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TRAINING PROGRAM HANDBOOK: A SYSTEMATIC APPROACH TO TRAINING

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

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FOREWORD

This Department of Energy (DOE) Handbook, *DOE-HDBK-1078-94, Training Program Handbook: A Systematic Approach to Training*, describes a systematic method for establishing and maintaining training programs that meet the requirements and expectations of DOE Orders *5480.18B, Nuclear Facility Training Accreditation Program*, and *5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*. The systematic approach to training (SAT) includes five distinct, yet interrelated, phases. These phases include analysis, design, development, implementation, and evaluation. SAT is consistent with other systematically based training systems such as performance-based training (PBT), training system development (TSD), instructional systems development (ISD), and other similar methods. For the purposes of this Handbook, SAT and PBT are interchangeable. The systematic approach method may also be used in conjunction with other DOE orders and directives that contain personnel training and qualification requirements.

This Handbook describes the more classical concept and approach to systematically establishing training programs. However, in some cases this classical approach has proven to be time- and labor-intensive, especially if excessive detail is expected. The risk and complexity associated with performance of a job or the nuclear hazard category of the facility affected may warrant the use of simpler, less detailed alternative methods to achieve results that are both satisfactory and effective. These methods are discussed in other Departmental and industry standards.

Users of this Handbook should consider the variety of training options that are available for establishing and maintaining personnel training and qualification programs. Blending classical and alternative systematic approaches to training methods often yields the most effective product. Finally, users should emphasize the fundamental goal of any training program as they use this Handbook; that is, to prepare workers to do their jobs safely, efficiently, and effectively, and to protect the work force, the public, and the environment.

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to:

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by using the U.S. Department of Energy Standardization Document Improvement Proposal (DOE F 1300.X) appearing at the end of this document or by letter.

This Handbook replaces DOE-STD-0102T, "TAP 2 Performance-Based Training Manual," of August 1993.

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ACRONYMS

DOE	Department of Energy
ECCS	Emergency Core Cooling System
ECS	Emergency Cooling System
EOL	End of Life
HP	Health Physics
KSA	Knowledge, skill, and ability
NE-1	Assistant Secretary for Nuclear Energy
OJT	On-the-job training
OR	Occurrence Report
OSHA	Occupational Safety and Health Act
P&E	Plant and Equipment
PER	Performance Evaluation Report
SD	Standing Directives
SER	Safety Evaluation Report
SME	Subject matter expert
SOP	Standard Operating Procedure
SP	Standard Practice
TAP	Training Accreditation Program
TES	Training/Evaluation Standard
TS	Technical Specifications (“Tech Specs”)

TRAINING PROGRAM HANDBOOK: A SYSTEMATIC APPROACH TO TRAINING

1.0 INTRODUCTION

The cornerstone of safe operation of the Department of Energy (DOE) nuclear facilities is personnel performing the day-to-day functions which accomplish the facility mission. Training that is conducted efficiently and effectively and is directly related to the needs of the job (i.e., performance-based training) is fundamental to safe operation. Responsibility for the safe operation of these facilities is a line-management function. Therefore, achieving performance-based training requires commitment from the organization for which training is provided. This commitment includes making subject matter experts (SMEs) available for participation in and review of the products of the performance-based training process. It also includes budgeting and scheduling the time required for both initial and continuing training. This commitment must be made by senior management from the beginning. Management must get involved at the start to ensure that they are not only cognizant of ongoing activities but are also involved to the degree necessary to thoroughly understand the process. Policies implemented and support demonstrated by senior management provide the driving force to ensure that training programs receive the attention that is imperative, if facility training programs are to be successful.

1.1 Development of this Handbook

This Handbook has been designed to assist facilities/sites/offices in their efforts to develop training programs based on the systematic approach to training (SAT) model. Information in this Handbook has been compiled from a number of sources: The Institute of Nuclear Power Operations, Principles of Training System Development; DOE Guidelines for Job and Task Analysis for Department of Energy Nuclear Facilities; and selected DOE contractor training manuals and procedures. In addition, personnel representing DOE contractors and private industry contributed significantly to the development of this process.

1.2 Handbook Description

This Handbook contains a narrative discussion on the various phases of the systematic approach to training process. The phases can be modified and incorporated as appropriate when developing detailed local procedures. Each phase is organized such that the major steps necessary to adequately complete it are clear. Figures, attachments, and illustrations are added for clarification and may be reproduced as desired.

The processes described in this Handbook represent only one of the possible approaches for the development of training programs using the systematic approach to training model. Other approaches may work equally well if they are based on a

systematic method of determining and implementing training that is directly related to the needs and requirements of the job.

This Handbook was written on the assumption that a facility/site/office is currently not using the systematic approach to training model for their training programs. However, many facilities/sites/offices do have effective training programs in place that contain many performance-based characteristics. Existing programs should not be discarded, rather systematic methods should be used to validate and supplement the content where necessary. The systematic approach also helps refine the methods of managing and implementing these programs.

This Handbook is organized into a series of sections, each section representing one of the phases of the SAT model. An overview of each of the phases follows.

1.2.1 **Analysis**. This section addresses three methods of identifying training/performance requirements: needs analysis, job analysis, and task analysis. The major outputs of the analysis phases are a task list for each position, and a task-to-training matrix.

The task-to-training matrix identifies the training disposition of the tasks identified in the task list and lists the existing materials that support task performance. Participation of subject matter experts and facility personnel is emphasized throughout the processes.

1.2.2 **Design**. The design phase uses the information collected during the analysis phase to provide a “blueprint” for developing training programs based upon the SAT model. This section of the Handbook addresses methods for writing learning objectives, setting training standards, designing tests, and preparing training plans. The major outputs of the design phase are learning objectives and test items. For existing programs, contractors are encouraged to determine if their learning objectives are appropriate, cover all required content, and include appropriate criteria and conditions.

1.2.3 **Development**. Development incorporates the results of the design activities. The major outputs of the development phase are the completed lesson plans and training aids.

1.2.4 **Implementation**. Implementation encompasses taking the results of the development phase into the training setting and conducting the training. The major output of the implementation phase is trained personnel.

1.2.5 **Evaluation**. Evaluation consists of a periodic review of the training materials and methods of soliciting feedback from former trainees and their supervisors on the effectiveness of training. The major outputs of evaluation are the decisions made to improve the training program during all phases.

1.3 Management of the Training Program

This Handbook does not contain all the material or information necessary to make a training program work. Overall policies and procedures that each organization determines necessary to develop and administer performance-based training programs are also required. These policies and procedures may be called Training Program Manuals, Training Procedures Manuals, Training Management Manuals, Training Plans, etc. Whatever its name, the document should contain procedures that govern the way the facility/site/office conducts training. For purposes of discussion in this Handbook, this document will be referred to as the *Training Management Manual*.

1.3.1 The *Training Management Manual* should formalize facility policies and procedures for training. Examples of sections that should be included in the manual follow.

1. Introduction and Organization

- Purpose and scope of the manual;
- Manual compliance requirements;
- Training program purpose and goals; and
- Organizational relationships and reporting structure.

2. Qualification and Training Program Descriptions

- Overview of qualification and training programs;
- New employee orientation or indoctrination;
- Visitor indoctrination;
- Subcontractor indoctrination and training;
- Descriptions of all training programs (individually or by groups);
- Instructor training and qualification;
- Continuing training;
- Proficiency requirements; and
- Requalification (periodic, following disqualification, lapsed qualification, etc.).

3. Training Program Material Development and Administration

- Training/Evaluation Standards;
- Checklists or qualification cards;
- Lesson plans, on-the-job-training (OJT) guides, lab guides, etc.; and
- Training aids and reference material.

4. Training Program Standards and Policies

- Academic standards;
- Examinations;
- OJT (conduct and evaluation);
- Lectures, seminars, training exercises, etc.;
- Drills;
- Signature requirements;
- Student conduct and controls;
- Disqualification procedures and policies; and
- Exceptions, extensions, and waivers.

5. Administration

- Training and qualification records;
- Selection and qualification of instructors;
- Training program development/change requests;
- Audits (internal and external);
- Evaluating training program effectiveness; and
- Control of subcontracted training.

2.0 ANALYSIS

The process descriptions contained in this section describe a systematic approach to identifying and documenting performance-based training requirements. The types of analysis used for identifying training requirements include needs analysis, job analysis, and task analysis. These analyses will provide assurance that training is the appropriate solution to performance problems and identify requirements that serve as the basis for the design and development of performance-based training programs. The process descriptions in this section will assist users:

2.1 Determine Training Needs

Training needs are initially identified by reviewing regulatory requirements and existing training programs, and/or conducting a needs analysis. These activities enable facilities/sites/offices to determine training needs originating from performance problems, regulatory requirements, and in some cases, requests for additional training or changes to existing training.

2.1.1 Further in-depth analysis need not be conducted for training requirements originating from a regulatory source [DOE Order, Occupational Safety and Health Act (OSHA), etc.], since in essence the needs analysis has already been done. These requirements are simply included and addressed in the design and development phases of the training program. Likewise, additional detailed needs analyses are not necessary for training programs that are in place and are producing the desired results. However, needs analyses are appropriate when a discrepancy exists in the performance of the job. A needs analysis should also be performed whenever changes to training or requests for new training courses are received. The analysis provides assurance that training is appropriate and ensures that it is not included elsewhere in the training program.

2.1.2 A needs analysis can identify solutions to job performance discrepancies. Substandard performance may be related to faulty equipment, inadequate procedures, attitude of the workforce, etc. Prior to developing new courses or modifying existing training programs, a needs analysis should be conducted to determine that training is the appropriate solution. Proper conduct of the analysis identifies the root cause(s) and serves as a basis for future plans to correct identified performance discrepancies. The following questions should be evaluated as part of this analysis.

1. Do performance deficiencies exist?

2. Are employees capable of performing their jobs?

3. Do they perform the job frequently?

4. Have previous employees been able to perform these jobs?

5. Are operating procedures adequate or have they changed significantly?

6. Are identified deficiencies training-related?

2.1.3 An effective needs analysis must involve subject matter experts (SMEs) such as job incumbents and supervisors who are knowledgeable of the job requirements and standards of performance. Job data collected from these sources provide insight into performance problems and valuable input into actions planned to correct them. Analysis of performance problems should follow a logical sequence and continue until the root cause is established. In general, the following sequence should be followed.

1. Identify specific symptoms of the problem clearly.

2. List possible alternative causes to the problem.

3. Investigate each alternative cause until it can be eliminated or confirmed as a contributor.

2.1.4 Circumstances generally having training-related implications may include the following.

1. Performance-based training programs for key positions are not in place.

2. The facility has a shortage of qualified personnel.

3. Major changes in job scope have occurred.

4. Changes to requirements have occurred.

5. Plant or equipment modifications are not routinely incorporated into training programs.

2.1.5 Any actions taken and decisions made during the needs analysis shall be documented. This documentation provides an important element that supports and validates the training program since a critical part of the training program records is the rationale that supports related decisions. A form similar to the "Training Needs Analysis Report" (Attachment 1) may be used to document findings and recommendations. These records should be maintained throughout the life of the training program to substantiate development efforts and subsequent modifications.

2.1.6 If a valid task list exists for a training program and a needs analysis results in the identification of additional tasks for a program, the tasks should be added to the task list. If the analysis does not result in identification of new tasks, the task list for the program should be reviewed to determine if the task titles need to be revised, or if any task needs to be changed to train or no-train (refer to Section 2.3.3 of this Handbook). If a valid task list for the program does not exist, a needs analysis may result in the development of a specific course that satisfies a training need for a specific task. This task should then be included in the task list when a job analysis when it is performed.

2.2 Develop a Valid Task List

A job analysis is conducted to develop a detailed list of duty areas and tasks for a specific job or position. It can also supply information to develop a job/position description, if desired. Job analyses also allow comparison of existing training programs to established requirements and identify deficiencies in the adequacy of program content. For existing programs, the job analysis provides reasonable assurance that all tasks essential to safe and efficient operation are addressed by the training program. It also identifies parts of the training program that are unnecessary, thus resulting in a more effective training program and more efficient utilization of resources. For facilities/sites/offices developing new programs, the job analysis provides the information necessary to identify tasks associated with the job. Training design and development activities can then be based on actual needs, as opposed to perceived needs.

All pertinent information regarding position-specific job analyses should be documented in a job analysis report, which becomes part of the training program file for each specified position. This report describes the process/methodology used to conduct the job analysis, the names and positions of individuals conducting the analysis, and the results of the analysis. The following sections provide general guidance pertaining to performing job analyses.

2.2.1 **Review Available Job Information**. The first step in job analysis is a review of available job information. This review provides input to an initial list of tasks and duty areas, and serves as the starting point for further analysis. The following are examples of the types of documents that should be reviewed.

1. Standard Operating Procedures (SOPs);

2. Group, Department, and/or Division Procedures;

3. Standing Directives (SDs), Standard Practices (Sps);

4. Technical Safety Requirements (TSR)/Standards;

5. Occurrence Reports (Ors);

6. Job Questionnaires/Job Descriptions;

7. Equipment/System Operating Manuals;

8. Existing Qualification Documents; and

9. Studies employing job or task analyses of similar jobs (e.g., DOE, Edison Electric Institute, Institute of Nuclear Power Operations, Nuclear Regulatory Commission).

Information gained from observation of job incumbents performing the tasks should be used in the review, as should any data that has been collected related to extremely effective or ineffective performance.

This review is conducted for the following reasons.

1. It enables the person conducting the analysis to better understand the nature of the job;

2. It identifies how much, if any, of the job analysis work has already been completed; and

3. It yields information to write a job description if one does not already exist.

2.2.2 **Select and Train Job Analysts**. Personnel selected to conduct the job analysis should include SMEs, supervisors for the job or position undergoing analysis, and representation from departments involved in the decision-making process. These departments may include Operations, Training, and Human Resources. Representation from these groups promotes better cooperation and understanding during and after the analysis. The persons selected should be supportive of the job analysis activity and trained in the process.

Training for those participating in the job analysis is necessary because the participants are much more likely to be knowledgeable in the details of the job being analyzed than they are in the process by which the analysis is conducted. A short course is recommended to explain the purpose, value, and methodology for collecting job analysis data.

2.2.3 **Develop the Task Listing**. In addition to the information obtained from the document review, SMEs from the prospective user group are consulted for compilation of the task lists. A task list is developed using the following general process.

1. The job is broken down into duty areas that are part of the job responsibilities;

2. Initial task lists are developed; and

3. Task statements are written to describe individual tasks.

Duty areas are groups of tasks that constitute a major subdivision of a job. They integrate specific knowledge, skills, and abilities required by the job. An example of a duty area for a reactor operator may be "the emergency core cooling system;" for a cascade operator, "the cascade compressor lubricating oil system;" and for a hot cell operator, "the cell ventilation system." Examples of tasks for the above duty areas are "Start up the emergency core cooling pump;" "Shift, inspect, and clean the lubricating oil strainers;" and "Align the ventilation system for negative cell pressure," respectively.

Task statements should be written such that they are clear, complete, concise, relevant, and stated at a consistent level. "Guidelines for Writing Task Statements" (Attachment 2) is a guide for preparing task statements and provides examples of "dos" and "don'ts" for task statement development.

2.2.4 **Validate the Task Listing**. Validation of the initial task list can be accomplished in numerous ways. A tabletop discussion using three or four SMEs, job-qualified employees, and supervisors can provide reasonable assurance that the initial task listing is accurate. Interviewing a limited number of job incumbents may also be an appropriate method. The primary concerns of the validation process are to ensure that:

1. All tasks performed are included on the task list;

2. The task statements accurately describe the tasks; and

3. Only those tasks associated with the job are included on the task list.

2.2.5 **Prepare the Survey Questionnaire**. Questionnaires are prepared for distribution to job incumbents. They are used to verify the accuracy and validity of the initial task list and identify which tasks will be selected for training. Each questionnaire includes appropriate instructions for filling out the form; a section for demographic information (personnel data); task listings appropriately grouped by functional duty areas; rating scales designed to gather information regarding the characteristics of each task; and a listing of the tools, equipment, and references for task performance. The job incumbent is asked during the survey to assign ratings in the following categories: Task Importance, Task Difficulty, and Task Frequency. The rating system is based on the criteria contained in "Task Rating System" (Attachment 3). Clear, complete instructions should be

included on the questionnaire. Attachment 4 is a questionnaire example that may be used.

2.2.6 **Select the Survey Sample and Conduct the Survey**. Questionnaires should be administered to a representative sample of the overall group, division, or department to ensure validity of response information. Considerations to be made concerning number and types of survey respondents include experience of the job incumbents, availability, and restrictions imposed by operational or production requirements. Qualified supervisors should be included in the survey. The survey sample size should be as large as possible to assure a representative sample of the prospective work group population.

2.2.7 **Analyze the Survey Results**. Survey results are compiled and analyzed by the training organization. As a minimum, the reported results should contain the following.

1. Frequency of task performance;

2. Importance (consequences of inadequate performance);

3. Difficulty of task performance; and

4. All additional tasks, identified by survey respondents, that were not included in the initial survey.

Any differences between supervisor responses and job incumbent responses are resolved during the analysis of the data. Differences may occur because of the different perspectives of the respondents and the emphasis each group places on individual tasks. Large deviations in numerical responses to individual tasks should also be investigated during this analysis. It is helpful to compile the results of the questionnaires on a form similar to "Job Analysis Tabulation" (Attachment 5). Data entered on this form are the numerical averages from all returned questionnaires (excluding supervisors). Data from the averages of the supervisor questionnaires are used to help determine the validity of the survey.

Survey results can be compiled by hand or by use of a computerized data base management system. Several software systems are readily available if a computer system is used. Before the responses are entered into the data base, each returned questionnaire should be checked to identify any problems that might invalidate responses. Upon completion of data entry, the survey data can be analyzed as desired for the overall ratings of each scale for each task. These results can then be used to determine which tasks, if any, are selected for detailed analysis.

2.3 Select Tasks for Training

2.3.1 **Develop Numerical Averaging Criteria**. After analyzing the survey results the numerical averages of the responses are used to identify which tasks will be selected for training. Tasks are selected or deselected for training using a systematic process similar to the one illustrated in Figure 1. This process involves the establishment of criteria for each category that represents tasks according to their average numeric position on the questionnaire scales (e.g., Difficulty: very, moderate, not). The numeric cutoff points should be based on consideration of the relative impact of the category on the operation concerned. Figure 1 contains example ranges for each of the categories. Normally, Task Importance and Task Difficulty have a greater impact than Task Frequency, and the outcome of the decision tree reflects this.

2.3.2 **Apply Responses to the Decision Tree**. After the criteria developed in Section 2.3.1 have been established, the numerical average of each of the tasks is inserted into the decision tree (Figure 1) and the proper path is chosen. Tasks should then be sorted into groups according to similar combinations of average difficulty, importance, and frequency ratings as shown in Figure 1. The decisions arrived at using this procedure result in a grouping of tasks along a scale so that one end of the scale contains difficult, important, and frequently performed tasks; the other end of the scale contains the easy, less important, and infrequently performed tasks. Tasks that are identified as No Train should be reviewed by subject matter experts and supervision to assure that no formal training is needed.

2.3.3 **Develop a Train/No Train/Overtrain List**. Each group of tasks, in turn, is associated with a recommendation to train, not to train, or to overtrain as follows:

<u>TRAIN</u>. Provide a combination of formal training (e.g., classroom, on-the-job, drills, simulators, etc.).

<u>NO TRAIN</u>. No Train is not to be interpreted to mean that no training at all is required. It means that no formal training (refer to Train above) is necessary; the task can be learned on the job.

<u>OVERTRAIN</u>. Provide a combination of formal training plus periodic practice of the task (retraining).

2.3.4 **Validate the Lists**. At this point, the Train/No Train/Overtrain lists should be reviewed by a committee. This review is intended to provide concurrence and/or refinement to the list of tasks identified for training. The committee should consist of representatives from training, SMEs, and management since

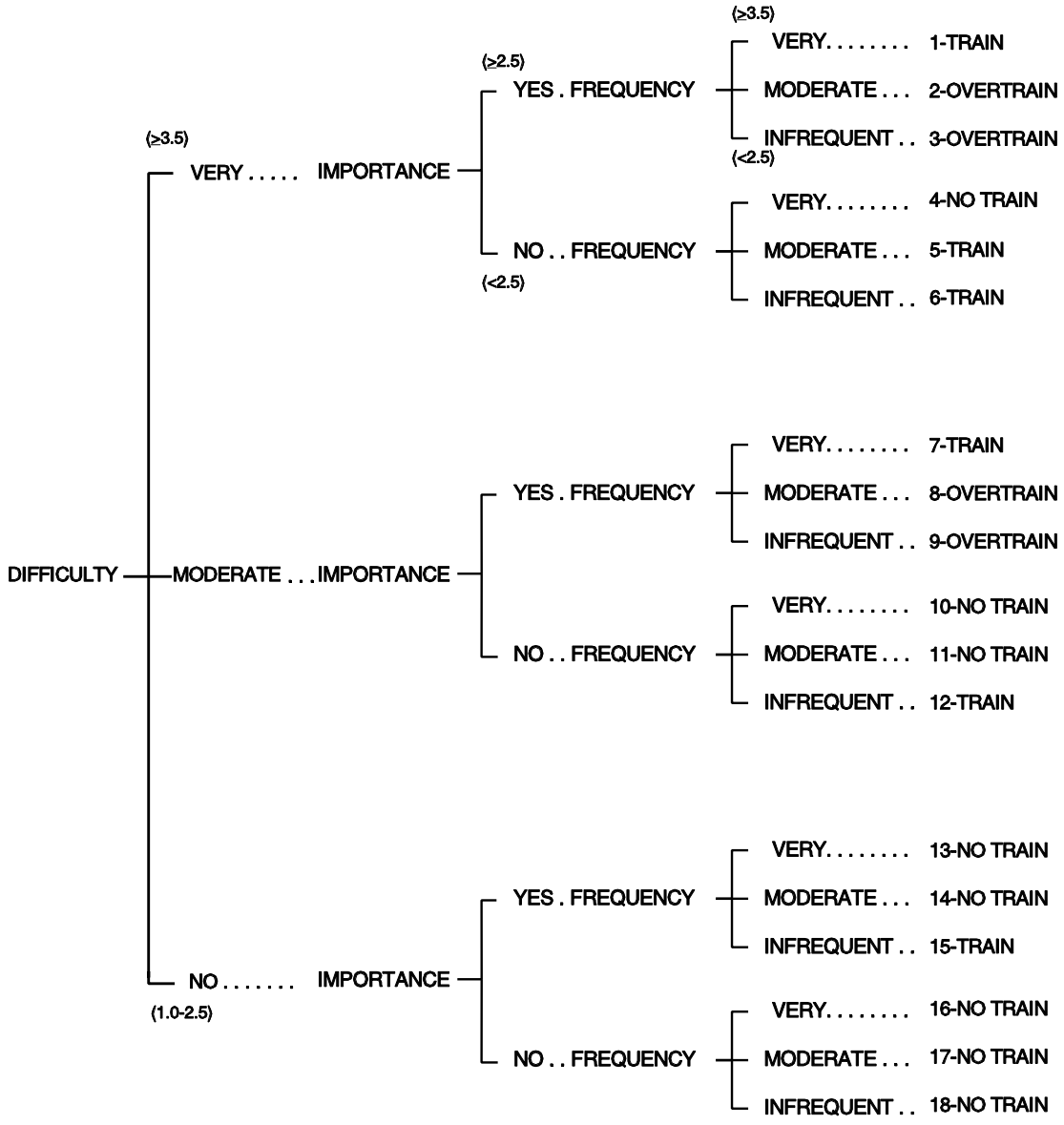

Figure-1. Criteria for Selecting Tasks for Training

decisions will be made at this point that will determine the amount of time and resources that will be dedicated to subsequent activities.

Selection or deselection of tasks for training should be based primarily on the results of the job analysis. Care should be taken to ensure that training needs are considered and training requirements, originating from regulatory sources, are included.

2.4 Prepare a Task-to-Training Matrix

The purpose of a Task-to-Training Matrix (TTM) is to provide one document that can be used to guide the maintenance of a training program. It provides a ready reference for evaluating the impact of procedure changes, criteria for selecting tasks for training, updated technical information, revised learning objectives, etc. The matrix should contain information for all tasks, whether selected for training or not. All related training and reference material should be included for the tasks selected for training. Tasks not selected for training should be listed in a separate section of the matrix and should include only related reference material. For new training programs, the matrix should be initiated following collection of job analysis data. As the later phases of the SAT are completed, additional information should be identified for inclusion into the matrix. For existing training programs, the TTM should be completed for all applicable training material (initial and continuing) and related references. This information provides the basis for analysis of existing training materials. Attachment 6, "Task-to-Training Matrix" provides an example.

2.5 Conduct an Analysis of Existing Training Material

At this point in the analysis phase, a comparison of existing training materials should be conducted. This is best accomplished using a committee made up of at least three SMEs and one or two knowledgeable people from the training organization. Existing lesson plans, lesson guides, OJT guides, and test questions, etc., should be compared to the criteria included in the process discussed in Section 3 of this Handbook to ascertain whether the existing materials are adequate.

2.5.1 Using the list of tasks selected for training, and the applicable operating procedures, review existing training materials for the following:

1. Training material exists that addresses the tasks identified for training;

2. Terminal objectives are included and are accurate and consistent with the task statement;

3. Standards for qualification are consistent with the terminal objectives;

4. Enabling objectives are included and sequenced such that they accurately reflect the knowledge, skills, and abilities necessary to perform the task elements contained in the applicable procedure; and

5. Test items (questions) accurately measure the performance under the conditions and standards required by the objectives and the procedure.

2.5.2 The outcome of this analysis places the tasks selected for training in one of three categories: training for the task is adequate, training for the task exists and requires changes, or training for the task does not exist.

2.6 Conduct a Task Analysis

Although included in this process for consistency, in actual practice, task analyses, design, and development activities normally occur concurrently for most tasks. As training is designed and developed for the tasks selected for training, each task should be analyzed to determine the knowledge, skills, and abilities required for satisfactory accomplishment of the task. Task analysts should be selected and further trained in the process.

2.6.1 Task analysis data collection forms should be developed to meet specific division/department needs. Task information to be collected includes:

1. Initial **conditions** (prerequisites) required for task performance;

2. **Standards** (criteria) for acceptable task performance (e.g., limits, ranges, time requirements);

3. Critical **elements** (steps) that must be performed to accomplish the task properly; and

4. Associated knowledge, skill, and ability statements required to perform particular elements of the task or the overall task.

2.6.2 Procedures for conditions, standards, and elements associated with a task may be referenced if the information is adequately addressed in the procedure.

2.6.3 Task analysis information may be collected by one or more of the following methods:

1. Incumbent/subject matter expert interviews using guidelines or previous task analyses;

2. In-depth procedural review; and

3. Subject matter expert consensus group meetings.

The particular method(s) used will be dependent upon manpower availability, plant production/operation requirements, and budgetary restraints.

2.6.4 When a task is large or complex, compiling key data on some type of analysis form can ensure that the required knowledge and skills are not overlooked. "Task Analysis Data Collection Form" (Attachment 7) and "Task Worksheet" form (Attachment 8) are examples of typical task analysis data collection forms.

2.6.5 Documentation collected during task analysis should be retained as part of the training course file and updated periodically as required by procedural changes, equipment/system modifications, management policy changes, and/or job restructuring.

2.7 Application of Job or Task Analysis Information

Information collected during the analysis is translated into training program requirements. Analysis data are also used to validate training program content and ensure that training reflects actual job requirements for both existing and newly developed material. The process contained in Section 3 describes the application of analysis data in the design of training programs.

2.8 Training Development/Changes

As additional training requirements are identified by user groups, requests for the development of new training materials and/or modifications of existing materials should be made. "Training Development/Change Request" (Attachment 9) is an example of a form that could be used.

2.9 Analysis Checklist

For ease in tracking activities during the analysis phase, use of a checklist is encouraged. This will allow individuals involved in the process to better plan and coordinate their activities. An example of an analysis checklist is given in "Analysis Checklist" (Attachment 10).

2.10 Key Considerations

The following key considerations should be emphasized when performing and evaluating activities of the analysis process:

1. A systematic process involving both training and facility personnel is used to analyze training needs.

2. Alternative solutions to performance problems, including training and other management initiatives, are considered thoroughly before committing resources.

3. Job performance requirements are identified through reviews of existing job data and/or surveys of workers and are confirmed by subject matter experts.

4. Clear standards and uniform methods are used to collect, analyze, and review job and task data.

5. A panel of subject matter experts is used to assist training personnel when selecting tasks for analysis and training.

6. Tasks are identified for initial and/or continuing training.

3.0 DESIGN

The approach described in this section outlines the basic processes used to design training programs that are based upon the job-related/performance-based information (i.e., training needs, task lists, tasks selected for training) collected during analysis. This section is organized into the major headings of the design process.

3.1 Write Terminal Objectives

Terminal learning objectives (TLOs) are learning objectives that clearly state the measurable performance the trainee will be able to demonstrate at the conclusion of training, including conditions and standards of performance. They are translated directly from the task statement, and provide the framework for the development of training/evaluation standards, enabling objectives, and lesson plans. Care must be taken when developing and writing learning objectives. Trainees must clearly understand them, or they are of limited use. Related terminal objectives must be written for each task statement before any other design work is begun. Refer to Attachment 11, "Guidelines for Writing Learning Objectives."

3.1.1 **Determine Appropriate Training Setting**. When writing a terminal objective, the training setting must be considered since it must be balanced against available resources and facility constraints. The training setting is the environment in which training is conducted and should be consistent with the task. Training settings include:

1. **Self-Paced Instruction**. This is any form of instruction that does not require the presence of an instructor at the training setting. However, feedback <u>must</u> be provided. Self-paced instruction can be in printed form, in audiovisual form, in the form of a kit that can be assembled or manipulated, or in the form of a computer-assisted instruction program. Training that meets the following conditions can be considered for self-paced instruction:

   - Training for the task does not require close supervision. Unsupervised training is not likely to result in injury to employees or damage to plant equipment. In addition, immediate feedback from a supervisor is not required for the trainee to achieve mastery.

   - New personnel are not required to perform the tasks immediately.

   - All conditions can either be provided in the training materials or made available in the facility when needed by the trainee. Tasks that require special facilities, conditions, or equipment

not readily available in the facility should be considered for another training setting.

- The task does not require extended periods to achieve mastery. Tasks that are very difficult or extremely difficult suggest lengthy training durations and are more suited to settings that provide supervision and immediate feedback.

2. **On-the-Job Training (OJT)**. OJT is formal training that is conducted and evaluated in the work environment. If the job permits the assignment of tasks to OJT, and a system is in place to handle the administration and testing involved in OJT, tasks can be considered for assignment to this setting. OJT has the advantage of providing continuous training on tasks that are of immediate need to the trainee. Further, OJT can continue for whatever length of time is necessary for the trainee to achieve mastery. OJT is limited to those situations where it is administratively possible to conduct the training and where OJT can be conducted without interference to ongoing facility operations. Training that meets the following conditions can be considered for OJT:

   - Assignment of trainees can be made in small groups and spread over a sufficiently long period of time.

   - There are no critical resource (manpower, material, facility availability) constraints in the plant, and multiple training conditions can be provided in the job environment.

   - Qualified personnel are available to conduct OJT.

     - If the tasks meet all the guidelines listed above, they should be considered for OJT. If one or more of the guidelines are not met, the tasks should be considered for assignment to the remaining settings.

     - It should be noted that for each job position there may be certain "must perform" items. The OJT setting is a preferable setting to adequately train and assess performance.

3. **Simulator**. Training that is conducted in or on a device that duplicates the physical appearance; operating conditions during normal, abnormal, and emergency conditions; and indications associated with the actual work environment. This setting, though expensive, is suited for training tasks requiring a high degree of trainee-system interaction, but for which OJT is not appropriate. For example, some of these tasks are

performed infrequently and would not be encountered normally in the course of OJT. Tasks that meet the following conditions can be considered for simulator training:

- Similarity to the actual task is required for the trainee to achieve mastery.
- Problem diagnosis under stressful situations is an integral part of performance.
- Teamwork is an important part of the task.
- Training of the tasks in the OJT setting would interfere with ongoing facility operations, would introduce unnecessary safety hazards, or would not be encountered in the course of normal job operations.
- A simulator exists or can be obtained that sufficiently resembles the physical and operational characteristics of the facility.
- The physical performance skills and system interaction components of the tasks are sufficiently great to require a fair amount of repetitious practice.

4. **Laboratory/Workshop**. Training that emphasizes hands-on practical experience in a controlled environment, but which is not necessarily conducted at the actual job site. Laboratory/workshop training should be considered if multiple job conditions (environment, system, equipment, etc.) are required for task performance. Laboratories and workshops permit application of course material by the trainees in a hands-on environment. They are particularly effective when used to train basic skills that support task performance. Training that meets the following conditions can be considered for laboratory/workshop instruction:

   - Tasks, elements, and skills require hands-on practice to achieve mastery.
   - Constraints exist that make OJT impractical.

5. **Classroom**. Training presented to groups of various sizes, typified by stand-up lecture, seminar, or group interaction. Classroom instruction works well for presentation of fundamental and basic theoretical knowledge. Because a classroom training setting does not replicate on-the-job conditions, it is recommended that a combination of

classroom and other settings be used in the course of instruction. Training that meets the following conditions can be considered for classroom training:

- Large quantities of information will be presented during training.
- A large group of trainees will be scheduled for training at a given time.
- Other training settings are not suitable or available.
- There are no critical resource constraints. (Everything required for training can be provided at the classroom facility.)

When evaluating the design of an existing training program or addressing a performance deficiency, determine if the current training setting for the task is the best instructional choice. If it is not, it may be necessary to select another training setting and/or modify the learning objectives and lesson material to incorporate the setting selected. For new programs, evaluate each setting and select the setting most consistent with the task, taking into account available resources and facility constraints. Write the terminal objective based on the task and the setting.

3.1.2 **Sequence the Terminal Objectives**. All terminal objectives for tasks identified for inclusion in the training program must now be sequenced and organized into instructional areas. Objectives are normally sequenced from simple to complex. The sequence should allow each terminal objective to build upon and provide information necessary to support the next terminal objective within that instructional area. They should be sequenced in a logical progression which takes into account the level of learning that must take place in order to build to the next objective. This will ensure the entire training program is sequenced correctly.

3.2 Develop Training/Evaluation Standards (TESs)

After the terminal objectives have been written, it is necessary to ensure that when training materials are developed they are directly linked to the objectives. The development of a Training/Evaluation Standard (TES) can help to ensure that this vital link is maintained. The purpose of the TES is to provide the basis for the development of objective-based training materials and to maintain consistency in the evaluation of student performance. Each TES is directly related to a specific job task (or group of very similar tasks) identified during job analysis.

The TES contains two sections; Training and Evaluation.

1. The Training section contains the task title and number, the terminal and enabling objectives, and the applicable references. The information contained in this section will form the basis for the training development activities that follow.

2. The Evaluation section contains a performance test that includes prerequisites, amplifying conditions and standards, and instructions to the trainee and the evaluator. This performance test is used to measure the adequacy of a trainee's performance on a particular job-related task. There are several names used for the evaluation section of this standard, each varying in format and degree of documentation (e.g., job performance measures, qualification standards, and OJT checklists). The evaluation section of the TES can also be used to evaluate the performance of existing job incumbents. Incumbents may not have had the opportunity to participate in the newly developed performance--based training program. By evaluating their performance using the performance test in the TES, the merit of prior training can be assessed, and appropriate remedial training can be assigned if necessary.

It is during the development of the TES that the majority of task analysis occurs, since many of the knowledge and skill requirements for task elements are identified while writing these standards. The advantage of performing task analysis at this point is twofold.

1. It reduces unproductive data gathering by providing early determination of entry-level requirements and course prerequisites. This results in the generation of a set of enabling objectives that can be provided to a training developer.

2. A document is generated that establishes the performance requirements necessary to evaluate trainee task performance.

Placing task analysis data into a computer data base will greatly facilitate the construction of a TES. A computer program could easily sort the data and print it out in the desired TES format. Also, the data base could be utilized to sort and organize the knowledge, skill and abilities (KSAs) and objectives to identify areas of commonality, and to group-related KSAs or objectives for ease of sequencing.

The TES can be formatted several ways, but should include the following components at a minimum:

1. **Task Number and Title** - Unique number and task statement from the Task-to-Training Matrix;

2. **Terminal Objective** - Derived from the task statement;

3. **Enabling Objectives** - Derived from the knowledge and skills identified during task analysis;

4. **References** - Applicable procedures, technical safety requirements, etc., related to task performance;

5. **Performance Test** - Designed to measure mastery of the terminal objective;

6. **Prerequisites** - List of qualifications, courses of instruction, etc., that must be completed prior to administration of the performance test;

7. **Amplifying Conditions and Criteria** - Provide clarification or amplification of the conditions and standards stated in the objectives;

8. **Instructions** - Clear instructions to the trainee and the evaluator on how to use the standard; and

9. **Approval Signature** - Appropriate signature and the date the performance test is approved.

Each TES can either stand alone or be incorporated into a larger document for ease of reference, recordkeeping, and training program description. An example of this type of document, for a single task, is found in Attachment 12, "Sample Training/Evaluation Standard (TES)."

The following steps are performed when developing the TES:

3.2.1 **Determine Testing Limitations**. The first step is to review the task and terminal objective to determine potential testing constraints. The testing must reflect the stated terminal objective. Constraints include availability of time, limited work force or equipment, and inadequate resources. If performance of an entire task would impose unreasonable demands on facilities or equipment, develop the evaluation portion of the TES using a sample of the task elements.

If actual task performance is not feasible due to limitations, simulation of the task should be considered. It is important to recognize that a "best approximation" for a standard of performance is not always adequate. Key portions of a task must be "perform" items whenever existing facility conditions permit.

3.2.2 **Determine Elements of the Task to be Tested**. Step two is where task analysis begins. The process of task analysis has often been an invisible activity that is performed by an instructor. In many cases, this method of

analysis is adequate and has resulted in enabling objectives and appropriate training content. However, visible task analysis information can help to ensure that key information will not be overlooked when developing training or performance tests. To aid in this endeavor, forms on which to compile task analysis information can be very useful when tasks are complex, lengthy, or unfamiliar to an instructional developer. There are a variety of forms available that will satisfy the user's needs. Attachment 13, "TES Development Worksheet" is a form that will not only provide space to collect key elements and KSAs but also provides space to identify KSAs as entry-level and write enabling objectives.

Begin by listing all of the task elements on Attachment 13. If an adequate procedure exists for the task, it may not be necessary to list the element description on the worksheet. In this case, it would be appropriate to list the element number from the procedure. If it is determined that, due to testing constraints, complete duplication of the task in the TES performance test is unrealistic, then the elements of the task should be examined. Elements that include important decision points can be used to measure successful performance of the entire task. Those key elements would then be listed on the worksheet.

3.2.3 **Identify Knowledge, Skills, and Abilities (KSAs)**. Using the list of all task elements, it is now necessary identify the KSAs required to perform those elements. Attachment 15, "Completed TES Development Worksheet" provides an example of how the TES Worksheet may be used to record this information.

3.2.4 **Determine Entry-Level Requirements**. In every training program, the entry-level KSAs of the trainee must be considered. By properly establishing the entry-level requirements, new learning will be based upon what the trainees already know, and the trainees will not be wasting time on objectives they have already mastered.

The entry-level requirements should be based on a familiarity with the general level of KSAs of the trainees, and by a careful review of documents such as job descriptions, position descriptions, or personnel qualification requirements. The entry-level requirement should be set at a point where most trainees have the required KSAs. Any required KSAs that the trainees do not possess upon entry will have to be taught as part of the overall training program. Remedial lessons may be necessary for those trainees who do not meet the entry-level requirements.

One way to determine entry-level is to develop and administer an entry-level test. This test can determine if personnel meet the entry-level requirements, and serves to focus the training at the appropriate level. This can be

especially helpful when evaluating an existing program since it allows comparison of existing job incumbent training level to the desired level.

It should be noted that entry-level testing is optional and can be affected by contractual agreement. It is essential, however, that a system be in place to enable verification that trainees meet the established entry-level requirements. The system should include a course of action for those personnel who fail to meet the requirements.

3.2.5 **Determine Amplifying Conditions and Standards**. The conditions and standards stated in the terminal objective may need further clarification to allow proper evaluation of task performance. For this reason, any additional conditions or standards that serve to amplify the terminal objective or individual task elements should be listed in the TES. Care should be exercised to ensure that the additional conditions and standards do not change the intention of the terminal objective.

Ideally, the conditions and standards applied during training and testing should be identical to those existing during actual task performance. However, if some testing constraints were determined to exist, the conditions and standards used during training will be a compromise. Although a compromise, the conditions and standards applied during training and testing must be designed to be the best possible assessment of the trainee's ability to perform the task under actual conditions.

3.2.6 **Write Enabling Objectives**. Enabling objectives are learning objectives that support the terminal objective. They include the critical components of performance, conditions, and standards. Enabling objectives should be written directly from the KSAs required for element performance. Any identified KSAs that are not included in the entry-level requirements must be incorporated into an enabling objective. See Attachment 11, "Guidelines for Writing Learning Objectives," for information on how to write learning objectives.

Enabling objectives should be sequenced logically, moving from simple to complex, and from lower to higher levels of learning. Often, the required sequence will drive the outline and content of the lesson plan and other training material. If TESs are developed for all tasks identified for a particular training program, enabling objectives that are common to several tasks may be grouped into one lesson of instruction. This grouping can increase the efficiency and cost effectiveness of a training program by reducing duplication. For this reason, a computerized system that can sort by enabling objective title can be invaluable.

When evaluating an existing program or a performance deficiency, identify which enabling objective(s) support each terminal objective. Each should then be evaluated for correct standards and conditions of performance, for clarity and conciseness, and for support of the terminal objective.

3.2.7 **Determine Scoring Methods**. Scoring methods are determined when constructing the evaluation section of the TES. In some evaluation standards, referenced procedures may provide detailed, step-by-step descriptions of required performance, and therefore provide an effective scoring method. Another method is to prepare a performance checklist that incorporates the action steps or elements of task performance. The trainee is required to follow each step, usually without deviation. See Attachment 12. For other tasks, where strict adherence to procedural sequence may not be required, the product of performance (i.e., a tangible result) can provide a measurement of successful task completion. When developing the TES, scorable items must be clearly defined to distinguish between satisfactory and unsatisfactory performance.

After completion of the TES development, a review of the TES should be done to ensure that it includes the desired characteristics. For an example, see Attachment 14, "TES Review Checklist."

3.3 Develop Test Items

Test items are developed to be consistent with the learning objectives. The purpose of the test item is to measure trainee performance against the criteria stated in the learning objective. The test item development sequence is as follows:

3.3.1 **Determine Test Item Format**. Test items are developed from the learning objectives to measure trainee skills, recall, and/or application of information. Test item formats that are preferred in a performance-based system include performance, completions/short answer, multiple choice, matching, alternate choice, and drawing/labeling. Other test item formats may have applications in specific situations.

Selection of test item format is guided by action verbs of the learning objectives. Action verbs of the learning objectives suggest one format to be more appropriate for use in testing than others.

1. Skill action verbs suggest a performance test format, and knowledge action verbs suggest one or more of the written formats. For example, "start" and "shut down" are skill actions verbs that suggest a performance test format.

2. Completion/short-answer format is appropriate for many knowledge actions verbs, including "recall," "identify," and "list."

3. Action verbs such as "discriminate" and "select" should be tested using a multiple choice format.

4. Learning objectives that require the student to "classify" or "relate" should be tested in the matching format. See "Test Item Formats" (Attachment 16) for guidelines of test characteristics.

3.3.2 **Determine the Number of Test Items to be Developed**. The appropriate number of test items for each learning objective depends on a number of factors. Although at least one test item must be developed for each learning objective, certain considerations justify development of more than one test item for a given learning objective. For example, tasks used to develop the learning objectives that were rated at or near the maximum scale of importance and/or difficulty would suggest a larger number of test items than those tasks rated near the minimum scale.

3.3.3 **Develop Skill and Knowledge Test Items**. Test items should be written after the format is selected and the number of test items is determined. Test items must have answer keys written at this time.

3.3.4 **Validate Contents of Test Items**. Content validation is the process by which test items are determined to be sound and incontestable as to meaning and correct answer. Each test item should be reviewed by at least three subject matter experts. Each should agree on what the test item is asking and the correct response. These validation reviews should be documented.

3.3.5 **Incorporate Items into Test Bank for Future Use**. A test item bank should be developed and maintained current. The items in the test bank will be used in the future to construct entry-level tests, preinstruction tests, progress tests, or after instruction tests. A tracking system should be developed to correlate test items to the corresponding learning objective.

3.4 Construct Tests

The construction of tests at this time is optional. However, tests must be constructed prior to implementing the training program. Tests are a form of evaluation that instructors can use to measure the results or effectiveness of their stated objectives. Test items should be constructed and scored in an objective, rather than subjective, manner. An objective test can be scored without the exercise of personal opinion. The length of a test should not exceed the number of test items which could be answered in two hours by the average trainee. This may require assembling several

tests for a given instructional area. The following steps are involved in the development of tests:

3.4.1 **Develop Test Specifications**. Learning objective levels are broken down into three levels: knowledge of facts, terms, and symbols; comprehension of principles and concepts; and application of information, principles, and concepts. Tests should have the appropriate number and mix of test items based on the importance of each area being tested and the level of learning objective. For example, if 50% of the learning objectives are written at the comprehension of principles level, and the majority of test items used are knowledge of facts, terms, and symbols, then the test is not representative of the learning required. Learning objectives that are more difficult to master and critical to job performance should have more test items represented on the test. The test specification is developed so that these concerns are addressed. See "Sample Test Specification Form for 50-Item General Employee Test" (Attachment 17).

The completed test specification should be reviewed by subject matter experts and facility management. This review can help to ensure that a sufficient number of learning objectives are tested to predict performance.

3.4.2 **Assemble the Test**. Tests are assembled using the following general guidelines:

1. Select the appropriate test items based on the test specifications;

2. Group test items with the same format together;

3. Group items of similar content together to help the concentration of the test taker;

4. Design the format of the test to have a place for the trainee's name, clearly marked page numbers, sufficient space between the questions, and clear distinctions between the different sections;

5. The test key should be prepared when the test is constructed. This is especially important for essay and short-answer questions;

6. Test directions should be written clearly and included on the test. A model answer may help to clarify directions;

7. Point allocations for each answer should be indicated and consistent with importance of the learning objective that the test item is testing; and

8. The content of the tests should be changed from one exam to the next so they are not compromised.

3.5 Write Training Development and Administrative Guide

A Training Development and Administrative Guide should not be confused with the facility's *Training Management Manual* (see Introduction) which outlines the facility training policies and procedures that guide the development of all training. A Training Development and Administrative Guide is a management tool for the administration of an individual training program. It is used to gain management approval of the program and guide development and implementation efforts. Though not part of this guide, additional specifications may be developed to clarify and detail the required characteristics of individual courses or lessons. Approval should include training management and the management of the organization for which the training is being developed. An example of this guide is in the Sample Training Development and Administrative Guide (Attachment 18).

The Training Development and Administrative Guide is not intended to be a large document. However, inclusion of the course outline could require several pages. The example outlined in Attachment 18 is just a few pages from each section of an outline, which is 21 pages in length. The rest of the document should only be a few pages in length. It should have appropriate signatures indicated for review and approval.

The following discussion outlines the major steps in developing procedures for the guide.

3.5.1 **Determine the Training Organization and Administrative Responsibilities**. Each contractor should have training responsibilities established as a guide for personnel that are responsible for various portions of the program. Typical questions to be answered are:

1. Who will develop the lesson material?

2. Who will perform reviews of material and when?

3. Who will present the material and document it?

4. What are the interfaces between the training personnel and the referent organization?

3.5.2 **Determine Course Loading and Scheduling Requirements**. These are determined by using training requirements identified during the analysis phase and the projected availability of new and existing facility employees who will require training. Course loading and scheduling should be based on the

availability of qualified instructors, capacity of facilities, and availability of equipment.

3.5.3 **Establish Trainee Evaluation Guidelines**. Evaluation criteria should provide for testing, placement, recycling, remedial training, and follow-up evaluation during on-the-job performance. Trainee evaluation guidelines should address the following:

1. Basis and method for exception from parts of the training program;

2. Evaluation method of trainee performance throughout the program;

3. Guidelines for disposition of trainees whose performance is unsatisfactory;

4. Provisions for counseling and remedial instruction, recycling to earlier segments of training, or removal from the program when appropriate; and

5. Evaluation of trainee comprehension and retention of material (i.e., using a post test).

It should be noted that several of the items above may be addressed in the facility *Training Management Manual*. Therefore, they would not have to be included in the guide, but should be referenced.

3.5.4 **Specify Required Instructor Qualifications**. Determine instructors' qualifications based on the training program needs. Qualified trainers, subject matter experts, job incumbents, or others should be utilized as appropriate. See the Guide to Good Practice for Training and Qualification of Instructors, DOE-NE-STD-1001-91.

3.5.5 **Determine Required Training Resources and Facilities**. To ensure that facilities and resources are available to support training activities, the guide should address physical facilities, equipment, and reference materials.

1. Physical facilities and equipment include the following:

- Classroom facilities;
- Laboratories and workshop facilities;
- Simulators;
- Audiovisual aids and equipment;

- Tools and equipment; and
- Office space and furnishings.

2. Technical reference material should cover topics at a level appropriate for the program, instructor, and trainee; should be applicable to facility systems and equipment; and should be current with facility modifications.

3.5.6 **Prescribe Test Administration Guidelines**. These guidelines should include the following:

1. Security, including accountability of test items to avoid compromise during reproduction, storage, use, and evaluation;

2. Prior notification to trainees of materials needed for the test and the procedure to be followed during the test;

3. Testing instructions to the trainee that include purpose of the test, importance of following test item instructions, time limitations, and special instructions for the answer sheet;

4. Development and use of answer keys;

5. Evaluation of test results using training standards established during test item development;

6. Disposition of test results, including review with and counseling of trainees; and

7. Provisions to vary the content of tests to prevent compromise.

3.5.7 **Establish Supplemental Training Record Requirements**. This should include retention periods and entry and retrieval procedures to provide the following:

1. Records relating to training programs that permit review of content, schedule, and results of past and current programs; and

2. Individual trainee records that include a history of trainee performance and permit verification of required qualifications.

3.5.8 **Develop the Course Curriculum Outline**. This outline serves as a guide for development of course material. It outlines, by training setting, the learning objectives in the prescribed sequence.

3.5.9 **Prepare the Development and Implementation Schedule**. Course, unit, and lesson objectives should be organized and scheduled. A schedule should be prepared to define the milestones for development and implementation activities. A simple milestone bar chart (e.g., Gantt Chart) to indicate major activities is sufficient.

3.6 Key Considerations

The following are key considerations that should be emphasized when performing and evaluating activities of the design process:

1. Training/evaluation standards contain job-related data for measuring task performance;

2. Selection of training settings considers task, instructional, resource, and logistical constraints;

3. Learning objectives are used to identify training content and satisfactory trainee performance;

4. Learning objectives identify observable and measurable trainee action or behavior;

5. Test items are appropriate for the learning objectives;

6. Learning objectives are compatible with expected entry-level skills and knowledge of trainees;

7. Learning objectives are sequenced to assist trainees in making the transitions from one skill or knowledge level to another;

8. Pretests are developed to determine trainees' entry qualifications and to identify remedial training and exception requirements as applicable;

9. Progress tests are developed to evaluate trainee performance and determine the need for additional assistance;

10. Post-tests are developed to measure trainees' satisfactory completion of training; and

11. Training standards for evaluating trainee test performance are established.

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4.0 DEVELOPMENT

This section describes the processes used to develop training programs that are based upon job-related performance-based information (i.e., training needs, task lists, tasks selected for training) collected during the analysis phase and the work accomplished (learning objectives, tests, Training Development and Administration Guide) during the design phase. The development process includes the following.

4.1 Select Training Methods

Training methods selected should be based on the objectives and settings for the course. Training methods are techniques of communicating instructional material to trainees. They include lecture, demonstration/practice, discussion/facilitation, oral questioning, role playing, walk-through, and self-pacing. Characteristics of each of these methods are found in "Training Methods" (Attachment 19).

Although discussion and oral questioning have general application in all training settings, other methods are more effective in certain training settings. For example:

- Lecture generally is considered more appropriate for the classroom;
- Demonstration and practice applies primarily to on-the-job training (OJT) and laboratory and simulator training, although it can also be used in the classroom;
- Role playing is particularly effective during simulator drills and exercises that involve team training;
- Walk-throughs serve to enhance training that is conducted in training settings where the job environment is simulated; and
- Self-pacing is a method generally reserved for self-study.

4.2 Develop Lesson Plans

Lesson plans are detailed expansions of the curriculum outline that ensure consistency in the delivery of training from instructor to instructor and from student to student. They are used by the instructor as the primary training tool to guide the learning process and utilization of training materials. Lesson plans identify the learning objectives, content, learning activities, training equipment, and training materials needed for training and provide guidance for their use. In addition, properly developed lesson plans perform the following functions:

- Provide a degree of standardization of instruction;

- Present a logical, sequential listing of content;
- Prevent over— as well as under-emphasis of selected content;
- Force instructors to analyze content prior to presentation;
- Offer a ready format for revision;
- Provide a record of contents presented;
- List aids, equipment, and references used; and
- Provide continuity between the lessons presented within a specific course, especially when several instructors are involved.

4.2.1 **Develop Lesson Plan Format**. The first step in lesson plan development is the determination of format. Instructor and trainee activities should be planned so they occur at the proper stages in the learning process. Once a standard format has been established, it should be used for all lesson plans. This standard format should be specified in the facility *Training Management Manual*, discussed in Section 1.0 of this Handbook. See the forms "Sample Lesson Plan Format—Classroom," "Sample Lesson Plan Format—OJT," "Sample Lesson Plan Format—Simulator" (Attachments 20 through 22, respectively) for sample lesson plan formats. While the printed design or format of a lesson plan may differ, the lesson plan should include the following:

1. Cover Page

   - Labeling Information

     - Course Title and Number - A title and a number unique to that lesson plan
     - Lesson Title - A title descriptive of the content
     - Lesson Time - Approximate duration of the lesson
     - Author - Individual who wrote or last revised the lesson plan
     - Review and Approval Signatures
     - Date - Date lesson plan was approved or last revised
     - Revision Number - Current revision number;

   - Terminal and Enabling Objectives - The learning objectives for the lesson;

- Training Aids and Material Used - A list of all support material and tests used during instruction with this lesson plan;

- References - All pertinent references used to support the content of the lesson plan (inclusion of page and paragraph for text material is helpful); and

- Prerequisites - Any courses, classes, qualifications, etc., required prior to beginning this instruction.

2. Historical Record Form

   - A section which includes documentation of the changes made to a lesson plan, why they were made, and who made and approved them. See "Training Materials Historical Record" (Attachment 23).

3. Presentation Content

   - Introduction - A section which includes the purpose of the lesson, the training session conduct and administration (i.e., breaks, smoking policy, outline of activities), and a statement of the learning objectives;

   - Body - The lesson content, trainee, and instructor activities; and

   - Summary - A highlight of important points and review of learning objectives.

4.2.2 **Write Content and Specify Learning Activities**. The second step of lesson plan development is the writing of content and learning activities. Although writing the content of the lesson plan and specifying the learning activities can be classified as separate activities, they occur concurrently when developing a lesson plan. Instructor and trainee activities should be planned so that they occur at the proper stages in the learning process. To ensure this proper timing, content can appear on one half of the page and activities on the other. Guidance for instructor activities is provided in "Instructor Activities" (Attachment 24) for the following items:

1. Gaining and maintaining attention and motivating the trainee;

2. Informing the trainee of the learning objectives;

3. Electing recall of prerequisite knowledge;

4. Presenting the training material;

5. Providing learning guidance;

6. Electing mastery of the learning objectives;

7. Electing performance feedback;

8. Evaluating trainee performance; and

9. Enhancing retention and transfer of training material.

The content of the lesson material is derived from the elements of the enabling objectives. Developers should use the training standard portion of the Training Evaluation Standard that was developed during the design phase as a rough outline for the development of this content. The sequenced enabling objectives can be used as the content headings in the body of the lesson. Using enabling objectives this way will aid in review, approval, and auditing of the lesson plan. However, a simple outline of the material is not considered adequate for instructional content because an outline is too brief and leads to subjective instruction which does not assure need-to-know information will be covered. Therefore, the outline should be developed in sufficient depth to assure mastery of the learning objectives and coverage of all test items being used for trainee evaluation. Some enabling objectives or portions of enabling objectives require activities to make the content more easily understood. "Instructor Activities" (Attachment 24) provides appropriate instructor activities for the introduction, body, and summary sections of the lesson. Trainee activities should be selected from methods listed in "Training Methods" (Attachment 19). The methods should be selected based on the characteristics described in the attachment, the learning needs of the students, and the learning objectives.

When revising an existing training program each lesson plan should be evaluated to assure proper format, instructional continuity, and depth of content. Existing lesson plans should not be discarded or considered inadequate until they are thoroughly reviewed. See "Lesson Plan Checklist" (Attachment 25) for a checklist to be used when reviewing lesson plans.

4.3 Develop Training Support Material

Training support materials refer to training equipment, audiovisual media, and printed material. When selecting or developing training support materials, the type of material is influenced by the learning objectives and method of instruction. Materials should support the learning objectives and emphasize job-related information and situations. The lesson specifies what training materials are required and when. A

guideline for incorporating training material into the lesson is found in "Training Media" (Attachment 26). The following steps are performed when developing training materials.

4.3.1 **Specify Use of Audiovisual Media**. The use of audiovisual media in presenting course material can help maintain trainee interest, motivation, and improve training efficiency and effectiveness. Media to be considered include simulation, computer-aided instruction, film or videotape, sound slide or film strip, audio recorder, transparencies, and written handouts.

The characteristics of a learning activity may suggest that a medium with certain audiovisual capabilities will be more effective in displaying or transmitting the desired information to the trainees. These characteristics (visual, visual movement, exact scale, audio) are summarized in "Learning Activity Characteristics " (Attachment 27). Each learning activity must be analyzed to determine which of the characteristics should be reflected in the audiovisual capabilities of the medium. These four characteristics are not independent and combinations of them may be needed to display or transmit the information effectively.

The media selected should be evaluated in terms of cost and practicality of use in the training program. Factors to be considered in these evaluations include:

1. Projected life-cycle costs of the selected media;

2. Budgetary resources available, particularly if the media requires a substantial capital investment;

3. Appropriateness of the media for the number of trainees to be trained at a given time;

4. Frequency of changes to media;

5. Compatibility with existing programs; and

6. Lead time required to produce the media.

4.3.2 **Review and Select from Existing Materials**. Developing effective training material requires creativity and is both costly and time-consuming. Adopting or modifying existing material can reduce training development costs. Existing course materials should be collected and reviewed to determine if they meet in whole or in part the needs of the training program. Review criteria for existing materials is found in "Existing Material Review Criteria" (Attachment 28). Material selection should be based on an evaluation of existing material against the following criteria:

1. Is it appropriate to expected trainee entry-level skills and knowledge?

2. Does it cover the learning objectives?

3. Is it consistent with learning activities?

4. Is it compatible with the Training Development and Administration Guide for the program?

The review and analysis of existing course material will identify materials to be rejected, materials to be accepted without revision, and materials to be revised. The materials that are suitable without revision should be incorporated into the development process. Material needing revision should be modified as described in the following section.

4.3.3 **Modify Existing Training Materials**. Modifying existing training materials can minimize development time and conserve resources. The modification process can involve two approaches: revision of existing training materials that are free of copyright restrictions, or preparation of supplementary material for training materials under copyright restrictions. Modification should be considered when existing materials are incomplete or minor changes are needed. For example:

1. Additional information is needed to meet the requirements of the learning objectives and learning activities;

2. Minor modifications to facility systems, equipment, and/or procedures require an update or change;

3. Minor changes in regulations require an update or change;

4. Industry operating and maintenance experiences necessitate a minor update or change; and

Existing materials that are incomplete or require minor modification should be modified using the following guidelines:

1. The style and reading level of the modification should be consistent with the existing materials;
2. Modifications should be inserted into existing material where needed; and
3. Some redundancy may be necessary to provide continuity between the modifications and the existing materials.

4.3.4 **Develop New Materials**. Development of new training materials should be consistent with the learning objectives and should reflect the learning activities to ensure that the trainees progress through training in an organized and efficient manner. Training materials should be developed using guidelines that are intended to promote learning.

The guidelines include formatting that will ensure ease in trainee use. For example, charts, graphs, tables, and other illustrations that are effective in emphasizing key points should be located on a separate page and in close proximity to related information.

The reading level of training materials should be consistent with the expected entry-level skills and knowledge of the trainees. Essential information should be located in the materials, and the trainees should not be referred to other places for that information.

More than one representation of key or complex information should be included in the materials. Relating the information in a job context is an effective way to promote learning. This should include a description of the job environment, how the information will be applied on the job, and the reasons why it is important for the trainee to learn the information.

4.4 Conduct Training Tryouts

During a training program tryout, data is compiled and evaluated to correct faults and improve the effectiveness of the lesson plan and training materials. A training program tryout includes evaluation of training material for technical accuracy as well as instructional effectiveness. The following steps are performed when conducting a tryout of the training material:

4.4.1 **Select, Train, and Evaluate Instructors**. Instructor qualifications were identified during the design phase. In addition to technical competence, instructor qualifications should provide oral and written communication abilities, interpersonal skills, and instructional capabilities. Instructors who do not meet these established qualifications should be trained in advance.

A continuing training program to upgrade and improve the technical and instructional capabilities of instructors should be established. Continuing training and development should be based on periodic evaluation of instructor performance. Evaluation should include direct observation by a qualified evaluator during training sessions and should address technical competence, instructional skills, and overall effectiveness in achieving the learning objectives. Examples for the evaluation of instructors are contained in "Sample Instructor Evaluation Form" and "Instructor/Supervisor Evaluation Example" (Attachments 29 and 30, respectively). Instructors should remain

current with job requirements, facility changes, operating experiences, and technical specifications in the facility.

The use of both announced and unannounced evaluations can improve the overall effectiveness of instructor performance. Guidelines to be followed by the evaluator should include the following.

1. Establish a relationship with the instructor based on mutual respect and trust;

2. Review the lesson plan and other course material prior to the training session in which the evaluation will occur;

3. Recognize that the primary purpose of instructor evaluation is to improve the quality of training;

4. Refrain from making comments or participating in training activities;

5. Schedule and conduct a critique of the evaluation with the instructor;

6. Provide a completed copy of the evaluation to the instructor; and

7. Assist the instructor in developing a plan for correcting any deficiencies noted.

4.4.2 **Confirm Availability of Trainees**. Selection of trainees should be coordinated between the training and referent organizations to ensure that course loading and scheduling requirements are met. Trainees selected should possess the required entry-level skills and knowledge of the scheduled program. Trainees should be selected sufficiently in advance to permit adjustments in scheduled training (e.g., remedial training) that may be required.

4.4.3 **Confirm Availability of Training Facilities and Resources**. The availability of training facilities and resources identified in the Training Development and Administrative Guide should be verified. Conflicts in scheduling or availability should be resolved to ensure that required facilities and resources are available when training begins. The following guidelines assist in this effort.

1. Confirm that the allocated training facility is adequate and appropriate for the number of trainees, learning activities, media, and the numbers and types of training equipment to be used;

2. Check the facility and correct any unsafe conditions;

3. Check equipment operability, including spare parts and maintenance support;

4. Verify that the facility is properly heated, cooled, and lighted, and is reasonably free of distractions; and

5. Confirm that sufficient training materials for the course are available (plant procedures, drawings/schematics, texts, handouts, audiovisual aids, tests, tools, consumables, etc.).

4.4.4 **Perform Technical Review**. The technical review is performed to ensure the training materials are technically accurate, current, and consistent with facility systems, equipment, and procedures. The review should be conducted by a subject-matter expert who provides feedback to the material developer. All materials should be reviewed, and identified deficiencies should be corrected. This review should be coordinated as materials are being developed.

4.4.5 **Conduct Small-Group Evaluation**. After revisions from the technical review have been made, a tryout of the materials should be conducted on a small group of trainees. The trainees should possess the entry-level skills and knowledge expected of future trainees. Although a minimum of one trainee is necessary, additional trainees should be used when personnel availability permits.

During the tryout the training setting should be simulated as closely as possible. The lessons are presented, and all appropriate tests are administered and scored. Effective small-group evaluation includes the following activities.

1. Trainees are monitored to determine if the presentation of material and directions for study are clear and easily understood.

2. Presentations and directions that require modification or clarification are documented.

3. Questions asked by the trainees that relate to effectiveness of training are recorded;

4. The length of time taken by trainees to complete training segments and tests is recorded;

5. Test items answered or performed incorrectly by the trainees are identified; and

6. Trainee comments that address the following are obtained:

- Difficulty of the material
- Length of the training
- Amount of material covered
- Clarity of the material
- Terminology used in the material
- Pace of the training
- Structure of the material and sequence of training
- Quantity and quality of practice exercises
- Quality of the media
- Relevance of the training to job performance.

For courses of lengthy duration it is not always feasible to conduct a small-group evaluation. An alternative is to conduct small-group evaluations on the most important segments of the course. Courses or segments of courses not submitted to small-group evaluation should receive increased monitoring and emphasis during the first run. See "Indicators of Potential Training Program Weaknesses," "Post-training Questionnaire," and "Post-training Interview" (Attachments 31 through 33, respectively) for examples of a checklist, questionnaire, and interview form that can be used to collect data during the small-group evaluation and the first run.

4.4.6 **Conduct First Run**. The first run verifies the usability of the training material under intended conditions and confirms the revisions made to the material during the technical review and small-group evaluation. Prior to conducting the first run, material should receive formal approval by the training and referent organization management. During the first run, learning and administrative problems are noted and trainee comments on the training are obtained. Techniques for data collection are the same as for small-group evaluation. After collection, the data should be analyzed to improve applicable training materials. If problems are identified during the tryout, retraining of the trainees involved may have to occur once the materials are corrected.

4.4.7 **Evaluate Data and Revise Material**. Data collected during the small-group evaluation and tryout are translated into findings, and decisions are made for revising the training materials. Progress and post-test scores should be collected and analyzed to determine if the intended learning outcome is reflected in the learning objectives and their associated test items. If the training does not produce the intended learning outcomes, revision of training materials should be considered. It should be noted that faulty test items may not accurately measure the intended learning outcome of the trainees. Those test items consistently missed by trainees should be analyzed for faulty construction. Supporting training materials should also be analyzed for clarity, completeness, and technical accuracy.

Trainee evaluations should be reviewed to detect errors in the presentation, materials, or media that may or may not be apparent to the program developer or instructor. Final materials should be approved by the cognizant training and referent organization management.

4.5 Key Considerations

The following are key considerations that should be emphasized when performing and evaluating activities of the development process:

1. Training methods are appropriate to the training setting and learning activities;

2. Training events define the structure and sequence of learning;

3. Learning activities are derived from the learning objectives;

4. Lesson plans provide a structured approach for conducting consistent training;

5. The learning objectives guide the evaluation of existing training material;

6. Development of new training materials is guided by the learning objectives, the learning activities, and the expected trainee entry-level skills and knowledge; and

7. Data, acquired during tryout of the training materials, are used to determine technical accuracy and training effectiveness, and guide any needed revisions.

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5.0 IMPLEMENTATION

The implementation activities described in this chapter should be applied based on the status of an existing program. Some activities are performed only once during implementation of a training program while others are repeated each time the program is conducted. Activities of implementation are:

5.1 Conduct Training

If specified in the Training Development and Administrative Guide, trainees should be pretested to ensure that they are adequately prepared. Trainee performance should be monitored and evaluated during training. This evaluation should provide for recognizing successful performance and areas in need of improvement. The following steps are performed when conducting training:

5.1.1 **Pretest Trainees**. Testing of (prospective) trainees should be done if so specified in the Training Development and Administrative Guide. The type of testing done is dependent on the design of the program and the needs of the organization receiving the training.

Entry-level testing is used to determine whether prospective trainees have the fundamental skills and knowledge needed to participate in the training program. Such tests are based on the entry level requirements identified in the analysis and design phases. Passing the entry-level exam indicates a probability of successful completion of the training. Failing the entry-level exam indicates that a potential trainee needs remedial training to acquire the fundamental skills or knowledge for successful completion of the training.

Pretests measure the trainees' mastery of the objectives that are addressed via the course content. Pretests should be given sufficiently in advance of training to allow for adjustments to course direction and scope. Pretest results can be used for the following reasons:

1. Accelerate or except from segments of training those trainees who exhibit mastery of specific learning objectives;

2. Identify overall training program emphasis based on common strengths and weaknesses of the group of trainees; and

3. Preview course content and trainee performance requirements.

5.1.2 **Prepare for Training**. Instructors should prepare sufficiently to ensure consistent and effective delivery of lessons. Lesson plans should be reviewed to ensure familiarity with lesson content, equipment and tools, and the use of media, text material, references, and tests. Technical errors should be

identified and corrected during this review. The schedule and emphasis should be modified based on trainee pretest results.

Instructor preparation should include a review of all procedures that address training implementation. Additionally, the instructor should:

1. Check the assigned training facility to ensure it is appropriate for the number of scheduled trainees, learning activities, equipment, and media to be used;

2. Verify his/her ability to operate equipment and use tools effectively;

3. Ensure that sufficient supplies of training materials (e.g. consumables, text material, handouts, workbooks, tests, procedures, etc.) are available and up-to-date;

4. Verify that the training facility is heated, cooled, and lighted properly and is reasonably free of distractions;

5. Review procedures for monitoring progress, evaluating performance, and counseling trainees; and

6. Review test administration procedures for test storage, retrieval, reproduction, and instructions during and after testing.

5.1.3 **Deliver Lessons**. Lesson plans outline instructor and trainee activities and the resources necessary to support training. Effective training presentation requires general adherence to the lesson plan and an understanding of the learning process.

Instructors can guide trainee progress more effectively if they have a working knowledge of the learning process. Trainee motivation can be enhanced by providing an effective training environment, by identifying a clear indication of what must be learned, and by presenting the materials in an organized, concise, and factual manner. Techniques that instructors can use to contribute to trainee motivation include the following:

- Assisting trainees in setting specific, attainable goals and identifying the means for achievement;

- Actively involving the trainees in the learning process, including hands-on application (e.g., equipment, tools);

- Using rewards to recognize achievement (e.g., certificates, promotions keyed to training progression); and

- Interjecting competition with self or others (e.g., accelerated pace, added skills an employee can use, new equipment the employee can operate/maintain, peer group recognition).

An effective training environment also requires that the trainee exercise good listening habits. The instructor should use the following methods to improve students' listening habits:

- Directing attention to the material being presented and eliminate distractions;

- Relating material being presented in personal terms and to personal experiences of the instructor or the students;

- Using learning objectives to organize ideas; and

- Reviewing and summarizing the main idea(s).

Meanwhile, students should be:

- Evaluating the material only after the facts have been presented; and

- Asking questions when they are uncertain or confused.

5.1.4 **Evaluate Trainee Performance**. Trainee performance should be evaluated regularly during and at the completion of the training program. Evaluation measures trainee progress and provides performance feedback to the instructor and the trainees that serves to reward success and identify needed improvement in trainee performance. Trainee performance is also used to evaluate the effectiveness of the training program.

Pre-tests, progress tests, and post-tests are administered as scheduled in the lesson plan to evaluate trainee performance. The following guidelines should be used in administering tests:

1. Security of tests and answer keys should be maintained during storage, reproduction, and testing of trainees to prevent compromise;

2. Trainees should be given prior notification of scheduled tests and materials needed (i.e., calculators);

3. Instructions to the trainees should include the purpose of the test, the importance of following instructions, and time limitations;

4. Equipment and tools used during performance tests should be available and in operational condition;

5. Written tests should be corrected, graded, and reviewed with the trainees in a timely manner to enhance benefits derived from the test; and

6. In performance tests, deficiencies should be identified, a grade given, and the trainee advised of the results promptly.

Trainee performance and progress toward achieving mastery of the learning objectives should be monitored closely. Monitoring should identify satisfactory performance and trends that may indicate potential problems. Trainees should be counseled periodically to review progress and at any time when deficiencies occur. Counseling should address trainee performance strengths and/or deficiencies and include a plan for improvement, if needed. The trainees' supervisor(s) should be kept informed of trainee progress and be involved in counseling when performance problems warrant.

Standards for evaluating trainee performance should be applied consistently. Trainees should not be permitted to complete the training program or progress to another segment of training until deficiencies have been corrected and the training standards met. A program of remedial training or recycling to previous segments of training can be beneficial in correcting trainee performance deficiencies. Remedial training is a cost-effective alternative to removal from training.

5.2 Conduct In-Training Evaluation

During training, data should be collected for subsequent use in evaluating and improving training program effectiveness. Evaluation information is collected from test performance data, instructor critiques and trainee critiques. Evaluation of the training program is addressed in the process. If the above data sources indicate recurring problems or suggest the need for improvement, follow the analysis and revision process outlined in Section 6.0 of this Handbook.

5.2.1 **Collect Test Performance Data**. Trainee test scores should be used to assess trainee progress and improve training and testing effectiveness. If a large number of trainees experience difficulty with a training segment, as reflected in their test scores, the training material or test items may be faulty and in need of revision. An exception analysis (see Evaluation Section 6.2.2, Conduct Exception Analysis) should be conducted to evaluate test data before revisions are made. Progress test and post-test scores should be compiled routinely during training. After the test scores are tabulated in a

usable form, an analysis should be conducted and interpretations made. Analysis may indicate changes or modifications needed to the training material.

5.2.2 **Perform Instructor Critiques of Training**. Instructors are a unique source of evaluation data. They can identify problems involving technical accuracy, completeness, pace, sequence, and level of difficulty of the training materials. A procedure for recording these problems when they occur should be established. Problems noted and suggestions for improvement should be reported in training critiques. The critique should be submitted by the instructor at the completion of training segments or at any time a problem of significance is identified. Evaluations should be performed in each training setting the instructor functions. "Instructor Lesson Rating Form" (Attachment 34) is an example of this type of critique.

Although instructor training critiques are a valid source of evaluation data, recommended changes should be analyzed along with the training supervisor's performance evaluation of the instructor and the success of trainees in completing the segment of training.

5.2.3 **Obtain Trainee Critiques of Training**. Trainees can provide useful feedback for improving presentation of course material. A questionnaire completed by trainees after major segments of training should focus on course effectiveness and ways in which training can be improved. It should address the pace of training, clarity of the material, and the quality of the media.

Trainee critiques of training should be used by the instructors to improve their performance and can be helpful when used in conjunction with instructor performance evaluations. See "Sample Course Critique" and "Example Employee Training Evaluation" (Attachments 35 and 36, respectively) for evaluation instruments to be completed by trainees. See "Revision Critique Summary" (Attachment 37) as an aid to improving the training program through the use of trainee critiques.

5.3 Document Training

The documentation of training includes preparing, distributing, storing, controlling, and retrieving records and reports that address the training program and trainee participation. These records and reports assist management in monitoring the effectiveness of the training program. They also provide a historical reference of changes that have occurred within a program due to evaluations. When documenting a training program, the training program and trainee records are maintained and reports prepared, as indicated by the recommended steps below.

5.3.1 **Maintain Training Program Records**. Training program records should be maintained to permit review of content, schedules, and current and past

program results. These records should be classified according to type and retention period. They should be located, organized, and indexed for ease of retrieval. Training program records should include the following.

1. Most recent job and task analysis data used in training program development;

2. Course schedules;

3. Lesson plans and tests;

4. Trainee attendance summaries (name, course, dates, and test results);

5. Instructor evaluations; and

6. Reports of program audits and evaluations.

5.3.2 **Maintain Trainee Records**. Records of the training and qualification of facility employees should be maintained. Records should be current and organized to permit efficient but controlled retrieval. A trainee's record should contain the individual's training history and the identification of required training that has not been completed. Specifically, trainee records should include the following.

1. A summary of the individual's education, training, experience, and qualifications at the time of hire;

2. A summary sheet indicating the individual's current and previous positions with the company, training received, qualifications achieved, and continuing training required;

3. A record of training completed, including course title, attendance dates, test performance, and certifications of successful course completion;

4. A record of training attended but not successfully completed, including course title, attendance dates, and test performance evaluations; and

5. A record of waivers or exceptions granted, including course titles and statements of justification.

5.3.3 **Prepare Training Reports**. The training organization should report periodically to appropriate levels of management on the status and effectiveness of training activities. Significant training events or problems should be identified and reported when they occur. Although specific aspects will vary with individual contractors, the reports should address the following.

1. Completion of training programs, including course title, dates, and summary of trainees' performance;

2. Attrition of individual trainees, including a summary of performance problems, remedial actions, and final disposition;

3. Evaluations and audits of training program effectiveness, use of training manpower and resources, and achievement of goals and objectives;

4. Recommendations for improving course scheduling; and

5. Action plans for completing program improvements.

5.4 Key Considerations

The following are key considerations that should be emphasized when performing and evaluating activities of the implementation phase.

1. Procedures are developed and used to implement the Training Development and Administrative Guide;

2. Technical and instructional qualifications are based on job performance requirements;

3. Trainees meet the training program prerequisites;

4. Training facilities and resources are available and appropriate for training;

5. Pretests are administered to trainees prior to training;

6. Instructors make all necessary preparations prior to training;

7. Instructors ensure they are using the most current procedures and lessons;

8. Instructors adhere to lesson plans;

9. Instructor performance is evaluated on a regular basis;

10. Trainee performance is evaluated regularly and upon completion of training, using established performance standards;

11. Security of tests and answer keys is maintained to prevent compromise;

12. Instructor and trainee critiques of training and trainee test scores are used in evaluating training program effectiveness; and

13. Trainee and training program records are maintained for evaluating training program effectiveness.

6.0 EVALUATION

The evaluation phase of performance-based training takes place in order to determine the effectiveness of the training program. Evaluation is the quality assurance component of the performance-based training model. There are three major activities involved in evaluation: monitoring of indicators, analyzing information, and initiating corrective actions.

6.1 Monitor Indicators

Data should be collected for each indicator that provides the best indication of training effectiveness. While this data collection should be continuous in many cases, it is a "batch" process. In these cases, the frequency for which these items are reviewed should be determined based on the frequency management feels is necessary to ensure the currency of the training program. The following indicators can be monitored to determine training program effectiveness.

6.1.1 **Monitor Facility Operating, Maintenance, and Industrial Safety Experiences**. Facility operating, maintenance, and industrial safety experiences should be monitored to identify employee performance problems caused by improper training. Facility events and industrial accident reports can identify tasks for which inadequate training may be contributing to equipment damage, excessive unavailability, unscheduled maintenance, rework, unsafe practices, or lack of adherence to approved procedures. This information should be supplemented with interviews. Training personnel should monitor the frequency of personnel errors, and review accident and event reports for training implications using the following questions.

1. Did the employee fail to follow prescribed procedures?

2. Did the employee improperly diagnose the situation?

3. Was the employee misinformed or unaware of the correct procedure?

4. What was the specific sequence of events?

5. Has this problem or a similar problem occurred in the past?

6. Was an individual injured?

7. Was equipment damaged?

8. Was a significant amount of work time lost?

9. Was a technical safety requirement or standard violated?

10. Does the report describe a new or unusual situation?

11. Was the employee newly assigned to this position?

12. Are job performance standards different from those used in training?

6.1.2 **Collect Employee and Supervisor Feedback**. Employee, supervisor, and instructor feedback is gathered to identify program strengths and weaknesses. Instructor and student critiques completed during implementation should be included in this data. This feedback can be gathered using checklists, numerical rating scales, questionnaires, and interviews. Regardless of the material, process, or program being evaluated, there are general principles that should be followed to construct an evaluation instrument.

Checklist Format. A checklist is used to observe a process or assess a product to judge whether the actions or results meet predetermined standards. Examples of checklist evaluation forms are "Lesson Plan Review Criteria Checklist," "Instructor Observation Checklist—Classroom," and "Training Development Recommendation Checklist" (Attachments 38 through 40, respectively). Checklists might be used to determine if a lesson plan is complete and ready for instructor use, if a trainee's job performance was satisfactory after training, or if an instructional session was conducted properly. The following guidance may be helpful when constructing a checklist.

1. Identify all actions or key points to be evaluated. Each must be important, observable, and measurable;

2. Identify the most frequent problems found in the activity to be evaluated;

3. Convert these problems (negative statements) into positive statements that describe satisfactory performance or describe satisfactory products; and

4. If possible, have a model or samples of acceptable materials to help the user judge whether standards of accuracy and quality are met.

Numerical Rating Scale Format. The use of a numerical rating scale helps control the subjectivity of the evaluator and provides better discrimination than a simple pass/fail or satisfactory/unsatisfactory choice. Numerical rating scales should include written descriptions of typical performance to help guide evaluators in rating performance. A numerical rating scale can be used to evaluate a trainee's performance on many tasks, evaluate group interactions, or collect feedback from facility management on trainee performance. For example, numerical scales might be used to collect post-training feedback from

trainees and supervisors, and to conduct instructional setting evaluations. "Laboratory Instructor Evaluation," "Instructor Performance Assessment Instrument," "Supervisor's Post-Training Feedback," "Simulator Instructor Observation," and "Trainee Post-Training Evaluation" (Attachments 41 through 45, respectively) are examples of numerical rating scale evaluation measures. Numerical rating scales also help reduce common rating errors such as:

1. Under— or over-rating specific performances because of a general or overall impression;

2. The tendency to rate most performances as average (avoiding highs and lows); and

3. The tendency to give similar ratings to two or more performances, related in the mind of the evaluator.

The following guidance may be helpful when constructing numerical rating scales:

1 Select the performance to be evaluated. It should be important, observable, and measurable;

2. Decide if the scale will contain an even or odd number of possible responses and how many possible responses will be supplied per item. Once this is determined all the selected performances being evaluated should have the same number of possible responses. Keep the scale simple for ease of use; and

3. Two different weighting systems could be used. One system assigns a low-to-high rating across the range of numbers. Two examples are low-medium-high and poor-good-excellent. A preferred system adds written descriptions of typical performances that describe what the ratings mean. Write the descriptions so they are balanced and accurate.

Questionnaire Format. A questionnaire is used to elicit opinions, obtain information, and collect feedback about the work or training environment. "Trainee Cumulative Feedback Evaluation," "End-of-Course Training Evaluation," and "Program Evaluation" (Attachments 46 through 48) questionnaires should be administered to individuals or groups as appropriate. Data collected in a group setting tends to be more reliable than mailed questionnaires. If mailed questionnaires are used, they should include a letter from a senior company official that explains the purpose of the questionnaire, solicits the individual's help, and thanks the respondents for their time.

Questionnaires distributed without addressing these topics usually have very poor results. Questionnaires can also be completed in an interview. If interviews are used they should be held in a controlled environment, free of noise or disruption. Responses should be recorded. The following guidance may be used when developing a questionnaire.

1. Define the purpose of the questionnaire. This can be done by asking the following questions: "What do we want to find out?", "Why do we want to find that out?", "When do we need the information?", "How can we best get the information we need?", "Where should we gather information?", and "Who is the information for and from whom should we collect the information?"

2. Select evaluation questions to be used in the questionnaire. There are generally three sources for these questions. These include managers and users of the information to be collected; previously collected data, interviews, and fieldwork with people in the environment; and other questionnaires that have been used for similar purposes.

3. Determine the types of questions required. Generally, three types are used.

   - **Performance Questions** - This type of question usually asks what has actually been performed. These questions are aimed at descriptions of actual experiences, activities, or actions and corresponding performance that would have been observable had the evaluator been present to observe the actions;

   - **Opinion Questions** - This type of question can help identify problem causes and suggest possible solutions. These questions are aimed at finding out what people think about something. Opinion questions reflect people's goals, intentions, desires, and values; and

   - **Knowledge Questions** - These questions assess what factual information the person has. The assumption is that certain facts are prerequisites for effective performance.

4. Focus each question on a specific point. Provide cues or a point of reference to help the respondent. For example, "What problems have you had in calibrating the transmitter since you were trained?", or "Based on what you know about the new modification procedures, what should be changed in this course?", or "In your opinion, should the fundamentals section of operator training be resequenced in the course?"

5. Specify the type of comparison or judgment to be made. Provide specific, appropriate bases from which comparisons or judgments can be made. Do not mix performance-based with other types of scales within the same response.

When gathering feedback from employees the following questions should be considered.

1. What additional training have you received since being assigned to your job?

2. What unexpected difficulties or problems in job performance have you experienced?

3. Has your supervisor given you instructions different from those you learned during training? What were they?

4. Have you noticed other differences between the training you received and what is expected of you now?

5. Have changes occurred in your job since you were assigned?

6. How were you prepared to handle these changes?

7. Which tasks do you find easiest?

8. Which tasks do you find especially challenging?

9. Looking back, what specific training benefitted you most?

10. What kinds of errors have been committed on the job?

11. What suggestions would you make to improve training?

12. What additional training do you need for your job?

Supervisors should be interviewed to determine how well training is preparing new employees to perform their jobs and what training is needed for current employees. The following types of questions can be used to collect supervisors' responses.

1. How well do employees (both newly-trained and experienced) perform on the job?

2. What tasks were newly-trained employees best prepared to perform?

3. For what tasks were they inadequately prepared?

4. Are employees able to diagnose conditions and identify alternate solutions for accomplishing a task?

5. What kinds of errors have employees committed?

6. Which tasks require excessive time for employees to complete?

7. How do newly-trained employees compare to those who received earlier training?

8. What additional training have they received since they were assigned job responsibilities?

9. Have employee errors caused equipment damage or failure?

10. Has rework by maintenance personnel been required due to personnel errors or lack of adequate training?

11. Have increases in rework, unscheduled maintenance, or overtime occurred in jobs performed by newly-trained employees?

12. Have employees been commended or warned for unusually good or bad job performances?

13. Have you observed unexpected results from training?

14. Has training created any new problems?

15. What suggestions would you make to improve initial or continuing training?

16. Do you expect any changes in job assignments or equipment that will require additional training or changes in current training?

17. What current training do you consider to be excessive or unnecessary?

6.1.3 **Review Facility Inspection and Evaluation Reports**. Facility and corporate inspection and evaluation reports (including quality assurance audits) should be reviewed for indications of training-related weaknesses. The following questions should be answered by this review.

1. How effectively is training preparing employees to conform to plant procedures?

2. To what extent do training activities conform to established procedures?

3. In what areas of training is improvement needed?

Review facility evaluations and audits reports for recommendations for improvement in the following areas:

1. Organization and management of the training system;

2. Trainee selection;

3. Development and qualification of training staff;

4. Support of training with facilities, equipment, and materials;

5. Conduct of job analysis and identification tasks for training;

6. Establishment of training program content;

7. Development of learning objectives as the basis for training;

8. Organization of instruction using lesson plans and other training guides;

9. Conduct of classroom and individualized instruction;

10. Conduct of on-the-job training;

11. Conduct of simulator training;

12. Conduct of laboratory training;

13. Examinations and evaluations leading to qualification/certification; and

14. Systematic evaluation of training effectiveness.

6.1.4 **Review Facility Modifications and Procedure Changes**. Facility modifications may require special training, changes in existing training, or additions to continuing training. Design changes, facility modifications, and procedure changes should be reviewed and tracked for training implications and considered for incorporation into existing training programs.

6.1.5 **Review Industry Operating and Maintenance Experiences**. Industry operating and maintenance experiences should be reviewed for applicability and possible incorporation in facility training programs. This information can be obtained from several sources such as Unusual Occurrences and DOE

investigations. Incorporating industry operating experience into facility training enables contractors to benefit from each other's experiences. Industry operating and maintenance experience reports should be screened to answer the following questions.

1. How unique is the event?

2. Do similar conditions exist at this facility?

3. What is the potential for the event to occur here?

4. What consequences to personnel or equipment will result if the event occurs?

5. Is there evidence that this event may be part of a trend?

6. What specific training should be provided to prevent the occurrence or mitigate the consequences of such an event at this facility?

6.1.6 **Regulatory Developments**. Training personnel should monitor DOE and Nuclear Regulatory Commission orders, regulations, special reports, etc., for information and changes in requirements affecting training. The impact of regulatory changes can be evaluated using the following questions.

1. What conditions do the changes address?

2. Do those conditions exist at this plant?

3. Will changes influence the way our personnel perform their tasks?

4. What specific effects will this change have on training?

5. Does the condition require an immediate response?

6.2 Analyze Information

Program evaluation information must be analyzed before it can be used to make changes in training. The simplest method of analysis that will yield the information required should be used. Analysis methods include exception analysis and content analysis. Some types of data should be organized and tabulated using frequency distributions prior to analysis. Apparent performance discrepancies must also be verified through discussions with appropriate personnel. The following activities are used to analyze data: frequency distributions, exception analysis, content analysis, and root cause identification.

6.2.1 **Frequency Distributions**. Frequency distributions should be used for organizing, summarizing, and displaying data. They can be constructed using simple counting, averaging, and graphing procedures that show how often particular events have occurred. They are normally used as the first step in analyzing responses to surveys and trainee progress test results.

After all data from the indicators is collected, responses are tabulated. Totals are then entered into the corresponding spaces on a blank survey. The average (mean) response for each item is calculated and displayed on a bar chart. The bar chart presents survey information in a simple visual form. It highlights high and low values and permits easy comparison with acceptable performance standards or sets of previous data.

6.2.2 **Exception Analysis**. Exception analysis is used for reviewing data to detect unacceptable variations from a predefined standard. Facility operating, maintenance, and industrial safety experience should be analyzed using this method. Increases in the frequency of accidents, injuries, personnel errors, rework or unscheduled maintenance, or increases in overtime above normal levels may indicate a need to provide additional training or improve existing training. Acceptable levels should be established for each of these parameters as criteria for comparison. If any observed value deviates from the criteria, the cause should be investigated.

Feedback from employees and employee exams, supervisors, and instructor and trainee critiques should be analyzed to indicate if any training problem needs to be investigated.

6.2.3 **Content Analysis**. Content analysis depends primarily on the expertise and professional judgment of the individuals performing it. Content analysis should be considered for use with all types of information and may be used in conjunction with exception analysis. Interview responses should be analyzed using content analysis. The following guidelines should be used when performing content analysis:

1. Look for agreement. If respondents provide the same or similar answers, these answers are more likely to be valid;

2. Do not disregard responses. Do not attempt to "second-guess" employees, supervisors, or subject matter experts. If a response appears erroneous or exaggerated, follow up with observations and additional discussion; and

3. Focus the analysis on discovering specific tasks or subject areas in which training refinements seem necessary.

6.2.4 **Root Cause Identification**. Identification of the root cause should lead to determination of the appropriate corrective action. Utilize training and facility personnel in the identification of root causes and the determination of appropriate solutions. In general, root causes are identified by first identifying specific symptoms of the problem. Then alternative causes are generated and investigated until they are confirmed or eliminated.

Identification of root causes may be aided by the use of evaluation standards produced during the design phase. When facility events or feedback from employees or their supervisors indicate that workers have difficulty with specific tasks, administering applicable evaluation standards to a group of workers may disclose the nature of the problem and its cause.

6.3 Initiate Corrective Actions

If a performance discrepancy or potential problem is discovered and analysis confirms that training can contribute to a solution, action should be initiated to correct the existing or potential problem. Training modifications initiated because of existing deficiencies in personnel performance and those resulting from changing needs should be processed in a similar manner. Improvements and changes to training should be initiated and tracked systematically. Analysis results should be retained to document evaluation activities and indicators should continue to be monitored.

Because of the amount of work and cost involved, any decision to modify training should be carefully considered. Each facility should establish a procedure for deciding whether or not training should be changed, how it should be changed, and to whom the new or modified training should be provided.

Improvements or revisions involving any phase of the training process (analysis, design, development, implementation, or evaluation) should be completed in a timely manner. Since some performance deficiencies can be eliminated by better implementation of an existing program, with no changes in the program itself, this should be considered.

6.4 Key Considerations

The following considerations should be emphasized when performing and evaluating activities during the evaluation phase.

1. Responsibility for monitoring indicators, analyzing data, and approving revisions is clearly defined;

2. The training department is alerted to facility operating, maintenance, and industrial safety experiences;

3. Communication on training effectiveness occurs between plant supervisors and the training department;

4. Employee opinion of the quality and effectiveness of training is collected periodically;

5. The training department is alerted to employee performance errors;

6. The training department meets with maintenance and operations, supervisors and engineers to determine potential training problems;

7. Training uses facility inspection and evaluation reports to guide program revisions;

8. Facility modifications and procedure changes are monitored for training consequences;

9. Training monitors industry operating and maintenance experiences for program impacts;

10. Regulatory changes are reviewed for training consequences;

11. Program performance data is analyzed;

12. Proposed changes are reviewed by appropriate facility and training personnel; and

13. Training changes are tracked.

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ATTACHMENTS

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ATTACHMENT 1
TRAINING NEEDS ANALYSIS REPORT

Requester:_____ **Tracking No.:** _____
Date Issued: _____

1. Task(s) requiring improvement:

2. Frequency of the performed task(s):

3. Consequences of improperly performed task(s):

4. Reason(s) task(s) require improvement:

5. Training recommendation(s):

6. Training action plan if applicable (identify individual/department responsible for delivery of training):

_____ _____
(Training Analyst) (Date)

Reviewed By:

_____ _____
(Training Manager) (Date)

_____ _____
(Requester) (Date)

_____ _____
(Supervisor) (Date)

☐ Approve Recommendation ☐ Reject Recommendation

If recommendation is rejected, identify an alternative solution:

(Please return completed form to originator and training analyst.)

ATTACHMENT 2
GUIDELINES FOR WRITING TASK STATEMENTS

	REQUIREMENTS	EXAMPLE
Clarity:	Use wording that is easily understood.	"Compare written description to actual performance" **Not** "Relate results to needs of field."
	Be precise. Use words that mean the same thing to all personnel int he job classification.	Minimize the use of vague words like "check, coordinate, and assist."
	Write separate, specific statements for each task.	"Supervise files." "Maintain files." **Not** "Have responsibility for maintaining files."
Completeness:	Use abbreviations only after spelling out the term.	"Emergency Cooling System (ECS) may be followed by `Start up the ECS.'"
	Include both form and title number when the task is to complete a standard form, unless all that is needed is the general type of form.	"Complete Task Description Worksheet" (Form No. XXX).
Conciseness:	Be brief. Short phrases are preferred.	"Write production and control reports.". **Not** "Accomplish necessary reports involved in the process of maintaining production and control procedures."
	Begin with a present-tense action word (subject "I" or "you" is understood).	"Clean" or "Write."
	Indicate an object of the action to be performed.	"Clean <u>engine</u>." "Write <u>report</u>."
	Use terminology that is currently used on the job.	"Use applicable DOE documentation."
Consistency:	Avoid stating a person's qualifications, such as experience or education.	"Load computer tape." **Not** "Has on year computer training."
	Omit items on receiving instruction, unless actual work is performed during training.	"Give instruction." **Not** "Attend lecture."

ATTACHMENT 3
TASK RATING SYSTEM

Frequency of Performing Task:

Minimum	1. Less than once per year
	2. Once every five to twelve months.
	3. Once every three weeks to four months.
	4. Once every one to two weeks.
Maximum	5. More frequently than once per week.

Importance of Task:

Minimum	1. Consequences of improper performance are negligible (improper performance would make no difference in plant operation).
	2. Consequences of improper performance are undesirable (improper performance may impair reliability of a system or a process).
	3. Consequences of improper performance are serious (improper performance may require an Unusual Occurrence Report).
	4. Consequences of improper performance are severe (improper performance may result in an Alert Event).
Maximum	5. Consequences of improper performance are extremely severe (a serious injury or site emergency may result).

Difficulty in Performing Task:

Minimum	1. "Very easy" to perform.
	2. "Somewhat easy" to perform.
	3. "Moderately difficult" to perform.
	4. "Very difficult" to perform.
Maximum	5. "Extremely difficult" to perform.

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE

INTRODUCTION

This survey is designed to gather information about the _____ Operator position at _____. Its specific purpose is to obtain from you, the job incumbent, information concerning technical tasks that make up your job. The information collected from this survey will be used by the Training Department to design training programs which reflect actual job requirements. This is possible only with your cooperation. Please consider each item listed in the survey, carefully. Your contribution to this effort is essential. If you have any questions or problems related to this survey please contact the Training Department. Thank you for your assistance in this effort.

GENERAL INSTRUCTIONS

Before beginning this survey, look through the booklet and become familiar with the contents and all instructions. It is important to review the task inventory and become familiar with it, in order to make a valid assessment of each task statement.

The survey is divided into two sections:

- **Section I—Biographical Information**—Asks for some information about your background, general job description, and plant facilities. These descriptions will be used to sort survey responses into common groups. In the event that clarification of a response is required, your name is requested. All survey responses will be treated confidentially.

- **Section II—Task Statements**—Contains a listing of specific tasks which may or may not be part of your particular job. These tasks are grouped by systems or duty areas and related tasks are kept together to make it easier for you to think about any tasks you perform that may not have been listed. You are asked to rate each task in terms of its "frequency," "importance," and overall "difficulty." These terms are defined in more depth in the following pages.

Remember that your responses to the items in this survey should reflect what you do when performing your job as an Operator. If referring to a procedure or reference would assist you in responding to an item, please feel free to do so, but give your own opinion.

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

SECTION I—BIOGRAPHICAL INFORMATION

Name: _____ **Date:** _____

1. What is your present job level? (Mark one)

   ☐ Supervisor ☐ Operator ☐ Operator Trainee

2. How long have you worked in your present job title?____ Year(s) ____ Month(s)

3. What is the highest level of education you have received?

   a. ___ Grade school

   b. ___ Attended high school, but did not graduate

   c. ___ Graduated from high school or equivalent

   d. ___ Attended trade/vocational school, but did not graduate

   e. ___ Graduated from trade/vocational school

   f. ___ Attended college, but did not graduate

   g. ___ Graduated from college.

4. How many years of formal vocational/technical education have you had beyond high school?

   a. Military schools _____ years _____ months

   b. Nonmilitary schools _____ years _____ months.

5. Please place a check mark beside each of the areas below in which you have had at least six (6) months experience:

Area I:	___	C-331	Area III:	___	C-360
	___	C-315		___	C-350
	___	C-310		___	C-340
	___	C-310A			
Area II:	___	C-333	Area IV:	___	C-337
	___	C-333A		___	C-337
	___	RCW			
			Building:	___	C-300

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

SECTION II—TASK STATEMENTS

Instructions

This section contains a list of tasks each of which may or may not be part of what you do on your present job. Because this survey is being taken by individuals with several experience and responsibility levels, we expect that some individuals will not perform many of the tasks and few individuals will perform all of the tasks.

You are asked to make three ratings for each task that is part of your job: **Frequency** (how often you do the task), **Importance** (how serious it is if the task is done improperly), and **Difficulty** (how hard it is to do the task properly). If you are not responsible for performing a particular task, just circle "Zero" (**Never**) for that task. It is anticipated that there may be tasks listed for which you are responsible, but may not have performed (for example, a task which is rarely performed, such as an emergency or abnormal situation). The three rating scales that follow are explained in more detail, and are repeated on the last page of the booklet which should be folded out for easy reference. Please rate these tasks to the best of your ability. Be sure to mark an answer for every task. Please use a pencil in case it is necessary to change a response.

Frequency

In this column you are asked to indicate how often you perform each task. When estimating the frequency of performance, think back over your activities and indicate how often you personally have performed each task by circling the appropriate frequency code number from the scale below:

1 = RARELY—Perform once a year or less

2 = SELDOM—About three or four times a year

3 = OCCASIONALLY—About one time per month

4 = OFTEN—About once a week

5 = VERY OFTEN—Daily.

Importance

This column asks you to rate the overall importance of each task in terms of the consequences of inadequate performance. You should consider the overall impact with regard to possible unnecessary contamination, damage to equipment and systems, injury to personnel, loss of production capability and possible environmental impact from failure to perform a task properly. Rate task importance using the following guidelines:

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

1 = NEGLIGIBLE—Improper task performance does not result in unnecessary exposure nor does it make any difference in plant operation (no lost production). Neither does it pose any personnel or environmental safety consequences.

2 = UNDESIRABLE—Improper task performance may result in a dose considered inconsistent with ALARA or cause some undesirable consequences to plant operation (reduced production capability or some potential environmental impact).

3 = SERIOUS—Improper task performance may result in exceeding plant or equipment operating limits, which may require moderate corrective action.

4 = SEVERE—Improper task performance may result in equipment damage or personnel injury requiring extensive corrective action.

5 = EXTREMELY SEVERE—Improper task performance may result in serious exposure or contamination, implying possible health consequences or plant/equipment consequences that may be enormously time consuming or costly to correct.

Difficulty

This scale is used to rate the difficulty of performing a task in the typical setting or location, rather than in unusual circumstances or in locations rarely encountered. In judging task difficulty, consider the knowledge required to perform the task or the mental activity required. Rate task difficulty using the following scale:

1 = VERY EASY—The mental activity required is low, and the degree of task complexity is low.

2 = SOMEWHAT EASY—The mental activity required is low, and the degree of task complexity is medium.

3 = MODERATELY DIFFICULT—The mental activity required is medium, and the degree of task complexity is medium.

4 = VERY DIFFICULT—The mental activity required is medium to high, and the degree of task complexity is high.

5 = EXTREMELY DIFFICULT—The mental activity required is medium to high, and the degree of task complexity is very high.

The examples below illustrate how to make your ratings for each task. The ratings shown in these examples are not meant to be accurate for any given job, but to show the correct way to mark your responses.

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

The example immediately following shows the most common type of response where the task is performed as part of the individual's job. The incumbent performs the task "about once a week," thus No.4 has been circled in the **Frequency** column. Number 3 has been circled in the **Importance** column, because the incumbent feels that "improper task performance may result in consequences requiring considerable corrective action. "Again, No.4 has been circled in the **Difficulty** column because the incumbent feels that task difficulty is high:

	Task	Never	Frequency	Importance	Difficulty
1.	Operate Vibration Detection System	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

In the example below, the person completing the survey does not perform the task as part of his/her present position. Zero(0) has been circled under **Never** and the other scales have not been marked:

	Task	Never	Frequency	Importance	Difficulty
1.	Unload Lube Oil Tank Car	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

102. PROCESS COOLANT SYSTEM

	Task	Never	Frequency	Importance	Difficulty
102.1	Prepare tank car for unloading.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.2	Unload tank car.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.3	Obtain moisture content samples.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.4	Dry coolant.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.5	Regenerate molecular sieve.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.6	Leak rate systems and headers.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.7	Operate liquid transfer pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.8	Operate IR pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.9	Operate Beech-Russ pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.10	Operate UF^{6-} Pit R-114 separation unit (C-335).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.11	Obtain coolant negatives on cells and equipment.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.12	Sample for negatives.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.13	Detect leaks through soaping (Gastech and OVA).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.14	Calibrate OVA.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.15	Perform routine daily checks.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.16	Perform prescheduled tests and inspections.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.17	Complete safety system documentation.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

	Task	Never	Frequency	Importance	Difficulty
102.18	Pump coolant to running systems.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.19	Apply/Issue electrical work permits.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.20	Apply/Issue hazardous work permits.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.21	Apply/Issue DNO tags.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.22	Adjust coolant pressures and temperatures.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.23	Interpolate coolant data.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.24	Transfer coolant to other buildings.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.25	Obtain coolant data.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.26	Operate coolant instrumentation and interpolate it.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.27	Troubleshoot coolant alarms.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.28	Drain coolant.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.29	Sample Pit R-114 for oxygen content (portable meter).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.30	Don SCBA, or air-line-supplied masks, before entering pit.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.31	Operate manual valves.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.32	Identify abnormal conditions.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.33	Operate Pit R-114, O_2 deficiency meter.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

	Task	Never	Frequency	Importance	Difficulty
102.34	Respond to O_2 deficiency alarms at Pit R-114.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.35	Troubleshoot coolant alarm light in ACR.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.36	Check operating condition of valves (seats).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.37	Complete paperwork (logs).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.38	Identify Pit R-114 valve nomenclature.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
102.39	Verify tank car sample results.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Please list (print) any tasks which you perform that are not listed (include scale ratings):

		Never	Frequency	Importance	Difficulty
102.40	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	_____				
102.41	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	_____				
102.42	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	_____				
102.43	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	_____				
102.44	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	_____				

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

111. AREA CONTROL ROOM

	Task	Never	Frequency	Importance	Difficulty
111.1	Monitor assay spectrometer.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.2	Calculate assay.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.3	Adjust line recorders.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.4	Calculate liter upflow.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.5	Adjust feed rates (C-337, C-333).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.6	Coordinate and dispense conditioning gas (C-335).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.7	Operate P&E pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.8	Set up headers.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.9	Control building UF^6 pressures and flows.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.10	Relamp Control Room.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.11	Monitor and adjust overlap flows (C-335).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.12	Maintain conditioning gas facility (C-331/C-335).	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.13	Alert and direct building operators during emergencies.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.14	Monitor ADP system.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.15	Clean kitchen.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.16	Open and close ACBs.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.17	Perform routine checks.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.18	Coordinate daily activities with C-300.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

Task		Never	Frequency	Importance	Difficulty
111.19	Maintain Control Room logs.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.20	Operate ADP system.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.21	Relamp indicating lights.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.22	Date/Time recorders.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.23	Monitor megawatt recorders.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.24	Monitor seismic alarms.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
111.25	Monitor all utility alarm panels.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

113. LUBE OIL/HYDRAULIC OIL

	Task	Never	Frequency	Importance	Difficulty
113.1	Start LO pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.2	Stop LO pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.3	Switch LO pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.4	Apply/Issue electrical work permits.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.5	Apply/Issue hazardous work permits.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.6	Valve RCW to cooler.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.7	Perform weekly checks.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.8	Adjust oil pressure.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.9	Adjust oil flow.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.10	Control oil spills.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.11	Switch lube oil strainers.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.12	Transfer oil from tank car.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.13	Control oil temperature.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.14	Valve oil to cooler.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.15	Perform annual check with C-300.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.16	Check gauge at strainers.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.17	Valve in Honan filter.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.18	Adjust oil tank levels.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.19	Start hydraulic pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11320	Stop hydraulic pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 4
SAMPLE SURVEY QUESTIONNAIRE
(Continued)

	Task	Never	Frequency	Importance	Difficulty
113.21	Switch hydraulic pumps.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.22	Valve hydraulic oil to control valves.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.23	Control hydraulic oil spills.	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Please list (print) any task which you perform that are no t listed (include scale ratings):

		Never	Frequency	Importance	Difficulty
113.24	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.25	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.26	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.27	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
113.28	_____	0	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

ATTACHMENT 5
JOB ANALYSIS TABULATION

Job/Duty Area_____ **Compiled By _____** **Verified By _____ Date_____** **Rated By _____ Date_____**	**Difficulty** **Importance** **Frequency**

TASK				COMMENTS

ATTACHMENT 6
TASK-TO-TRAINING MATRIX

TASK-TO-TRAINING MATRIX	
Job/Duty Area:	Task Number:
Task Statement:_____	
Comments:_____	

TRAINING SELECTION CATEGORY					
Train:_____ No Train: _____				Continuing (overtrain): _____	
LESSON PLANS				Reference Procedures	
Classroom	OJT	Self-Paced	Laboratory	Simulator	

ATTACHMENT 7
TASK ANALYSIS DATA COLLECTION FORM

Task No: _____

Task Title: _____

_____

_____

Subject Matter Expert: _____ _____
(Signature) **(Date)**

Task Analysis: _____ _____
(Signature) **(Date)**

Reviewer: _____ _____
(Signature) **(Date)**

Initial Conditions:_____

_____

_____

Task Standards: _____

_____

_____

_____

References: _____

_____

_____

_____

Tools/Equipment: _____

_____

_____

_____

ATTACHMENT 8
TASK WORKSHEET

Task No. ___ ___ • ___ ___ • ___ ___ ___			Page ____ of ____
Element Number	**Elements**	**Conditions/Standards**	**Knowledge/Skills/Elements**

ATTACHMENT 9
TRAINING DEVELOPMENT/CHANGE REQUEST

Requested for: ☐ Training Development ☐ Training Change

Training Subject/Topic (include lesson plan/OJT checklist number(s), if known):

Location of Training, (include lesson plan/OJT checklist number(s), if known):

Reason for Request (check as applicable):

☐ Familiarization ☐ Improve Skill ☐ System/Component Change/Plant Event

☐ New Information/Method ☐ DOE, Corporate, or Company Procedure Change

☐ Error, or information lacking in existing Training/Posttraining Feedback

☐ Other: _____

General Description of Development/Change (identify the problem and what the appropriate solution to the problem is; comment here and/or attach additional information and necessary):

☐ Additional information attached

Requested By: _____ **Phone No.:**_____
(Print Name)

Date Request Submitted:_____ **Date Training/Change Required[a]:**_____

([a]Date should not be less than 10 workdays from request.)

DO NOT WRITE BELOW THIS LINE (For Training Organization use only)

Action Taken by Training Organization:

_____/_____
(Signature) (Date)

Follow-up (date copy sent to requester, or requester contacted): _____

_____/_____
(Signature) (Date)

ATTACHMENT 10
ANALYSIS CHECKLIST

Instructions - Review and check the box of each step below as accomplished:

1. Determine training needs:

- ☐ a. Performance problems
- ☐ b. Regulatory requirements
- ☐ c. Requests for additional training
- ☐ d. Requested revisions to training

2. Develop a valid task list:

- ☐ a. Review available job information
- ☐ b. Select and train job analysts
- ☐ c. Develop the task listing
- ☐ d. Validate the task listing
- ☐ e. Prepare the survey questionnaire
- ☐ f. Select the survey sample and conduct the survey
- ☐ g. Analyze the survey results

3. Select tasks for training

- ☐ a. Develop numerical averaging criteria
- ☐ b. Apply responses to the decision tree
- ☐ c. Develop a train/no train/overtrain list
- ☐ d. Validate the lists

☐ **4. Prepare a task-to-training matrix.**

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES

STEP 1: DETERMINE THE ACTION STATEMENT

The first step in developing a learning objective is to determine the action statement. The action statement consists of an action verb and a direct object. The action verb should identify trainee behavior that is observable and measurable. For example, in the action statement "start secondary feed system," the action verb (start) and the direct object (secondary feed system) are both observable and measurable.

The following is a verb list with definitions to aid in the selection of an action verb for the action statement:

ACKNOWLEDGE	Recognize and respond to an indication or alarm.
ACTUATE	Put into mechanical action or motion.
ADD	Increase; to perform the mathematical addition process.
ADJUST	Bring a continuous effort into proper or exact position.
ALIGN	Adjust or correct relative position of an item.
ALTERNATE	Change or substitute one to another.
ANALYZE	Break down a complex whole into its component parts.
ANNOUNCE	Give notice of an event or evolution (e.g., via the public address system).
ANSWER	Respond to a request for information.
ANTICIPATE	Give advance thought, discussion, or treatment; foresee.
APPLY	Bring into action; put into operation.
ASSEMBLE	Fit parts together into a complete structure or unit.
ASSESS	Determine the importance, size, or value.
ASSIST	Give support or aid.
AUTHORIZE	Legally approve of action; empower.
BACKWASH	Move air or liquid backward by a propelling force.
BALANCE	Equalize opposing forces.
BEGIN	Commence or initiate.
BLEED	Extract or cause to escape from a contained source.
BLOCK	Obstruct passage or progress.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

BOIL	Heat to the boiling point.
BORATE	Add boric acid.
BUILD	Construct according to specific plan or process.
BYPASS	Avoid or circumvent.
CALCULATE	Determine by mathematical processes.
CALIBRATE	Detect, correlate, report, or eliminate, by adjustment, any discrepancy in accuracy of an instrument or measuring device being compared with a standard.
CALL	Communicate orally in person or by phone.
CENTER	Place or adjust around a center area or position.
CHANGE	Replace.
CHARGE	Restore or load to capacity.
CHECK	Look at carefully or critically; verify.
CHOOSE	Select after consideration of alternatives.
CIRCULATE	Flow in a circular path.
CLEAN	Free from dirt or contamination.
CLEAR	Free from obstruction or limitation.
CLOSE	Bring or come to a natural or proper end; cease operation.
CODE	Assign symbols, letters, numbers, or words.
COLLECT	Bring together into one body or place.
COMPARE	Examine the character or qualities in order to discover resemblances or differences.
COMPLETE	Bring to an end; having all necessary parts.
COMPUTE	Determine by mathematical means.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

CONNECT	Join or fasten together.
CONTROL	Manage with authority.
COOL	Cause to lose heat or warmth.
CORRECT	Alter or adjust to a required condition or standard.
CONSTRUCT	Make or form by combining parts.
DECIDE	Come to a conclusion based on available information.
DECREASE	Make less as in size, number, or intensity.
DEENERGIZE	Disconnect energy or voltage.
DEPRESS	Press down.
DESELECT	Stop a selected function.
DETECT	Discover the existence or presence of something.
DETERMINE	Decide or resolve conclusively.
DIAGNOSE	Recognize or determine the nature or cause of a condition by consideration of signs or symptoms.
DILUTE	Make thinner or diminish the strength of, by admixture.
DIRECT	Assign activities to another person.
DISASSEMBLE	Take apart.
DISCONNECT	Sever or terminate a connection.
DISPLAY	Exhibit for visual evidence.
DISPOSE	Get rid of.
DISSOLVE	Cause to pass into solution.
DON	Put on clothing or equipment.
ENERGIZE	Impart energy or voltage.
ENTER	Input data.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

ESTABLISH	Make firm or stable.
ESTIMATE	Calculate approximately the extent or amount of.
EXIT	The act of going out or going away.
EXPLAIN	Make understandable.
FEED	Supply a signal to an electric circuit; supply liquid to a system.
FLUSH	Cleanse or wash out with a fluid.
HEAT	Add energy to achieve higher temperatures.
HOIST	Raise into position using a tackle.
HOLD	Retain by force; apply continuous pressure.
IDENTIFY	Regard or recognize clearly.
IMMERSE	Plunge or dip into a fluid.
INCREASE	Add or enlarge in size, intent, quantity.
INFORM	Communicate information.
INSPECT	Examine officially; to determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards.
INSTALL	Seat or fix into position a component or assembly to allow the proper functioning of equipment or system.
INTERPOLATE	Determine or estimate intermediate values from two given values.
INTERPRET	Translate the meaning of.
INSERT	Put in.
ISOLATE	Separate from another.
JOG	Move, start, and then stop quickly.
LET DOWN	Allow to descend.
LINE UP	Organize in a linear arrangement.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

LOAD	Place power output on line.
LOCATE	Find a particular spot or place.
LOCK	Secure by key, combination, or device.
LOG	Record required information in a book or on a sheet.
LOWER	Decrease in elevation, pressure, or temperature.
LUBRICATE	Make smooth or slippery by applying a substance capable of reducing friction.
MAINTAIN	Keep in an existing state.
MANIPULATE	Operate mechanically or with skillful hands.
MEASURE	Regulate by a standard.
MIX	Combine or blend.
MONITOR	Check or observe the operation of a system and its components over a period of time.
MOVE	Go or pass from one place to another with continuous motion.
MULTIPLY	Increase in number greatly or in multiples.
NEUTRALIZE	Counteract the activity or effect. To make electrically or chemically inert.
NOTIFY	Give formal notice to.
OBSERVE	Watch with careful attention.
OBTAIN	Hold onto; gain by planned action.
OPEN	Make available for entry or activity.
OPERATE	Start, stop, or influence the operation of a specified component or system.
ORGANIZE	Arrange into a coherent unity or function.
OVERHAUL	Restore to completely serviceable or operational conditions as prescribed by maintenance standards.
OVERRIDE	Bypass the action of an automatic control.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

PERFORM	Carry out an action to conform to prescribed procedure.
PLAN	Devise or formulate a program of future or contingency activity.
PLOT	Represent by means of placing points on a graph.
POSITION	Place a control in a discrete state.
PREPARE	Compound; put together; make ready.
PRESSURIZE	Apply force in a contained vessel.
PRIME	Prepare for work by filling or charging with something.
PRINT	Produce something in printed form.
PULL	Draw out or hold back.
PUMP	Raise, lower, transfer, or compress fluid or gasses by suction, pressure, or both.
PURGE	Free of sediment or relieve trapped gas by bleeding.
RACK IN/OUT	Insert or remove the breaker from the cabinet.
RAISE	Increase in elevation.
REACTIVATE	Become active or functioning again.
READ	Understand visual information which is presented symbolically by scanning.
REALIZE	Bring into existence.
REBUILD	Restore unserviceable equipment to a like new condition in accordance with original manufacturing standards.
RECEIVE	Be given written or verbal information.
RECIRCULATE	Begin flow again.
RECORD	Write information; document events or trends.
RELEASE	Set free.
REMEMBER	Retain information or recall information.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

REMOVE	Take away.
REPAIR	Restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in component or assembly.
REPLACE	Substitute a serviceable component or assembly for an unserviceable counterpart.
REPORT	Give an account of; formally document meeting or event proceedings.
REQUEST	Ask for information.
RESPOND	React in response; answer.
RETURN	Restore something to former state or condition.
RINSE	Cleanse by flushing with liquid.
RUN	Continue in force or operation.
SAMPLE	Draw a specimen for judging the quality of the whole.
SCAN	Read quickly.
SECURE	Protect from damage; control access.
SELECT	Choose from a group.
SEQUENCE	Arrange in order.
SERVICE	Keep an item in proper operating condition.
SHUT	Stop or suspend operation (see close).
SHUT DOWN	Stop or suspend operation (see close).
SKETCH	Draw roughly.
SPRAY	Apply a jet of vapor of liquid.
START	Begin; come into being.
START UP	Begin; set in operation.
STOP	Close or cease (see close).

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

STORE	Lay away for future use.
SWITCH	Shift to another electrical circuit; exchange.
SUBTRACT	Take away by reducing.
SUPPLY	Provide or furnish.
SYNCHRONIZE	Arrange operations to occur simultaneously.
TELEPHONE	Communicate by phone.
TEST	Verify serviceability and detect failure by measuring against prescribed standards.
THROTTLE	Decrease the flow of; regulate the speed of.
TITRATE	Method or process of determining the strength of a (titration) solution or the concentration of a substance in solution, in terms of the smallest amount of a reagent of known concentration, required to bring about a given effect in reaction with a known volume of a test solution.
TOTAL	Add up; compute.
TRACE	Discover signs, evidence, or remains of; follow a path.
TRACK	Be aware of a progression of activities.
TRANSFER	Convey from one place or situation to another.
TRANSMIT	Send or transfer from one person to another.
TRANSPORT	Transfer or convey from one place to another by mechanical means.
TRIP	Remove from service rapidly.
TUNE	Adjust; respond to radio waves of a particular frequency.
TURN	Rotate or revolve.
TYPE	Operate a keyboard.
UNLATCH	Open or loosen by lifting a latch.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

UNLOAD	Take off a load.
UPGRADE	Raise the quality of; improve.
UPDATE	Bring up to date; revise.
UNLOCK	Unfasten; free from restraint.
UNCOUPLE	Detach or disconnect.
VENT	Release gas, liquid, or pressure.
VERIFY	Confirm the accuracy of.
VENTILATE	Expose to air.
WAIT	Expect or remain in readiness.
WARM UP	Make ready for operation by preliminary exercise or operation.
WEIGH	Ascertain the weight of.
WITHDRAW	Remove from use.
ZERO	Adjust to zero.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

STEP 2: DETERMINE CONDITIONS

A properly developed learning objective should state clearly the condition that will exist at the time of trainee performance. Conditions of performance define the facility situation, environmental aspects and resources available to aid trainee performance. Typical conditions may include the following:

- Facility operating mode
- Safety considerations or hazards
- System and equipment status
- Tools and materials to be used
- References available
- Environmental conditions
- Problem situations or contingencies (abnormal or emergency).

Learning objective conditions are derived from various job conditions identified during analysis. When developing learning objective conditions, adjustments may be necessary to reflect the degree of fidelity that can be achieved in the training setting. For example, job conditions can be simulated with high fidelity during OJT and simulator training, because they mirror the actual job conditions. When classroom or self-pacing is used, the learning objective conditions are limited by the constraints of the classroom or self-paced environment. If an implied condition is used, it should be easily understood by all who read the objective. Because the learning objective and the setting affect each other, examples of appropriate settings and the conditions that may be required for the setting are listed in the left-hand column below. The written learning objectives, that include the required conditions, are listed in the right-hand column.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

SETTING AND CONDITION REQUIREMENTS	LEARNING OBJECTIVES
OJT Setting: Facility operating mode; equipment and equipment status	**Given the reactor plant at full power, the secondary equipment, closed cycle, cooling water system running with one heat exchanger in service and one heat exchanger in standby, and the secondary equipment, closed cycle, cooling water pump aligned with one pump running and one pump in standby,** operate the secondary equipment, closed cycle, cooling system within system temperature limits.
Laboratory Setting: Equipment; materials	**Given a process sample, laboratory equipment, and reagents,** analyze a feedwater sample for pH in accordance with approved procedures.
Classroom Setting: References	**Given a manual on fire prevention,** state the most effective extinguishing agent for a Class-C fire.
Simulator Setting: Problem situations or contingencies	**Given a malfunction in the main feedwater pump,** troubleshoot the malfunction in the main feedwater pump.
Workshop Setting: Equipment; tools; references	**Given the disassembled parts of a three-phase electric motor, proper tools, and a technical manual,** assemble parts of the three-phase electric motor in correct sequence.
Classroom Setting: Safety considerations	**Given a complete set of protective clothing,** don the clothing in the correct sequence.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

Step 3: IDENTIFY STANDARDS

A well-prepared learning objective includes a standard for evaluating student performance. The trainee's action should result in an output, and the required quantity or quality of that output is the standard of performance. Standards can include step-by-step processes that do not permit deviation. Others may prescribe the product of performance and the factors for judging that product.

Standards are derived from job standards identified during analysis. Similar to the development process for conditions, learning objective standards also should be adjusted to reflect fidelity to job standards. In some cases an implied standard may not be included in the objective. For example, an implied standard of “without error” may be assumed for a procedural step. If an implied standard is used, it should be easily understood by all who read the objective.

The following is a list of characteristics for standards, a description of what the characteristics specify, and an example of a learning objective including these standards:

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

LEARNING OBJECTIVES GUIDELINES

Characteristics of Good Standards	What is specified	Example
Completeness	Precise nature of the output; number of features output must contain; minimum acceptable level of performance	Using a calculator, multiply two three-digit, numbers and write the answer **to the nearest tenth.**
	Number of steps or sequence of steps that must be covered; reference to a plant operating procedure	Given a process sample, laboratory equipment, and reagents, analyze the sample for pH. **The steps will be performed in correct sequence and comply with plant procedures.**
Accuracy	Implying the standard of NO ERROR; how exact the performance must be; correct numbers reflecting tolerances	Given the reactor plant at power, the feedwater regulating system in manual, a wide range of steam generator level reading, and a steam generator system description, calculate the steam generator narrow range level to ± **5% of the wide range level.**
	Value of dimensions that acceptable answer/ performance can assume (these may be qualitative)	Given a misadjusted carburetor and the necessary tools, adjust the carburetor so the engine **idles at its smoothest point.**
Speed	Amount of days, hours, minutes, or seconds allowed for performance	Given a 200-word rough draft, type a letter **without error at a minimum speed of 40 words per minute.**
		Given a disassembled globe valve, rags, gasket, material, tools, and a technical manual, reassemble the globe valve in **30 minutes.**

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

STEP 4. PREPARE GENERIC OBJECTIVES (OPTIONAL)

It is important for learning objectives to address the knowledge needed across the range of task performance under all conditions. The use of generic (fill in the blank) learning objectives can provide management control for ensuring that objectives span the range of knowledge required under both routine and abnormal conditions, as well as supplement the task analysis process of identifying appropriate knowledge for a task. The Example System that follows can be used as a template when writing objectives for a lesson.

When designing your own set of generic objectives each of the headings listed in the example should be taken into consideration. Notice that the example includes objective statements requiring both memorization and application of knowledge. When developing generic objectives you should ensure coverage of both memorization and application. You will note criteria and conditions are not listed in these examples. Your objectives should contain all three parts of an objective (action statement, conditions, and standards).

Example System

Purpose:

1. State the purpose of the _____ system.

Design and Interrelationships:

1. Name the major components of the _____ system.

2. Draw a one-line diagram of the _____ system that shows its interconnections with other systems.

3. Describe the chemical control/functional dependencies that exist between the _____ system and the systems below.

4. Predict how the _____ system responds during a _____ chemistry transient.

Operations:

1. Summarize the operation of the _____ system.

2. State the reason for _____.

3. Recognize the correct _____ system alignments for each of the following conditions:

4. Determine the applicable chemistry specifications for each of the following plant conditions:

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

Operations (Continued):

1. Classify the following _____ system conditions into normal or abnormal.
2. Relate each _____ system test to the condition(s) it detects.
3. Predict how changing environmental conditions affect the _____ system.

Procedures:

1. Identify where the _____ procedures are located.
2. Select the procedure(s) for the _____ activity.
3. Determine the chemistry limitations of the _____ system under the following conditions:
4. Summarize how to _____.
5. List the consequences of improperly performing a _____.
6. Describe the process for reporting errors or sources of confusion in chemistry procedures.

Sampling:

1. Identify the sample points in the _____ system.
2. Describe where in the _____ system flowpath _____ samples are obtained.
3. Identify the equipment used to sample the _____.
4. Determine the valve alignment for sampling the _____.
5. Determine the flushing/recirculation requirements for sampling the _____.
6. List the factors that can influence _____ analysis results.
7. Describe the labeling information required on _____ samples.
8. Describe how to transport _____ samples.
9. Summarize how to dispose of _____ samples.

ATTACHMENT 11
GUIDELINES FOR WRITING LEARNING OBJECTIVES
(Continued)

Controls:

1. Identify where the _____ system controls are located.

2. Describe how _____ control layout, design, or operation limitations might contribute to employee performance errors.

3. Relate _____ control adjustments to their effects on the following system parameters.

Alarms:

1. Identify the alarms associated with the _____ system.

2. Identify where the following _____ alarm sensors monitor the system:

3. Identify where the _____ alarm annunciator is located.

4. Recognize the set points of the _____ system alarms.

5. Identify the expected chemistry alarms during the following plant events:

6. Identify the conditions that verify a _____ alarm.

Indicators and Chemistry Monitors:

1. Identify the operational chemistry monitors associated with the _____ system.

2. Identify where in the flow path each of the following chemistry monitors measures _____ system performance.

3. Match _____ system/component chemistry monitor indications to specific chemistry events.

4. Recognize the failures modes of each of the _____ system chemistry monitors.

System-Related Hazard/Safety Precautions:

1. Identify the personnel hazards or dangers associated with the _____ system.

2. List the precautions associated with the _____ system.

3. Describe how each of the following chemistry conditions can damage the _____ system.

4. Relate the following precautions to the _____ system damage each prevents.

ATTACHMENT 12
SAMPLE TRAINING EVALUATION STANDARD (TES)

TASK NO. 505021—HEALTH PHYSICS TECHNICIAN

Task Title: "Perform Radiation Surveys in Support of Field Radiography Operations."

Terminal Objective: Given that applicable references, equipment, and materials are available, perform radiation surveys in support of field radiography operations in accordance with procedure.

References:

1. SOP WPS-14871, *Radiological Control of Field Radiography Operations* and attachments.
2. IPM IV-10, *Radiological Controls Manual*.
3. RM-901C, *PortaScan Operator's Manual*.

	Enabling Objectives	References
1.	Given a Radiography Checklist, describe the information that must be filled in and when, during the field radiography operation; this should be completed.	1
2.	Given a Source Survey Checklist, describe the information that must be filled in and when, during the field radiography operation; this should be completed.	1
3.	Describe how to verify proper posting of the area affected by the radiography operation.	1
4.	List and locate the equipment to perform radiation surveys in support of field radiography operations.	1,2
5.	Describe the locations required to be surveyed during the field radiography operation.	1
6.	Given the equipment technical manual, perform preoperational check of portable radiation monitoring equipment.	3
7.	Use portable beta-gamma survey equipment to determine radiation levels in accordance with procedure.	3
8.	Demonstrate proper survey techniques using appropriate instruments.	2

ATTACHMENT 12
SAMPLE TRAINING/EVALUATION STANDARD (TES)
(continued)

Performance Test: TASK NO. 505021—HEALTH PHYSICS TECHNICIAN

Prerequisites:
1. HPT-ST-303, Portable Survey Equipment
2. HPT-ST-302, Performing Radiation Surveys
3. HPT-RO-101, Principles of Radiography
4. Qualified Radiation Worker.

Conditions: Affected system tagged out (if required) and prepared for radiography.

Instructions to Trainee—You are to perform the required radiation surveys in support of the selected radiography operation. You must acquire the necessary references and equipment, and complete all required documentation. If you perform a critical step improperly, or do a step out of sequence, you will fail this performance test.

	Action Step	Criteria	Initials
1.	C —Obtain references	—	_____
2.	C —Obtain equipment	—	_____
3.	S/C—Perform preoperational check of portable radiation monitoring equipment	Preoperational checks performed (IAW Equipment Technical Manual).	_____
4.	S/C—Verify posting of the area affected by the radiography	Posted in accordance with SOP WPS-14871.	_____
5.	S/C—Complete the Radiography Checklist	—	_____
6.	S/C—Determine radiation levels	Surveyed in accordance with IPM IV-10 and SOP WPS-14871.	_____
7.	S/C—Record survey data	—	_____
8.	S/C—Complete the Source Survey Checklist	—	_____
9.	S/C—Submit survey data	—	_____
10.	Return equipment	Equipment returned to proper storage location.	_____
11.	Return references	References returned to proper storage location.	_____

Evaluator Instructions—The trainee is to perform this test, without assistance, on the job site. An implied standard of "without error" is assumed for procedural step completion. Provide clarification of requirements if requested by trainee. You are encouraged to ask relevant questions to verify trainee understanding. If a trainee fails this performance test, clearly document the reason for failure, and forward the documentation to the trainee's immediate supervisor. Successful completion of this performance test is to be recorded on the trainee's qualification card.

Codes: (S) Sequence is important. This step must be performed only after the preceding step(s).
(C) Critical step. Failure to meet standards for this item constitutes failure of the TES.

Approved by: _____ **Date:**_____
(Manager)

ATTACHMENT 12
SAMPLE TRAINING/EVALUATION STANDARD (TES)
(continued)

QUALIFICATION CARD—DUTY AREA 5
RADIATION/CONTAMINATION SURVEYS

P,S,O,D[1]	Task Number	Task Title	Performance/Evaluation Signatures (Trainee and Instructor)	Date
P,S	505010	Perform Material Release Surveys		
P	505017	Perform Personnel Contamination Surveys		
P,S	505020	Perform Job Coverage Surveys		
P	505021	Perform Radiation Surveys in Support of Field Radiography Operations		

1The symbols P,S,O, and D refer to Perform, Simulate, Observe, and Discuss. They indicate the mode of evaluation acceptable for the task.

ATTACHMENT 13
TRAINING EVALUATION STANDARDS (TESs) DEVELOPMENT WORKSHEET

Task Number:	**Task Title:**
References:	**Terminal Learning Objective:**
	Task Standards:
	General Conditions:

ATTACHMENT 13
TRAINING EVALUATION STANDARDS (TESs) DEVELOPMENT WORKSHEET (Continued)

Element Number: KSA Taxonomy Number	Element Statement: Knowledge, Skills, and Abilities	Entry-Level Required (Y/N)	Enabling Objectives	Performance Evaluation Method and Amplifying Conditions and Standards

ATTACHMENT 14
TRAINING EVALUATION STANDARDS (TESs) REVIEW CHECKLIST

Instructions—Check each item after review:

☐ 1. Will each TES measure how well the trainee performs?

☐ 2. Is each TES written at the task level?

☐ 3. Does each TES represent the best approximation to actual task performance that can be made, considering cost, time, and ability to measure?

☐ 4. In situations where an end product was available for inspection, was the acceptance criteria incorporated in the TES?

☐ 5. Are TES criteria adequate to require proficient performance without being unnecessarily high?

☐ 6. Do criteria of the TES reflect the desired level of proficiency?

☐ 7. Have specific instructions for administration and evaluation of the TES been provided?

☐ 8. Has subjectivity in scoring been minimized?

☐ 9. For TESs in which a process has been broken down into several observable elements, are the selected elements representative of the process, and can they predict successful performance?

☐ 10. Has the TES been validated on a representative sample of the target population?

☐ 11. Does the TES require that the task be "performed" in those cases where performance is suitable and feasible?

☐ 12. Have those TESs, for which constraints preclude performance in the job environment, been verified as having high-fidelity?

ATTACHMENT 15
COMPLETED TES DEVELOPMENT WORKSHEET

Task Number: 8100090208	**Task Title:** Repair Strainers—Diesel Generator Lube Oil System
References: • Supply Procedure • Quality Assurance Manual • Maintenance Procedure • Technical Manual • Administrative Procedures.	**Terminal Learning Objective:** • Given required initial conditions and proper tools, repair strainers in accordance with the maintenance procedure and the component Technical Manual. **Task Standards:** • Repairs must meet the standards for physical condition and cleanliness required by the Maintenance Procedure. **General Conditions:** • Lube oil system tagged out by Operations • Generator tagged out be Operations • Operations has drained the lube oil system.

ATTACHMENT 15
COMPLETED TES DEVELOPMENT WORKSHEET (Continued)

Element Number: KSA Taxonomy Number	Element Statement: Knowledge, Skills, and Abilities	Entry-Level Required (Y/N)	Enabling Objectives	Performance Evaluation Method and Amplifying Conditions and Standards
8100090208-1:	**Remove Strainer Cover:**			
401206010100	Location of strainer	N	1. Describe the location of the diesel generator lube oil strainers.	
401206040100	Identify strainer components using TM drawings	Y		
401206040101	Determine strainer construction	Y		
401206100200	Determine sequence to remove strainer cover	Y		
404001010521	Location of face shield	N	2. Describe the location of the maintenance mechanic toolroom.	
404001050521	Use of face shield	Y		
404101013323	Location of prybar	N	3. (Same as No. 2)	
404101051700	Use of prybar	Y		
404103010520	Location of lint-free rags	N	4. (Same as No. 2)	
404103050520	Use of lint-free rags	Y		
8100090208-2:	**Remove Gasket from Strainer Cover:**			
401206100204	Determine sequence to remove cover gasket	Y		
401206070101	Recognize that gasket is properly removed	Y		
404101010120	Location of screwdriver	Y	5. (Same as No. 2)	
404101050191	Use of screwdriver	Y		
8100090208-3:	**Remove Strainer Element:**			
401206100208	Determine sequence to remove strainer element	Y		

ATTACHMENT 15
COMPLETED TES DEVELOPMENT WORKSHEET (Continued)

Element Number: KSA Taxonomy Number	Element Statement: Knowledge, Skills, and Abilities	Entry-Level Required (Y/N)	Enabling Objectives	Performance Evaluation Method and Amplifying Conditions and Standards
401206070102	Recognize that strainer element is properly removed	Y		
8100090208-4:	**Clean Strainer Element:**			
401206100700	Determine sequence to clean strainer element	Y		
401206070103	Determine cleanliness standard for strainer element	N	6. Describe cleanliness standards from the maintenance procedure (MP)	Meet MP standards for cleanliness
401206070104	Recognize that strainer element meets cleanliness standard	N	7. Demonstrate use of MP cleanliness standards	
402902010101	Location of cleaning solvent	N	8. Describe location of flammables	
402902050101	Use of cleaning solvent	Y		
402902060102	Safety precautions for solvent use	N	9. Describe safety precautions for use of approved solvents	
8100090208-5:	**Inspect Strainer Element:**			
401206100500	Determine sequence to inspect strainer element	Y		
401206070105	Determine physical condition standards for strainer element	N	10. Describe physical condition standards for a lube oil strainer element	Strainer element must be free of holes/tears and meet maintenance procedure standards for physical condition.
401206070107	Recognition that strainer element meets physical condition standards	N	11. Demonstrate use of MP physical condition standards	

ATTACHMENT 16
TEST ITEM FORMATS

GUIDELINE FOR TEST ITEM FORMATS

Type	Description	Standards
Performance	A direct translation of a skill learning objective into a test item the trainee is required to perform.	Performance of the learning objective must be matched in the test item. Conditions and standards of the learning objective must be matched in the test item. Item directions to the trainee should be clear and concise. Actions should be observable, and measurable process items (i.e., step-by-step procedures) should be listed in the order in which they are performed. Standards for results to be achieved (i.e., accuracy or completeness) should include an indication of performance (e.g., ±5% of program level, within two degrees).
Completion/Short Answer	An item that requires the trainee to complete the sentence or write the answer to a question in a few words. A series of well-constructed completion/short answer items that can measure knowledge with more consistency and objectivity than essay test items.	The item must be stated simply without extensive qualification so that the test is not unintentionally a reading test. The answer called for must be clear to the informed trainee. For completion items, the main idea should precede the blank. The item should be constructed so that only one correct, brief answer is possible.
Alternate Choice (true-false)	A two-choice item in which only one of the responses is absolutely correct.	The item must be true or false, without qualification. The item should not be long or overly complex with many qualifying phrases.

ATTACHMENT 16
TEST ITEM FORMATS
(Continued)

GUIDELINE FOR TEST ITEM FORMATS (Continued)

Type	Description	Standards
Alternate Choice (true-false) (Continued)		The item should not normally be lifted directly from printed sources due to the potential lack of clarity or accuracy when taken out of context.
Multiple Choice	An item with three or more responses, one of which clearly provides the "best answer."	The item can contain either a direct question or incomplete statement (to be filled in with the correct response). Words should not be included in the item that otherwise would be repeated in each response. The correct answer should be clearly the best of the responses. Responses should be within the trainee's comprehension. Responses should be arranged in some logical order. "None of the above" and "all of the above" should be avoided. Positions of the correct answer should be varied. The item and responses should not measure trainee opinion. Response should be independent, not overlapping or include other responses.
Matching	A list of conditions, responses, and directions for matching the conditions to responses.	Conditions and responses should have a plausible relationship to each other.

ATTACHMENT 16
TEST ITEM FORMATS
(Continued)

GUIDELINE FOR TEST ITEM FORMATS (Continued)

Type	Description	Standards
Matching (Continued)		The number of responses should be less than or more than the number of conditions to avoid the simplicity of a one-to-one relationship. Directions to the trainee should explain the basis for matching clearly.
Drawing/Labeling	An item that requires the trainee to sketch the flow path of a given system/circuit, or label a drawing as provided.	The item should be clear and contain specific instructions. The system/circuit to be sketched should have only one correct flow-path. The drawing (test item) should identify the items to be labeled clearly. There should be only one correct term for each item to be labeled in the drawing.

ATTACHMENT 17
SAMPLE TEST SPECIFICATION FORM FOR 50-ITEM GENERAL EMPLOYEE TEST

LEVEL OF LEARNING OBJECTIVES				
Content Area	**Knowledge of Facts, Terms, Symbols**	**Comprehension of Principles/ Concepts**	**Application of Information (Principles/Concepts)**	**Total Number of Questions**
Fundamentals	1	1	0	2
Biological Effects	0	2	0	2
Administration	2	2	1	5
Exposure Control	2	5	4	11
Contamination Control	2	5	3	10
Monitoring	1	3	1	5
Access Control	3	3	1	7
Unusual Incidents/ Emergencies	1	2	3	6
Protective Clothing/ Respiratory Equipment	1	1	0	2
Total Questions	13	24	13	50

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE

General Information:

1. Course—Health Physics (HP) Technician Training
2. Referent Organization—Operational Health Physics
3. Required by DOE Order 5480.11
4. Prepared by HP Trainer.

Organization and Administrative Responsibilities:

1. Development of course material will be accomplished by Health Physics Training, specifically, HP Trainer and RP Trainer.
2. Materials will be reviewed by Operational Health Physics management, Radiation Technology, and selected HP technicians.
3. Reviews will be performed on draft material issued on 6/7, 7/15, and final draft 8/25. One week will be allowed for review and comment.
4. Final materials will be approved by the Manager, Health Physics Training, and the Manager, Operational Health Physics.
5. Course material will be maintained by Health Physics Training and administered by Health Physics Training and Operational Health Physics as specified in Qualification Standard No. 0602Q.
6. Key contacts will be I. M. Responsible, Supervisor Operational Health Physics, and HP Trainer, Training Specialist, Health Physics Training.
7. Subject matter experts will be assigned by I. M. Responsible to aid in development as requested by HP Trainer.

Course Loading and Scheduling:

1. Each course will accommodate a minimum of three and a maximum of 15 trainees.
2. Scheduling will be coordinated through the Manager, Health Physics Training. Requests for scheduling must be made 15 workdays prior to the required start date.

Evaluation Guidelines:

1. Release of trainees from portions or all of the training course must be approved by the Manager, Health Physics Training, and the Manager, Operational Health Physics. Exceptions must be documented as stated in the Training Management Manual.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

Evaluation Guidelines (Continued):

2. Pretests covering entry-level knowledge will be given one week prior to course start date. Any individual deficiencies will require remedial work prior to starting the course. Health Physics Training will coordinate remedial activities.

3. Two progress tests, Week One and Week Three, and a final comprehensive test will be given.

4. Failure of any test will require remedial action described in the *Training Management Manual*.

Instructor Qualifications:

1. All classroom instruction will be provided by qualified health physics instructors.

2. All OJT instruction will be provided by qualified OJT personnel.

Training Resources and Facilities:

1. Classroom instruction will be conducted in Room 130 of the Plant Training Building.

2. All additional training will be provided in the appropriate OJT area.

3. There will be no impact to facility operations to conduct training. All OJT can be conducted during the course of normal operations.

4. Training aids and additional equipment are available through Health Physics Training or can be obtained, on a loanable basis, from Operational Health Physics.

Test Administration Guidelines:

1. Tests will be controlled and administered as described in the *Training Management Manual*.

Supplemental Training Records:

1. All training will be recorded in Qualification Standard No.0602Q.

2. Completed qualification standards will be sent to Health Physics Training for review and inclusion in the individual training files.

Course Curriculum Outline:

Included as an example are sections from each training setting. This is not the complete outline. The actual guide should contain all portions of the outline.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

COURSE CURRICULUM OUTLINE—SELECTED SECTIONS

Classroom (Approximately 120 Hours)

Math and Science Fundamentals

Basic Mathematics/Algebra:

1. Add, subtract, multiply, and divide whole numbers, fractions and decimals.
2. Calculate percentages, square roots, and averages.
3. Determine significant figures.
4. Convert units from metric to English and English to metric for length, volume, flow rate measurements, temperatures, and pressures.
5. Add, subtract, multiply, and divide algebraic expressions, use parentheses, factor algebraic expressions, and change signs to the depth necessary.
6. Apply the concept of exponential buildup and decay to solve radioactive decay and gamma ray shielding problems.
7. Use exponents, radicals, and scientific notation in radiological protection technology.
8. Graph sample data.
9. Perform statistical analyses of data.

Physics:

1. Discuss the use of a system of units.
2. Discuss the concepts of and relationships between work, energy, and momentum.
3. Discuss equilibrium and the laws of motion.

Chemistry:

1. Describe the structure and relationship between atoms, elements, molecules, and compounds. Describe the types of chemical bonding.
2. State the properties of acids and bases.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

Chemistry (Continued):

1. Explain the concept of chemical and ionic equilibrium.

2. Solve simple chemical equations.

Nuclear Physics:

1. Define the following terms, SI equivalents, and identify the symbols used for:

   a. Curie

   b. Rad

   c. Rem

   d. Roentgen

   e. Radioactivity

   f. Radioactive decay

   g. Half-life.

2. Define the term isotope and discuss similarities and differences between an isotope and the base element.

3. Discuss mass-energy equivalence.

4. Discuss the concept of nuclear forces.

5. Define binding energy and relate it to binding energy per nucleon.

6. Define the term “fission” and discuss its relationship to nuclear material.

7. Discuss parent-daughter relationships for radioactive material.

8. Discuss the concepts employed in criticality safety (e.g., double and triple contingency) at your facility.

Basic Electricity:

1. Explain the characteristics of conductors, semiconductors, resistors, capacitors, inductors, and simple direct current circuits.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

COMMUNICATION

Written and Oral:

1. State the importance of accurate communications.
2. Discuss the importance of interpersonal communication skills.
3. Apply them both to written and oral communication (i.e., handling conflict, active listening, assertiveness).

Radiation Protection Theory

Radioactivity and Radioactive Decay:

1. Explain the processes involved in the nuclear stability of atoms.
2. Identify the modes of radioactive decay (e.g., alpha, beta, and neutron).
3. Explain gamma-ray emission.
4. Write simple equations describing each mode of decay.
5. Perform radioactive decay calculations using exponential equations and appropriate graphs.
6. Characterize alpha and beta particles, gamma rays, x-rays, and neutrons.
7. Write simple equations describing the process of neutron activation.
8. Discuss the information that can be obtained from the Chart of Nuclides.

Sources of Radiation:

1. State and quantify the major sources of natural background radiation.
2. State and quantify the major man-made sources of radiation.
3. State and quantify the major sources of radiation at the facility.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

LABORATORY (Approximately 20 Hours)

Math and Science Fundamentals

Basic Mathematics/Algebra:

1. Graph sample data.
2. Perform statistical analyses of data.

Radiation Protection Theory

Interaction of Radiation with Matter:

1. Select the type(s) of shielding material required for each type of radiation.

Counting Statistics:

2. Perform minimum detectable activity calculations, when necessary.

Radiation Protection Concepts and Procedures

External Radiation Exposure Control:

1. Solve simple distance attenuation problems for line and point sources.
2. Perform corrections for instrument readings (geometry, distance, etc.)
3. Evaluate the effectiveness of temporary shielding in various practical applications.
4. Perform gamma-ray shielding calculations using these items:
    a. Exponential shielding equation
    b. Half- and tenth-thickness values
    c. Empirically derived graphs.
5. Demonstrate proper survey techniques using appropriate instruments.
6. Perform dose-equivalent determinations.
7. Solve dose-rate and shielding problems using:
    a. Inverse square law
    b. Tenth value layer
    c. Half value layer.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

ON-THE-JOB TRAINING (OJT)
(Training will be completed during a 3-month shift cycle)

Communication on the Job

Oral and written:

1. Demonstrate proper oral communication:
   a. Face-to-face
   b. Radio
   c. Telephone.
2. Demonstrate proper written communication in:
   a. Work logs
   b. Radiation surveys
   c. Maintenance requests
   d. Radiation work permits
   e. Other required written records.

Radiation Protection Concepts and Procedures

Radiation Protection Concepts and Procedures:

1. Demonstrate proficiency in using DOE and Department of Transportation standards and contractor administrative limits in practical situations.

External Radiation Exposure Control:

1. Demonstrate the ability to utilize the principles of time, distance, and shielding to minimize personnel exposure.
2. Solve simple distance attenuation problems for line and point sources.
3. Perform corrections for instrument readings (geometry, distance)
4. Evaluate the effectiveness of temporary shielding in various practical applications.
5. Perform gamma-ray shielding calculations using these items:

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

External Radiation Exposure Control (Continued):

a. Exponential shielding equation

b. Half and tenth thickness values

c. Empirically derived graphs

6. Implement facility exposure control systems.

7. Respond to area radiation monitor alarms.

8. Demonstrate proper survey techniques using appropriate instruments.

9. Perform dose-equivalent determinations.

10. Solve dose-rate and shielding problems using:

    a. Inverse square law

    b. Tenth value layer

    c. Half value layer.

Radioactive Contamination Control:

1. Identify the potential sources of radioactive contamination, including work operations that can generate contamination.

2. Identify the conditions in which the use of each type of containment device should be considered.

3. Identify the methods by which a work site can be prepared in advance for performance of highly contaminated work.

4. Demonstrate proper survey techniques (e.g., smears, fixed contamination, personnel contamination) using appropriate instrumentation.

5. Demonstrate proper techniques and procedures for limiting the spread of contamination.

6. Demonstrate the ability to post a contamination area properly with the required signs.

7. Identify the facility contamination monitoring systems and their operating principles and capabilities.

8. Demonstrate proper donning and removal of anticontamination clothing, and define the conditions that dictate the use and selection of anticontamination clothing.

ATTACHMENT 18
SAMPLE TRAINING DEVELOPMENT AND ADMINISTRATIVE GUIDE (Continued)

Radioactive Contamination Control (Continued):

9. Convert meter readings to radioactivity levels.

10. Estimate surface contamination levels resulting from various working conditions and incidents.

Development and Implementation Schedule:

1. 5/01—"Training Development and Administration Guide" approval

2. 6/07—First-draft lesson plans

3. 6/14—First-review complete

4. 7/15—Second-draft lesson plans including training support material

5. 7/22—Review of support and second-draft lesson plans

6. 8/25—Final lesson plans and support material complete

7. 9/03—Final review of materials

8. 9/17—Final comments incorporated

9. 9/20-10/18—small-group evaluation

10. 11/01—Review and modifications identified in small-group evaluation

11. 11/08-12/06—First Run

12. 12/15—Review and modifications identified in first run

13. 12/30—Final course approval.

Approval Signatures:

_____ _____

(Manager, Operational Health Physics) (Manager, Plant Training)

ATTACHMENT 19
TRAINING METHODS

Method	Characteristics
Lecture	• A public-speaking-type presentation • Effective and efficient with large groups of trainees • Typically used in classroom settings • Body of information that is well-organized, condensed, and presented in logical steps • Presentation provides periodic pauses for asking and answering questions to determine trainee comprehension • Conclusion provides a summary of key points.
Demonstration/Practice	• A presentation in which the exact procedures (skills) are shown in step-by-step sequence by the instructor • More effective with small groups of trainees • Limited to laboratory/workshop, OJT, and simulator training, when use of equipment is involved • Performance of each step and its relationship to the overall procedure is emphasized by the instructor • Trainee performs the step-by-step procedure under instructor supervision until proficiency is achieved.
Discussion/Facilitation	• Conversation is guided between trainees, with direction from the instructor or group leader • More effective with small groups of trainees • Typically used in classroom settings • A discussion leader is appointed for each group

ATTACHMENT 19
TRAINING METHODS
(Continued)

Method	Characteristics
Discussion/Facilitation (Continued)	• Provides for use of case studies • Provides opportunity for trainees to observe, listen, and actively participate in the learning activity.
Oral Questioning	• Instructor asks specific questions of different trainees (not always those who volunteer the answer) to increase interaction and control the pace of the training • Permits direct interaction between the instructor and trainees • Appropriate to all settings • Samples trainee comprehension of the material.
Role Playing	• Trainees assume roles (responsibilities) in a real or simulated job environment • Develops an understanding of roles and the importance they play in the job environment • Permits instructor observation of trainee attitudes, philosophies, and personality traits • Appropriate to all settings except self-pacing • Effective in learning team member functions and team response coordination • Particularly effective during exercises and drills.
Walk-Through	• Trainees experience actual job environment • Used to facilitate trainees' transition from learning in a simulated environment to application in the job environment • Limited to a discussion of action steps within the actual job environment

ATTACHMENT 19
TRAINING METHODS
(Continued)

Method	Characteristics
Walk-Through (Continued)	• Emphasizes physical facility layouts, spatial relationships, equipment location, and observation of trained employees performing their jobs • Places the course learning objectives in a job context that increases trainee motivation and allows active participation • Permits a sampling of trainee comprehension of the learning activity.
Self-Pacing	• The pace of training is controlled by the trainee (i.e., a lesson stops when a trainee fails to respond and remains stopped until the trainee responds) • Frequently used during remedial training.

ATTACHMENT 20
SAMPLE LESSON PLAN FORMAT—CLASSROOM

LESSON PLAN			
Training Department:		**Course:**	
Author:	**Date:**	**Lesson:**	
Review:	**Date:**	**Lesson No.:**	**Rev. No.:**
Approval:	**Date:**	**Time:**	

Terminal Objective and Enabling Objectives:

Prerequisites:

References:

Instructional Aids:

(Page of Pages)

ATTACHMENT 20
SAMPLE LESSON PLAN FORMAT—CLASSROOM
(Continued)

LESSON PLAN (Continued)	
Lesson:	**Lesson No.:** **Rev. No.:**
Content Outline	**Instructor/Trainee Activities**

(Page of Pages)

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT

LESSON TITLE: "Tying the Woolly-Worm Fish Fly"

LESSON NUMBER: 001 **TIME:** 30-45 Minutes

RELEVANT PROCEDURE(S): "Woolly-Worm Fly," Western Flies, Vol. I, page 127

REQUIRED FACILITY CONDITIONS: N/A

SUBMITTED BY: I. M. FAST **DATE:** 10/23/89

REVIEWED BY: R. U. SHURE **DATE:** 10/23/89

APPROVED BY: G. O. RILLA **DATE:** 10/25/89

Safety Precautions and Procedural Limitations:

- Hook and sharp instrument safety
- Avoid breathing fumes from the head cement.

Required Tools/Materials/Instructional Aids:

- Fly tying vise
- Bobbin
- Scissors
- Saddle hackles
- Red yarn
- Bodkin/half-hitch tool
- One box No. 4X hooks
- No. 1 nylon thread
- Assorted chenille
- Head cement.

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT
(Continued)

Objectives:

- Terminal: Given the necessary tools, materials, and procedure, tie a Woolly-Worm fly that closely matches the instructor-provided example or photograph.
- Enabling: None.

Instructor Preparation:

- Review Lesson Plan, Procedure, and Evaluation Guide.
- Prepare materials (enough for at least six flies) in advance.

Student Preparation: None.

1. INTRODUCTION

a. Introduce self	A little small talk usually helps to "break the ice."
b. Motivator	WIIFM?[1]—You should be able to earn up to $100.00 per week tying flies in your spare time.
c. Learning objective (LO)	Review with the student the lesson's LO; see cover sheet.
d. Overview	Describe to the student how you intend to teach this lesson.
e. Find out what the student already knows	Tailor OJT session based on this.
f. Questions	Make sure the student feels free to ask questions at any time.

2. LESSON BODY

a. Review tools and materials	**STRESS SAFETY:** Ensure that the student understands terminology, the use(s) of each tool, and reasons for using <u>only</u> high quality materials.

[1]What's in it for me?

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT
(Continued)

2. LESSON BODY (continued)

b. Explanation and demonstration

(1) Explain and demonstrate the tying of a Woolly-Worm fly using the referenced procedure.	**STRESS PROCEDURAL COMPLIANCE:** Ensure that you cover all listed knowledge requirements stated on the attached OJT Evaluation Guide.
(2) Discuss/explain the critical steps (listed on Evaluation Guide).	The suggested method for this lesson is to demonstrate how to tie the fly, explaining your actions as you accomplish each step. Ask comprehension checking questions to ensure that the student understands.

c. Practice under supervision

(1) Review the procedure with the student	Again, stress the importance of closely following the procedure.
(2) Have the student tie a Woolly-Worm fly.	Be patient! Demonstrate procedural steps again if necessary.
(Instructor's option: Tie another fly as the student ties his/hers. This allows you to show the student how to perform the step again <u>or</u> use the fly that the student is tying.)	Allow the student to continue only after completing each step of the procedure. Comprehension Check—Ask the student why he/she performed the critical procedural steps <u>or</u> what could happen if performed incorrectly.
(3) Have the student tie another fly.	Reduce your assistance as the student becomes more proficient.

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT
(Continued)

3. CONCLUSION

a.	Restate the learning objective	
b.	Review any areas in which the student had difficulty	Remember to keep your comments positive!
c.	Restate the motivator	Cottage Industry—It's possible to earn up to $100.00 or more per week working in your spare time.
d.	Document the completion of training	

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT
(Continued)

OJT EVALUATION GUIDE

TASK STATEMENT: Tie a Woolly-Worm Fly **TASK NO.:** 505075

REFERENCE: Western Flies, Vol. I, Page 127 **DATE:** __/__/__

STUDENT: _____ **EVALUATOR:** _____

Learning Objective—Given the necessary tools, materials, and procedures, tie a Woolly-Worm fly that closely matches the instructor-provided example or photograph.

Knowledge Requirements—Discuss the following during task performance:

- Safety precautions.
- Reason for leaving hook point exposed.
- Reason for always wrapping in a clockwise direction.
- Necessity of tying half hitches.
- Why a space is left between Position "A" and the eye of the hook.

Performance Requirements—

CRITICAL STEPS	YES	NO	REMARKS
1. Thread attached and base wrapped?			
2. All materials attached at proper location?			
3. Materials firmly attached?			
4. Wrappings wound clockwise?			
5. All applicable safety rules observed?			
6. Complied with the procedure?			

Final Evaluation Pass/Fail—Performance requirements must be completed with 100% accuracy. Knowledge requirements must be completed with 80% or greater accuracy.

PASS ☐

Failures—Return this form to the Training Department to reschedule the evaluation session and/or additional training. Time permitting, provide training on identified weak areas and document your actions on the back of this Evaluation Guide.

FAIL ☐

EVALUATOR SIGNATURE: _____

ATTACHMENT 21
SAMPLE LESSON PLAN FORMAT—OJT
(Continued)

PROCEDURE—TYING THE WOOLLY WORM

General Information

Caution!—Be aware of the hook point when handling and wrapping. It is very sharp! Do not cover the point of the hook with the vise.

1. Attach the vise to the worktable. Adjust so that the operating lever will secure the jaws firmly. **Hook position**

2. Place hook in vise as shown. Hook should be parallel to the worktable.

3. Starting at Position “A,” wrap thread clockwise over the entire shank of the hook to Position “B.” This provides a base for all future operations. **Hook nomenclature**

4. Attach red yarn for the tail at Position“B.” Tail should extend about 1/4 inch beyond the bend. Three wraps of thread around the yarn is adequate to hold the tail secure. Trim excess yarn from shank. **Hackle**

5. Chenille is used as the body; tie on at Position “B.”

6. Select a large saddle hackle for the ribbing; tie in the tip at Position “B.” **Tail**

7. Wrap thread to Position “A,” then tie a half hitch. Wrap chenille clockwise to Position“A,” tie off with three wraps and a half hitch; trim chenille. **Chenille**

> NOTE
> Make sure there is sufficient space between Position "A" and the eye for making a head.

Vertical lines "A" and "B" are strategic tying positions

8. Wrap hackle to Position “A,” tie off, and trim as in Step 7. The wrapping technique is called “palmering,” and successive wraps should be about 1/16 inch apart.

9. Complete the tying by forming the head behind the eye. Tie two half hitches to secure. Apply one or two drops of head cement. **The Woolly Worm**

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR

EXAMPLE OF A SIMULATOR EXERCISE GUIDE AND ASSOCIATED CLASSROOM PREVIEW

SCENARIO TITLE: Primary Cooling System Operations—Single-Loop and Natural Circulation Operation

SCENARIO CODE: SI-124

REVISION: Two

EFFECTIVE DATE: August 29, 1985

COURSE: Certified Operator Initial Training (Advanced Operations Module)

PREPARED BY: _____
(Instructor)

REVIEWED BY: _____
(Operations Training Supervisor)

CONCURRED BY: _____
(Operations Superintendent)

APPROVED BY: _____
(Training Manager)

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SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

Scenario Title: Primary Cooling System Operations—Single-Loop and Natural Circulation Operations.

Setting/Duration: Classroom Preview—2 to 4 h
Control Room Simulator—2 to 4 h.

References:

1. ECCS Surveillance
   a. Plant Procedure 7.4.5.17, Emergency Core Cooling System (ECCS) Surveillance and associated data sheets
   b. Plant Procedure 2.13, Emergency Core Cooling System
   c. Technical Specification (TS) 3/4.5.1.
2. Primary Cooling Pump Seal Failure
   a. Plant Procedure 4.3.1.2, High Unidentified Reactor Leakage
   b. Plant Procedure 4.3.1.3, High Identified Reactor Leakage
   c. Plant Procedure 4.2.1.7, Primary Cooling Pump Seal Failure
   d. Technical Specifications 3/4.3.2, 3/4.1.1, and 3/4.4.1.
3. Primary Cooling Pump Trip
   a. Annunciator Procedure 4.602.A13-4.5 Primary Cooling Pump Turbine Trip
   b. Annunciator Procedure 4.602.A6-4.7 Primary Cooling Pump Trip.

Malfunctions:

1. 10-05-0001 Primary Cooling Pump “A” Seal Failure
2. 10-01-0002 Primary Cooling Pump “B” Turbine Trip.

Initial Conditions:

1. IC-11 [100% power, end of life (EOL)]
   a. Core thermal power—2425MW(t) (99.55%)
   b. Core flow—102M lb/h (99.55%)

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(Continued)

c. Exposure—8400MWD/T (near EOL)

d. Equilibrium xenon—3.1% delta K/K

e. Reactor pressure—1590 psig.

Scenario Summary:

Starting from 100% power and 100% core flow at the end of core life, the following conditions will be encountered in sequence:

1. Failure of an ECCS pump to start on demand during a routine pump operability surveillance

2. Failure of primary cooling pump "A" seal requiring isolation of the pump

3. Inadvertent trip of primary cooling pump "B" during maintenance activities supposedly being conducted on pump "A" resulting in natural circulation operation.

Learning Objectives:

Upon completion of the classroom preview and simulator exercise, the trainees will be able to perform the following tasks with the reactor plant operating at power and under the additional conditions as indicated:

1. Perform an ECCS surveillance in accordance with Plant Procedure 7.4.5.17 and respond to inoperative pump in accordance with Plant Procedures 2.1.3 and TS 3/4.5.1.

2. Diagnose a primary cooling pump seal leak and take corrective action in accordance with Plant Procedures 4.3.1.2, 4.3.1.3, and 4.2.1.7, also TS 3/4.3.2, 3/4.1.1, and 3/4.4.1.

3. With one primary cooling pump isolated and a trip of the running primary cooling pump, identify the primary cooling pump trip, identify the natural circulation condition, and take corrective action in accordance with Plant Procedures 4.602.A13-4.5, 4.602.A6-4.7, 4.2.1.10, and TS 3/4.4.1.

Common Student Errors:

Note: This section will be filled out by the facility as it uses the exercise guide to alert the instructor for areas to look for when conducting future training. (Operators do not always complete subsequent actions in abnormal procedures.)

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

EXERCISE PREVIEW—CLASSROOM

Instructor Outline	Trainee Activity
1. INTRODUCTION	
a. Scenario Title: Primary	
(1) Cooling Operations—Single	
(2) Loop and Natural Circulation Operations	
b. Expected Duration	
(1) Simulator—2 to 4 h	
(2) Classroom—2 to 4 h	
c. Learning Objectives.	
2. SCENARIO OVERVIEW AND REVIEW	
a. Initial Conditions	
(1) Power (100%)	
(2) Core flow (100%)	
(3) Equilibrium xenon, near EOL	
(4) Maximum decay heat power history.	
b. ECCS Surveillance	
(1) Review Surveillance Procedure 7.4.5.17	Respond to instructor questions.
Note: Use the generic outline provided in Appendix C as a reference for topics to discuss.	
(2) ECCS pump startup failure	
(a) Symptoms (Control Room indications)	Respond to instructor questions.

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SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

EXERCISE PREVIEW—CLASSROOM (Continued)

Instructor Outline	Trainee Activity
2. SCENARIO OVERVIEW AND REVIEW (Continued)	
(b) Applicable alarm response procedures (list:)	Respond to instructor questions.
(c) ECCS system started Procedure 2.1.3	
(d) TS LCO 3/4.5.1 action requirements for inoperable core cooling pump	
Note: Use the generic outline provided in Appendix C as a reference for topics to discuss while reviewing TS.	
c. Primary Cooling Pump Seal Failure	Respond to instructor questions:
(1) Symptoms (Control Room indications) (list:)	• Leak-detected confinement equipment, drain flow high, annunciator • Primary cooling pump outer seal leakage high • Primary cooling pump seal staging flow high/low.
(2) Operator actions	Respond to instructor questions:
Note: Use the generic outline.	
(a) Applicable annunciator	• Review Plant procedures (list:) Procedure 4.3.1.2 (High Unidentified Reactor Leakage)
(b) Applicable plant abnormal procedures (list:)	• Review Plant Procedure 4.3.1.3 (High Identified Reactor Leakage)

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

EXERCISE PREVIEW—CLASSROOM (Continued)

Instructor Outline	Trainee Activity
2. SCENARIO OVERVIEW AND REVIEW (Continued)	
(c) Applicable technical specifications (list:).	Review TS 3/4.4.1 and Power Flow Map
(d) Applicable emergency procedures (list:)	Respond to instructor questions. • Review Plant Procedure 4.2.1.7 (Primary Cooling Pump Seal Failure) - TS 3/4.3.2 - TS 3/4.1.1 - TS 3/4.4.1.
(e) Applicable technical specifications (list:).	• Review applicable technical specifications for reactor leakage and single primary cooling loop operation:
d. Primary Cooling Pump Trip	
(1) Symptoms (Control Room indications) (list:)	Respond to instructor questions: • Turbine trip • Flow coastdown • Reactor power decrease • Primary pump suction or discharge valve closed.
(2) Operator Actions (use the generic outline):	
(a) Applicable alarm response procedures (list:)	• Review Alarm Response Procedure 4.602.A13-4.5 (Primary Cooling Pump Turbine Trip) • Review Alarm Response Procedure 4.602.A6-4.7 (Primary Cooling Pump Trip)
(b) Plant abnormal procedure(s) (list:)	• Review Abnormal Procedure 4.2.1.10 (Loss of Core Flow).

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SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

EXERCISE PREVIEW—CLASSROOM (Continued)

Instructor Outline	Trainee Activity
3. SUMMARY	
a. Review Learning Objectives	
Note: Normally, these instructions would not necessarily be included in the body of the exercise guide, but would be explained in a training department instruction governing the use of simulator exercise guides.	
(1) If the classroom presentation does not immediately precede the simulator training session, review the scenario summary and the learning objectives.	
(2) Trainee knowledge is assessed using items listed in segments titled "QUESTIONS."	
(3) All bold-faced segment titles (e.g., MALFUNCTION, role play) require the instructor to perform certain functions that impact the conduct of the exercise.	

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE

Instructor Outline	Trainee Activity
1. SIMULATOR INITIAL CONDITION SET—IC-11	
2. PREEXERCISE BRIEFING	
a. Scenario Summary (if needed)	
b. Learning Objectives (if needed)	
c. Shift Turnover Information	
(1) No equipment out of service	
(2) No evolutions in progress	
(3) No abnormal equipment lineups	
(4) Planned evolutions—ECCS surveillance	
(5) Initial plant conditions:	
(a) Power (100%)	
(b) Core Flow (100%)	
(c) Equilibrium xenon	
(d) Maximum decay heat power history	
(e) Refueling is scheduled for next month.	
d. Assign Shift Positions	Conduct shift turnover, board walkdown and assume shift positions and prepare to perform ECCS surveillance.
3. EXERCISE	
a. Start Simulation—RUN	

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE

Instructor Outline	Trainee Activity
MALFUNCTION: Activate Malfunction 11-03-0007, "A" ECCS pump inoperative.	• Direct ECCS surveillance. • Comply with procedure in accordance with station policy; maintain plant conditions to comply with surveillance prerequisites.
QUESTIONS: At appropriate times as the surveillance is conducted or later during the critique, ask questions probing trainee knowledge of related, fundamental topics such as the following:	• Answer instructor questions.
Q1. Definition of electrical motor starting current?	**A1.** Current flow is due to voltage applied to a pure resistive load (windings) before a counter EMF is produced by rotor back into stator.
Q2. Difference between starting and running current of alternating current induction motors?	**A2.** Starting current is six to seven times as great as running current.
Q3. Normal valve lineup of the ECCS system?	**A3.** Valve V-1 open; Pump B running; Pump A in off position; Valve V-5 closed; flow control valve closed; Valve V-6 closed; Valve V-51 open.
Q4. Locations of ECCS components?	**A4.** ECCS test bypass valves located in ECCS pump room.
OBSERVATION: Observe that students take immediate and subsequent action in response to inoperative ECCS pump as per Plant Procedure 2.1.3 and TS 3/4.5.1.	• Recognize "A" ECCS pump does not start and announce failure to Control Room personnel. • Direct maintenance foreman to investigate cause of pump failure.

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE (Continued)

Instructor Outline	Trainee Activity
Note: Perform the role of plant personnel as they are asked for by the shift supervisor or Control Room operator.	• Declare ECCS system inoperable.
ROLE PLAY: As maintenance foreman, advise the control room that the reason for pump failure cannot readily be determined, and that trouble-shooting efforts have started.	• Determine technical specification requirements for inoperable ECCS pump.
MALFUNCTION: Activate Malfunction 10-05-0001, Primary Cooling Pump "A" Seal Failure, after discussion of TS action requirements.	• Perform immediate and subsequent actions for failed primary cooling pump seal failure.
OBSERVATION: Observe diagnosis of the primary cooling pump seal failure. The following symptoms are evident:	• Determine primary cooling pump seal failure.
1. Leak detected "Confinement Equipment Drain Flow High" annunciator	
2. Leak detected "Confinement Floor Drain Flow High" annunciator	
3. Primary cooling pump outer seal leakage high	• Announce failure to Control Room personnel
4. Primary cooling pump seal staging flow high/low.	
OBSERVATION: Observe trainees take immediate and subsequent actions in response to primary cooling pump seal failure as per Plant Procedures 4.3.1.2, 4.3.1.3, 4.2.1.7, and TS 3/4.3.2 and 3/4.1.1.	• Determine seal failure leak rate from equipment drain sump pump run times and integrator readings. • Determine Technical Specifications action requirements for inoperable primary cooling pump.
ROLE PLAY: As plant equipment operator, advise as to the Control Room pump seal leak rate.	• Secure the malfunctioning primary cooling pump and isolate the pump; verify leakage has stopped.

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE (Continued)

Instructor Outline	Trainee Activity
Note: Perform the role of plant personnel as requested by the shift supervisor.	
ROLE PLAY: As maintenance foreman, request the shift supervisor approve a work order allowing maintenance on the isolated primary cooling pump.	
MALFUNCTION: Activate malfunction 10.01-0002, Primary Cooling Pump "B" Turbine trip.	• Perform immediate and subsequent actions for tripped primary cooling pump.
(**Caution!** When primary cooling pump trips, remove Malfunction 10.01-0002.)	
OBSERVATION: Observe diagnosis of the primary cooling pump trip:	• Determine primary cooling pump trip.
1. Primary coolant pump trip	• Announce failure to Control Room personnel.
2. Primary flow coastdown	• Determine technical specification limitations for no primary cooling pumps running.
3. Reactor power decrease.	
OBSERVATION: Observe trainees take immediate and subsequent actions in response to primary cooling pump trip per Plant Procedures 4.602.A13-45, 4.602.A6-47, 4.2.1.10 and TS 3/4.4.1.	• Dispatch plant equipment operator to determine cause of primary cooling pump trip.
QUESTIONS: At appropriate times during the casualty, ask questions probing trainee knowledge of related, fundamental topics such as the following:	• Answer instructor questions.
Q5. Methods of determining the cause of the primary cooling pump turbine trip in the Control Room	**A5.** Potential causes: • Indication of turbine fault

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE (Continued)

Instructor Outline	Trainee Activity
	• Primary cooling pump suction or discharge valve closed (governor trip) • Loss of vacuum • Loss of bearing oil pressure.
Q6. Temperature difference limits between isolated and operating primary cooling loops and how they are measured.	**A6.** Refer to temperature recorder TR-560 for primary cooling pump temperature (Loops A and B)—Technical Specifications limits.
TERMINATION: After team decides plant conditions can be maintained or plant management decides to shut down and make needed repairs—end of scenario—FREEZE SIMULATOR.	
4. POSTEXERCISE CRITIQUE	Discuss major problems and questions about the scenario.
a. Obtain trainee's self-evaluation/comments/questions.	
b. Review learning objectives.	
c. Review the exercise using recorder traces of the evolutions; compare trainee responses to malfunctions with correct responses.	
d. Review all oral questions and correct answers; correct the wrong answers provided by individual trainees during the exercise.	
e. Critique student performance observed during each exercise:	
(a) Reinforce proper individual and team performance	

ATTACHMENT 22
SAMPLE LESSON PLAN FORMAT—SIMULATOR
(Continued)

PREEXERCISE BRIEFING-EXERCISE-POSTEXERCISE CRITIQUE (Continued)

Instructor Outline	Trainee Activity
(b) Reinforce applicable theory	
(c) Identify areas for improvement.	
f. Solicit additional questions from students and promote discussion of correct answers.	
5. EVALUATION (at conclusion of simulator training session)	
a. Performance evaluation form (one per trainee)	
(1) Strengths	
(2) Weaknesses.	
b. Discuss evaluation results with each trainee.	
c. Comments.	

ATTACHMENT 23
TRAINING MATERIALS HISTORICAL RECORD

NUMBER: _____ **TITLE:** _____

DATE REVISION APPROVED: _____

Scope and Reason for Modification	Instructor	Date

ATTACHMENT 24
INSTRUCTOR ACTIVITIES

Instructions—Review the guidelines below, and check off each as they are accomplished:

1. **Gaining and maintaining attention and motivating the trainee:**

   ☐ a. Appeal to known interests of the trainee.

   ☐ b. Relate the instruction to short- and long-term goals of the trainee and training program.

   ☐ c. Change the media and schedule break periods during lengthy segments of training.

2. **Informing the trainee of the learning objectives:**

   ☐ a. Address the learning objectives in clear, concise language; and if necessary, illustrate them in a variety of ways to clarify misunderstandings and for added emphasis.

   ☐ b. Relate the value of the learning objectives to job performance.

   ☐ c. Explain the enabling objectives and how they relate to mastery of the terminal objective.

3. **Eliciting recall of prerequisite knowledge:**

   ☐ a. Stimulate the recall of previous learning and relate it to new information.

4. **Presenting the training material:**

   ☐ a. Use appropriate media to provide a visual demonstration of the information.

   ☐ b. Present statements of new information in a meaningful context and logical sequence.

   ☐ c. Provide examples and periodic review or summaries.

   ☐ d. Provide for proper timing and sequence within and between skill events, and break the events down into manageable steps.

5. **Providing learning guidance:**

   ☐ a. Provide features of the job environment that will aid in retention of the information, concept, or rule.

ATTACHMENT 24
INSTRUCTOR ACTIVITIES
(Continued)

☐ b. Provide opportunity for the trainee to apply the concept or rule in a variety of new situations.

☐ c. Identify each skill step, its performance, and its relationship to the overall skill event.

6. Eliciting mastery of the learning objectives:

☐ a. Ask the trainee to state or write the information or to perform the skill event.

☐ b. Ask the trainee to apply the rule or concept in an unfamiliar situation.

☐ c. Monitor trainee progress.

7. Eliciting performance feedback:

☐ a. Identify to the trainee what is wrong or omitted from the information, concept, or rule.

☐ b. Provide assessment of performance and reward promptly and frequently during early training, and occasionally during later training stages.

8. Evaluating trainee performance:

☐ a. Ask the trainee to restate the information, rule, or concept.

☐ b. Ask the trainee to originate a situation and apply the rule or concept.

☐ c. Ask the trainee to perform the skill in accordance with the standards of performance.

9. Enhancing retention and transfer of training material:

☐ a. Provide time for repetition and rehearsal of the information, concept, or rule.

☐ b. Provide the opportunity for application of the rule or concept to a variety of job situations.

☐ c. Provide periodic practice for infrequently used skills.

ATTACHMENT 25
LESSON PLAN CHECKLIST

Instructions—Review the following guidelines as a basis for classroom application, and check off each item as you become familiar with each event:

1. Cover Page

☐ a. List lesson plan number and lesson time.

☐ b. List all references; name and number all training aids.

☐ c. All objectives are clearly written and are measurable.

2. Introduction

☐ a. Introduce yourself; establish credibility.

☐ b. Identify ground rules:

(1) Break/lunch, location of restrooms, smoking policy

(2) Note-taking, handling of questions, trainee evaluation(s).

☐ c. Motivate trainees:

(1) Stress WIIFM; explain purpose of the class

(2) Relate actual job experiences; use vivid examples.

☐ d. Review objectives and give overview of lesson.

3. Body (<u>What</u> will you train?)

☐ a. Organize and train to lesson objectives.

☐ b. Mention enabling objectives when covered.

☐ c. Use internal summaries—have trainees assist in summarizing.

☐ d. Repeat new information three to six times during the lesson.

☐ e. Make content interesting:

(1) Use examples and analogies; relate to actual job

(2) Incorporate a variety of visual training aids.

ATTACHMENT 25
LESSON PLAN CHECKLIST
(Continued)

4. Summary

☐ a. Review lesson objectives:

(1) Have trainees provide answers

(2) Consider giving trainees time to study notes before the test

(3) Do not include any new information in the summary.

5. Instructor Notes (<u>How</u> will you train?)

☐ a. Indicate when and how visual aids and handouts will be used.

☐ b. Specify trainee activities, group exercises, etc.

☐ c. Indicate when and how trainee feedback will be obtained; include specific feedback questions on key content material.

6. Objectives and Test

☐ a. The performance is clearly stated for each objective.

☐ b. The lesson plan supports each enabling objective.

☐ c. Each test item is valid (test items can be matched to objectives).

☐ d. Each test item is objective.

☐ e. Enough objectives are tested for the examination to be reliable.

LP Number: _____ Reviewer's Name: _____ Date: _____

ATTACHMENT 26
TRAINING MEDIA

OVERVIEW

Virtually all presentations involve the use of some form of visual aid. Although most lessons can be made more interesting and effective by incorporating audio-visual aids, probably no part of the presentation is misused more. Care must be taken to design the lesson and the use of any visual aids to meet the stated objectives.

EFFECTIVE INSTRUCTOR-TRAINEE COMMUNICATION

The following basic principles of effective instructor-trainee communication should be considered when choosing audio-visual aids:

- First, visuals can increase trainee understanding where words cannot convey all the information. A sketch, photograph, diagram, or graph can describe relationships more completely than words. Visuals can also convey the same information faster and more efficiently.

- Second, long-term retention of information can be increased by visuals. Seventy-five percent of all the information stored in the mind comes through the eyes, while 13% of all the information stored in the mind comes from the sense of hearing. Therefore, using the visual sensory channel helps to communicate in the way most people are able to learn most easily.

- Third, instructors are also helped by designing visual aids. The process of designing visual aids forces instructors to organize their ideas, and during the presentation the aids assist in keeping their thoughts organized.

GENERAL AUDIO-VISUAL AID GUIDELINES

Audio-visual aids offer many advantages to the instructor, but there can be many disadvantages if an audio-visual medium is not used properly. A good presentation should be able to stand alone without visual aids. The training aid should support the presentation, not be the center of it. Audio-visual aids should strengthen what is being said, but should not require interpretation. The following general audio-visual guidelines should be considered when using and selecting audio-visual aids.

Audibility and Visibility

Can everyone in the room comfortably hear and see the aid? (Take into consideration distracting noises outside the room, the acoustics, lighting, and size of the room.) An aid that cannot be heard or is illegible or cannot be seen is worse than no aid at all because the audience will become distracted. It is advisable to rehearse with the visual aid far enough in advance of the presentation to make any necessary changes needed.

Accessibility or Availability

Plan the use of visual aids around the equipment that will be available where the presentation will be given. Is it accessible when needed? A model can be an effective aid, but it can distract the audience if it is left in view throughout the briefing. If a model cannot be placed completely out of sight, keep it covered in the back of the room or in another room until it is needed. Flip charts can also remain covered until it is desired to turn the attention of the audience to the charts.

ATTACHMENT 26
TRAINING MEDIA
(Continued)

Adaptability

Design the training aids to be a natural, intrinsic portion of the sequence of the instruction. Do not make important points fit the aid available. The addition of instructional aids in instruction is good; however, the aid should be related to the instructional objectives and work smoothly into the subject matter. Any difficulties encountered using the aid will distract the audience and detract from the effectiveness of the presentation.

Appropriateness

Is the visual aid appropriate for the audience being addressed? Are cartoons being used when precise diagrams and models should be? Determine the intent of the learning objectives, and analyze the learning needs of the audience before the aid is used.

Support Value

The aid should emphasize the subject matter to be remembered. Instructional aids are tools; and while it is desirable for the tool to be attractive and amusing, it should primarily stimulate interest in the main subject rather than in itself. The crucial point is that aids are neither superimposed extras nor the backbones around which a subject is organized, but they are an integral part of the treatment of the subject, making their unique contribution to the achievement of the stated objectives.

TYPES OF TRAINING AIDS

There are many different types of training aids that can be used for an effective presentation. This section discusses the various training aids available to you as an instructor.

Flip Chart

Flip charts are prepared on large sheets of paper and attached to the top of an easel by a clamp. Each chart is flipped over when discussion of the material it displays is finished. The size of the charts can vary considerably, depending upon the material to be displayed. An instructor can prepare the chart by drawing directly on the paper. The visual can be prepared before class or as the instruction progresses. Advantages of preparing the chart prior to class are that more time can be taken to draw the chart and more class time will be available for the instructor. Rather than flipping the used sheets over, they can be displayed around the room as a subject is developed. The charts can usually be rolled up and carried fairly easily for future use or reference.

35MM Slides

Slides can be prepared by photographing a particular subject and displaying it on a screen through a slide projector. Slides require fairly expensive equipment to project and considerable time to prepare. Slides are worth the trouble if they are going to be used a number of times. Slides are particularly effective if the group is large or an exact diagram or picture is needed that cannot be

ATTACHMENT 26
TRAINING MEDIA
(Continued)

drawn precisely by the instructor. However, the room usually needs to be darkened, which limits eye contact with the audience and may tire the audience if used for prolonged periods of time. Slides will not necessarily limit your flexibility to use the chalkboard as long as the instructor is close to the light switches and is comfortable moving from one medium to the other.

Overhead Transparencies

Overhead transparencies are a practical, inexpensive, and versatile method of displaying information. Transparencies can be written on like a chalkboard or flip chart, used to construct a chart step-by-step through the use of overlays, and the overhead projector can be turned off when not in use. The drawbacks are minor but may include keystoning the image on the screen, blocking the audiences' view by the projector or the instructor, and occasional difficulties in adjusting transparencies.

The following are some general guidelines for constructing overhead transparencies:

- They should be kept simple in detail and word usage.
- For most situations, there should be no more than ten lines and at least two minutes should be allowed for its use. The audience will be confused and frustrated if transparencies are changed more frequently because it takes twenty to thirty seconds for the audience to focus on the content.
- The transparency should clarify an idea better than speech alone could.
- The transparency should present highlights only.
- Use large, clear, bold, uncrowded letters and lines.
- The lettering should be large enough for all to see easily and stand high enough so that the lettering at the bottom is not blocked by the audience.
- Only use those transparencies that accurately represent the facts; if graphs or charts are used, analyze them before the presentation so that comments and answers are accurate. Verify that there are no flaws in the interpretation of the chart.
- A contrasting color should be used to highlight only important points.
- The transparency should be neatly made and be an accurate representation of the idea to be conveyed.
- The transparency should be sturdy and easy to carry or file.

Handouts

Handouts can be an effective way of increasing a trainee's learning and retention if careful thought has been given to their preparation and use. The following are guidelines for the use of handouts:

ATTACHMENT 26
TRAINING MEDIA
(Continued)

- The audience may be distracted by the handouts if they are distributed while the presentation is being given. Supplemental handout material (i.e., articles) should be handed out as identified in the lesson plan so that the trainees' attention is focused on the material at the appropriate time.

- Reproduce copies of flip charts or transparencies only if they are vital for future reference.

- Reproduced charts that are not completely understandable by themselves should be accompanied by interpretive remarks and/or notes for future reference.

- If the handouts do not contribute to the learning objectives, do not use them.

Chalkboard

The chalkboard, or whiteboard if using dry-erase pens, is one of the most useful and least expensive forms of visual aid equipment. It offers plenty of space and can be changed relatively easily. Words, diagrams, and sketches can all be used on a chalkboard. Writing on the chalkboard adds variety to the presentation and gives the audience a chance to take notes. The audience can get involved by being asked for input and listing their ideas on the board. The following are guidelines for use of the chalkboard:

- Writing should be legible, neat, and much larger than usual.

- All members of the audience should be able to see the chalkboard. Remove any visual obstructions and avoid writing on the bottom of the board.

- Enough time should be allowed for the audience to copy or study the material developed on the chalkboard before you erase the material.

- The instructor should not talk while writing on the board.

- Writing lengthy material on the board should be avoided.

- Key ideas and phrases should be written on the board for emphasis.

- Material on the board should be erased when it is no longer needed.

Film and Video Tape

Film and video tape are very effective in conveying an idea, particularly when the instructor does a good job in preparing the audience with an introduction to the material and in conducting a summary after its showing. Films can be selected from various libraries and vendors. Video tapes, however, can be produced at the facility. Events such as previous lectures, debates, panel discussions, facility evolutions, etc., can be recorded. Specific tasks may be dramatically displayed on video tape with narration or allowing the instructor to discuss as the task evolves. As with film, there are several sources of video tapes on a wide variety of subjects.

ATTACHMENT 26
TRAINING MEDIA
(Continued)

Some disadvantages of film and video tape are the availability of the equipment, the cost of films, video tapes and associated equipment, and the complexity of using the equipment.

The following rules should be helpful when using film and video tape equipment:

- Set up the equipment before the session and test it to ensure that it is operating as expected.
- Check the seating arrangements and remove any visual obstructions.
- Designate an assistant to help with light control if necessary.
- Have spare equipment available.

INCORPORATING TRAINING VISUAL AIDS INTO THE PRESENTATION

The following is a list of suggestions for developing training aids, which will contribute to the achievement of the learning objectives and facilitate communication in the classroom:

- Prepare lesson of instruction as usual.
- Examine the lesson plan to see whether any learning outcome could be achieved better through supplementing or reinforcing words with training aids.
- Upon identifying such an objective, consider several aids that would help to achieve it. Choose the best training aid for the learning objective, to help the students master the lesson. Also use a variety of training aids in order to vary the pace of the instruction.
- Decide which training aids are best adapted to the needs, resources, and capabilities.
- Locate the aid needed, or have it made.
- Rehearse the presentation with the aid and determine if the aid really contributes to the completeness of the presentation. If not, alter or eliminate it.

ATTACHMENT 27
LEARNING ACTIVITY CHARACTERISTICS

TRAINING MEDIA	CHARACTERISTICS
Visual	The learning activity has pictorial or alphanumeric characteristics that are best learned through visual display of those characteristics.
Visual Movement	Physical movement, in the learning activity, is best learned through demonstration of that movement.
Exact Scale	The learning activity requires knowledge of the exact form and dimensions of an object that is best learned through an exact scale representation of the object.
Audio	The learning activity has sound characteristics that are best learned through demonstration of those characteristics.

ATTACHMENT 28
EXISTING MATERIAL REVIEW CRITERIA

CRITERIA		
Category	**Clarification**	**Application**
Appropriateness to expected trainee entry-level skills and knowledge	Are the materials prepared at a level of skills and knowledge appropriate to the trainees?	Determine if material content can be related to expected entry-level skills and knowledge, including appropriate reading level of the trainees.
	Are the materials clearly written and presented so the trainee can complete the required learning activities?	Determine if selected trainees can use the materials and complete the learning activities.
Coverage of learning objectives	Do the materials reflect the learning objectives of the desired program?	Assess the material, comparing the learning objectives to those of the desired program, and determine which learning objectives are not covered adequately.
	Will the use of the mater-ials be consistent with other materials used in the training program or the mastery of the learning objectives?	Analyze sets of materials to determine if they are supportive and provide an effective progression of learning.
Consistency with learning activities	Do the materials conform to the learning activities of the desired program?	Analyze the material, comparing the learning activities to that of the desired program. Identify any deficiencies.
Compatibility with the "Training Development and Administration Guide"	Are the materials practical for use in the given facility situation?	Determine if the materials can be used in facilities with available equipment, time, space, and with the number of trainees planned.

ATTACHMENT 29
SAMPLE INSTRUCTOR EVALUATION FORM

Instructor:	Observer:	Class Size:	Date: / /

Class ID:	Course Title:	Location:

General Class Occupations:	Length of Lecture:	Length of Observation:

Instructions—Answer the questions below, and make comments whenever "No" is selected:

1. Did the instructor follow the master lesson plan? ☐ Yes ☐ No
   Comments: _____

2. Was the instructor's knowledge of the subject satisfactory? ☐ Yes ☐ No
   Comments: _____

3. Was the instructor's method of presentation satisfactory? ☐ Yes ☐ No
   Comments: _____

4. What was the attitude of the instructor towards the class? _____

5. What was the general attitude to the class?
   Comments: _____

ATTACHMENT 29
SAMPLE INSTRUCTOR EVALUATION FORM
(Continued)

6. Were handouts used? ☐ Yes ☐ No ☐ Not Observed
   Were the handouts satisfactory ☐ Yes ☐ No ☐ Not Observed
   Comments: _____

7. Were visual aids used? ☐ Yes ☐ No ☐ Not Observed
   If "yes," what type? _____
   Comments: _____

8. Were the visual aids satisfactory? ☐ Yes ☐ No ☐ Not Observed
   Comments: _____

Instructor Performance Summary:

(Excellent)				(Average)				(Needs Improvement)	
10	9	8	7	6	5	4	3	2	1

General Comments: _____

_____
(Observer's Signature)

Reviewer: _____ Reviewed with Instructor: _____

_____ (Date) _____ (Date)

Noted by Supervisor: _____ _____ (Date)

cc: File (original)
Instructor
Training Manager

(**Note:** Similar forms should be developed and utilized for each instructional setting.)

ATTACHMENT 30
INSTRUCTOR/SUPERVISOR EVALUATION EXAMPLE

INSTRUCTOR/SUPERVISOR EVALUATION GUIDE

Instructor: _____ **Evaluation Date:** _____

All items should be checked on the following basis as appropriately designated:

N/O = Not observed.
NI = Performance (Needs Improvement) is less than standard.
S = Performance (Satisfactory) meets the standard.
G = Performance (Good) exceeds the standard.
E = Performance (Excellent) exceeds the standard significantly higher.

	N/O	NI	S	G	E	REMARKS
TRAINING ENVIRONMENT						
Adjusted lighting						
Controlled temperature						
Kept background uncluttered						
Other distractions						
INSTRUCTOR						
Introduction:						
Displayed topic						
Presented learning objective						
Presented lesson topic overview						
Endeavored to motivate student(s)						
Stressed importance of material						
Solicited class participation						
Presentation:						
Knowledge of subject matter						
Displayed enthusiasm						
Variety of training aids						
Use of training aid techniques						
Reinforced student participation						
Response to student needs						
Used examples/analogies						
Checked student comprehension/questioning						
Clarified/amplified important points						
Maintained student interest						
Delivery rate/voice level						
Summary/review of lesson						
COURSE CONTENT						
Organized/easy to follow						
Lesson technical content accurate						
Course technical content accurate						

Reviewer: _____ ____/____/____ (Date)

Reviewed with Instructor: _____ ____/____/____ (Date)

Noted by Supervisor: _____ ____/____/____ (Date)

cc: File (original)
Instructor
Training Manager

ATTACHMENT 31
INDICATORS OF POTENTIAL TRAINING PROGRAM WEAKNESSES

Instructions—Check the indicators that were observed during small-group evaluations and the first run of the course:

☐ 1. Learning objectives are not compatible with the entry-level skills and knowledge of the trainees.

☐ 2. Learning objectives are not sequenced for effective learning.

☐ 3. Learning activities do not support effective accomplishment of the learning objectives.

☐ 4. Learning activities do not specify adequately the behavioral activities of the instructor and trainees.

☐ 5. Text material and references are inconsistent with expected trainee entry-level skills and knowledge.

☐ 6. Materials contain terminology not used in the facility.

☐ 7. Pacing of material is too slow or too rapid.

☐ 8. Audiovisual media used is inappropriate or ineffective.

☐ 9. Practice exercises are not similar to test items.

☐ 10. Test items do not measure mastery of the learning objectives adequately.

ATTACHMENT 32
POSTTRAINING QUESTIONNAIRE

Instructions—Please check the response you consider appropriate for each question and provide comments where appropriate:

1a. How difficult was the instruction?

☐ Too Easy ☐ Average ☐ Too Difficult

b. Where and why was it too easy or too difficult? _____

_____

2a. How was the length of the instruction?

☐ Too Short ☐ Okay ☐ Too Long

b. Where and why was it too short or too long? _____

_____

3. How was the amount of information?

☐ Too Little (at one time) ☐ Okay ☐ Too Much (at one time)

4a. How was the information?

☐ Clear ☐ Average ☐ Confusing

b. Where and why was it confusing? _____

_____

5. How was the vocabulary in the lesson?

☐ Too Simple ☐ Okay ☐ Too Complicated

6a. How were the directions?

☐ Clear ☐ Average ☐ Confusing

b. Where were the directions confusing? _____

_____

7. How was the amount of practice exercises?

☐ Too Few ☐ About Right ☐ Too Many

ATTACHMENT 32
POSTTRAINING QUESTIONNAIRE
(Continued)

8. How were the practice exercises?

☐ Interesting ☐ Okay ☐ Boring

9. How was the lesson's pace?

☐ Too Slow ☐ Okay ☐ Too Fast

10. How was the content structured?

☐ Logically ☐ Okay ☐ Randomly

11. Any other general comments? Please write them below.

Comments:

ATTACHMENT 33
POSTTRAINING INTERVIEW

Instructions—Review the following questions and briefly comment on each:

1. How difficult was the instruction? _____

2. How was the length of the instruction? _____

3. How was the amount of information? _____

4. Was the information clear or confusing? _____

5. How was the vocabulary in the lesson? _____

6. Were the directions clear or confusing? _____

7. How were the practice exercises? Were they helpful? _____

8. How was the lesson's pace? _____

9. How were the illustrations? _____

10. Was the instruction sequenced logically? _____

11. Did you know this information before you came to class? _____

12. Any other general comments? _____

ATTACHMENT 34
INSTRUCTOR LESSON RATING FORM

NAME: _____ **COURSE TITLE:** _____

DATE STARTED: _____ **DATE COMPLETED:** _____

QUESTIONS	SAT	UN-SAT	CORRECTIVE ACTION/COMMENTS
1. Were course objectives developed from specific tasks for the course?			
2. Did test questions match the objectives taught?			
3. Did subject matter contain just the information necessary to teach that objective?			
4. Were student exercises and practices in instructional material relevant to specific learning objectives?			
5. Were reference materials readily available to the instructor and the students?			
6. Were audio equipment and materials easily obtainable and in good working order?			
7. Were students interested in the subject matter?			
8. Were students attentive and well motivated?			
9. Was instructor interested in the subject matter and material?			
10. Did instructor have adequate time to prepare for the course?			
11. Was learning environment the most suitable to the material being taught?			

ATTACHMENT 34
INSTRUCTOR LESSON RATING FORM
(Continued)

QUESTIONS	SAT	UN-SAT	CORRECTIVE ACTION/COMMENTS
12. Was the delivery the system most efficient and economical available?			
13. Was the instructor-to-trainee ratio appropriate for the instructional setting?			

COURSE PROBLEMS	RECOMMENDED CORRECTIVE ACTION

_____
(Instructor)

ATTACHMENT 35
SAMPLE COURSE CRITIQUE

INSTRUCTIONS: This critique sheet will be used to evaluate and improve facility training programs. Please place an "X" in a number block to represent your score for each criterion, and include additional comments, if you wish. An envelope for completed course critique sheets will be provided by your instructor. These completed critique sheets will then be delivered to the appropriate Training Manager.

Name: _____ **Job Title:** _____
Course: _____ **Course Date(s):** _____
Instructor(s): _____ **Course Location:** _____

	PERFORMANCE									
	Needs Improvement			Adequate				Excellent		
CRITIQUE QUESTIONS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Technical quality of the course?										
2. Teaching skills/expertise of the instructor?										
3. Technical knowledge of the instructor?										
4. Instructor attitude?										
5. Appropriateness of course topics?										
6. Sequence of course topics?										
7. Length of course?										
8. Instructional quality of training material?										
9. Participant learning resulting from the course?										
10. Overall opinion of the course?										

(**Note:** If comment is directed to a particular criteria, please include the number with your comment.) Comments: _____

_____

_____

_____

_____
Signature (optional)

ATTACHMENT 36
EXAMPLE EMPLOYEE TRAINING EVALUATION

This form is to be completed by the trainee following completion of the training. A rating of 1 indicates little or no value or poor quality. A rating of 5 indicates high value or high quality.

EMPLOYEE TRAINING EVALUATION	
Course Title:	
Instructor:	**Date:**

Please include comments in each blank: Check appropriate box:

		Poor				Excellent
1.	Objectives (clear, appropriate)?	1	2	3	4	5
2.	Content (organized, relevant)?	1	2	3	4	5
3.	Speaker (knowledgeable, responsive)?	1	2	3	4	5
4.	Delivery (lively, stimulating, clear, fluid)?	1	2	3	4	5
5.	Visual Aids (helpful, well-designed)?	1	2	3	4	5
6.	Handouts (helpful, well-designed)?	1	2	3	4	5
7.	Application (useful on the job)?	1	2	3	4	5
8.	Overall Rating (satisfying, recommendable)?	1	2	3	4	5

Other comments (e.g., training weaknesses/strengths, suitability of course length, adequacy of facility:_____

Name (optional):	**Contractor:**
Department:	**Title:**

ATTACHMENT 37
REVISION CRITIQUE SUMMARY

The following example represents a method for instructors to summarize the major comments submitted by students for supervisory notification and possible course or lesson revision:

Course/Lesson Title: _____

Period of Instruction: _____ **Instructor:** _____

Critique Comments	Recommended Action

_____ ____/____/____

(Submitted By) **(Date)**

Training Coordinator's Comments: _____

_____

_____

_____

Action:

☐ Revision File _____ ____/____/____

(Training Coordinator) (Date)

☐ Return

cc: Training Manager

ATTACHMENT 38
LESSON PLAN REVIEW CRITERIA CHECKLIST

This example checklist could be used to judge whether a lesson plan meets predetermined standards and is ready for use by an instructor.

Note: To use this checklist each item must be compared to standards that are determined by your individual facility. These standards should be included on this form.

Course/Program: _____

Author: _____ **Revision No.:** _____

Date: ___/___/___

Instructions to Reviewer: Place the appropriate letter in the blank provided—
S (Satisfactory), **U** (Unsatisfactory). If **U** is entered, explain why in the comment section:

S = Item is properly completed

U = Item is not completed or improperly completed

N/A = Not applicable.

Cover Page (A)

1. ___ Course/program title
2. ___ Module/title or unit number
3. ___ Appropriate approvals (supervisor, SME, etc.)
4. ___ Prerequisites for module/unit
5. ___ Page numbers with total pages of lesson plan listed
6. ___ Revision number and effective date (if initial lesson plan, write in date of lesson plan completion)
7. ___ Author's name
8. ___ Revisor's name
9. ___ Learning objectives
10. ___ Learning objectives listed in sequence as taught
11. ___ Approximate teaching time
12. ___ Instructor references
13. ___ Trainee references.

Comments: _____

ATTACHMENT 38
LESSON PLAN REVIEW CRITERIA CHECKLIST
(Continued)

Left-Hand Column (B):

1. ___ Content written in seminarrative style (not a typical outline or completely narrative textbook)
2. ___ Content introduction, motivational statement
3. ___ Content summary/review of objectives
4. ___ Content matches objectives
5. ___ Math word problems with solutions fully written.

Comments: _____

Right-Hand Column (C):

1. ___ Lists instructional methods in sufficient detail to permit another instructor to successfully teach the lesson
2. ___ Lists media to be used
3. ___ Lists oral questions and answers.

Comments: _____

OVERALL RECOMMENDATION

The reviewer is instructed to use the following criteria and check one of the two boxes below:

1. If all applicable items are **Acceptable—Check Box a.**
2. If any applicable items are **Unacceptable—Check Box b.**
3. List specific problems under "Comments."

☐ a. Recommended for approval.

☐ b. Not recommended for approval. Critical missing items listed below should be added and the lesson plan resubmitted for review and approval.

Comments: _____

Reviewer's Signature: _____ Date: ___/___/___

ATTACHMENT 39
INSTRUCTOR OBSERVATION CHECKLIST—CLASSROOM

(Instructor/Observer)	**(Class Size)**	**/ /** **(Date)**
(Course Title)	**(Phase Title)**	**(Lesson Title)**
[Length of Lesson (scheduled/actual)]		**(Length of Observation)**

Directions: Check Yes, No, N/O (Not Observed), of N/A (Not Applicable).

The following questions provide a example of how a checklist format could be used to evaluate an instructional presentation in a classroom setting:

1. Advance Preparation—Determine if the instructor demonstrated adequate preparation for the training session:

	YES	NO	N/O	N/A
a. Training area was set up for effective instruction prior to training (e.g., lighting, seating, supplies)?	☐	☐	☐	☐
b. Training materials were gathered and checked for accuracy, completeness, and legibility?	☐	☐	☐	☐
c. Training materials were previewed?	☐	☐	☐	☐
d. Administrative materials (e.g., attendance sheets) were organized for effective and efficient use?	☐	☐	☐	☐
e. Training aids and materials (e.g., tests, handouts, transparencies) were available?	☐	☐	☐	☐
f. Audio/Visual equipment was set up and operational?	☐	☐	☐	☐

2. Format of the Training Material—Determine if the instructor demonstrated ability to follow the lesson:

	YES	NO	N/O	N/A
a. An overview of the session was presented as a part of the introduction?	☐	☐	☐	☐
b. Training content was presented according to the lesson plan?	☐	☐	☐	☐

ATTACHMENT 39
INSTRUCTOR OBSERVATION CHECKLIST—CLASSROOM
(Continued)

2. Format of the Training Material (continued):

	YES	NO	N/O	N/A
c. Instructor/trainee activities were implemented according to the plan?	☐	☐	☐	☐
d. The instructor demonstrated the ability to make instruction meaningful for the trainees?	☐	☐	☐	☐
e. Training objectives were provided at the beginning of the class?	☐	☐	☐	☐
f. Objectives were reinforced during the training?	☐	☐	☐	☐
g. Examples and analogies were used to apply the content to practical situations?	☐	☐	☐	☐

Determine if the instructor demonstrated the ability to focus trainee attention on the training content:

	YES	NO	N/O	N/A
a. The trainees were provided with an appropriate purpose/ rationale for the training?	☐	☐	☐	☐
b. Interest in the topic was increased through use of reinforcement?	☐	☐	☐	☐
c. The relationship of the present session to previous training was identified?	☐	☐	☐	☐
d. The on-the-job significance of the training was emphasized?	☐	☐	☐	☐

Determine if the instructor demonstrated the ability to present the content and instructor/ trainee activities in an organized, logical sequence:

	YES	NO	N/O	N/A
a. One teaching point/objective flowed to the next?	☐	☐	☐	☐
b. Trainees could follow the presentation without confusion?	☐	☐	☐	☐
c. "Nice to know" information was minimized?	☐	☐	☐	☐
d. Meaningful relationships between concepts and skills were clear?	☐	☐	☐	☐
e. Topics had natural beginning and ending points?	☐	☐	☐	☐

ATTACHMENT 39
INSTRUCTOR OBSERVATION CHECKLIST—CLASSROOM
(Continued)

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3. Technical Material Review (for use when evaluation is performed by a SME)—Determine if the instructor demonstrated appropriate technical competence to present the subject matter:

	YES	NO	N/O	N/A
a. Content knowledge was accurate and current?	☐	☐	☐	☐
b. Knowledge was of appropriate depth?	☐	☐	☐	☐
c. Knowledge could be applied to the job as appropriate?	☐	☐	☐	☐

4. Applied Instructional Theory—Determine if the instructor demonstrated the ability to involve trainees actively in the learning process (as opposed to constant lecture or watching a demonstration):

	YES	NO	N/O	N/A
a. Active trainee participation was encouraged?	☐	☐	☐	☐
b. Checks for understanding were made through questioning, performance, review quizzes, etc?	☐	☐	☐	☐
c. Training was monitored/adjusted according to trainee needs?	☐	☐	☐	☐
d. Allowances were made for "slower" and "faster" learners?	☐	☐	☐	☐
e. Behavior and trainee responses were reinforced in a positive manner?	☐	☐	☐	☐
f. Frequent and appropriate trainee responses were elicited?	☐	☐	☐	☐
g. Opportunity to ask subject-matter questions was encouraged?	☐	☐	☐	☐
h. Trainees were given an opportunity to practice more than once (if needed)?	☐	☐	☐	☐
i. "Hands-on" practice was provided where possible?	☐	☐	☐	☐
j. "Hands-on" practice emphasized critical steps and skills?	☐	☐	☐	☐

ATTACHMENT 39
INSTRUCTOR OBSERVATION CHECKLIST—CLASSROOM
(Continued)

4. Applied Instructional Theory (continued) Determine if the instructor summarized key points, information, and task steps before progressing to the next objective:

	YES	NO	N/O	N/A
a. The amount of information presented was appropriate for the trainees?	☐	☐	☐	☐

Additional Comments: _____

ATTACHMENT 40
TRAINING DEVELOPMENT RECOMMENDATION CHECKLIST

The example below is representative of how a checklist could be used to evaluate facility change actions and their applicability to training.

Originator: _____

New Development: _____ **Revision:** _____

_____

1. Identify the problem/need: _____
   _____
   _____

2. Is the problem/need safety-related? Yes: _____ No: _____

3. What job classification is affected? (Check one)

   __ a. Control Room operator
   __ b. Shift supervisor
   __ c. Shift superintendent
   __ d. Facility equipment operator
   __ e. Shift technical advisor
   __ f. Electrician
   __ g. Mechanical maintenance
   __ h. Instrument and control technician
   __ i. Radiation protection technician
   __ j. Chemistry technician
   __ k. Managers and technical staff
   __ l. Other _____

4. What type of task is involved? (Check one)

   __ a. Normal operations
   __ b. Maintenance and surveillance
   __ c. Administrative
   __ d. Abnormal
   __ e. Emergency
   __ f. Team evolution
   __ g. Other _____

5. How important is this situation? (Check one)

   __ a. Negligible
   __ b. Undesirable
   __ c. Serious
   __ d. Severe
   __ e. Extremely severe

6. Does the situation require urgent consideration? Yes: _____ No: _____

ATTACHMENT 40
TRAINING DEVELOPMENT RECOMMENDATION CHECKLIST
(Continued)

7. How difficult is this task to perform? (Check one)

   __ a. Not difficult
   __ b. Moderately difficult
   __ c. Very difficult

8. What is the frequency of this problem/need? (Check one)

   __ a. Infrequent (a few times a year)
   __ b. Moderately (about once a month)
   __ c. Very frequent (weekly to daily)

9. What is the source of the problem/need? (Check one)

   __ a. Lack of training
   __ b. Insufficient training emphasis
   __ c. Lack of practice during training
   __ d. Incorrect training materials
   __ e. Conflict between training and job requirements
   __ f. Regulatory requirement
   __ g. Not applicable

10. How can this recommendation benefit facility operations? (Check one)
   __ a. Correct unsafe practices
   __ b. Improve facility availability
   __ c. Eliminate equipment misuse/damage
   __ d. Reduce reworks
   __ e. Reduce unscheduled maintenance
   __ f. Improve employee performance
   __ g. Accelerate qualification
   __ h. Avert anticipated problem
   __ i. Respond to regulatory/requirement/change
   __ j. Maintain job qualifications

11. How do you suggest training be revised or developed?
   (Attach a written description that describes the root cause of the problem and how it should be corrected.)

Recommendation Submitted By: _____ ___/___/___
(Signature/Title) (Date)

Recommendation Reviewed By: _____ ___/___/___
(Signature) (Date)

Recommendation Approved By: _____ ___/___/___
(Signature) (Date)

ATTACHMENT 41
LABORATORY INSTRUCTOR EVALUATION

This rating scale provides an example of how a laboratory session could be evaluated. The Mastery, Satisfactory, and Unsatisfactory ratings provide a three-part rating scale.

Date: ___/___/___

INSTRUCTOR:

Name: _____
Title: _____

EVALUATOR:

Name: _____
Title: _____

Course Name: _____
Course Number: _____
Control Number: _____

EVALUATION:

Announced: _____
Unannounced: _____
Start Time: _____
Stop Time: _____

Instructions—The instructional evaluation form is divided into five parts. Each statement should be rated.

EXPLANATION OF RATINGS

M	=	**Mastery**	—	Instructor exhibited and consistently applied the stated characteristic.
S	=	**Satisfactory**	—	Instructor exhibited the stated characteristic.
U	=	**Unsatisfactory**	—	Instructor did not exhibit the stated characteristics.
NA	=	**Not Applicable**	—	Not relevant to this observation.
N/O	=	**Not Able to Observe**	—	Evaluator not present when it should have occurred.

General Instructional Techniques	Ratings (circle one)	Notes
1. Objectives for the laboratory were:		
a. Stated prior to performance.	**M S U NA N/O**	_____
b. Discussed prior to performance.	**M S U NA N/O**	_____

ATTACHMENT 41
LABORATORY INSTRUCTOR EVALUATION
(Continued)

General Instructional Techniques	Ratings (circle one)	Notes
2. Instructor followed the lab guide (content and time).	**M S U NA N/O**	_____
3. Instructor actively assisted trainees during lab sessions.	**M S U NA N/O**	_____
4. Instructor identified and corrected trainee knowledge and skill weaknesses.	**M S U NA N/O**	_____
5. Instructor used trainee responses and other situations as opportunities to teach and reinforce concepts.	**M S U NA N/O**	_____
6. Instructor indicated interest and enthusiasm for the session.	**M S U NA N/O**	_____
7. Instructor listened to the trainees and responded to their questions and needs.	**M S U NA N/O**	_____
8. Instructor adjusted the pace to the level of trainees' knowledge and ability.	**M S U NA N/O**	_____
9. Instructor movements and gestures were appropriate (not distracting).	**M S U NA N/O**	_____
10. Instructor maintained vocal variety (avoided monotone).	**M S U NA N/O**	_____
11. Instructor avoided using distracting vocal mannerisms (“and-uh,” “you know,” “okay?”).	**M S U NA N/O**	_____
12. The instructor summarized activities at the end of the session.	**M S U NA N/O**	_____
13. Instructor solicited and answered unresolved trainee questions at the end of session.	**M S U NA N/O**	_____

ATTACHMENT 41
LABORATORY INSTRUCTOR EVALUATION
(Continued)

Knowledge of Subject Matter (only to be answered by SME)	Ratings (circle one)	Notes
1. Instructor explained technical information clearly and concisely.	**M S U NA N/O**	_____
2. The instructor pointed out differences that may exist between the lab and actual facility procedures and equipment.	**M S U NA N/O**	_____
3. The questions required the trainees to:		
a. Think through causes and effects of steps.	**M S U NA N/O**	_____
b. Think through plant conditions, activities, causes, and responses.	**M S U NA N/O**	_____
c. Integrate knowledge (theory, systems, procedures, tech specs/ bases, etc.).	**M S U NA N/O**	_____
4. Instructor's feedback to trainees (timing, frequency, nature) was appropriate for the stage of the session.	**M S U NA N/O**	_____
5. The instructor effectively incorporated the theory of facility operations and industry operating experiences into the laboratory training.	**M S U NA N/O**	_____
6. Enough time was spent on exercises.	**M S U NA N/O**	_____

Comments and Examples: _____

_____

_____

_____

_____

ATTACHMENT 42
INSTRUCTOR PERFORMANCE ASSESSMENT INSTRUMENT

This rating scale provides an example for development of a five-part rating scale. Each descriptor builds on the previous one, thus providing a progressive rating from Low (1) to High (5). The specific application of this rating scale is to evaluate instructional materials with regard to their support of the lesson's learning objectives.

Instructions: The material is arranged so that the indicators are grouped according to the competency which they define. Each indicator is followed by a general comment which clarifies the intent of the indicator. Key points in the descriptors and corresponding examples are also provided in an effort to make evaluating the competency and indicator easier. Rate the indicator by circling the appropriate descriptor number (1, 2, 3, 4, 5).

Instructor's Name: _____ **Date:** ___/___/___
Course/Program: _____

COMPETENCY: Uses instructional techniques, methods, and media related to the objectives.
INDICATOR: Uses instructional materials that provide learners with appropriate practice onobjectives.

(The focus of this indicator is on materials such as texts, lab equipment, etc., used by individual trainees. This may be left blank in some situations. This indicator requires reference to the instructor's plans since the focus is the match of materials with objectives.)

Circle One	Scale of Descriptors	Comments
1.	Materials chosen are irrelevant to the topic or objectives, or no materials are used when it would have been appropriate to do so.	_____
2.	Materials chosen are related to topics, not objectives. For example, the objective may state “distinguish between gamma and beta radiation,” but the list used includes many other radiation types.	_____
3.	Most materials chosen are relevant and provide for practice on specific objectives. Some of the practice may be insufficient in quantity to achieve the objectives.	_____
4.	Materials chosen are relevant to the objectives. Trainees are given ample opportunity to practice the objectives.	_____
5.	In addition to Item 4, formal or informal progress assessment techniques are used to determine whether the practice individual trainees receive is sufficient. Classroom questions may be an adequate basis for a 5 rating if Descriptor 4 is observed. However, simply asking “Any questions?” is not sufficient for a rating of 5.	_____

ATTACHMENT 42
INSTRUCTOR PERFORMANCE ASSESSMENT INSTRUMENT
(Continued)

COMPETENCY: **Plans instruction to achieve selected objectives.**
INDICATOR: **Specifies or selects trainee objectives for lessons.**

(This indicator was selected to assess the appropriateness of the objectives which are found in the lesson plans. Objectives are to be rated if they are prepared by the instructor or are selected for use from the textbook, a "canned" instructional program, or other source. To be rated, the objectives must be included in the portfolio. For a rating of 3 or higher, the objectives must be stated as expressive encounters or in the performance terms.)

Circle One	Scale of Descriptors	Comments
1.	The instructional plans do not include objectives for trainees. If there are objectives they are in terms of instructor behaviors or goals.	_____
	Example:	
	Instructor Behavior—The instructor will introduce the topic of reactor fundamentals.	_____
	Long-Range Goals—The trainee will become a good operator by his study of reactor fundamentals.	_____
2.	The plans include a statement of trainee objectives which are written in broad terms. Many of the objectives seem questionable for the topic or the trainees. Objectives that should have been used with the unit are missing.	_____
	Example:	
	Broad Terms—The trainee will understand the process of reactivity.	_____
3.	The plans include stated trainee objectives that, with only a few exceptions, are appropriate for the topic and the trainees.	_____
	Example:	
	Performance Outcome—Those objectives in which the desired outcome is stated in behavioral terms (e.g., the trainee will draw a one-line diagram of the RHR system).	_____
4.	All objectives are appropriate to the unit and the trainees. The differences in Items 3 and 4 are that in Item 3 some of the objectives are questionable for the topic and the trainees; whereas, in Item 4 all objectives are appropriate for the topics and the trainees.	_____
5.	In addition to the items included in Item 4, the objectives are sequenced in hierarchical fashion by either the instructor or the text.	_____

ATTACHMENT 42
INSTRUCTOR PERFORMANCE ASSESSMENT INSTRUMENT
(Continued)

COMPETENCY: **Demonstrates a variety of teaching methods.**
INDICATOR: **Implements learning activities in a logical sequence.**

(The intent of this indicator is to determine if the instructor can select and logically sequence learning activities. The intent is also to determine if there is sequence from one activity to another within an activity.)

Circle One	Scale of Descriptors	Comments
1.	Activities in the classroom are unrelated to one another or to the objectives.	_____
2.	Many ideas, skills, or activities seem out of sequence.	_____
3.	The lesson is arranged to present most ideas, skills, etc., in a logical sequence. Only occasionally is there a problem of sequence.	_____
4.	No instances of problems in sequencing are noted.	_____
5.	In addition to Item 4, provision is made to acquire prerequisites before or during learning activities, if learners have not already done so.	_____

ATTACHMENT 43
SUPERVISOR'S POSTTRAINING FEEDBACK

This example provides a model for supervisors feedback on trainees three to six months after training has taken place. This is not a complete evaluation instrument, but it is a sample of a five-part rating scale used for posttraining evaluation.

This posttraining evaluation is designed to obtain information which will maintain and improve training program quality. Based upon your observations of the trainee's job performance, rate the trainee on each of the listed tasks by circling the appropriate number. The rating should be based on performance of tasks that were trained on during the course or program.

Supervisor's Name: _____ **Date:** ___/___/___

Course/Program Title: _____

Rating Scale:

1— Unacceptable trainee performance; insufficient display of learning ability and/or manual dexterity.

2— Poor trainee performance (partially competent); marginal display of learning and/or manual dexterity.

3— Adequate trainee performance (competent); sufficient display of learning and/or manual dexterity.

4— Very competent trainee performance; good display of learning and/or manual dexterity.

5— Extremely competent trainee performance; outstanding display of learning and/or manual dexterity.

TASK STATEMENT: Initiate a chemical item classification permit as the requester.

Rating: 1 2 3 4 5

TASK STATEMENT: Remove protective (anticontamination) clothing.

Rating: 1 2 3 4 5

TASK STATEMENT: Perform a locked, high-radiation area/exclusion area, entry/exit.

Rating: 1 2 3 4 5

TASK STATEMENT: Perform equipment/tool/area decontamination.

Rating: 1 2 3 4 5

ATTACHMENT 44
SIMULATOR INSTRUCTOR OBSERVATION

This rating scale example is not complete but provides an example format of how simulator instruction could be evaluated. The H (High), M (Moderate), and L (Low) scale provides a three-part rating for evaluation.

Instructor: _____ **Course:** _____

No. of Trainees: ____ **Date:** __/__/__ **Time:** _____ **Observer Signature:** _____

Instructions: Below is a list of competencies which simulator instructors should use to contribute to the learning process. For each competency observed, please check **H (High)** always observed, **M (Moderate)** generally observed, or **L (Low)** seldom observed, to indicate its strength. The ratings must be based on the appropriateness of the characteristic observed. Comment on the overall characteristics or on each specific characteristic as necessary.

Competency/Characteristic	Rating			Comment
Questioning Techniques:	H	M	L	
1. Poses questions to the group.	☐	☐	☐	
2. Restates learner's response.	☐	☐	☐	
3. Handles incorrect responses appropriately.	☐	☐	☐	
Use of Simulator:	H	M	L	
1. Communicates using proper phones.	☐	☐	☐	
2. Requires trainees to use proper phones.	☐	☐	☐	
3. Initiates malfunctions properly.	☐	☐	☐	
4. Operates instructor's console correctly.	☐	☐	☐	
5. Utilizes simulator training time effectively.	☐	☐	☐	
6. Utilizes simulator training time effectively.	☐	☐	☐	
Trainee Activities:	H	M	L	
1. Reports to assigned facility.	☐	☐	☐	
2. Uses procedures.	☐	☐	☐	
3. Uses reference material appropriately.	☐	☐	☐	
4. Uses phones correctly.	☐	☐	☐	
5. Works as a team.	☐	☐	☐	
6. Maintains proper roles.	☐	☐	☐	
7. Responds positively to critique.	☐	☐	☐	

ATTACHMENT 44
SIMULATOR INSTRUCTOR OBSERVATION
(Continued)

Competency/Characteristic	Rating			Comment
Technical Knowledge (Contents to be used by subject-matter experts only):				
	H	**M**	**L**	
1. Presents information clearly.	☐	☐	☐	
2. Demonstrates knowledge of reactor operator, senior reactor operator, and shift supervisor positions.	☐	☐	☐	
3. Focuses presentation on level of learner's understanding.	☐	☐	☐	
4. Organizes material and presentation well.	☐	☐	☐	
5. Demonstrates familiarity with facility procedures/reference material.	☐	☐	☐	
	H	**M**	**L**	
Summary (Overall):				
1. Completes required documentation and logs.	☐	☐	☐	
2. Summarizes simulator session.	☐	☐	☐	

Reviewed with instructor: _____ ____/____/____
(Reviewer) (Date)

_____
(Instructor)

Noted: _____ ____/____/____
(Supervisor) (Date)

cc: File (original)
Instructor
Training Manager

(**Note:** Similar forms should be developed and used for each instructional setting.)

ATTACHMENT 45
TRAINEE POSTTRAINING EVALUATION

This Trainee Posttraining Evaluation example is not complete but is representative of how combined rating scales can be used effectively. For each task, the knowledge and performance items are three-part scales and the job relatedness and job preparedness items are six-part scales.

Name: _____

Course/Program Title: _____

Date(s) of Training: _____

This Trainee Posttraining Evaluation questionnaire is designed to obtain information which will maintain and improve the quality of our training programs. Based on what you now know about your job in relation to the training you received in this course, please rate the following performance objectives/task statements by checking the relevant line or by circling the appropriate number on the rating scales.

TASK STATEMENT: Conduct surveillance test of instrument valves.

1. Knowledge—Training provided knowledge of (check one):

____ a. Parts, tools, equipment, and simple facts used on the job.

____ b. Includes “a” above plus the procedures used to complete the task.

____ c. Includes “a” and “b” above plus the operating principles involved in performing the task.

2. Performance—Training provided the skills needed to perform (check one):

____ a. Simple parts of the task.

____ b. The task with supervision.

____ c. The task without supervision.

3. Job Relatedness—Tasks trained on related to my job (circle one):

N/A	1	2	3	4	5
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)	(Applies mostly to my job.)	(Applies to all of my job.)

4. Job Preparedness—Level of task training prepared me for my job (circle one):

N/A	1	2	3	4	5
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)	(Applies mostly to my job.)	(Applies to all of my job.)

ATTACHMENT 45
TRAINEE POSTTRAINING EVALUATION
(Continued)

TASK STATEMENT: Calibrate and maintain source range monitor.

1. **Knowledge**—Training provided knowledge of (check one):

   ____ a. Parts, tools, equipment and simple facts used on the job.

   ____ b. Includes “a” above plus the procedures used to complete the task.

   ____ c. Includes “a” and “b” above plus the operating principles involved in performing the task.

2. **Performance**—Training provided the skills needed to perform (check one):

   ____ a. Simple parts of the task.

   ____ b. The task with supervision.

   ____ c. The task without supervision.

3. **Job Relatedness**—Tasks trained on related to my job (circle one):

N/A	**1**	**2**	**3**	**4**	**5**
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)	(Applies mostly to my job.)	(Applies to all of my job.)

4. **Job Preparedness**—Level of task training prepared me for my job (circle one):

N/A	**1**	**2**	**3**	**4**	**5**
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)	(Applies mostly to my job.)	(Applies to all of my job.)

TASK STATEMENT: Tag defective equipment/tools.

1. **Knowledge**—training provided knowledge of (check one):

   ____ a. Parts, tools, equipment and simple facts used on the job.

   ____ b. Includes “a” plus the procedures used to complete the task.

   ____ c. Includes “a” and “b” plus the operating principles involved in performing the task.

2. **Performance**—Training provided the skills needed to perform (check one):

   ____ a. Simple parts of the task.

   ____ b. The task with supervision.

   ____ c. The task without supervision.

ATTACHMENT 45
TRAINEE POSTTRAINING EVALUATION
(Continued)

3. Job Relatedness—Tasks trained on related to my job (circle one):

N/A	**1**	**2**	**3**	**4**	**5**	
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)		(Applies mostly to my job.)	(Applies to all of my job.)

4. Job Preparedness—Level of task training prepared me for my job (circle one):

N/A	**1**	**2**	**3**	**4**	**5**	
(Not applicable, does not apply to my job.)	(Applies very little to my job.)	(Applies somewhat to my job.)	(Applies to about half of my job.)		(Applies mostly to my job.)	(Applies to all of my job.)

ATTACHMENT 46
TRAINEE CUMULATIVE FEEDBACK EVALUATION

This questionnaire example is not complete but provides a format model for evaluating trainee feedback at the end of a course. (Note that the scale requires each trainee to evaluate and express an opinion about statements relating to the training just received.)

Course/Program: _____ **Date:** ___/___/___

Name (Optional): _____ **Instructor's Name:** _____

Please circle the following statements using the following scale:

0 = N/A — Not Applicable Nor Observed

1 = SD — Strongly Disagree

2 = D — Disagree

3 = N — Neutral

4 = A — Agree

5 = SA — Strongly Agree

	N/A	SD	D	N	A	SA
1. Time allotted to each unit of instruction was about right?	0	1	2	3	4	5
2. Examples, analogies, and topics in training were relevant to my job needs?	0	1	2	3	4	5
3. Training aids, audio-visuals and handouts were current, accurate, and relevant to my job needs?	0	1	2	3	4	5
4. As a result of attending the program or course, I am better prepared to perform my present duties?	0	1	2	3	4	5
5. The classroom setting helped to promote learning?	0	1	2	3	4	5
6. Facility specifics were taught where needed?	0	1	2	3	4	5
7. The classroom training I received was beneficial to me in my understanding of facility operations?	0	1	2	3	4	5

ATTACHMENT 46
TRAINEE CUMULATIVE FEEDBACK EVALUATION
(Continued)

	N/A	SD	D	N	A	SA
8. The information received in training was accurate and consistent with information received in the plant?	0	1	2	3	4	5
9. The composition of the group was appropriate to allow me to gain the most from the program (e.g., participant position, responsibilities, interests, beginning knowledge level)?	0	1	2	3	4	5
10. My questions were answered satisfactorily?	0	1	2	3	4	5
11. Overall, the course/program was beneficial and will help me to better perform my job?	0	1	2	3	4	5

COMMENTS:

ATTACHMENT 47
END-OF-COURSE TRAINING EVALUATION

This end-of-course evaluation example provides an alternate format for a questionnaire evaluation instrument. It is also incomplete, but does provide a model for collecting trainee input on training just received.

Course Title: _____ **Course Date:** ____/____/____

Instructor: _____ **Trainee Job Title:** _____

We need your evaluation of the training that you have just completed. Please indicate your responses to the statements below by checking the appropriate box:

	Always	Almost Always	Sometimes	Almost Never	Never	N/A
1. Program Content:						
a. This training was relevant to my job.	☐	☐	☐	☐	☐	☐
b. The training was well organized.	☐	☐	☐	☐	☐	☐
c. The training objectives were clear to me.	☐	☐	☐	☐	☐	☐
2. Training Material:						
a. The information provided in texts and handouts was adequate.	☐	☐	☐	☐	☐	☐
b. The text and handout material were easy to use.	☐	☐	☐	☐	☐	☐
c. The visual aids were of good quality.	☐	☐	☐	☐	☐	☐
3. Instructor:						
a. The instructor was knowledgeable about the course material.	☐	☐	☐	☐	☐	☐
b. The instructor's training information was well communicated to me.	☐	☐	☐	☐	☐	☐
c. The instructor kept me interested in the course.	☐	☐	☐	☐	☐	☐
d. The instructor demonstrated enthusiasm for training and the subject being taught.	☐	☐	☐	☐	☐	☐

ATTACHMENT 47
END-OF-COURSE TRAINING EVALUATION
(Continued)

4. Training Methods:	Always	Almost Always	Sometimes	Almost Never	Never	N/A
a. The lectures were well organized and informative.	☐	☐	☐	☐	☐	☐
b. I participated in classroom discussions.	☐	☐	☐	☐	☐	☐
c. Classroom discussions were useful for clarifying ideas.	☐	☐	☐	☐	☐	☐
d. There was an adequate number of training exercises.	☐	☐	☐	☐	☐	☐
e. Training exercises were useful in clarifying information.	☐	☐	☐	☐	☐	☐
f. There was enough time spent on individual exercises.	☐	☐	☐	☐	☐	☐
g. Exams and quizzes were relevant to the training.	☐	☐	☐	☐	☐	☐
h. Exams and quizzes reinforced the training material.	☐	☐	☐	☐	☐	☐

COMMENTS:

ATTACHMENT 48
PROGRAM EVALUATION

This questionnaire is an example of a narrative program evaluation, that could be used to comprehensively evaluate a training program covering many months. Only sections of the program evaluation have been supplied as a format model. Although classroom and laboratory settings are not included in the figure, they should be developed as appropriate.

Program: _____ **Facility:** _____

Date(s) Conducted From: ____/____/____ **To:** ____/____/____

Evaluator(s): _____

In completing the step-by-step procedures of the narrative program evaluation instrument, the evaluator(s) will be required to respond in various manners at each point in the process. Both objective and subjective data will be collected. Because of the diversity of the program, some steps may not be applicable, and these steps should be cited. Examine the applicable training materials and interview instructors, trainees, and trainees' supervisors to answer the following questions:

Development:

1. Does a written job/task analysis exist for this program? (Cite examples.)

2. Did training personnel and facility technical personnel participate in identifying training needs and developing training programs? (Describe the process.)

3. How was the job/task analysis used to provide the basis for making decisions regarding program content? (If a training task list or matrix has been developed for this program, attach a copy.)

4. Were the entry level skills and knowledge of the trainees given consideration when the program was developed? (Discuss the considerations.)

ATTACHMENT 48
PROGRAM EVALUATION
(Continued)

Development (Continued):

5. Has the program been compared with current facility procedures and other technical and professional references to identify training content and facility-specific information for use in developing training materials?

6. How were the suggested instructional methods or activities developed (task analysis, terminal performance objectives, enabling objectives, actual experience, test pilot, etc.)?

Additional Remarks:

On-the-Job Training (OJT):

1. Is in-facility training delivered using well-organized and current materials? (Include samples.)

2. How are training materials kept current with respect to facility modifications and procedure changes? (Cite examples.)

3. Is OJT conducted by designated personnel who are instructed in program standards and methods? How are they instructed?

ATTACHMENT 48
PROGRAM EVALUATION
(Continued)

On-the-Job Training (OJT) (Continued):

4. What are the required qualifications for in-facility evaluators?

5. Are the above qualifications appropriate for tasks being taught or evaluated?

6. What materials are provided for the trainee's OJT? Include samples.

7. Is the trainee provided an appropriate amount of time in which to learn tasks prior to evaluation?

8. What instructional aids are available to the trainee during the OJT process?

Additional Remarks:

ATTACHMENT 48
PROGRAM EVALUATION
(Continued)

Simulator Training:

1. Do simulator responses emulate those of the plant?

2. Does the simulator hardware resemble that of the Control Room?

3. Is the simulator configuration program effective?

4. To what degree does a nonplant-referenced simulator respond to the trainees' actual plant?

5. Determine if appropriate procedures, references, etc., are available and maintained current:

   a. For nonplant-referenced simulators, are actual facility procedures and references utilized and adapted as appropriate?

6. Do simulator training materials provide for a proper mix of normal, abnormal, and emergency exercises?

ATTACHMENT 48
PROGRAM EVALUATION
(Continued)

Simulator Training (Continued):

7. Do continuing training materials effectively incorporate facility and industry events?

8. Does the normal Control Room complement participate in simulator training?

9. Does management routinely observe and evaluate simulator training?

10. Are effective posttraining critiques conducted?

11. Is feedback from trainees and management solicited and used to modify or improve the quality of the training?

12. Are trainee performance evaluations effectively used to enhance the training program?

13. Do exercises and scenarios effectively support established learning objectives?

ATTACHMENT 48
PROGRAM EVALUATION
(Continued)

Simulator Training (Continued):

14. Does the content of the training guides support the related classroom instruction?

15. Determine if simulator guides, including exercises and scenarios, are based on sound operating principles:

    a. Do they reflect the manner of conducting business established at this plant?

16. Are learning objectives specific to identified training needs of the plant?

17. Are there learning objectives established for each crew position?

18. Do exercises and instructors challenge trainees to perform to the best of their ability?

Additional Remarks:

_____
(Evaluator)

Reviewed By: _____
(Training Manager)

cc: File (original)
Training Coordinator
User Organization

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CONCLUDING MATERIAL

Preparing Activity:
DOE-EH-63

Review Activity:

DOE	Operations Offices
DP	SR
EH	
EM	
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FM	
HR	
NE	

Project Number:

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