

Keeping counterfeit and fraudulent items out of the nuclear supply chain

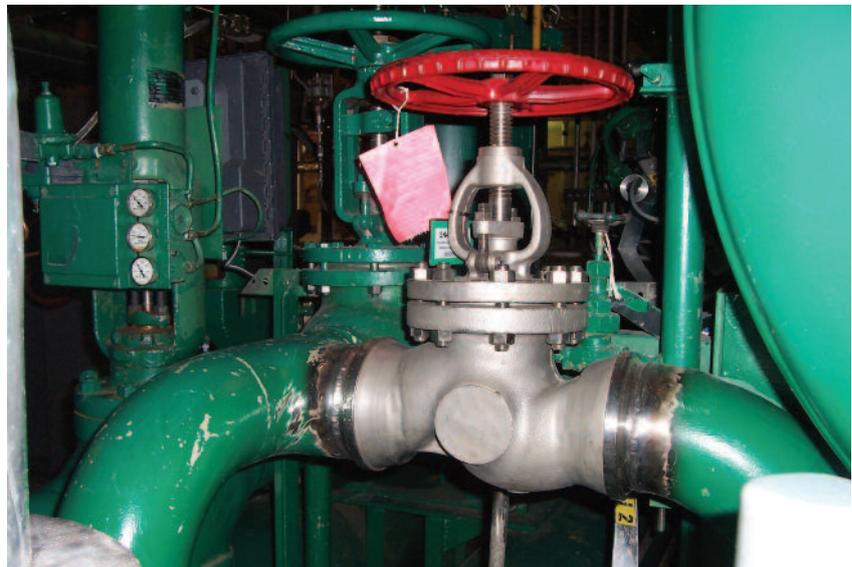
In light of specific instances where counterfeit items have been found at nuclear plants, updated industry guidance is being developed to improve detection and identify risk mitigation options.

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The US Immigration and Customs Enforcement agency estimates that counterfeiting costs US industry 750,000 jobs annually. Thousands more jobs are at risk around the world. In federal fiscal year 2008, Immigration and Customs Enforcement and the Customs and Border Protection agency made more than 14,000 seizures of counterfeited goods, valued at more than \$272.7 million, representing a 38% increase in value over 2007. In the US commercial nuclear industry, several counterfeit, fraudulent, and substandard items (CFSIs) have been detected prior to being placed in active inventory, and several others have been detected only after installation. Fortunately, the items did not fail in service before being identified and replaced. Their existence, however, highlights the need for vigilance on behalf of the industry, its regulators, and its suppliers to ensure the safe and efficient operation of nuclear power plants.

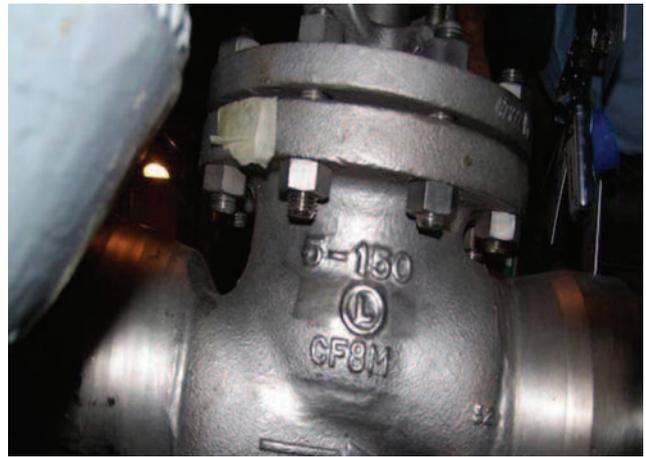
Not a new issue

The problem is far from new. A number of incidents identified by the US Nuclear Regulatory Commission (NRC) in the 1980s and 1990s catalyzed the US nuclear industry to adopt standard precautions to guard against counterfeit items. Those precautions were documented in 1989 in NRC Generic Letter 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products," and in Appendix C of a 1990 EPRI Report titled "Guidelines for the Procurement and



Counterfeit (top) and legitimate (bottom) valves at a southeast US nuclear power plant. One counterfeit valve had been installed in a non-safety application; a second was in inventory.





Legitimate (left) and counterfeit (right) valves. The "L" logo on the counterfeit valve appears to have been added via welding (instead of cast into the valve body) and "cleaned up" with grinding.

Receipt of Items at Nuclear Power Plants (NP-6629)." Similar guidance is contained in a 2000 International Atomic Energy Agency technical document, "Managing Suspect and Counterfeit Items in the Nuclear Industry (TECDOC-1169)."

A few recent events in the US nuclear power industry have drawn additional attention to the issue. In November 2007, the Plant Hatch nuclear facility in Georgia discovered a counterfeit stop check valve on the stator cooling water skid of Unit 2. Hatch personnel later determined that the plant contained two counterfeit valves, one in the warehouse and one installed in Unit 2. Duke Energy discovered that counterfeit circuit breakers manufactured in China and labeled as "Square D" products may have been purchased for its Oconee, McGuire and Catawba nuclear plants in North and South Carolina sometime between 2003 and 2006. The counterfeit circuit breakers could fail to trip when overloaded, posing a fire hazard. These events compelled the NRC to issue Information Notice 2008-04, "Counterfeit Parts Supplied to Nuclear Power Plants", which reiterated the importance of the actions contained in Generic Letter 89-02. While the precautions have proven to be effective barriers, additional actions are necessary to better address the resources and capabilities of today's counterfeiters. The NRC is among a group of government agencies working to address the economic and safety implications associated with CFSIs. Heightening awareness, providing training, impeding the flow of CFSIs into the country, investigating and bringing appropriate action against entities providing CFSIs are some of the avenues being pursued.

Recognizing the growing importance of this issue, EPRI's Joint Utility Task Group, which addresses procurement engineering, formed a technical advisory group in 2008 to develop enhanced guidance on CFSIs. Although EPRI includes a module addressing counterfeit items in its Nuclear Vendor and Nuclear Utility Procurement training courses, the advisory group is currently developing updated guidance on the topic, and is benchmarking programs and anti-counterfeiting techniques used by the U.S. Department of Energy, industry organizations such as the National Electrical Manufacturers Association and Underwriters Laboratories, and suppliers aggressively combatting counterfeiting of their products, such as Square D-Schneider Electric and Eaton Controls.

Supply chain entry

Although there are legal and dictionary definitions for "counterfeit," EPRI's technical advisory group uses the following simplified terminology.

- Counterfeit items are items that are intentionally manufactured or altered to imitate a legitimate product without legal right to do so.
- Fraudulent items are items that are intentionally misrepresented to be something they are not. Fraudulent items include items provided with incorrect identification or falsified/inaccurate certification. Fraudulent items also include items sold by entities that have acquired the legal right to manufacture a specified quantity of an item (such as an integrated circuit), but produce a larger quantity than authorized and sell the overage as legitimate inventory.

- Substandard items do not meet the intended product specification. It is possible for legitimate suppliers to unknowingly provide substandard items that were manufactured using raw materials or part-level items that were acquired from sub-tier suppliers and for some reason did not meet the applicable specifications.

CFSIs can enter supply chains in many ways. A large number of counterfeit items are introduced by counterfeiters who intentionally reproduce and market hard-to-find or high-demand products for profit. It is more difficult for counterfeiters to penetrate approved distribution networks, so counterfeits are often introduced by brokers and distributors operating outside of the original equipment manufacturer's approved distribution network. Although the chances of receiving a counterfeit are substantially reduced by purchasing directly from the original equipment manufacturer or an approved distributor, risk still exists. In March 2009, the preliminary results of a Department of Commerce study of counterfeit electronics indicated that 91% of the 498 organizations surveyed accept returns, 40% place returned items into stock, and 14% have identified counterfeit items in returned merchandise. Rejected or excess inventory items that are not properly disposed of can also end up entering the supply chain misrepresented as new items. According to Roger Moerman of Energy Solutions - Parallax, "When delivering training on counterfeits at an oil refinery, one of the workers mentioned that several men drove up to people working in a laydown (storage) yard and asked workers to call them if they ever





Counterfeit valve on left with red hand wheel; legitimate valve on right with gray hand wheel. The differences are obvious to a trained eye, but may escape an unsuspecting inspector.

had any damaged or used items they were going to throw away. We've seen repackaged breakers and other devices delivered that may or may not actually operate. Because craft people are often the first to open shipping packages for breakers and other equipment used in non-critical applications, it's important to train craft to look for counterfeit items."

New technologies or standards introduced to the marketplace present another challenge, as inventory of items meeting new standards may become mixed with inventory of items meeting the old standards, even when they are not completely interchangeable.

Minimizing risk

Although the problem of CFSIs is extensive there are actions that can be taken to minimize risk.

The top two best practices identified by respondents to the Department of Commerce electronics study were simply, "Be wary of buying from low cost countries" and "Be wary of brokers." It may not be practical for a supply organization supporting a nuclear power plant to implement these practices universally. In some cases only a single source exists for spare and replacement items, and in the case of obsolete equipment, there is often no choice but to resort to sources other than the original manufacturer or approved distribution network.

Perhaps the most obvious method of reducing exposure to CFSIs is to

communicate with your suppliers. Discuss the issue with your suppliers to identify concerns and expectations. The experience can be a productive exchange of information for both parties and can enhance the relationship. The EPRI guideline that will be published in late 2009 will include a list of questions that can be used by plant operators to discuss the issue with suppliers. In the context of this discussion, "suppliers" encompass suppliers of both safety and non-safety related items, including original equipment and component manufacturers as well as distributors, engineering-procurement-construction firms, and nuclear steam supply system manufacturers.

Nuclear power plants can also take action internally to reduce risk and exposure to CFSIs. Most importantly, relevant staff can be trained in how to avoid CFSIs. Wherever possible, encourage the use of authorized distribution networks, which typically employ a rigorous process for ensuring component authenticity. When this is not possible and when brokers are used, purchases should be flagged as "at-risk" and undergo additional inspection or verification before being placed into inventory.

Bhavesht Patel, who manages Progress Energy's procurement engineering and dedication group, notes, "To reduce the risk that we accept counterfeits, we have started to make photographs of authentic items in our inventory available in our enterprise asset management system for use by inspectors during the receiving

process. We have also established an intranet site for reported incidents of counterfeit and fraudulent items so updated information is readily available to our staff." Proposal evaluation policies can be reviewed to identify and consider elimination of requirements that encourage buyers to purchase from the lowest bidder without additional screening to determine authenticity and acceptability of their product. Finally, one of the more difficult challenges is to develop a means to capture and report known issues, and share them with other stakeholders who are at similar risk.

Not easy

Avoiding CFSIs is not an easy task in today's global supply chain, but it is an important one. Suppliers must protect their reputations and business; operators must ensure their facilities operate safely and efficiently.

Historically, existing U.S. nuclear facilities have been somewhat insulated from CFSIs due to the age of the equipment and the low demand for nuclear-related components in the marketplace.

If construction of new nuclear generation facilities in the United States increases, CFSIs will almost certainly be included in the plethora of items supplied to manufacture the equipment and construct the units. In this global marketplace, it is the responsibility of all involved – nuclear plant owners, equipment and component manufacturers, nuclear engineering-procurement-construction companies – to be aware of the issue and ensure CFSIs don't make it past the receiving docks.

