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Standard Guide for Acceptance, Checkout, and Pre-Operational Testing of a Nuclear Fuels Reprocessing Facility¹

This standard is issued under the fixed designation C 1010; 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.

^{€1} NOTE—Section 10, Keywords, was added editorially in November 1992.

1. Scope

1.1 This guide sets forth those criteria necessary for the acceptance, checkout, and pre-operational testing of a nuclear fuels reprocessing facility.

1.2 This guide is specifically applicable to a nuclear fuels reprocessing facility employing the Purex process; however, a large portion of this guide is also applicable to other facilities employing different processes.

1.3 This guide provides recommendations for procedure preparation, acceptance criteria following construction, training, component and systems tests, and final integrated testing. These procedures² when utilized in accordance with the prescribed quality assurance (QA) requirements should provide permanent QA records.

1.4 This guide deals primarily with the mainline aqueous/organic (Purex) sections of a nuclear fuels reprocessing facility. Operations such as fuel receipt, headend (shearing and dissolution), plutonium conversion, waste immobilization, and others of this nature are not included.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ANSI Standard:

N15.19 Volume Calibration Techniques for Nuclear Materials Controls³

3. Significance and Use

3.1 Most reprocessing facilities in existence today in the United States were designed to use the Purex solvent extraction

process, in either mixer settlers, pulsed columns, or centrifugal contactors to recover, purify, and separate uranium and plutonium from spent reactor fuel. The complexity of these plants and the nature of the material to be handled dictate the need for a comprehensive testing, evaluation, and documentation program following the turnover from construction through hot startup of a facility. The testing, evaluation, and documentation program must be tailored to meet applicable state and federal regulations.

3.2 The test program starts during the design and construction phases with approval of detail designs, specifications, construction procedures, and actual construction activities in new facilities and during the pre-planning stages for the restart of mothballed or partially shutdown facilities. An engineering staff must be assembled to establish the overall testing program and to prepare the necessary, written test programs and procedures. Early in the planning stages, a training program must be instituted to provide trained personnel for every phase of the startup.

3.3 Procedures for acceptance, checkout, and preparation for operation of reprocessing facilities are the primary subject of this guide and should be written in such a manner as to provide permanent, documented records of the test and training programs and their results. Since the plant is complex, a sequential testing program must be devised to test individual components, then individual systems, and finally, the entire plant as an integrated unit. This approach assures that all items in the plant are adequately tested.

4. Procedure Preparation

4.1 The planning for a smooth takeover and operation of the facility can only be accomplished by the development of a set of procedures (checkout, operations, administrative, etc.). These procedures will provide the assurance that all portions of the facility have been evaluated to the appropriate standard. Take care in setting up the format for these procedures so that they define the goals that are to be achieved, the limits within which the results are acceptable, and the approvals required for acceptance.

4.2 Divide the facility into small segments for procedure preparation. These segments shall follow the normal process system breakdown of the facility, as well as general facility

¹ This guide is under the jurisdiction of ASTM Committee C-26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.09 on Nuclear Processing.

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² Quality Assurance Programs should maintain the design intent of ANSI N46.211, Quality Assurance Requirements for the Design of Nuclear Fuel Reprocessing Facilities, and be conducted in accordance with ANSI N46.2, Quality Assurance Program Requirements for Post Reactor Nuclear Fuel Cycle Facilities.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.