Recommended Practice for Qualification Programs for Offshore Production Personnel Who Work with Safety Devices

RECOMMENDED PRACTICE T-2
SECOND EDITION, DECEMBER 2001

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Upstream Segment

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FOREWORD

This Recommended Practice is under the jurisdiction of the American Petroleum Institute Executive Committee on Drilling and Production Operations. It has been prepared with the overall advisory guidance of the API and the Offshore Operators Committee (OOC). The purpose of this Recommended Practice is to provide guidelines for the qualification of personnel engaged in operating, installing, inspecting, testing, and routinely maintaining surface and subsurface safety devices during the production of oil and gas from offshore platforms. This document is for use by employers, mentors, instructors, and candidates for qualification. This publication has intentionally stressed recommended safe operating practices concentrating on personnel and public safety. THE PUBLICATION DOES NOT, HOWEVER, PURPORT TO BE SO COMPREHENSIVE AS TO PRESENT ALL OF THE RECOMMENDED SAFE OPERATING PRACTICES THAT CAN AFFECT SAFETY IN ONSHORE OIL AND GAS PRODUCTION OPERATIONS. It is intended that this voluntary recommended practice will promote and maintain safe working conditions for personnel engaged in onshore production operations. Every effort has been made by API to assure the accuracy and reliability of data contained in this document. However, the Institute makes no representation, warranty, or guarantee in connection with the publication of this recommended practice and hereby expressly disclaims any liability or responsibility for loss or application hereunder or for any violation of local, state, or federal laws with which the contents may conflict. INFORMATION CONCERNING SAFETY AND HEALTH RISKS AND PROPER PRECAUTIONS WITH RESPECT TO PARTICULAR MATERIALS AND CONDITIONS SHOULD BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT MATERIAL, OR THE MATERIAL SAFETY DATA SHEET (MSDS). Users of this publication are reminded that constantly developing technology and specialized or limited operations do not permit complete coverage of all operations or alternatives. Recommendations presented herein are not intended to inhibit developing technology and equipment improvements or improved operational procedures. This document is not a substitute for qualified engineering analysis and judgment to fit the specific operations situation. The publication is available for review by federal and state agencies or authorities and possible use as a model safe practice to assist in preparation or revision of occupational safety codes or regulations. Recommendations set forth in this publication are viewed as one satisfactory method for accomplishing a desired result. They should not be considered as the only method for achieving the desired results. This publication includes usage of the verbs "shall" and "should," whichever is deemed most applicable for the specific situation. For the purposes of this publication, the following definitions are applicable:

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CONTENTS

Qualification Programs for Offshore Production Personnel Who Work with Safety Devices

1 General

1.1 INTRODUCTION AND SCOPE

This Recommended Practice provides guidelines for the qualification of personnel engaged in installing, inspecting, testing, and routinely maintaining surface and subsurface devices that are used to insure safety and to prevent pollution during the production of oil and gas on offshore platforms. These guidelines provide expected candidate performance levels, instructional content and recommendations for testing. A certificate is issued to the candidate upon successful completion of the testing phase.

The value of work experience is recognized by dividing the guidelines into instructional and testing phases. Any candidate who has the experience prerequisites may complete only the testing phase. If a candidate demonstrates proficiency in all classes of safety devices, a certificate is issued identical to those issued to candidates who first take the instructional phase and then pass the testing phase.

This Recommended Practice (RP) complements API RP 14B, API RP 14C and API RP 14H as well as other API Specifications.

1.2 POLICY

This recommended practice may be used by an organization to develop and conduct a qualification program as outlined above. The Institute makes no representation, warranty or guarantee in connection with the publication of any API specification or recommended practice and hereby expressly disclaims any liability or responsibility for loss or damage resulting from their use, for any violation of any federal, state or municipal regulation with which an API specification or recommended practice may conflict, or for the infringement of any patent resulting from the use of an API specification or recommended practice.

2 Definitions (Terminology)

Definitions of terms for equipment and for abnormal production process conditions may be found in the following API Recommended Practices plus any future Recommended Practices and Specifications that deal with offshore safety devices.

API RP 14B ***Recommended Practice for Design, Installation, and Operation of Subsurface Safety Valve Systems.***

API RP 14C ***Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms***.

API RP 14H ***Recommended Practice for Installation, Maintenance and Repair of Surface Safety Valves and Underwater Safety Valves.***

3 Guidelines for Instructional Content

3.1 INTRODUCTION

This section of the guidelines describes the instructional content for qualification. Content may be communicated through any instructional media including, but not limited to, lecture, computer-based instruction, computer simulation, exercises and hands-on demonstrations. Instructional content is generically described for each class of equipment listed in Section 2.3 (i.e., level sensors, pressure sensors, relief valves, etc.). Specific details should be developed by each training organization. The instructional content developed by an operating or service company should emphasize the safety devices the company most widely employs or services within each category. Other training organizations (such as college or vocational school) should develop detailed instructional content that emphasizes safety devices most widely used offshore.

To earn a certificate the candidate should satisfactorily pass the test for each class of safety device (level sensors, pressure sensors, relief valves, etc.).

3.2 ABNORMAL CONDITIONS RESULTING FROM PROCESS SYSTEM MALFUNCTIONS

At the completion of the testing phase a candidate should be able to complete a safety analysis and read a safe chart to determine how failures or malfunctions in the process system can cause abnormal conditions that must be brought under control by properly functioning safety devices.

The reference for instruction in abnormal conditions is Section 4 of API RP 14C, which describes types of undesirable events and explains how the various safety devices can detect and/or control each one.

The detectable abnormal conditions covered in the Section of Undesirable Events of API RP 14C are:

1. Overpressure.
2. Leak.
3. Liquid Overflow.
4. Gas Blowby.
5. Under-pressure.
6. Excess Temperature (Fired Components).
7. Direct Ignition Source (Fired Components.
8. Excess Combustible Vapors in the Firing Chamber.

The reference material of API RP 14C can be tailored for the specific devices that are part of the instructional phase.

3.3 RELEVANT GOVERNMENTAL REGULATIONS

At the end of the testing phase, the candidate should be able to explain which governmental regulations pertain to work with safety devices, including MMS requirements in 30 CFR 250.

Copies of appropriate regulations should be made available to a candidate as part of the instruction phase. The portions of these regulations that are of direct interest to the candidates should be clearly marked. Updates of these regulations should be carefully reviewed by the instructing organizations so that updated material will be included in the instructional and testing yhases.

3.4 SAFETY DEVICES

At the end of the testing phase the candidate should be able to install, operate and maintain at least one safety device that illustrates the operating principles in each of the major classes listed below. In this context, operation includes inspecting, testing, adjusting, calibrating, and recording results. Installation includes original installation and replacement. Maintenance refers to preventive maintenance, routine repair, and replacement of defective or malfunctioning component parts.

As a minimum, the instructional and testing phases should include the following major classes in the surface safety device category:

1. High and low pressure sensors.
2. High and low level sensors.
3. High and low temperature sensors.
4. Combustible gas detectors.
5. Pressure relief devices.
6. Flowline check valves.
7. Surface safety valves.
8. Shutdown valves.
9. Flame detectors.
10. Auxiliary devices (3-way block and bleed valves, time delay relays, 3-way snap-acting valves, etc.).
11. Surface control equipment for surface controlled subsurface safety valves.

The major classes in the subsurface safety device category that should be included in the instructional and testing phases are the following:

1. Surface-controlled subsurface safety valves (including surface control equipment).
2. Subsurface-controlled subsurface safety valves.

Instructional sessions for each category should be subdivided according to the major classes of safety devices as listed above. Instruction relating to testing and adjustment of surface safety devices should follow the procedures outlined in Appendix D entitled "Testing and Reporting Procedures" (excluding "Design and Installation Verification") of API RP 14C and recommended inspection, installation, field testing and maintenance procedures for wellhead surface safety valves in API RP 14H. Additional procedures included in other RP's and Specifications dealing with offshore surface safety devices should also be included. Instruction relating to inspection, testing, and maintenance of subsurface safety devices should follow the procedures outlined in API RP 14B. Assembly and disassembly procedures are furnished in the Manufacturers Operation Manuals for all subsurface safety valves as specified in API Spec 14A.

Instruction relating to the inspection of surface control systems for surface-controlled subsurface safety valves should follow API RP 14B.

For each major class of safety device the following should be included:

1. Introduction on the type of malfunctions or abnormal conditions the class of safety device is intended to detect or control. The discussion and figures from Appendix A (entitled, "Process Component Analysis") of API RP 14C can be used in this instruction.
2. Tnstruction on the specific safety devices within the major class to include the following:

a. Basic principles of operation.
b. Limitations affecting application.
c. Most probable problems causing malfunction or failure and their correction (i.e., bad O-ring, blocked orifice, broken spring, etc.).
d. Test for proper set point, operation, etc.
e. Adjustment, calibration, or reset where applicable.
f. Recording inspection results and malfunctions on appropriate forms.
g. Special techniques for installing of safety devices. These would include such things as safety device orientation, special lubricants, and special installation tools.

3.5 REFERENCE MATERIAL

All material used for instruction should be compiled and available for the candidates. These materials would include instruction notes, manufacturers' detail sketches and descriptions of specific safety devices, government regulations and dl relevant API recommended practices.

The candidate's employer should also provide reference material for any safety devices unique to their operation.

4 Qualification Procedures

4.1 PREREQUISITES

Before enrolling in the instruction phase for safety devices, the candidate should have on-the-job experience with oil and gas production equipment. Preferably, the candidate should have field experience working on safety devices under the guidance of a qualified individual.

4.2 PLANS

Each employer should develop and maintain qualification plans for their offshore employees. These plans would outline the content, steps and requirements for employees to qualify for work with safety devices.

4.3 QUALIFICATION TESTS

Candidates with adequate experience may take the qualification test without having taken the instructional phases in those categories.

The tests should assure that the candidate:

1. Can install, test, perform routine repairs on, adjust, and replace those safety devices described in Subsection 2.3.
2. Can describe the principles of operation of safety devices.
3. Can read a safe chart and determine undesirable events that safety devices are installed to prevent and control.

Can explain the appropriate requirements and intent of government regulations.

4.4 TYPES OF TESTS

Qualification tests should be performance based to provide observable and objective results. Tests for principles of operation, installing, testing and maintaining of safety devices should be measured using computer simulators, operative equipment or bench-type simulators. Tests for safe charts, undesirable events, their detection and control and government regulations should be measured with computerized or written questions.

4.5 DOCUMENTATION OF TEST RESULTS

All test results should be retained in a permanent file by the training organization. If instruction and testing is performed by a third-party organization, a copy of the test results shall be furnished by the training organization to the employer. An appropriate certificate should be furnished each candidate who successfully completes the tests. The certificate should include wording to indicate that the candidate has demonstrated proficiency in accordance with APT RP T-2.

4.6 FREQUENCY OF QUALIFICATION

All candidates should periodically retake the qualification tests. If the candidate passes the qualification test, a new certificate should be issued. If the candidate does not pass the qualification test, instruction should be available for refresher instruction followed by testing. The employer should set the frequency of qualification, but the time interval between testing should not exceed 5 years.

4.7 INSTRUCTOR/MENTOR QUALIFICATION

Instructors/mentors should be knowledgeable of safety devices and of oil and gas process systems. Each instructor1 mentor should be able to demonstrate the ability to instruct or coach and fulfill either of the following prerequisites:

- Successfully completed a course in surface and subsurface safety and pollution control devices, or
- Has extensive experience in the installation, testing, repair, and maintenance of safety and pollution control equipment.

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RECOMMENDED PRACTICE

for

QUALIFICATION PROGRAMS FOR OFFSHORE PRODUCTION PERSONNEL WHO WORK WITH ANTI-POLLUTION SAFETY DEVICES

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TABLE OF CONTENTS

QUALIFICATION PROGRAMS FOR OFFSHORE PRODUCTION PERSONNEL WHO WORK WITH ANTI-POLLUTION SAFETY DEVICES

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FOREWORD

This Recommended Practice (RP) is under the jurisdiction of the American Petroleum Institute (API) Committee on Offshore Safety and Anti-Pollution — Training and Motivation (OSAPTM). It has been prepared with the overall advisory guidance of the API, Offshore Operators Committee (OOC), and the Western Oil and Gas Association (WOGA).

The purpose of this Recommended Practice is to provide guidelines for the qualification of personnel engaged in installing, inspecting, testing, and routinely maintaining surface and subsurface devices that are used to insure safety and prevent pollution during the production of oil and gas from offshore platforms. This document was prepared for the use of employers, instructors, and candidates for qualification.

DEFINITIONS (TERMINOLOGY)

Definitions of terms for items of equipment and for abnormal production process conditions may be found in the following API Recommended Practices plus any future Recommended Practices and Specifications that deal with offshore safety and anti-pollution devices.

API RP 14B — API Recommended Practice for Design, Installation, and Operation of Subsurface Safety Valve Systems.

API RP 14C — API Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms.

API Spec 14D — API Specification for Wellhead Surface Safety Valves for Offshore Service.

SECTION 1
GENERAL

INTRODUCTION AND SCOPE

This Recommended Practice provides guidelines for the qualification of personnel engaged in installing, inspecting, testing, and routinely maintaining surface and subsurface devices that are used to insure safety and to prevent pollution during the production of oil and gas on offshore platforms. These guidelines are intended for training courses with well-defined curricula and include recommendations for testing to assure that a candidate is qualified when he completes a course. A diploma shall be issued to the candidate upon successful completion of the testing phase.

The value of work experience is acknowledged in these guidelines by dividing the courses into instructional and testing phases. A candidate may take only the testing phase if he has the required experience prerequisites. If he demonstrates proficiency in all classes of safety devices, he will be issued a diploma identical to those issued to candidates who first take the instructional phase and then pass the testing phase.

The instructional and testing phases are further divided into two categories — surface safety devices and subsurface safety devices. A candidate may earn diplomas in either or both of these categories.

This Recommended Practice (RP) complements API RP 14B (Recommended Practice for Design, Installation, and Operation of Subsurface Safety Valve systems), API RP 14C (Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems on Offshore Production Platforms), API Spec 14D (Specification for Wellhead Surface Safety Valves for Offshore Service), and a number of references are made to those RP's and Specifications.

POLICY

This API Recommended Practice may be used by a company or educational institution to develop and conduct a qualification program as outlined above. The Institute makes no representation, warranty or guarantee in connection with the publication of any API specification or recommended practice and hereby expressly disclaims any liability or responsibility for loss or damage resulting from their use, for any violation of any federal, state or municipal regulation with which an API specification or recommended practice may conflict, or for the infringement of any patent resulting from the use of an API specification or recommended practice.

SECTION 2
GUIDELINES FOR COURSE CURRICULA

INTRODUCTION

This portion of the guidelines describes the information that should be passed to the candidate through classroom lecture and hands-on demonstration. Curriculum content is described only to the generic level for each class of equipment as listed in Section 2.3 (i.e., level sensors, pressure sensors, relief valves, etc.). Specific detail should be developed by each training organization under the following guidelines. A training program developed by an operating or service company would be directed toward the safety devices they most widely employ or service within each category. Other training organizations (such as a college or vocational school) would develop a detailed curriculum directed toward the pieces of equipment most widely used offshore. A list of equipment most widely used offshore is available from the API Committee on Offshore Safety and Anti-Pollution — Training and Motivation.

To earn a diploma in either the surface or subsurface category, the candidate must satisfactorily pass the test on each class of safety device within that category presented in the course (i.e., level sensors, pressure sensors, relief valves, ek.).

2.1 INSTRUCTION ON ABNORMAL CONDITIONS THAT CAN RESULT FROM MALFUNCTIONS IN THE PROCESS SYSTEM

A candidate in the Surface Safety Device Training Course should understand how failures or malfunctions in the process system can cause abnormal conditions that must be brought under control by properly functioning safety devices. His understanding in this area will aid him in diagnosing the cause of an upset and will instill in him an understanding of the need for instruction on specific classes of devices that will follow in the course. The importance of properly making essential adjustments and conducting tests will be conveyed if he understands the serious consequences that can result from improperly operating safety devices.

The instruction for the candidate's understanding of abnormal conditions should be based on Section 4 of API Recommended Practice 14C. (Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms), which describes types of undesirable events and explains how the various safety devices can detect and/or control each one.

The detectable abnormal conditions covered in Section 4.2a (Undesirable Events) of API Recommended Practice 14C are:

1. Overpressure (Section 4.2a1)
2. Leak (Section 4.2a2)
3. Liquid Overflow (Section 4.2a3)
4. Gas Blowby (Section 4.2a4)
5. Underpressure (Section 4.2a5)
6. Excess Temperature (Fired Components) (Section 4.2a6)
7. Direct Ignition Source (Fired Components) (Section 4.2a7)
8. Excess Combustible Vapors in the Firing Chamber (Section 4.2a8)

The candidate should retain as a separate section in a course instruction manual a written description of the various undesirable events and their causes. This written material can be extracted from API Recommended Practice 14C and detail added as required to tailor the manual to the specific devices covered in the course.

2.2 INSTRUCTION ON RELEVANT GOVERNMENTAL REGULATIONS

The candidate should receive instruction on governmental (federal, state, and local) regulations that pertain to his work with safety and anti-pollution devices, including U.S.G.S. (United States Geological Survey) OCS Order Numbers 5, 8, and 9. The candidate should be given an appreciation of the intent of the regulations.

Copies of appropriate regulations should be included in the course manual. The portions of these regulations that are of direct interest; to the trainees in these courses should be clearly marked. Future revisions of these orders and new orders should be carefully reviewed by the instructing organizations so that additional relevant material will be included in the training.

2.3 SAFETY AND ANTI-POLLUTION DEVICES

The candidate should receive instruction for at least one safety device that illustrates each of the primary operating principles in each of the major classes listed below. He should receive sufficient instruction on working models to prepare him for installing, operating, or maintaining these devices. In this context, operating includes inspection, testing, adjusting, calibration, and recording results. Installing includes original installation and replacement.

Maintaining refers to preventive maintenance, routine repair, and replacement of defective or malfunctioning component parts.

As a minimum, the major classes in the surface safety device category that should be included in the training are the following:

1. High and low pressure sensors.
2. High and low level sensors.
3. High and low temperature sensors.
4. Combustible gas detectors.
5. Pressure relief devices.
6. Flowline check valves.
7. Surface safety valves.
8. Shutdown valves.
9. Flame detectors.
10. Auxiliary devices (3-way block and bleed valves, time delay relays, 3-way snap-acting valves, etc.).
11. Surface control equipment for surface-controlled subsurface safety valves.

The major classes in the subsurface safety device category that should be included in the training are the following:

1. Surface-controlled subsurface safety valves (including surface control equipment).
2. Subsurface-controlled subsurface safety valves.

Training sessions for each category are to be subdivided according to the major classes of safety devices as listed above. Training in each safety device is to consist of those techniques necessary to insure that the candidate can perform on wo king models in the classroom installation, inspection, testing, adjusting, calibration, recording, repair, and replacement that he will be required to do on the job.

Training relating to testing and adjustment of surface safety devices should follow the procedures outlined in Appendix D entitled "Testing and Reporting Procedures" (excluding Section D-2 entitled "Design and Installation Verification") of API Recommended Practice 14C and in Appendix G entitled "Recommended Inspection, Installation, Field Testing and Maintenance Procedures for Wellhead Surface Safety Valves for Offshore Service" in API Spec 14D. Additional procedures included in future RP's and Specifications dealing with offshore surface safety devices should also be included. Training relating to inspection, testing; and maintenance of subsu face safety devices should follow the procedures outlined in Subsections 2.7, 2.8, and 2.9 (entitled "Operation — Inspection, Testing, and Maintenance") of API Recommended Practice 14B. Assembly and disassembly procedures are furnished in the Manufacturers Operation Manuals for all API licensed subsurface safety valves as specified in API Specification 14A (API Specification for Subsurface Safety Valves).

Training relating to the inspection of surface control systems for surface-controlled subsurface safety valves should follow Subsections 3.8, 3.9, and 3.10 (entitled "Operation") of API Recommended Practice 14B.

The curriculum should include the following subjects for each major class of safety device:

1. Instruction on the type of malfunctions or abnormal conditions the class of safety device is intended to detect or control. The discussion and figures from Appendix A (entitled "Process Component Analysis") of API RP 14C can be used in this training.
2. Instruction on the specific safety devices within the major class to include the following:
   a. Basic principles of operation.
   b. Limitations affecting application.
   c. Most probable problems causing malfunction or failure and their correction (i.e., bad O-ring, blocked orifice, broken spring, etc.).
   d. Test for proper set point, operation, etc.
   e. Adjustment, calibration, or reset where applicable.
   f. Recording inspection results and malfunctions on appropriate forms.
   g. Special techniques for installing of safety devices. These would include such things as safety device orientation, special lubricants and special installation tools.

The course instruction manual should include all lecture notes, manufacturers' detail sketches and descriptions of each specific safety device, and instructions for the testing portion. This material should be retained by the candidate for his future reference.

The candidate's employer is responsible for providing training (on-the-job or in schools) for each safety device that the candidate will encounte in his normal duties that was not included in the training course. The employer should furnish instructional material for these safety devices, which will be incorporated in the candidate's course instruction manual.

2.4 INTRODUCTION TO REFERENCE MATERIAL

The instructional phases should include' a description of reference material the candidate might obtain to further increase his proficiency in working with safety devices. This material includes API Specifications 14A, 14D, and API Recommended Practices 14B and 14C plus any future RP's and Specifications in this series. A list of this material with instructions for obtaining the material should be included in the course instruction manual.

SECTION 3
QUALIFICATION PROCEDURES

3.1 PREREQUISITES

Before enrolling in the Surface Safety Device Course, the candidate should be familiar with oil and gas production equipment. Preferably, the candidate should have field experience working on surface safety devices under the guidance of a qualified individual. Before enrolling in the Subsurface Safety Device Course, the candidate should have experience in assisting in the installation or inspection of subsurface safety valves.

3.2 QUALIFICATION TESTS

Candidates with adequate experience may take the qualification test in either the surface or subsurface safety device categories without having taken the training phases in those categories.

Adequate tests are required to assure that the candidate:

1. Can install, test, perform routine repairs on, adjust, and replace those safety and anti-pollution devices described in Subsection 2.3. If the function of a particular safety device (for example, converting a high-level sensor to a low-level sensor or a snap-acting device to *a* throttling device) can be readily converted in the field, the candidate shall be capable of making that conversion.
2. Understands the principles of operation of safety devices.
3. Is aware of undesirable events that the devices are installed to prevent and control.
4. Knows the requirements and intent of appropriate regulations and the penalty for noncompliance.

3.3 TYPES OF TESTS

1. The preferred test for Items 1 and 2 in Subsection 3.2 is a hands-on demonstration on either operative equipment or bench-type simulators on which the candidate performs the identical actions required on the job. The demonstration shall be observed by *a* qualified instructor, who shall be sole judge of candidate competence. This type test will result in either a pass or failure judgment by the instructor.
2. Tests for Items 3 and 4 in Subsection 3.2 should preferably be written, either multiple choice, true-false, or fill-in-the-blank questions.

3.4 DOCUMENTATION OF TEST RESULTS

All test results shall be retained in a permanent file by the training organization. If training is performed at *a* training school other than the candidate's employer, a copy of the test results shall be furnished by the training school to the employer. An appropriate diploma shall be furnished each candidate who successfully completes the course. The diploma should include wording to indicate that the candidate has demonstrated proficiency in the subsurface or surface category, (or both), in accordance with API RP T-2.

3.5 INSTRUCTOR QUALIFICATIONS

Instructors shall be knowledgeable of safety and anti-pollution devices and of oil and gas process systems. Each instructor shall be able to demonstrate the ability to instruct and shall fulfill either of the following prerequisites:

1. a. Successfully complete the basic course in safety and pollution control devices, and
   b. Serve as instructor's assistant during which time he practices instructing under the tutelage of a qualified instructor, or
2. Have had extensive experience in the installation, testing, repair, and maintenance of safety and pollution control equipment.