corrosion cracking
 - Crevice corrosion
- d. Explain the ion exchange process.

Material Science

3. Decommissioning personnel shall demonstrate a familiarity level knowledge of basic material science in the areas of concepts, theories, and principles.

Supporting Knowledge and/or Skills

- a. Discuss the following terms:
 - Compressibility
 - Stress
 - Shear stress
 - Tensile Stress
 - Compressive stress
- b. Define the following terms:
 - Strain
 - Plastic deformation
- c. Discuss the following terms:
 - Strength
 - Malleability
 - Ductility
 - Toughness
 - Yield Strength
 - Hardness
 - Ultimate Tensile Strength

- d. Discuss the phenomenon of thermal shock.
- e. Discuss the following terms and discuss their relationship to material failure:
 - Ductile fracture
 - Brittle fracture
 - Nil-ductility transition (NDT) temperature
- f. Discuss the phenomenon of brittle fracture.
- g. Explain fatigue failure and work hardening with respect to material failure.
- h. Discuss the effects of the following types of radiation on the structural integrity of metals.
 - Alpha
 - Beta
 - Gamma
 - Neutron

Statistics

4. Decommissioning personnel shall demonstrate a familiarity level knowledge of solving problems involving probability and simple statistics.

Supporting Knowledge and/or Skills

- a. State the definition of the following statistical terms:
 - Mean
 - Variance
 - Mean variance
 - Median
 - Mode
- b. Explain the structure and function of distributions.
- c. Calculate the mathematical mean of a given set of data.
- d. Calculate the mathematical mean variance of a given set of data.
- e. Given the data, calculate the probability of an event.
- f. Describe how measures of samples (i.e., measures of central tendency and variability) are used to estimate population parameters through statistical inference
- g. Discuss decision errors and the relationship to sampling and confidence levels.

Physics

- 5. Decommissioning personnel shall demonstrate familiarity level knowledge of applying the principles of force to stationary or moving bodies.**

Supporting Knowledge and/or Skills

- a. Define the following:
 - Force
 - Weight

- b. Define the following:
 - Tensile force
 - Compressive force
 - Frictional force

Hydrology, Geology, and Soil Science

- 6. Decommissioning personnel shall demonstrate a familiarity level knowledge of the basic principles and concepts of hydrology, geology, and soil science.**

Supporting Knowledge and/or Skills

- a. List the different soil textures and soil structures.

- b. Define erosion and describe the characteristics and effects of water and wind erosion.

- c. Describe the following processes and explain how water and soil interact in each:
 - Infiltration and percolation
 - Groundwater recharge
 - Runoff
 - Evapotranspiration

- d. Describe the hydrologic cycle.

- e. Define the following hydrologic terms and describe the relationships between them:
 - Precipitation
 - Streamflow
 - Evaporation
 - Transpiration
 - Subsurface water
 - Sedimentation

- f. Discuss the composition and identification of the following types of rocks and cite examples of each.
 - Igneous
 - Sedimentary
 - Metamorphic

- g. Describe the geometry and properties of the following rock masses:
 - Folds
 - Faults
 - Structural Discontinuities
 - Residual Stress
 - Sheet Joints

- h. Describe the Vadose zone.

- i. Discuss contaminant movement relates to soil density.

Electricity

- 7. Personnel shall demonstrate a familiarity level knowledge of basic electrical fundamentals in the areas of terminology and theory.**

Supporting Knowledge and/or Skills

- a. Discuss the following terms:
 - Electrostatic force
 - Electrostatic field
 - Conductor
 - Insulator
 - Resistor

- b. Describe the following parameters and discuss their relationship:
 - Voltage
 - Current
 - Resistance
 - Ohm's Law
 - Power
 - Inductance
 - Capacitance

- 8. Personnel shall demonstrate a familiarity level knowledge of basic electrical fundamentals in the area of direct current (DC).**

Supporting Knowledge and/or Skills

- a. Discuss the basic principle by which the following components produce direct current (DC):
 - Battery
 - DC Generator
 - Thermocouple
- b. Discuss the purpose of a rectifier.
- c. Discuss the following terms:
 - Electric circuit
 - Series circuit
 - Parallel circuit
- d. Discuss the following terms:
 - Battery
 - Electrode
 - Electrolyte
 - Specific-Gravity
 - Ampere-Hour
- e. Describe in basic terms what happens when a lead-acid battery is charged and discharged.

9. Personnel shall demonstrate a familiarity level knowledge of basic electrical fundamentals in the area of alternating current (AC).

Supporting Knowledge and/or Skills

- a. Discuss the basic theory of operation of an alternating current (AC) generator.
- b. Discuss the reasons that three phase power systems are used in industry.
- c. Discuss the basic theory of operation of an AC motor.
- d. Discuss the purposes of a transformer.

10. Personnel shall demonstrate a familiarity level knowledge of basic electrical fundamentals in the area of electrical distribution systems.

Supporting Knowledge and/or Skills

- a. Explain the following terms as they apply to electrical distribution systems:
 - Neutral grounding
 - Protective relays

- b. Describe the protection provided by fuses and circuit breakers.

Heat Transfer, Fluid Flow and Thermodynamics

11. Personnel shall demonstrate a familiarity level knowledge of basic thermodynamics concepts and theories.

Supporting Knowledge and/or Skills

- a. Define the following terms:
- Specific volume
 - Density
 - Specific gravity
 - Mass
 - Weight
- b. Describe the thermodynamic properties of temperature and pressure.
- c. Compare and contrast the Fahrenheit, Celsius, Kelvin, and Rankine temperature scales, and discuss the concept of absolute zero.
- d. Describe the relationship between absolute pressure, gauge pressure, and vacuum.
- e. Define the following and describe their relationship:
- Energy
 - Potential Energy
 - Kinetic Energy
 - Work
 - Heat
- f. Describe the following types of thermodynamic systems:
- Isolated system
 - Open system
 - Closed system

12. Personnel shall demonstrate a familiarity level knowledge of basic heat transfer and fluid flow concepts and theories.

Supporting Knowledge and/or Skills

- a. Using the ideal gas law discuss the relationship between pressure, temperature, and volume.
- b. Describe the effects of pressure and temperature changes on confined fluids.

- c. Describe how the density of a fluid varies with temperature.
- d. Define the term buoyancy.
- e. Describe the relationship between the pressure in a fluid column and the density and depth of the fluid.
- f. Define the property of viscosity.
- g. Define the term head, head loss, and frictional loss, with respect to its use in fluid flow.
- h. Describe the phenomenon of water hammer, pressure spike, and steam hammer.

OPERATIONS KNOWLEDGE

Mechanical Systems

- 13. Personnel shall demonstrate a familiarity level knowledge of basic pneumatic and hydraulic systems in the areas of components, operations, and theory.**

Supporting Knowledge and/or Skills

- a. Define the following and discuss their relationship:
 - Force
 - Pressure
 - Pneumatic
 - Hydraulic
- b. Describe the basic operation of a pneumatic system.
- c. Describe the basic operation of a hydraulic system.
- d. Identify the hazards associated with pneumatic and hydraulic systems and their components.

- 14. Personnel shall demonstrate a familiarity level knowledge of heat exchanger construction, operations, and theory.**

Supporting Knowledge and/or Skills

- a. Describe the two types of heat exchanger construction.
- b. Describe hot and cold fluid flow in parallel flow, counter flow, and cross flow heat exchangers.

- c. Discuss the following heat exchanger applications:
 - Evaporator
 - Radiator
 - Condenser
 - Cooling tower

15. Personnel shall demonstrate a familiarity level knowledge of pump construction, operations, and theory.

Supporting Knowledge and/or Skills

- a. Describe the principles of operation for centrifugal pumps.
- b. Describe the principles of operations for positive displacement pumps.
- c. Define the following terms and explain their relationship:
 - Net Positive Suction Head
 - Cavitation

16. Personnel shall demonstrate a familiarity level knowledge of valve construction, operations, and theory.

Supporting Knowledge and/or Skills

- a. Given a drawing of a valve, identify the major component parts.
- b. Given a drawing of a valve, identify which of the following type of valve it is:
 - Gate
 - Globe
 - Relief/Safety
 - Ball
 - Check
- c. Describe the construction and principle of operation for the following types of valve actuators:
 - Manual
 - Electric
 - Solenoid
 - Pneumatic
 - Hydraulic

17. Personnel shall demonstrate a familiarity level knowledge of basic strainer and filter construction, operations, and theory.

Supporting Knowledge and/or Skills

- a. Describe the following types of filters, including an example of typical use:
 - Cartridge filters
 - Pre-coated filters
 - Deep-bed filters
 - HEPA filters
- b. Describe the following types of strainers, including an example of typical use:
 - Bucket strainer
 - Duplex strainer

HVAC

- 18. Decommissioning personnel shall demonstrate a working level knowledge of basic heating, ventilation, and air conditioning system (HVAC) construction and operations, the potential of these systems as hazard sources and the relationship of these systems to contaminant transfer.**

Supporting Knowledge and/or Skills

- a. Given a one-line diagram of an HVAC system, identify and discuss the purpose of the following components:
 - Compressors
 - Blowers
 - Dampers
 - Chillers
 - Filters
 - Heat exchangers
 - Scrubbers
 - Hoods
 - Glove Boxes
 - Pressure sensors
- b. Discuss the relationships between the following in HVAC systems:
 - Supply Ventilation
 - Flow
 - Exhaust Ventilation
- c. Describe the types of refrigerants used in air conditioning systems.
- d. Discuss the hazards associated with these refrigerants.
- e. Describe the purpose of the HVAC system in the following applications:
 - Hoods
 - Glove boxes

- Hot Cells
 - Confinement systems
- f. Discuss the reason for and significance of the following system parameters:
- Positive vs. Negative system pressure
 - Differential pressure across filters
 - Differential pressure across components
- g. Describe how ventilation systems may be used for contamination control.

Instrumentation and Controls

19. Personnel shall demonstrate a familiarity level knowledge of process instrumentation principles of operation, purpose and uses.

Supporting Knowledge and/or Skills

- a. Explain the reason for measuring temperature, pressure, flow, and fluid level.
- b. List the three basic functions that temperature, pressure, flow, and fluid level detectors provide.
- c. For the temperature detection devices listed, explain how the instrument provides an output representative of the temperature being measured:
- Thermocouple (TC)
 - Resistance Temperature Detector (RTD)
- d. For the pressure detection devices listed, explain how the instrument provides an output representative of the pressure being measured:
- Bellows type
 - Bourdon tube type
- e. For the fluid level detection devices listed, explain how the instrument provides an output representative of the level being measured:
- Gauge-glass type
 - Conductive probe type
 - Magnetic bond type
 - Differential pressure type
 - Ball float type
- f. For the flow detection devices listed, explain how the instrument provides an output representative of the flow being measured:
- Orifice plate type
 - Venturi tube type
 - Pitot tube type

- Displacement type
- Electromagnetic

Engineering Drawings

20. Decommissioning personnel shall demonstrate a working level knowledge of engineering drawings.

Supporting Knowledge and/or Skills

- a. Given an engineering print, read and interpret the information contained in the title block, the notes and legend, the revision block, and the drawing grid.
- b. Identify the symbols used on engineering P&IDs for:
 - Types of valves and actuators
 - Basic types of instrumentation.
 - Types of instrument signal controllers and modifiers
 - Types of system components (pumps, etc.)
 - Types of lines
- c. Identify the symbols used on engineering P&IDs to denote the location of instruments, indicators, and controllers.
- d. Identify how valve conditions are depicted.
- e. Determine system flowpath(s) for a given valve lineup.

Civil

21. Demonstrate familiarity-level knowledge of the application of civil engineering theories, principles and techniques.

Supporting Knowledge and/or Skills

- a. Discuss the basic concepts of structural design and integrity.
- b. Discuss the basic concepts of civil transportation design (roads, bridges, etc.)
- f. Describe the basic design requirements for sanitary systems.

22. Decommissioning personnel shall demonstrate a working level knowledge of the basic principles and concepts of general building construction and identify potential sources of physical hazards.

Supporting Knowledge and/or Skills

- a. Describe the advantages and disadvantages of the following types of construction:
 - Brick and mortar
 - Wood framed
 - Metal framed
 - Metal
- b. Identify the basic dimensional and tolerance symbology.
- c. Identify the basic fabrication, construction, or architectural symbology.
- d. Given a drawing, analyze the drawing for potential worker or workplace hazards.
- e. Given an engineering fabrication, construction, or architectural drawing, read and interpret the basic dimensional and tolerance symbology, and basic fabrication, construction, or architectural symbology.

INTEGRATED SAFETY MANAGEMENT

23. Decommissioning personnel shall demonstrate a working knowledge of the purpose and requirements of DOE P 450.4, Safety Management Policy.

Supporting Knowledge and/or Skills

- a. Describe the purpose, scope, and application of the requirements detailed DOE P 450.4, Safety Management Policy.
- b. Describe the Integrated Safety Management System (ISMS) Objective.
- c. Discuss the relationship of DOE P 450.4, Safety Management Policy to the Department of Energy Acquisition Regulations (DEAR)
- d. List and explain the five core functions set forth in the Safety Management System policy.
- e. List and explain the seven guiding principles of the Safety Management System policy, including their relationship to the five core functions of the Safety Management System policy.
- f. Given the Integrated Safety Management System (ISMS) guide discuss the process for tailoring the ISMS to facility disposition activities, including both DOE and contractor responsibilities in the tailoring process.
- g. Using the ISMS Guide and Appendix C of DOE-STD-1120-98, Integration of Environment, Safety, and Health into Facility Disposition Activities, prepare an action

plan which adequately outlines interviews and observations, and details documents to review during an evaluation of contractor compliance with the requirements of DOE P 450.4, Safety Management Policy.

- h. Using the ISMS Guide and Appendix C of DOE-STD-1120-98, Integration of Environment, Safety, and Health into Facility Disposition Activities, evaluate contractor compliance with the requirements of DOE P 450.4, Safety Management Policy. During this evaluation, demonstrate the ability to properly conduct interviews, observations, and document reviews.
- i. Given data from an evaluation, analyze the results of the evaluation to determine contractor compliance or noncompliance of the requirements.
- j. Given the results from an analysis of contractor compliance or noncompliance, document the results and communicate the results to contractor and Department line management.

24. Decommissioning personnel shall demonstrate a working knowledge of the purpose and guidance given in DOE-STD-1120-98, Integration of Environment, Safety, and Health into Facility Disposition Activities

Supporting Knowledge and/or Skills

- a. Identify the Federal Regulation requiring integration of environment, safety and health into work planning and execution.
- b. Explain why full implementation of the Integrated Safety Management System into work planning is critical to the facility disposition process.
- c. Identify the five basic hazard identification activities that should be performed for all facility disposition activities.
- d. Given the hazard type identified through the hazard identification and characterization process, and Appendix A of DOE-STD-1120-98, identify the applicable ES&H directives and the potential Federal Applicable or Relevant and Appropriate Requirements (ARARs) for the planned facility disposition process.
- e. Compare and contrast a facility and task hazard analysis. Explain their application during the facility disposition process.
- f. Discuss the five types of hazard baseline documents that support facility disposition activities.
- g. Given the facility disposition activity and the type of hazard presented by the facility disposition activity, determine the Hazard Baseline Documents required and the possible Environmental Permits.

- h. Identify the five criteria for determining when a “Readiness Evaluation” should be performed for facility disposition activities.
- i. Describe the Management of Change process that should be implemented for facility disposition activities.
- j. Explain why performance indicators and measures are particularly important to the facility disposition process.

25. Decommissioning personnel shall demonstrate a working level knowledge of the requirements for the use of personal protective equipment.

Supporting Knowledge and/or Skills

- a. Describe the principles governing the selection, use, and limitations of the following:
 - Respirators
 - Protective clothing
- b. Describe the various types of equipment (devices or clothing) worn to protect a worker from exposure to hazardous substances and physical injury.
- c. Given a work procedure and atmospheric conditions, identify the appropriate type of respiratory protection for the activity.
- d. Describe the four levels of protection for workers at hazardous waste sites or for those workers conducting emergency response activities as defined by the Environmental Protection Agency.

26. Decommissioning personnel shall demonstrate a working level knowledge of the safety-related requirements for hazardous substances.

Supporting Knowledge and/or Skills

- a. Discuss the hazards associated with the use of corrosives (acids and alkalies).
- b. Describe the general safety precautions necessary for the handling, storage, and disposal of corrosives.
- c. Discuss the general safety precautions regarding toxic compounds.
- d. Describe the criteria used to determine if a compound is a health hazard and discuss the methods by which toxic compounds may enter the body.
- e. Discuss the general safety precautions regarding the use, handling, and storage of compressed gases, including specifically hydrogen, oxygen, and nitrogen.

- f. Discuss the safety precautions for working with cryogenic liquids.
- g. Explain the difference between a flammable liquid and a combustible liquid.
- h. Describe the general safety precautions regarding the use, handling, and storage of flammable and combustible liquids.

27. Decommissioning personnel shall demonstrate a working level knowledge of hazardous waste operations and their impact on worker safety and health.

Supporting Knowledge and/or Skills

- a. Describe the industrial process associated with hazardous waste operations as they pertain to Decommissioning.
- b. Explain the personnel hazards associated with the following:
 - Polychlorinated Biphenyls (PCB) removal
 - Asbestos removal
 - Biological hazards
 - Solvents
 - Paint removal
 - Waste oil

28. Decommissioning personnel shall demonstrate a working level knowledge of safety practices associated with construction, decontamination, and decommissioning of defense nuclear facilities.

Supporting Knowledge and/or Skills

- a. Explain basic safety practices used on construction sites. Include a discussion of the purpose and importance of using hard hats, eye protection, and hearing protection.
- b. Describe the hazards associated with compressed air and compressed air tools.
- c. Discuss safety requirements for working with or near overhead cranes.
- d. Discuss basic safety practices and potential hazards in the use of portable power tools.
- e. Discuss the requirements for lead and asbestos abatement.
- f. Conduct an evaluation of worker and workplace safety on a construction site.

29. Demonstrate working-level knowledge of the following DOE Orders:

- **DOE Order 420.1, Facility Safety**

- **DOE Order 414.1, Quality Assurance**

Supporting Knowledge and/or Skills

- a. Discuss the purpose, scope, and application of the listed Orders, policies, and circulars. Include in this discussion key terms, essential elements, and personnel responsibilities and authorities.
- b. Discuss the contractor's responsibilities for environmental safety and health protection as stated in the above documents.

30. Demonstrate working-level knowledge of the Occupational Safety and Health Act (OSHA) requirements in the following documents:

- **DOE Order 440.1A, Worker Protection Management for DOE Federal and Contractor Employees**
- **29 CFR 1910, Occupational Safety and Health Standards**
- **29 CFR 1926, Safety and Health Regulations for Construction**

Supporting Knowledge and/or Skills

- a. Discuss the application and impact of OSHA on Department projects.
- b. Identify the requirements in the OSHA that form the basis of authority for project management personnel in the oversight and management of a project.
- c. Discuss the project manager responsibilities set forth in DOE Order 440.1A, Worker Protection Management for DOE Federal and Contractor Employees.
- d. Discuss the construction contractor's responsibilities under DOE 440.1A, Worker Protection Management for DOE Federal and Contractor Employees:
 - Establishing a safety program
 - Worksite presence during work activities
 - Compliance by subcontractors
- e. Discuss the requirements for the performance of a hazard analysis and a hazard abatement/prevention program. Include in the discussion each of the following elements:
 - Responsibility for implementation
 - Purpose and content of the hazard analysis
 - Worker awareness of the hazards and hazard abatement/prevention program
- f. Discuss the contractor's responsibility for providing necessary training to employees in the area of safety and health on the worksite.
- g. Discuss the project manager's responsibility for on-site safety and health inspections.

- h. Discuss the contractor's required response to an identified safety and/or health hazard.

WASTE MANAGEMENT

31. Demonstrate working level knowledge of hazardous waste as described in 40 CFR, Resource Conservation and Recovery Act

Supporting Knowledge and/or Skills

- a. Define the term "hazardous waste."
- b. Using the decision tree in 40 CFR Part 260, relate RCRA solid waste to hazardous waste and identify the applicable RCRA regulations for each.
- c. Identify the kinds of hazardous wastes generated within the Department and their sources.
- d. Describe the combination of facilities used to manage hazardous wastes at a site.
- e. Discuss the current methods of disposing of hazardous wastes.

32. Demonstrate familiarity level knowledge of the packaging and transportation of waste as described in:

- **DOE Order 460.1A, Packaging and Transportation Safety**
- **DOE Order 460.2, Departmental Materials Transportation and Packaging Management**
- **49 CFR Parts 106-199, Hazardous Material Regulations of the Department of Transportation**
- **40 CFR Parts 262-263, Resource Conservation and Recovery Act**

Supporting Knowledge and/or Skills

- a. Discuss the requirements of the Hazardous Materials Transportation Act as they relate to the packaging and transportation of waste.
- b. Describe the requirements for shipping containers.
- c. Discuss the requirements of the Resource Conservation and Recovery Act (40 CFR 262, Standards Applicable to Generators of Hazardous Waste, and 40 CFR 263, Standards Applicable to Transporters of Hazardous Waste) as they pertain to the packaging and shipping of waste.
- d. Discuss the labeling, placarding, and shipping requirements specified in the requirements of 49 CFR (Placarding, Labeling, and Shipping).

- e. Review actual shipping manifests and report on their completeness, accuracy, and applicability.

33. Demonstrate familiarity-level knowledge of the management of low-level radioactive waste as described in:

- **DOE Order 435.1, Radioactive Waste Management**
- **DOE M 435.1, Radioactive Waste Management**

Supporting Knowledge and/or Skills

- a. Define the term "low-level waste."
- b. Discuss the Department's performance objectives and performance assessment for disposal of low-level radioactive waste as outlined in DOE M 435.1, Radioactive Waste Management.
- c. Discuss the low-level waste characterization requirements.
- d. Describe the Department's low-level radioactive waste acceptance criteria.
- e. Discuss the basic requirements for a low-level disposal site closure and for post closure operations.
- f. Define the term "mixed waste."
- g. Identify the applicable regulations and DOE Order for managing mixed low-level radioactive waste.

AUTHORIZATION BASIS DOCUMENTATION

34. Demonstrate working-level knowledge of DOE Order 424.1, Unreviewed Safety Questions.

Supporting Knowledge and/or Skills

- a. Discuss the reasons for performing an unreviewed safety question determination.
- b. Define the following terms:
 - Accident analyses
 - Safety evaluation
 - Technical safety requirements

- c. Describe the situations which require a safety evaluation to be performed.
- d. Define the conditions for an unreviewed safety question.
- e. Describe the responsibilities of contractors authorized to operate defense nuclear facilities for the performance of safety evaluations.
- f. Describe the action(s) to be taken by a contractor upon identifying information that indicates a potential inadequacy of previous safety analyses or a possible reduction in the margin of safety as defined in the technical safety requirements.
- g. Discuss the action(s) to be taken if it is determined that an unreviewed safety question is involved.
- h. Discuss the qualification and training requirements for personnel who perform safety evaluations.

35. Demonstrate working-level knowledge of the technical safety requirements as described in DOE Order 423.1, Technical Safety Requirements.

Supporting Knowledge and/or Skills

- a. Discuss the purpose of technical safety requirements.
- b. Describe the responsibilities of contractors authorized to operate defense nuclear facilities for technical safety requirements.
- c. Define the following terms and discuss the purpose of each:
 - Safety limit
 - Limiting control settings
 - Limiting conditions for operation
 - Surveillance requirements
- d. Describe the general content of each of the following sections of the technical safety requirements:
 - Use and application
 - Safety limits
 - Operating limits
 - Surveillance requirements
 - Administrative controls
 - Design features
- e. Discuss the possible source documents that may be used in developing technical safety requirements.

- f. Discuss the conditions that constitute a violation of the technical safety requirements and state the reporting requirements should a violation occur.

36. Demonstrate familiarity-level knowledge of DOE Order 232.1, Occurrence Reporting and Processing of Operations Information.

Supporting Knowledge and/or Skills

- a. State the purpose of the Order.
- b. Define the following terms:
 - Event
 - Condition
 - Facility
 - Notification report
 - Occurrence report
 - Reportable occurrence
- c. Discuss the Department's policy regarding the reporting of occurrences as outlined in the Order.
- d. State the different categories of reportable occurrences and discuss each.
- g. Refer to Attachment 1 to DOE Order 232.1, Occurrence Reporting and Processing of Operations Information, and discuss the role of decommissioning personnel in decommissioning-related reportable occurrences.

DECONTAMINATION AND DECOMMISSIONING REQUIREMENTS

37. Decommissioning personnel shall demonstrate a working knowledge of the purpose and requirements of DOE O 430.1A, Life Cycle Asset Management.

Supporting Knowledge and/or Skills

- a. Describe the purpose, scope, and application of the requirements detailed in DOE O 430.1A, Life Cycle Asset Management.
- b. Discuss the four basic actions to be performed prior to completion of mission activities or prior to transfer or disposition to ensure that facility systems are placed in stable and known conditions and that hazards are identified and known.
- c. Discuss the process and requirements for disposition of physical assets, including the specific requirements for contaminated facility disposition.

- d. Using DOE O 430.1A, Life Cycle Asset Management, prepare an action plan which adequately outlines interviews and observations, and details documents to review during an evaluation of contractor compliance with the requirements of DOE O 430.1A, Life Cycle Asset Management.
 - e. Evaluate contractor compliance with the requirements of DOE O 430.1A, Life Cycle Asset Management. During this evaluation, demonstrate the ability to properly conduct interviews, observations, and document reviews.
 - f. Given data from an evaluation, analyze the results of the evaluation to determine contractor compliance or noncompliance of the requirements.
 - g. Given the results from an analysis of contractor compliance or noncompliance, document the results and communicate the results to contractor and Department line management.
- 38. Decommissioning personnel shall demonstrate a working knowledge of the purpose and guidance given in the following implementation guides supporting DOE O 430.1A, Life Cycle Asset Management:**
- **DOE G 430.1-5, Transition Implementation Guide**
 - **DOE G 430.1A-2, Surveillance and Maintenance During Facility Disposition**
 - **DOE G 430.1A-3, Deactivation Implementation Guide**
 - **DOE G 430.1A-4, Decommissioning Implementation Guide**

Supporting Knowledge and/or Skills

- a. Describe the overall facility disposition process, including the transition, deactivation, decommissioning, and surveillance and maintenance phases.
- b. Discuss the purpose and applicability of each of the implementation guides.
- c. Discuss the potential impact of selecting alternative methods to methods described in each of the implementation guides.
- d. Identify the top-level project management objectives that apply to facility disposition activities.
- e. Discuss the “end point methodology” as used in the detailed engineering planning of facility disposition.
- f. Discuss the impact on facility disposition activities of the *Policy on Decommissioning of Department of Energy Facilities under the Comprehensive Environmental Response, Compensation, and Liability Act*.

- g. Discuss the “tailoring approach” as it applies to the facility disposition process and identify the source document that describes the intent of DOE with respect to the tailoring approach.
- h. Relate the implementation of the Integrated Safety Management System to each phase of the facility disposition process.
- i. Discuss the objectives of the surveillance and maintenance program during the facility disposition process.
- j. Using the appropriate implementation guides:
 - Identify the major steps to be performed for each disposition phase and the sequence of these steps.
 - Relate each of the major steps in the facility disposition process to DOE O 430.1A, Life Cycle Management
 - Describe the general tasks to be performed for each of the major steps in the facility disposition process.

39. Decommissioning personnel shall demonstrate a familiarity level knowledge of the purpose and requirements of DOE O 4330.4B, Maintenance Management.

Supporting Knowledge and/or Skills

- a. Describe the general policy and objectives associated with the establishment of programs for the management and performance of cost-effective maintenance and repair of DOE property.
- b. Describe the guidelines for establishing and conducting a maintenance program.

40. Decommissioning personnel shall demonstrate a working level knowledge of the purpose and requirements of DOE O 5400.5, Radiation Protection of the Public and Environment.

Supporting Knowledge and/or Skills

- a. State the Department's policy and discuss the objectives regarding the protection of the public and the environment from radiation as contained in DOE O 5400.5.
- b. List and discuss the factors that must be considered pertaining to the release of materials and equipment having residual radioactive material as outlined in Chapter IV, Residual Radioactive Material Cleanup.
- c. Identify and discuss the release criteria for:
 - soil
 - air/water
 - surface

real property

- 41. Decommissioning personnel shall demonstrate a working level knowledge of Department of Energy radiation protection requirements sufficient to assess the effectiveness of radioactive material containment, exposure control, and radiological work practices.**

Supporting Knowledge and/or Skills

- a. Discuss the relevant Departmental requirements related to the following radiological control elements:
 - Contamination control
 - Radiation work permits
 - Radiation safety training
 - Posting and labeling
 - Respiratory protection
 - Records
 - X-Ray generating devices
 - b. Describe and explain the radiological concerns in the design, construction, and operation of containment and confinement systems.
 - c. Discuss the design and operational characteristics of containment and confinement systems that minimize personnel radiation exposure.
- 42. Decommissioning personnel shall demonstrate a familiarity level knowledge of Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).**

Supporting Knowledge and/or Skills

- a. Describe the various types of surveys and the purpose of each performed at a site.
- b. Discuss Field Measurement Methods and Instrumentation.
- c. Describe the site investigation process from Site Identification through Final Status Surveys.
- d. Discuss the techniques of sampling and monitoring the environment. Include in the discussion the protocols used and the purpose of a Quality Assurance Project Plan.
- e. Describe the Environmental Protection Agency's Data Quality Objectives.
- f. Describe the various analytical and validation methods.

- g. Describe the survey planning and design process.

43. Demonstrate working level knowledge of Project Risk Assessment.

Supporting Knowledge and/or Skills

- a. Perform an assessment of project risks that identifies critical systems, subsystems, and other factors that require focused work and resolution.
- b. Identify the types of risks that are addressed in a project risk assessment.
- c. Evaluate the assessed level of risk.
- d. Describe the basis for the risk assessment.
- e. Identify the critical project elements that contribute to the risk.
- f. Identify the consequences of the risk.
- g. Develop activities and alternatives to minimize the risk.
- h. Identify the stage(s) of the project in which the risk exists.

44. Decommissioning personnel shall demonstrate a working level knowledge of the principles, concepts, and requirements of environmental risk assessment.

Supporting Knowledge and/or Skills

- a. Define risk assessment, risk management, and risk communication.
- b. Describe the four steps of a risk assessment.
- c. Describe how risk assessment helps in site decision-making.
- d. Define the term "Baseline Risk Assessment."
- e. Describe the process for a Toxicity Assessment.
- f. Describe the process for an Exposure Assessment.
 - g. Describe the process used to characterize risk.

ENVIRONMENTAL LAWS AND REGULATIONS

45. Decommissioning personnel shall demonstrate a working level knowledge of the development, review, and assessment of the following National Environmental Policy Act documentation.

- x EIS, Environmental Impact Statement
- x EA, Environmental Assessment
- x FONSI, Finding of No Significant Impact
- x CX, Categorical Exclusion
- x ROD, Record of Decision

Supporting Knowledge and/or Skills

- a. Describe the process for developing the listed documents.
- b. Discuss the requirements for each document and describe the process for reviewing the listed documents.

46. Decommissioning personnel shall demonstrate a working level knowledge of the development, review, and assessment of the following Resource Conservation and Recovery Act documentation.

- x Notice of Violation
- x RCRA Facility Investigation - Corrective Measures Study
- x Consent Order & Settlement Agreement

Supporting Knowledge and/or Skills

- a. Describe the process for developing the listed documents.
- b. Discuss the requirements for each document and describe the process for reviewing the listed documents

47. Decommissioning personnel shall demonstrate a familiarity level knowledge of the purpose and requirements of the Comprehensive Environmental Response, Compensation, and Liability Act.

Supporting Knowledge and/or Skills

- a. Discuss the nine criteria set forth in 40CFR300, National Oil and Hazardous Substances Pollution Contingency Plan, concerning the performance of Cleanup Alternative Analysis.
- b. Describe the requirements for public comment as they apply to the Comprehensive Environmental Response, Compensation, and Liability Act activities.
- c. Discuss the purpose and history of the Comprehensive Environmental Response, Compensation, and Liability Act.

- d. Discuss the relationship between the Comprehensive Environmental Response, Compensation, and Liability Act and all other environmental regulations, especially the relationship between CERCLA and the Resource Conservation and Recovery Act.

48. Decommissioning personnel shall demonstrate a working level knowledge of the development, review, and assessment of the following Comprehensive Environmental Response, Compensation, and Liability Act documentation.

- x Remedial Investigation Feasibility Study
- x Investigative Work Plan Report
- x Permits
- x National Pollution Discharge Elimination System
- x Record of Decision
- x Remedial Design Report
- x Remedial Work Plan
- x Consent Order & Settlement Agreement

Supporting Knowledge and/or Skills

- a. Describe the process for developing the listed documents.
- b. Discuss the requirements for each document and describe the process for reviewing the listed documents.
- c. Discuss the use of non-time critical removal action process as it applies to conducting decommissioning activities.

49. Decommissioning personnel shall demonstrate a working level knowledge of the management and negotiation of regulatory agreements and permits.

Supporting Knowledge and/or Skills

- a. Describe the responsibilities involved with the management of the following documents:
 - National Pollution Discharge Elimination System
 - Federal Facility Agreement
 - Consent Order & Settlement Agreements
 - Record Of Decision
 - Resource Conservation and Recovery Act permit parameters
 - Grant conditions
- b. Discuss the requirements and methods of negotiation for the following documents:
 - National Pollution Discharge Elimination System
 - Federal Facility Agreement
 - Consent Order & Settlement Agreements

- Record Of Decision
- Resource Conservation and Recovery Act permit parameters
- Grant conditions

50. Decommissioning personnel shall demonstrate a working level knowledge of the Resource Conservation and Recovery Act Corrective Action Process.

Supporting Knowledge and/or Skills

- a. Describe the purpose and the history of the Resource Conservation and Recovery Act.
- b. Discuss the requirements of 40CFR260, Hazardous Waste Management System - General, through 40CFR270, EPA Administrated Permit Programs: The Hazardous Waste Permit Program, as applied to the field of Decommissioning.
- c. Describe the requirements of 40CFR260, Hazardous Waste Management System - General, through 40CFR270, EPA Administrated Permit Programs: The Hazardous Waste Permit Program, in applying for and developing Resource Conservation and Recovery Act permits.
- d. Describe the requirements of 40CFR273, Subpart A applicable to the management of hazardous batteries, pesticides, and mercury-containing thermostats.
- e. Discuss how the Resource Conservation and Recovery Act applies to different Departmental facilities and sites.

51. Decommissioning personnel shall demonstrate a familiarity level knowledge of other environmental related laws and regulations.

Supporting Knowledge and/or Skills

- a. Explain the purpose and application of the following documents which may impose permitting requirements on decommissioning activities:
 - Clean Air Act
 - Clean Water Act
- b. Describe the purpose, and discuss the requirements and processes associated with the following laws and regulations not requiring permits but that may impact decommissioning activities:
 - Endangered Species Act
 - National Historic Preservation Act
 - Coastal Zone Management Act
 - Natural Resource Damage Assessment
 - Fish and Wildlife Coordination Act
 - Atomic Energy Act

COMMUNICATIONS, PROJECT CONTROLS AND EVALUATIONS

52. Demonstrate working-level knowledge of configuration management principles to satisfy the project's technical and operational requirements.

Supporting Knowledge and/or Skills

- a. Discuss the objectives of configuration management.
- b. Describe the following elements of configuration management:
 - Configuration identification
 - Configuration control
 - Configuration recording and reporting
 - Waivers and deviations
- c. Discuss the revision process for technical baselines over the life of a project, including an explanation of each of the following terms:
 - Functional requirements baseline
 - Technical requirements baseline
- d. Ensure that the configuration management and baseline change control processes are integrated.

53. Decommissioning personnel shall demonstrate a familiarity-level knowledge of the training and qualification requirements for defense nuclear facility personnel.

Supporting Knowledge and/or Skills

- a. Describe the five elements of a systematic approach to training.
- b. Discuss the relationship between training, risk, and safe facility operations.
- c. Discuss key elements of an effective on-the-job training program.

54. Decommissioning personnel shall demonstrate a working level knowledge of problem analysis principles and techniques necessary to identify problems, determine potential causes of the problems, and identify corrective actions(s).

Supporting Knowledge and/or Skills

- a. Describe and explain the application of problem analysis techniques including the following:
 - Root Cause Analysis

- Causal Factor Analysis
 - Change Analysis
 - Barrier Analysis
 - Management Oversight Risk Tree Analysis
- b. Describe and explain the application of the following Root Cause Analysis processes in the performance of occurrence investigations:
- Events and Causal Factors Charting
 - Root Cause Coding
 - Recommendation Generation
- c. Compare and contrast Type A, Type B, and Type C investigations and discuss an example of the application of each.
- d. Explain the necessity for and differences between the immediate, short term, and long term actions taken as the result of a problem identification or occurrence.
- e. Explain and apply problem analysis techniques to the identification of potential problems and/or the prevention of problems. Include data gathering techniques and the use of trending/history in your explanation.
- f. Participate in a contractor problem analysis and critique the results.

55. Decommissioning personnel shall demonstrate a working level knowledge of the requirements and criteria used to evaluate Federal employee and contractor health and safety programs.

Supporting Knowledge and/or Skills

- a. Describe the requirements and criteria for a Health and Safety Plan.
- b. Describe the requirements and criteria contained in the Occupational Safety and Health Administration (OSHA) Field Operations Manual.
- c. Describe the requirements and criteria contained in the OSHA/DOE Safety and Health Technical Manual.
- d. Describe the requirements of 29CFR1910.120.

56. Decommissioning personnel shall demonstrate a working level knowledge of financial management necessary to integrate program resources and apply those resources to meet project commitments as described in Department of Energy (DOE) Guide 430.1-1, Life Cycle Asset Management.

Supporting Knowledge and/or Skills

- a. Define the term "Work Breakdown Structure" and discuss the process for developing one.
- b. Define and compare the terms "cost estimate" and "budget."
- c. Describe the process for preparing cost estimates and budgets.
- d. Describe and compare labor and non-labor costs.
- e. Describe and compare direct and indirect costs.
- f. Discuss methods of reducing indirect costs.
- g. Discuss the importance of determining the measure for work performed before work starts.
- h. Describe methods for measuring work performed.
- i. Discuss schedule and cost variance.
- j. Given actual project management documentation and data, identify budgeted cost of work scheduled, budgeted cost of work performed, actual cost of work performed, and determine the schedule variance and cost variance.
- k. Describe the types of Earned Value and how they are measured.
- l. Explain what is meant by the term "baseline" as it relates to project management.
- m. Describe the types of data required to forecast cost and schedule performance.
- n. Define the term "Life Cycle Cost Estimate."
- o. Given sample data, calculate "Life Cycle Cost Estimate."
- p. Discuss the importance of formal change control with regard to project management.
- q. Discuss the use of strategic planning, and how such planning relates to ongoing operations and safety of operations.

APPENDIX A

CONTINUING EDUCATION, TRAINING AND PROFICIENCY PROGRAM

The following list represents suggested continuing education, training and other opportunities that are available for Decontamination and Decommissioning personnel after completion of the competency requirements in this technical Functional Area Qualification Standard. It is extremely important that personnel involved Decontamination and Decommissioning maintain their proficiency through continuing education, training, reading, or other activities such as workshops, seminars, and conferences. The list of suggested activities was developed by the Subject Matter Experts involved in the development of the Functional Area Qualification Standard and is not all-inclusive.

Based on the knowledge and experience of the Subject Matter Experts, it is suggested that [*to be determined*] learning activities per [*to be determined*] are necessary to maintain proficiency in the Decontamination and Decommissioning functional area after completion of the competencies in the Standard and other requirements of the Technical Qualification Program.

LIST OF CONTINUING EDUCATION, TRAINING AND OTHER ACTIVITIES

To Be Determined.