

# AFE Member Responses Help Boiler Safety Survey

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Other information presented in the survey ranges from manpower and staffing levels to unit costs for natural gas.

One hundred and seventy responses were received from the online Boiler Operations and Safety Benchmarking Survey made available to AFE members in late September. It provided a lot of very interesting information to those involved in boiler operations. Here is a summary of the results.

## SAFETY

The results had some alarming news related to boiler safety. Nearly 10% of the respondents indicated that they had experienced some type of an explosion or near-miss incident within the past five years. This is a very high incidence of events given the potential for absolute catastrophe when boilers are involved. An analysis of the data received from the survey provides obvious reasons why this incidence was so high. The lack of training, start-up/shutdown procedures, knowledge of safety codes, and mandated testing of safety interlocks and valves was shocking.

## LACK OF TRAINING

Most codes, like ASME and NFPA 85, call for annual training of boiler operating personnel. In fact, ASME goes further to define training requirements, indicating that training should also include mock upset drills. Even with this requirement, almost 54% of respondents indicated that their operators had not received this kind of annual training.

## LACK OF STARTUP/SHUTDOWN PROCEDURES

Only about 40% of the survey respondents indicated that they had startup/shutdown procedures posted. This means that in many cases operators are left to their own devices. It could mean that the safest way to start up the equipment has not been decided

upon by the organization.

Here is an example. Have you ever thought about making it mandatory for a pre-start walk around of the equip-



ment? This would be done before a start attempt is made and you would look for obvious issues such as damaged switches, combustion air fan blockage and/or linkages out of place. What about something as simple as where to stand? Did you know that standing in front of a burner or by any bolted connection or with your eye at a site port can get you killed? These and many other seemingly minor steps in a comprehensive startup procedure can make the difference between life and death.

## LACK OF TESTING

Testing of combustion safety interlock components and tightness checking of automatic valves is not something that is optional, it is actually required by codes. This means that it is mandated by law in many states.

The ASME CSD-1 code has been adopted by 27

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states (applies to boilers 400,000 to 12,500,000 BTUH). It calls for at least annual testing of components and valves. NFPA 85 also calls for annual testing.

Twenty-six percent of respondents indicated that they did not do any automatic valve leak testing and 17% indicated that they do not do combustion system safety interlock testing. Our experience is that about 5% of these devices are failed at any one given time. Redundancy in safety systems usually means that it takes two or more simultaneous failures for an explosion. In the case of those who are not testing, their facilities are already halfway there.

#### LACK OF CODE KNOWLEDGE

Over 40% of the respondents indicated that they did not have a working knowledge of the two most important codes related to operating boilers. Also, 75% of the respondents are located in states where ASME CSD-1 has been adopted. If you operate boilers, these are the guidelines that should be ruling your life. They are minimum safety standards that make it possible for you and your staff to make it home every night in one piece. If you go to [www.asme.org](http://www.asme.org) and

[www.nfpa.org](http://www.nfpa.org), you can buy the codes you need. You should at a minimum have NFPA 54 (National Fuel Gas Code), NFPA 85, and ASME CSD-1, said a consultant. These are practical, easy-to-read documents that will open your eyes as to what safety practices should be in place. Even if you are not doing safety interlock and/or valve tightness testing in house, at least understand what your contractor should be doing.

#### COST SAVINGS

The top cost savings effort to be pursued by more than 60% of respondents was to have burners tuned. There is no doubt that burner tuning absolutely provides the best return on investment. Even a 1% saving goes a long way. Most burner tuning jobs pay for themselves in less than one year. You can get a lot more out of a burner tuning if you consider a few simple additional concepts.

Besides tuning, establish which boilers are most efficient throughout the entire operating range. Then change your control strategy to make the most efficient unit be the base load unit. Also, when tuning takes place, make sure you get a copy of the analyzer readings for all of the set points. A proper tuning

should see someone take the boiler from 10% or low fire in relatively small steps all the way to 100% or full load. If your system has FGR (flue gas recirculation), this process usually needs to happen in reverse, starting at 100% fire. In doing this readings should be taken along the way and adjustments made at each step.

Tuning a boiler will mean that you will need to fire up to 100% load and have somewhere to divert the steam or the hot water generated. In the case of steam, this usually means the site has a vent line specially designed with a silencer for this purpose.

Tuning a burner means optimizing it for something. It is not always possible to leave you with a burner that is optimized for fuel efficiency. Tuning may mean that emissions targets are the first priority and that efficiency is then the second parameter to be targeted once emissions targets are hit.

You should also know that the act of tuning could put you in hot water. In most states if you have knowledge of being out of compliance on emissions you are legally obligated to report yourself and to then get back into compliance.

It is fair game to ask the technician who comes to your site if he or she has had their analyzer calibrated lately. The chemical specific cells in analyzers do not last all that long and are expensive to have serviced. It is also important to make sure that provisions are made to control water in sampling hoses. Analyzers that have cells out of calibration and that are not protected from water may not read accurately. Remember, tuning is all about being very accurate; it is a game of very small numbers that make a big difference.

#### OTHER INFORMATION

There is a lot of other very important benchmarking information presented in the survey from manpower and staffing levels to unit costs for natural gas. The unit costs for example had a surprising range that indicated different purchasing strategies. Full survey results are available at [www.combustionsafety.org](http://www.combustionsafety.org) and [www.afe.org](http://www.afe.org)

Thank you to all the AFE members that contributed to make this survey such an enlightening experience.

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