



**PDHonline Course G355 (1 PDH)**

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## **Expedited NUKE Certification**

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# Expedited Nuke Cert

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## Course Content

### 1. Introduction

The primary purpose of this PDH Course is to inform Engineers of a quick & easy way to obtain approval to place any type device in the containment area of a NUKE plant.

Any product used for any purpose within the containment area of any NUKE plant must be certified for that specific use.

It became necessary to simplify & expedite the original excessively complex & restrictive Nuclear (NUKE) certification procedure. The reason for this is given in paragraph 3 below.

A comprehensive discussion of a little known means of obtaining a legal, effective shortcut for obtaining a NUKE certification follows. This includes a comparison of conventional & shortcut NUKE cert. & describes the resulting major reduction & simplification of the paperwork & procedures required.

### 2. General Information on NUKE certification

Until this procedure was revised, the certification of any product for use inside the containment area of any NUKE plant or facility was extremely lengthy & difficult. All aspects of specification of materials, design, procurement, storage, manufacturing, testing, packaging, & shipment were very tightly controlled.

Typical Requirements for all aspects of conventional NUKE manufacturing activity:

Every aspect of procurement, material specification & verification were originally extremely tightly controlled. Material chemicals & mechanicals, including heat treatment, were specified & verified with the greatest of precision. Design, manufacturing, assembly, & testing were also strictly

controlled per specifications. Storage of material, components, work in progress, identification, packaging, & shipment, required exceptionally tight control & documentation. Inspectors were required to verify all material before each action. They were required to witness & document each operation. All pertinent measurements must be witnessed or performed by an inspector. All actions, such as machining, required careful monitoring & verification. The quality system required precision & much greater detail than more conventional quality systems, with absolute detail of each action verified by a qualified inspector & others contributing to changes. The quality system precluded the possibility of anyone interacting in a prohibitive manner with any material or component at any time during the process. Positive control of materials & components was essential; typically by enclosing in special controlled access rooms or cages.

### How stringent must a quality system be to qualify a part for modified NUKE Cert?

A typical ASME or equivalent quality control system is generally adequate, with the exception of the stringent controls of all operations. An inspector must observe & document each action to preclude any omissions or erroneous actions.

An example of the rigidity of controls required was when an official from a major oil company once visited all management personnel of the author's employer, bringing with him several of his high level managers. He asked a variety of difficult questions. One question that he asked the author (Engineering Manager) was how he knew that a machinist who was on probation, had not substituted a similar piece of metal after seriously damaging a part in progress. He had a point, even with our excellent quality control system (not NUKE). It could happen. Not even the astute president had a satisfactory answer. For Nukes it absolutely must not be possible without fraudulent action by several persons.

ISO falls well short of NUKE standards since ISO only emphasizes following procedures, rather than assuring product quality.

### **3. Justification for relaxed NUKE cert requirements**

The entire NUKE cert quality system is so obtrusive that many manufacturers refuse to compete for projects. That eventually led to the recognition by the NRC that a relaxed NUKE cert procedure was justified, per the following:

During the year 2000, a customer sent an auditor to review the quality system for a single product at a small manufacturing firm. The author, who was the Engineering Manager, had written the quality manual to ASME - NBBI standards. He supported the auditor during his visit.

Before beginning, the auditor advised that there was now a possibility of obtaining a new type of simplified NUKE Cert.

He explained that justification of the new system resulted when a particular supplier refused to continue manufacturing a specific essential NUKE certified product. He told the NRC representative that it was simply not worth the effort. He was selling an identical product to a very large market for a small fraction of what NUKE customers paid for the NUKE certified product, without the "ridiculous" red tape & additional material, process controls, & documentation effort. The buyer offered a much larger payment, but the supplier still refused to manufacture the product. The essential NUKE product was indeed unavailable. Other manufacturers of similar products were either not certified or not interested in manufacturing it.

A desperate situation demanded desperate action. It was agreed that the only option was to accept a product that was manufactured to a less stringent quality system. The simplified system was developed & approved.

The auditor explained the details of the procedure, & offered to provide a NUKE cert for the entire compliment of unrelated products rather than just one product. The author's quality manual appeared to be acceptable. An audit proved that it was acceptable, with a few minor revisions, for the new NUKE standard. The requirements included witnessing the manufacturing process, as well as documentation of each product. In this case, there was one component of one product that was out of stock. That was the only product that did not receive the NUKE cert. Each of the other 8 products was then certified for NUKE applications.

A very important benefit was that each approved product was placed on an international database, so that any potential customer in the entire world could locate it, order it, & legally operate it in the containment area of any NUKE plant in the world.

Note that a NUKE cert is not required for operation in a NUKE plant if located outside of the containment area.

## 4. Governing Agency & Documentation

The Governing Agency responsible for NUKE Certs is the Nuclear Regulatory Commission (NRC).

The NRC developed a simplification of the basic procedure, which relaxed the standards without jeopardizing the safety of the NUKE power plant.

To supply a safety-related component for an operating nuclear power plant, a manufacturer must implement a quality program that meets the requirements of Appendix B to 10 CFR Part 50; with approval of the NRC.

A more recent revision to the CFR document provided an option for a licensee who is unable to obtain a full NUKE certification for equipment to perform commercial-grade dedication under its Appendix B program.

Such a quality program shall be equivalent to an ASME program. Title 10 code of federal energy regulations permits operation within a NUKE containment area without the full NUKE cert.

The use of the revised-relaxed procedure dedicated to simplification of the certification of the NUKE cert permitted assurance of adequate safety & reliability in NUKE service.

## 5. Equipment subjected to requirements of the NUKE cert.

Manufacturers of any equipment that is intended for use in the containment area of a NUKE power plant must certify said equipment for NUKE service. Such equipment includes, but is not limited to:

- Valves, pumps, tanks and vessels, and heat exchangers.
- Standby power; batteries, battery racks, DC switchgear, MCCs, battery chargers and UPS equipment.
- Electrical distribution equipment, including switchgear, distribution panels, and transformers.
- Chillers, air conditioners, air-handlers, cooling coils, fans, and filtration units.
- ASME Section III Equipment.
- Instrumentation, including level and flow meters, power supplies, paperless recorders, meters, & gauges.

## **6. How does a manufacturer initiate an expedited NUKE cert?**

Manufacturers are not permitted to apply for, or request an abbreviated NUKE cert. The big question is then how one may arrange for this new cert.

Only a potential customer may request that the NRC initiate an audit for the purpose of granting an expedited NUKE cert. The complication is that the manufacturer may not initiate the audit or process. The customer desiring a NUKE certified product for use in his plant must recommend the manufacturer & request an audit of the manufacturer.

The manufacturer is free to advise potential customers of an interest in producing a product for use in NUKE plants.

Once a NUKE cert has been obtained the manufacturer may advertise the availability of a NUKE certified product.

## **7. Safety**

NUKEs have been involved with fewer fatalities than any other form of power generation including wind generators until the catastrophic Japanese earth quake & Tsunami.

It is obvious that no other form of power generation would survive such a catastrophic event without numerous fatalities.

Between 1970 & 2010 no NUKE fatalities resulted, while coal & gas powered power plants involved some & wind turbines involved 60 fatalities.

The author has never been in a power plant that could have withstood the Japanese earth quake & Tsunami.

## **8. Summary**

An abbreviated or shortcut NUKE certification procedure permits manufacturers to produce a safe NUKE product with a quality system such as the ASME type.