



Standard Guide for Developing Training Programs in the Nuclear Fuel Cycle¹

This standard is issued under the fixed designation C 986; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Keywords were added editorially in June 1995.

1. Scope

1.1 This guide covers a systematic process for the development of training programs. This approach is recommended for use within the nuclear fuel cycle. However, the steps described can be beneficially applied to the development of other technical training programs. It is particularly valuable for promoting the efficiency and safety of a complex technical operation.

1.2 This guide provides a description of the activities to be considered in developing effective training programs. It is written from the viewpoint of an industrial user. The approach is based on an operating organization (company) using its resources to develop training programs to meet that company's specific needs.

1.3 The responsible organization or individual who would perform the activities described will differ due to the unique variability in organizational structures of those applying the process. This is, therefore, not addressed in this guide. It is also not within the scope of this guide to prescribe the specific method for performing the activities.

1.4 There are many associated activities and decisions not considered such as training facility design, audio-visual resources, and documentation systems. However, to reduce the possibility of oversight, it is recommended that the user refer to "A Checklist for Technical, Skills, and Other Training."

2. Referenced Documents

2.1 *American Society for Training and Development Document:*

A Checklist for Technical, Skills, and Other Training²

3. Terminology

3.1 *Descriptions of Terms and Symbols Specific to this Standard:*

3.1.1 The following terms are presented in hierarchical order:

¹ This guide is under the jurisdiction of ASTM Committee C-26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.08 on Quality Assurance and Reference Materials.

Current edition approved Nov. 24, 1989. Published January 1990. Originally published as C 986 – 83. Last previous edition C 986 – 83.

² Available from American Society for Training and Development, Suite 305, 600 Maryland Ave., S. W., Washington, D. C. 20024.

3.1.2 *programs*—the total accumulation of training activities that prepares an individual to perform the defined duties of a particular job (that is, reactor operator).

3.1.3 *courses*—the specific portions of a training program that are designed to present certain job duties or core knowledge important to the job (that is, radiation safety, reactor cooling system).

3.1.4 *units*—the subdivisions of training courses where certain subjects related to specific duties are presented (that is, radiation self-survey, primary coolant flow).

3.1.5 *lessons*—the component parts of a course unit that present individual subject material (that is, the Geiger-Müller counter, the PC-1 coolant pump).

3.1.6 *job analysis*—the examination of a job to determine the duties, tasks, and associated activities performed in a job. The results are lists that clearly define the job in terms of what is done.

3.1.7 *task analysis*—the systematic examination of exactly what is done when performing a task (the action steps, operations, or elements), the conditions under which it is performed, and the standards for adequate performance. The product of this is a detailed description of exactly what the employee must do and how it is done.

4. Significance and Use

4.1 The purpose of this guide is to outline a generic process for development of training programs which meet the demanding requirements of the nuclear fuel cycle. The application of this process is intended to promote a training program that will be thorough, effective, and efficient in providing the knowledge and skill required for the job at hand.

4.2 The product of the overall process is a training program. Several of the steps in the process result in tangible elements that can document the process and provide a basis for independent review of the development efforts. This allows assessment of the completeness and applicability of the training program.

4.3 The process steps described here should comprise all the needed elements for an accreditable/auditable training program. However, the depth of detail pursued by an organization

is a company management decision based on individual/industry needs, standards, governmental requirements, etc.

5. Understanding the Process Description

5.1 This guide outlines a process that is divided into five major activities as diagrammed in Fig. 1. When these activities are incorporated into a dynamic training program, the ultimate objective, competent employees, will be achieved. While a sequencing is apparent, there are feedback loops throughout the process so that the program can be readily revised to fulfill any changing requirement.

5.2 The component activities are dealt with in more detail in the following section utilizing detailed diagrams for clarity. The diagrams shown in Figs. 2-6 use standard precedence logic in a vertical format with a succeeding event below those that precede it. As an additional aid to clarity, the diagrams have the activities coded to the section within this guide where they are discussed.

5.3 Many activities result in tangible products that can serve to document the activity. When this is the case, these are recommended for inclusion in the overall program documentation.

6. Process Description

6.1 *Program Definition*—This major activity is diagrammed

in detail in Fig. 2. Program definition provides the framework for all activities that follow. Careful attention to the overall intent of the training effort makes its achievement far more likely.

6.1.1 *Define Program Goals*—Training program should have goals pertaining to the overall purpose of the program. These defined goals should represent an extension of company policy and reflect laws and regulations with respect to training. Goal statements serve the following purposes:

6.1.1.1 Clarify what is to be accomplished through the program,

6.1.1.2 Provide a basis for communicating program intent to trainees, management, and others,

6.1.1.3 Establish criteria for measuring the value of development efforts that follow, that is, determining whether this activity is necessary or effective in meeting the program goal, and

6.1.1.4 Provides assessment of how this program fits into the overall company training effort.

6.1.2 *Perform Job Analysis*—A job analysis produces detailed lists of tasks performed by the workers. This provides a foundation for the content and quality of program development. The result is a description of the job essential to planning and scoping the course content and the development efforts that

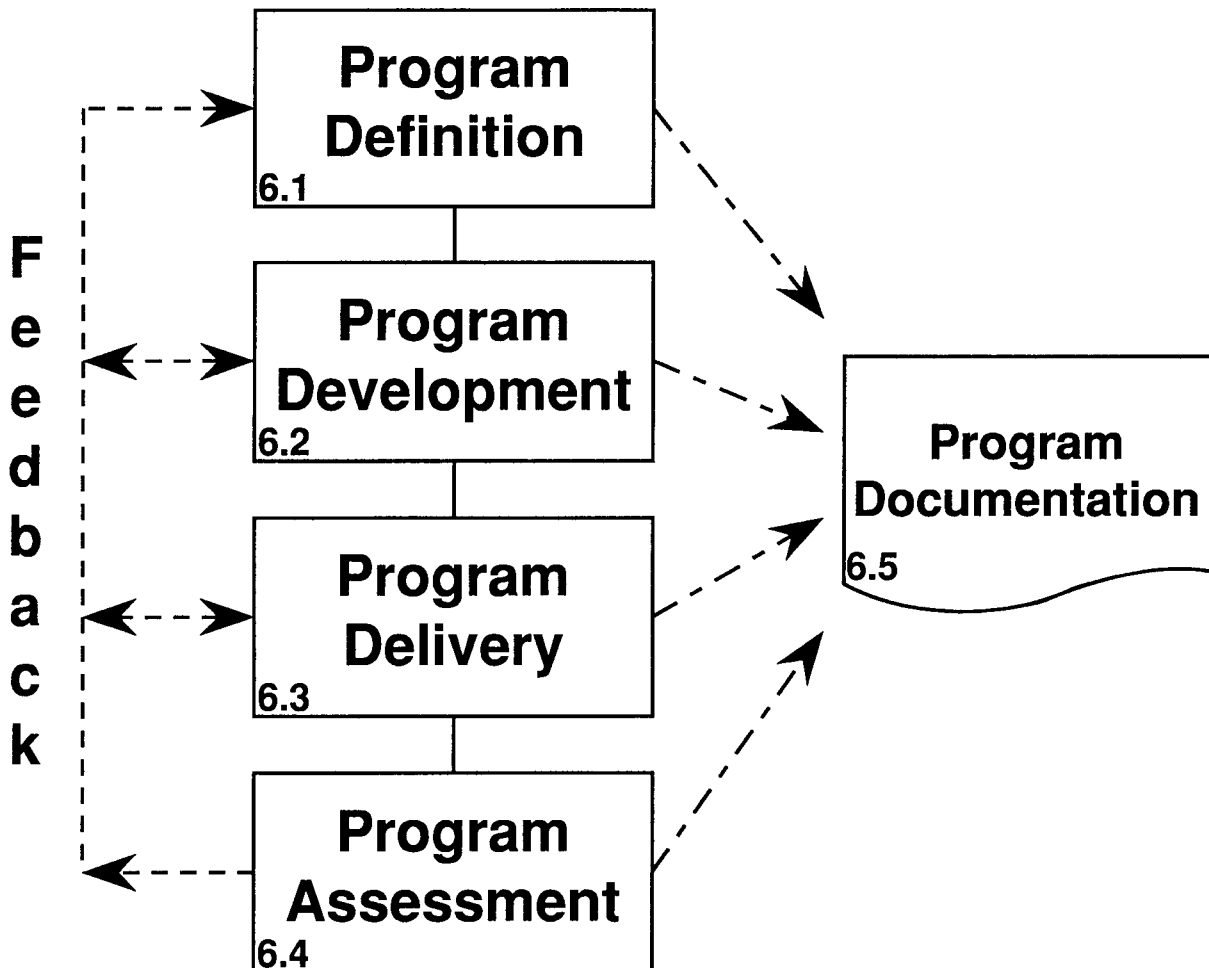


FIG. 1 Major Components

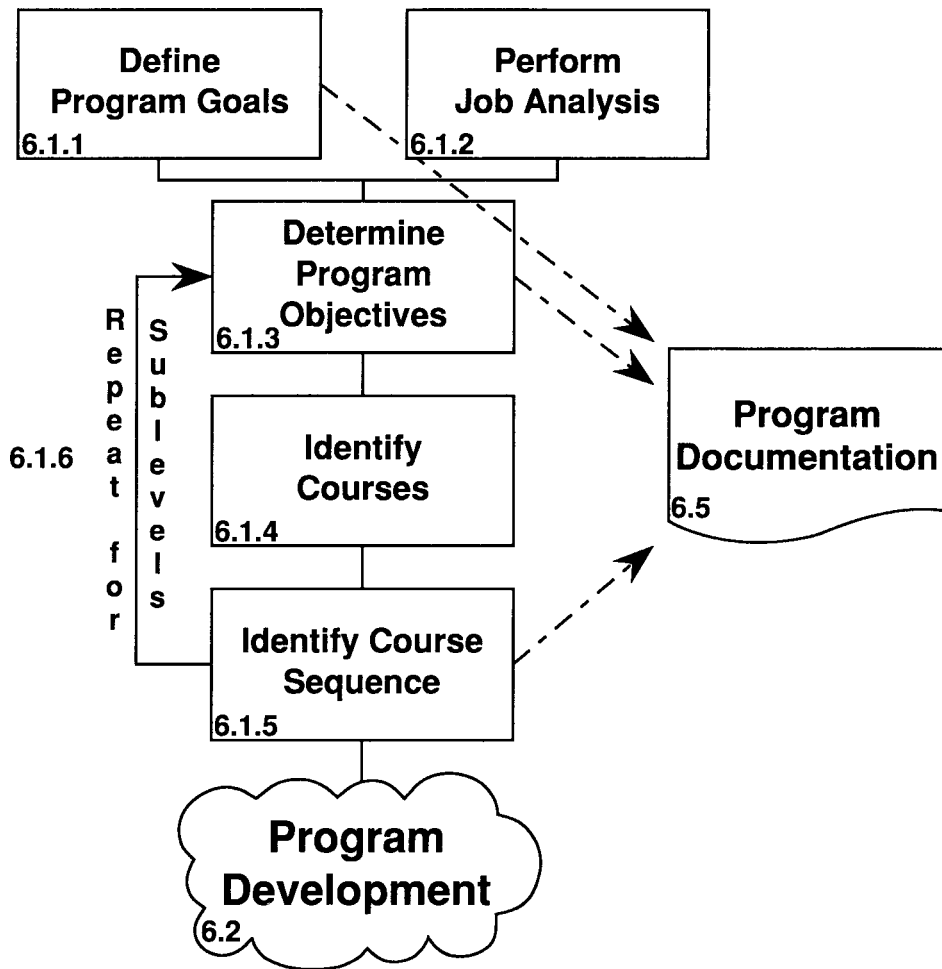


FIG. 2 Program Definition

follow. This serves to do the following:

6.1.2.1 Define what the worker does on the job, and

6.1.2.2 Determine how work activities are conducted and managed, products are produced and distributed, and how services are provided. These tasks must be carefully identified with the job title of the worker to assure that the resulting instruction provides workers with knowledge and skills for the job they actually perform.

6.1.3 *Determine Program Objective*—Program objectives should be developed that will provide a specific description of the training program criteria. As a minimum, this should include the following:

6.1.3.1 Who is to receive instruction. (It can be valuable to state physical requirements, entry level experience, and aptitude. These may become at least part of the criteria for trainee selection.),

6.1.3.2 The job assignment where the training will be applied,

6.1.3.3 The knowledge and skill the trainee should possess upon completion of the program, that is, “mathematics sufficient to perform data analysis,” and

6.1.3.4 General employment conditions that may include reference to physical, time, and operational conditions.

6.1.3.5 The program objectives should reflect the job requirements that were identified in the job analysis. A compari-

son should be made between the objectives and the identified tasks and any incongruities resolved.

6.1.4 *Identify Courses*—Courses that support the program objectives should be identified. These courses represent the first division of the overall program into more manageable parts. Generally, courses support specific skill or knowledge objectives of the program either from a subject viewpoint (mathematics), a process viewpoint (emergency shutdown), or a system viewpoint (ventilation).

6.1.5 *Identify Probable Course Sequence*—This produces an outline of the training program. The sequence logic should be evident and provide definition of prerequisite course requirements. Care in this step can avoid duplication of effort in the various courses.

6.1.6 *Repeat for Sublevels*—In Section 3, a training program was broken down into three levels of successively increasing detail. In order, these are courses, units, and lessons. In Section 6, the units appear to be omitted. This is not an oversight. The number of successive levels of detail varies with the complexity of the total program. In simple cases, only two sublevels may be necessary, where very complex programs may require more than the three shown here. In any case, the term, lesson, generally refers to the greatest level of detail from which specific instruction is conducted. The development approach shown for course development should be applied to