

## BOILER AND BOILER PLANT OPERATIONS

**1. SUMMARY OF MAJOR CHANGES:** This directive:

a. Adds responsibilities in paragraph 2 for the Under Secretary for Health; Assistant Under Secretary for Health for Operations; Assistant Under Secretary for Health for Support; Executive Director, Veterans Health Administration (VHA) Healthcare Environment and Facilities Program; and Director, VHA Office of Healthcare Engineering (OHE).

b. Consolidates, updates and expands the appendices to include technical boiler design and operational requirements from Engineering Standard ES-2018-001, Low Pressure Steam and Hot Water Boilers which will be rescinded upon publication of this directive.

c. Removes local policy requirements and instead identifies procedures in Appendix A that must be established locally.

**2. RELATED ISSUES:** None.

**3. POLICY OWNER:** The Director, OHE (19HEFE), is responsible for the contents of this directive. Questions may be addressed to [VHAHealthcareEng@va.gov](mailto:VHAHealthcareEng@va.gov).

**4. RESCISSIONS:** VHA Directive 1810(1), Boiler and Boiler Plant Operations, dated February 6, 2017, is rescinded.

**5. RECERTIFICATION:** This VHA directive is scheduled for recertification on or before the last working day of January 2028. The VHA directive will continue to serve as national VHA policy until it is recertified or rescinded.

**6. IMPLEMENTATION SCHEDULE:** This directive is effective upon publication.

**BY DIRECTION OF THE OFFICE OF  
THE UNDER SECRETARY FOR HEALTH**

/s/ Alfred A. Montoya Jr., MHA, FACHE  
Acting Assistant Under Secretary for Health  
for Support

January 4, 2023

VHA DIRECTIVE 1810

**NOTE:** *All references herein to Department of Veterans Affairs (VA) and VHA documents incorporate by reference subsequent VA and VHA documents on the same or similar subject matter.*

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## BOILER AND BOILER PLANT OPERATIONS

### 1. POLICY

It is Veterans Health Administration (VHA) policy that high pressure (HP), low pressure (LP) and hot water boilers and boiler plants in owned and operated Department of Veterans Affairs (VA) medical facilities be designed, installed, maintained and operated in a safe and efficient manner to ensure the safety of all patients, staff and visitors at VA medical facilities. **AUTHORITY:** 38 U.S.C. § 7301(b).

### 2. RESPONSIBILITIES

a. **Under Secretary for Health.** The Under Secretary for Health is responsible for ensuring overall VHA compliance with this directive.

b. **Assistant Under Secretary for Health for Support.** The Assistant Under Secretary for Health for Support is responsible for establishing policy and providing guidance and oversight as necessary to ensure the timely and successful implementation of this directive.

c. **Assistant Under Secretary for Health for Operations.** The Assistant Under Secretary for Health for Operations is responsible for:

(1) Communicating the contents of this directive to each of the Veterans Integrated Services Networks (VISNs).

(2) Assisting VISN Directors to resolve implementation and compliance challenges in all VA medical facilities within that VISN.

(3) Providing oversight of VISNs to ensure compliance with this directive and its effectiveness.

d. **Executive Director, VHA Healthcare Environment and Facilities Program.** The Executive Director, Healthcare Environment and Facilities Program is responsible for:

(1) Overseeing the VHA Boiler and Boiler Plant Operations program.

(2) Periodically assessing the VHA Boiler and Boiler Plant Operations program and system for continued need, currency and effectiveness.

(3) Coordinating with the Assistant Under Secretary for Health for Operations, VISN Directors and VA medical facility Directors to ensure all necessary action is taken and funding is obtained to address boiler and boiler plant performance in a manner that meets the requirements of Federal, State and local statutes and regulations; applicable Executive Orders; and VA and VHA directives.

e. **Director, VHA Office of Healthcare Engineering.** The Director, VHA Office of Healthcare Engineering (OHE) is responsible for:

(1) Developing and issuing policy, guidance, standards and notifications for the safe and efficient operation of boilers and other heating equipment (see Appendix A).

(2) Conducting assessments and surveys of the Boiler and Boiler Plant Operations program related to the implementation of this directive and associated requirements and standards.

(3) Evaluating reports and data submitted by each VISN regarding implementation of this directive.

(4) Providing consultative assistance to the VISNs and VA medical facilities on interpretation or clarification of this directive and boiler design requirements as needed.

(5) Reviewing and approving or disapproving all requests for deviations from this directive and associated documents. ***NOTE: This deviation process for requirements and standards is different than the national waiver process outlined in VHA Notice 2022-01, Waivers to VHA National Policy, dated February 10, 2022.***

(6) Approving extensions to equipment useful life expectancy based on the evaluation/useful life study of the condition/reliability and the efficiency and cost effectiveness of continued equipment operations (see to Appendix B).

f. **Veterans Integrated Services Network Director.** The VISN Director is responsible for:

(1) Ensuring that all VA medical facilities within the VISN comply with this directive and informing leadership when barriers to compliance are identified.

(2) Prioritizing resources and support for implementation and ongoing execution of this directive for all VA medical facilities within the VISN.

(3) Ensuring competent qualified boiler operator staffing and the completion of required notifications: VA medical facility compliance reporting; inspection and testing of safety devices; adequacy of reserve fuel supplies and back-up emergency power.

(4) Assigning VISN staff to regularly review compliance and incident reporting from the VA medical facilities; supporting VA medical facilities in the development and fulfillment of corrective action plans for non-compliance; providing corrective action progress reporting to OHE as required; and reviewing quarterly Boiler Compliance and Inventory Surveys from VA medical facilities in the VISN for accuracy and completeness. Items of concern, exceptions and negative trends must be brought to the attention of OHE via email at: [VHAHealthcareEng@va.gov](mailto:VHAHealthcareEng@va.gov).

(5) Completing and submitting reports and data to the VHA OHE Director regarding implementation of this directive.

(6) Evaluating the reports and data submitted by each VA medical facility regarding implementation of this directive, including Boiler Compliance and Inventory Surveys.

g. **VA Medical Facility Director.** The VA medical facility Director or designee (e.g., VA medical facility Chief Engineer), is responsible for:

(1) Ensuring that the VA medical facility complies with this directive.

(2) Developing and maintaining written VA medical facility procedures and programs for boiler and boiler plant operations, as described in Appendix A, paragraph 4; ensuring that the programs and associated requirements are implemented, including evaluation/useful life studies.

(3) Completing and providing a copy of an investigation and testing report, within 30 days, of all incidents to the VHA OHE Director (see Appendix B, paragraph 1).

(4) Ensuring that compliance with this directive and associated documents, including VA medical facility standard operating procedures, is assessed against practice and documentation and reported annually to the VISN; developing; tracking and communicating corrective action plans for non-compliance and providing corrective action progress reporting to assigned VISN staff.

(5) Completing quarterly Boiler Compliance and Inventory Surveys for the VA medical facility. Reporting must be accomplished through the use of the web-based survey/reporting tools available at: <http://vaww.hefp.va.gov/resources/vha-boiler-plant-compliance-survey> and <http://vaww.hefp.va.gov/resources/vha-boiler-plant-inventory-survey> no later than 2 weeks after the start of each fiscal quarter (October 1, January 1, April 1 and July 1). **NOTE:** *These are internal VA websites that are not available to the public.* All reporting submissions require certification by the VA medical facility Director and the VA medical facility Chief Engineer (or equivalent).

(6) Verifying and signing off on On-the-Job training content (see Appendix A).

### 3. TRAINING

The following training is ***required***:

#### a. **Talent Management System Training.**

(1) All qualified boiler operators must complete the Boiler Plant Safety Device Testing Safe Steamin' training (Safe Steaming 1 and 2 in VA's Training Management System (TMS)) courses, as part of the onboarding process and then every 3 years or when there is an update in the training. Attendants must complete the Safe Steaming modules related to burner management and safety.

(2) The boiler plant supervisor or lead and contracting officer representative (COR) for the third-party safety device inspection/testing must complete every 3 years refreshers on the Safe Steaming 2 course in TMS. **NOTE:** *For a list of the Boiler Plant*

Safety Device Testing Safe Steamin' TMS Training Courses 1 and 2, visit <http://vaww.hefp.va.gov/resources/boiler-plant-safety-device-testing-safe-steam-tms-training-courses-1-and-2>. This is an internal VA website that is not available to the public.

**b. VA Medical Facility Training.**

(1) Qualified boiler operators, attendants and testers/inspectors must be trained in the requirements of National Fire Protection Association (NFPA) 70E as part of the onboarding process and then every 3 years or upon code update, be deemed "Qualified Person" in accordance with NFPA 70E and provided with the appropriate personal protective equipment (PPE) In accordance with NFPA 70E competency requirements to complete work/maintenance.

(2) Qualified boiler operators of high-pressure plants must be provided a minimum of 3 months continuous, full-time training with steam generation systems under the supervision of an experienced boiler operator and complete onboarding training before being eligible for qualified boiler operator designation. Qualified operators or attendants for low pressure or hot water systems must complete all required training and provide proof of one (1) week in-person training under the supervision of a qualified operator, attendant, or operations supervisor. See Appendix A for further information on the boiler/boiler plant training program.

(3) All boiler plant staff, and engineering leadership must attend the Boiler Safety Device Training provided via contract by OHE when scheduled at their VA medical facility. **NOTE:** VA medical facilities must maintain boiler staffing for operation, which may mean one or two qualified boiler operators may not be able to attend every training.

c. The boiler plant supervisor or lead and COR for the Safety Device Testing Contract must be trained on the Safety Device Testing via contract by OHE and the requirements of the VHA Boiler and Associated Plant Safety Device Testing Manual, current edition, available at <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>. **NOTE:** This is an internal VA website that is not available to the public.

#### **4. RECORDS MANAGEMENT**

All records regardless of format (e.g., paper, electronic, electronic systems) created by this directive must be managed as required by the National Archives and Records Administration (NARA) approved records schedules found in VHA Records Control Schedule 10-1. Questions regarding any aspect of records management should be addressed to the appropriate Records Officer.

#### **5. BACKGROUND**

a. Boilers and boiler plants are essential to the operation of a VA medical facility by providing steam and hot water to support space heating, sanitation, food production and preparation, infection prevention and control, heat for process equipment and a

healthful environment for the delivery of health care.

b. Boiler and boiler plant safety and reliable operation are dependent on the presence of a qualified boiler operator or attendant to monitor and operate boilers and equipment; boiler plant supervision that is competent in boiler plant operations; properly functioning safety equipment; availability of equipment specific operational and maintenance procedures; well-maintained boilers and support equipment and a commitment to continuous quality improvement.

c. Fuel and supply costs for boilers are a significant portion of a VA medical facility's utility expenditures. Therefore, the proper maintenance, periodic operational assessment and updating of equipment ensures continued optimal efficiency of operations.

## 6. DEFINITIONS

a. **Boiler Plant.** A boiler plant consists of all equipment and systems required to generate steam, hot water or other high temperature liquid, such as oil, including steam or hot water generating equipment not housed in the boiler plant building (e.g., Sterile Processing Service steam generators, system regulating stations, system condensate pumping equipment, safety devices, process equipment).

b. **Decentralization.** Decentralization is a reduction or supplementation of the capacity of centralized systems such as steam generation, hot water production and fluids used for environmental heating through the relocation or addition of the capacity to locations other than the central boiler plant or energy plant.

c. **Decentralized Boiler.** A decentralized boiler is a boiler that is used for the reduction or supplementation of the capacity of centralized boiler plant or energy plant for localized use of steam generation, heating hot water production, heating of fluids used for environmental heating and providing heated liquid for process equipment.

d. **Electric Hot Water Boiler.** An electric hot water boiler is a closed vessel in which water or other liquid is heated to generate hot water use external to itself. Energy for heating the liquid is produced by the direct application of electrical energy to thermal heating elements.

e. **Electric Steam Boiler.** An electric steam boiler is an electrically powered boiler that generates steam for use external to itself. This type of equipment is sometimes installed to generate steam for use with sterile process sterilizers or other such equipment that delivers steam for the process is governed by this directive.

f. **High Pressure Boiler.** An HP boiler is a closed vessel in which water or other liquid is heated to generate steam or vapor, high temperature liquid or any combination thereof, under pressure. Energy for heating can be produced by the direct application of thermal energy from the combustion of fuels or from electric heating elements. HP boilers are those equipped with steam safety relief valve(s) set at a pressure of 15 pounds per square inch gauge (psig) or greater. Also included are systems used for



heating or vaporizing water and other liquids where the equipment is part of another piece of equipment or processing system.

g. **Hot Water Boiler.** A hot water boiler is a closed vessel in which water or other liquid is heated to generate hot water for use external to itself for space heating or process needs. Energy for heating the liquid is produced by the direct application of thermal energy from the combustion of fuels. Hot water boilers include both condensing and non-condensing types.

h. **Low Pressure Steam Boiler.** An LP steam boiler is a vessel in which water or other liquid is heated to generate steam or vapor for use external to itself. Energy for heating the liquid can be produced by the direct application of thermal energy from the combustion of fuels or from electric heating elements. LP boilers are those equipped with steam safety relief valve(s) set at a pressure less than 15 psig. Also included are equipment and systems meeting the above definition, even if it is a decentralized boiler from the main boiler plant.

i. **Qualified Contractor.** A qualified contractor is a vendor that is knowledgeable and experienced in the design and construction of boiler plants and VA's standards for construction and testing of safety devices.

j. **Qualified Boiler Operator.** A qualified boiler operator is an individual that has met the requirements as a Boiler Plant Operator, WG-5402 (WG-9 or higher) for HP, LP and hot water boilers, as described in the Office of Personnel Management qualification standards available at <https://www.opm.gov/policy-data-oversight/classification-qualifications/general-schedule-qualification-standards/>.

k. **Qualified Boiler Attendant (Includes High Pressure Electric Steam Boiler).** A qualified boiler attendant is an individual that has completed a satisfactory annual competency assessment by a qualified boiler operator and the applicable Boiler Plant Safety Device Testing Safe Steamin' Boiler training (Safe Steaming 1 and 2) courses. **NOTE:** For the purpose of this directive, wherever an attendant is referred to it is intended to mean qualified boiler attendant.

l. **Qualified Testing Contractor.** A qualified testing contractor is an individual/company that has performed testing in compliance with VHA Boiler and Associated Plant Safety Device Testing Manual in at least three other VA medical facilities.

## 7. REFERENCES

- a. 38 U.S.C. § 7301(b).
- b. VA Directive 5019, Part II, Employee Occupational Health Service, dated March 27, 2015.
- c. VHA Notice 2022-01, Waivers to VHA National Policy, dated February 10, 2022.

d. VHA Boiler and Associated Plant Safety Device Testing Manual, latest edition.  
<http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>.

**NOTE:** This is an internal VA website that is not available to the public.

e. VHA Boiler Plant Compliance Survey. <http://vaww.hefp.va.gov/resources/vha-boiler-plant-compliance-survey>. **NOTE:** This is an internal VA website that is not available to the public.

f. VHA Boiler Plant Inventory Survey, <http://vaww.hefp.va.gov/resources/vha-boiler-plant-inventory-survey>. **NOTE:** This is an internal VA website that is not available to the public.

g. Boiler Plant Safety Device Testing Safe Steamin' TMS Training Courses 1 and 2.  
<http://vaww.hefp.va.gov/resources/boiler-plant-safety-device-testing-safe-steamin-tms-training-courses-1-and-2>. **NOTE:** This is an internal VA website that is not available to the public.

h. Steam, Heating Hot Water, and Outside Distribution Systems Design Manual, Volume 1 Steam Boilers (Steam Generating Systems).  
<https://www.cfm.va.gov/til/dManual.asp>.

i. Steam, Heating Hot Water, and Outside Distribution Systems Design Manual, Volume 2 Water Boilers (Hot Water Generating Systems).  
<https://www.cfm.va.gov/til/dManual.asp>.

j. ASME Boiler and Pressure Vessel Code, latest edition.

k. NFPA 70E, Standard for Electrical Safety in the Workplace.

l. NFPA 110, Standard for Emergency and Standby Power Systems.

m. Office of Personnel Management Classification and Qualification.  
<https://www.opm.gov/policy-data-oversight/classification-qualifications/general-schedule-qualification-standards/>.

## VHA BOILER AND BOILER PLANT PROCEDURES

### 1. GENERAL

a. Safety is the priority for boiler and boiler plant operations. Boiler safety must not be compromised to maintain service.

b. A review by a qualified party (qualified contractor or Office of Healthcare Engineering (OHE) staff) must be completed during the design, inspection, startup, testing and commissioning of new plants, boilers and major equipment repair/replacement projects.

c. The OHE Director must be notified by the Department of Veterans Affairs (VA) medical facility Director when any installations, changes, repairs, incidents and similar situations related to boilers and boiler plants are planned or occur as identified in Appendix B.

d. Following OHE notification, a thorough investigation, including root cause analysis and risk evaluation, must be performed by the VA medical facility within 30 days. A copy of the report is to be provided to OHE upon completion.

e. On-site reserve fuel requirements must be maintained and recorded in compliance with Appendix B, paragraph 2. Fuel storage requirements must be re-evaluated and documented annually against actual total fuel/energy used in the current year during the most extreme winter conditions in heating season. Fuel must be tested for quality annually and polished/filtered as required to meet the fuel quality requirements defined by the American Society for Testing and Materials D975. **NOTE:** *Reserve fuel requirements for decentralized hot water boilers and low pressure (LP) steam are only applicable to inpatient and resident care areas and mission critical facilities as defined by VA and Veterans Health Administration (VHA) policy and regulation. In cold climates, the VA medical facility may exceed these requirements to ensure the protection of government assets based on an internal risk analysis of structures that do not fall into one of the two categories above. Where unusual conditions exist, the VA medical facility Director must request authorization from OHE to deviate from the above requirements.*

### 2. EQUIPMENT

a. All safety devices installed in the boiler plant, steam distribution system and the boiler(s), must be regularly tested to ensure their proper function (see the VHA Boiler and Associated Plant Safety Device Testing Manual located at <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations> for a full list of devices and their frequency of testing. **NOTE:** *This is an internal VA website that is not available to the public.*). Testing of all safety devices required to be tested every 6 months must be completed once annually by VA medical facility staff and once annually by a qualified testing contractor, unless otherwise approved by OHE. All

devices must be identified and itemized within the local procedures.

b. Boilers must only be operated if safety devices have passed all of the required testing. At the discretion of the VA medical facility Director, boiler operation may be permitted if a written Interim Safety Measure (ISM) approved by the VA medical facility Director is in place for the failed safety device(s); it must be documented that the ISM was communicated to all qualified boiler operators. Each safety device deficiency must have its own ISM as a separate document, with format clearly stating the deficiency, what is being done to provide equivalent protection and with specific parameters to monitor. ISMs must be tracked on a centralized spreadsheet that lists all ISMs and repairs with date, status and comments. Failed devices must be repaired within a month of identification of deficiency unless otherwise approved by OHE in writing.

c. Safety devices noted in the VHA Boiler and Associated Plant Safety Device Testing Manual located at <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations> and not installed on the boiler or ancillary equipment must be installed immediately, or the VA medical facility must request a deviation from OHE with justification as to why the device(s) are not needed and be compliant with the results of that deviation request. **NOTE:** *This is an internal VA website that is not available to the public.*

d. The emergency electrical generator serving the boiler plant must be included as part of the VA medical facility's essential electrical or stand-by system testing and maintenance program. Testing and maintenance on the generators must comply with National Fire Protection Association (NFPA) 110, Standard for Emergency and Standby Power Systems.

e. Remote restarting or automatic start/restart of boilers with combustion systems is prohibited. This includes the use of control systems to start and stop boilers to meet the load (automatic recycle). This also includes the ability to start a boiler from an office within the boiler plant or adjacent area or by automation such as lead-lag control.

f. All inactive boilers and ancillary equipment must be consecutively rotated back into service. Each month, a different inactive boiler and ancillary equipment must be brought online.

g. Repairs to boilers and pressure vessels must not be executed without notification to OHE and must comply with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. No welded repairs are permitted except by certified welders using Code-approved procedures. Repair and records of certification and the qualification of welders must be retained for a minimum of 3 years from the date of completed work.

h. While a boiler plant is under renovation or lacking N+1 redundancy (see Steam, Heating Hot Water, and Outside Distribution Systems Design Manual located at <https://www.cfm.va.gov/til/dManual.asp>) temporary boilers may be utilized. Temporary boilers function as the VA medical facility boilers during this time and must meet the

requirements of this directive. If safety devices are not present or are not in compliance with the VHA Boiler and Associated Plant Safety Device Testing Manual, ISMs approved by OHE must be in place. Proposed temporary boiler physical security mitigations setup must be submitted to the VHA Healthcare Engineering Oversight Committee on Physical Security and Resiliency for review and approval prior to installation.

### 3. BOILER OPERATION AND OVERSIGHT

a. Where high pressure (HP) boilers are in operation, there must be a qualified boiler operator present in the boiler plant or room 24 hours a day, 7 days a week and in all other locations having distributed boilers (operating at HP) for continuous monitoring and safe operation. Qualified boiler operators must not leave any HP boiler plant unattended at any time unless they can be relieved by a qualified boiler operator.

b. A qualified boiler attendant must be present at each electric HP boiler when operating at 15 pounds per square inch gauge (psig) or greater. Attendants must not leave any electric HP boiler unattended at any time when it is operating at a pressure of 15 psig or greater unless they can be relieved by an experienced attendant. This includes locations remote from the central boiler plant including Sterile Processing Service, kitchen(s), research and laundry plants.

c. A qualified boiler attendant or qualified boiler operator must make rounds every 4 hours for low pressure (LP) steam and hot water boiler plants or decentralized boiler locations 24 hours a day, 7 days a week to monitor and operate; boiler plant supervision must be competent in boiler and plant operations; properly functioning safety equipment; availability of equipment specific operational and maintenance procedures; well-maintained boilers and support equipment and a commitment to continuous quality improvement. A qualified boiler operator must be present on the station 24 hours a day, 7 days a week to respond to alarm or trouble conditions within the boiler plant.

d. Centralized LP steam and hot water boilers that do not have an operator stationed in the plant 24 hours a day, 7 days a week but have a qualified boiler operator make rounds as part of their other duties on site must be remotely monitored at a location that is manned 24 hours a day, 7 days a week. The staff responsible for monitoring must have the ability to dispatch the qualified boiler operator to respond to alarms/trouble. The monitoring system must be capable of logging the alarm condition and the individual that acknowledged or canceled it. Further, the VA medical facility must have a process for documenting who responded, the resolution, communication with leadership, and escalation, to ensure alarms are addressed in a timely manner if the qualified boiler operator on site is not available or does not respond. 24 hours a day, 7 days a week monitoring and response requirements are identical for decentralized LP steam and hot water boilers. Staff and procedures must also be in place to monitor systems (e.g., fire alarm, medical gas alarms, and generator status) that require continuous monitoring by code. **NOTE:** *The use of closed-circuit television does not preclude the need for an attendant 24 hours a day, 7 days a week to monitor the systems nor the qualified boiler operator on site to respond to alarms and make rounds every four hours when*

*equipment is in operation.*

e. The VA medical facility may request a deviation for the reduction in oversight and rounding interval requirements for LP steam and hot water boilers from OHE, based on a documented risk assessment analyzing the impact of failure on facility resilience; patient, employee and visitor safety; and the protection of Federal assets for decentralized boilers of limited capacity (e.g., less than 750,000 British Thermal Units per hour and with no more than three units covering the building load).

f. Any time maintenance and construction work is performed on steam systems, two valve isolation is required (closed position) in series between the steam and the work being performed. This applies to all HP steam as well as LP steam lines 2 inches or larger and hot water systems where the temperature of the operating fluid is at or greater than 257 degrees Fahrenheit.

g. Scheduled steam and hot water shutdowns must be fully planned and coordinated. Occupational Safety and Health Administration's (OSHA) lockout/tagout procedures 29 C.F.R. § 1910.147 must be followed. All downstream steam traps must be fully operational before the system is re-energized. The written shutdown and startup plan must be reviewed with all qualified boiler operators, the boiler plant supervisor and the VA medical facility Director or designee before commencement.

#### **4. REQUIRED VA MEDICAL FACILITY-SPECIFIC STANDARD OPERATING PROCEDURES AND PROGRAMS**

Site-specific Standard Operating Procedures (SOPs) and programs must be developed and maintained by each VA medical facility and must include the following:

a. A procedure for notifying the VA medical facility Director and Veterans Integrated Services Network (VISN) Director when any boiler safety device is non-functional, regardless of the status of the boiler (e.g., spare, backup).

b. A procedure for notifying the VA medical facility Director and VISN Director when one or more boilers is out of service and the redundancy required by this directive (N+1 minimum) is compromised.

c. Site specific testing procedures that follow the format of the current VHA Boiler and Associated Plant Safety Device Testing Manual, available at <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>.

**NOTE:** *This is an internal VA website that is not available to the public.*

d. A written steam conservation program focused particularly on maintaining steam traps, condensate pumps and the integrity of piping systems and pipe insulation. Steam and condensate leaks and other necessary repairs must be reported to the VA medical facility Director or designee (e.g., VA medical facility Chief Engineer) and given a high priority for correction. This part of the written program must include the following:

(1) The title and name of the person responsible for implementing and overseeing the program.

(2) The titles and names of persons responsible for conducting the inspections.

(3) An inspection report format that includes the frequency of inspections; method and date of inspection; location of devices; types of devices or equipment inspected; identification of any discrepancy(ies) found, if any; and corrective action(s) taken.

e. A written steam/heating hot water load-shedding plan for implementation during a boiler or boiler plant emergency that reduces steam/heating hot water-generating capability and identifies the critical loads that must continue to be served to the greatest extent possible, without compromising boiler or boiler plant safety.

f. A written water treatment program that includes daily tests, records of the tests, the use of chemicals and a monthly review by a technical representative of the chemical supplier by an independent water treatment consultant, or a qualified boiler operator. No chemical treatment systems are to be manual. **NOTE:** *Magnetic/Electronic water treatment systems are prohibited in VHA boiler plants.*

g. A utilities systems security program ensuring restricted access to the boiler or boiler plant, on site fuel facilities (including fuel storage) and distribution piping systems.

h. A written procedure for verification of the welfare of the qualified boiler operator or attendant at a minimum of every 2 hours to ensure that the ability to perform assigned duties has not been impaired due to an accident or other event; for example, radio or phone checks by police or other assigned service, or remote alarms that the qualified boiler operators must carry. The procedure must also include a process to manage the boilers in the event the qualified boiler operator is not capable of doing so. **NOTE:** *One qualified boiler operator or attendant, as appropriate based on equipment, per shift is sufficient to attend, monitor and operate gas-fired, oil-fired, coal-fired or electric HP boilers at each location under normal circumstances.*

i. A written boiler/boiler plant training program to develop and maintain staff competency and knowledge and provide at least 40 hours of training annually (in areas identified as needing improvement, specific to boiler operations) to qualified boiler operators to improve proficiency in safe boiler and boiler plant operations. The boiler/boiler plant training program must include the requirement for documentation of formal training as described in paragraph 3 and on-the-job training (OJT) for every specific piece of equipment for which the individual is to obtain and maintain qualifications. OJT must be conducted by experienced instructors and be verified and signed off on by the boiler plant supervisor or VA medical facility Director or designee. The boiler/boiler plant training program must address the requirements of paragraph 3 in this appendix and the following:

(1) Qualified Boiler operators or attendants are well trained and proficient in properly performing the following on each type of boiler and system being utilized:

- (a) Lighting off, warming up, placing in service and shutting down the boilers.
  - (b) Firing on each of the available fuels.
  - (c) Operating all plant equipment and controls, including start-up and shutdown.
  - (d) Gradual warm-up of hot piping system and placing them into service.
  - (e) Maintaining water quality to protect the equipment and piping from damage.
  - (f) Handling malfunctions and emergency situations, including emergency or backup generator operation in the central plant.
  - (g) Collecting and organizing the equipment and plant performance records.
  - (h) Operating boiler plant emergency generators within the central plant and associated electrical equipment. If the central plant emergency generator is not located inside the central plant, emergency SOPs must be established for the restoration of central plant electrical power, along with training plans for appropriate personnel.
  - (i) Routine equipment maintenance.
  - (j) Preparing equipment for inspections.
  - (k) Operating and testing of all safety devices and control equipment.
  - (l) Facilitating and monitoring the receipt of fuels and supplies.
  - (m) Operating all equipment at the most cost-effectiveness and efficiency. This means maintaining pressures, temperatures and fuel consumption at the minimum necessary for the proper operation of the equipment, plant and connected loads.
- (2) Electric HP qualified boiler attendants are well trained and proficient in properly performing the following on each type of boiler and system being utilized:
- (a) Startup, warmup and shutdown of boiler.
  - (b) Operation of all equipment and controls.
  - (c) Gradual warmup of piping system for placement into service.
  - (d) Maintenance of water quality to protect the equipment from damage.
  - (e) Handling malfunctions and emergency situations.
  - (f) Collection and organization of plant performance records.
- (3) Site-specific training elements to ensure operators are competent in the operation and maintenance of all equipment such as computer systems and



instrumentation.

(a) A method to track and ensure that each qualified boiler operator has an annual physical and audiological examination to ensure physical fitness to perform assigned duties as required by VA Directive 5019, Part II, Employee Occupational Health Service, dated March 27, 2015, Appendix A, paragraph 4.

(b) Procedures for boilers, support equipment and distribution system components to be shut down for maintenance and repairs. Recommend one annual planned steam/hot water plant outage in the summer months to perform maintenance or make repairs on the steam, condensate and hot water distribution system. All VHA employees and contractors must follow OSHA 29 C.F.R. § 1910.147 for the control of hazardous energy (lockout/tagout). This must include two valve isolation for steam repairs and maintenance (refer to paragraph 3. f. in this Appendix). All Lockout/Tagout procedures requiring more than two locks in the boiler plant (i.e., the boilers) must use lock boxes to ensure efficient and effective execution.

(c) Equipment replacement programs must be developed and based on the useful life expectancy table found in Volumes 1 and 2 of the Steam, Heating Hot Water, and Outside Distribution Systems Design Manual located at <https://www.cfm.va.gov/til/dManual.asp>. **NOTE:** *Retention of equipment beyond the useful life expectancy must be approved by OHE and based on a documented engineering evaluation/useful life study of the condition /reliability, efficiency and cost effectiveness of continued operation. The useful life study must be completed 3 years prior to the end of expected useful life of each boiler and ancillary equipment, as detailed in the table or as extended. The useful life expectancy of a boiler can only be extended for a maximum of 10 years beyond the listed value in the useful life expectancy table.*

## 5. DOCUMENTATION

The following documentation must be available to all qualified boiler operators and attendants in the boiler plant or accessible location for decentralized equipment.

### a. **General.**

(1) One-line diagrams of the following boiler plant systems: High, Medium and Low-Pressure Steam Systems, Make Up and Supply Water Systems, Condensate System, Primary and Alternate Fuel Systems, Control Systems and the Electrical Distribution System.

(2) Manufacturer's literature for all installed equipment.

(3) Boiler Efficiency Improvement Operator Manual, available at: <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>.

**NOTE:** *This is an internal VA website that is not available to the public.*

(4) VHA Boiler and Associated Plant Safety Device Testing Manual, available at: <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>.

**NOTE:** This is an internal VA website that is not available to the public.

(5) A current copy of this directive with all appendices.

(6) Current normal and emergency operations procedures, including start-up, operation and shutdown of all boiler plant equipment, fuel systems and steam distribution systems.

(7) Current list of installed equipment and its operating information, including pressure and flow requirements.

(8) Lock-out tag-out procedures for all equipment in the boiler plant.

(9) Confined space entry procedures, as applicable.

(10) Load shedding plan and steam conversation plan.

b. **Boiler Maintenance and Testing Records.** Boiler maintenance and inspection records must be retained for the life of the boiler. Safety device testing records must be maintained for at least 3 years. All components of the utility system associated with the production and use of steam at the VA medical facility, including fuel, must be individually reviewed for inclusion in the preventive maintenance program. All safety devices must be considered critical utility system components. Inspection, testing and maintenance records are required for all critical components of the utility system. Records must include the following:

(1) Date of test, inspection or maintenance activity.

(2) Results of the test, inspection and maintenance procedures completed.

(3) Parts installed.

(4) Names of individuals performing testing, inspection or maintenance.

(5) Notification of the VA medical facility Director is made regarding any device failures.

(6) Repairs or adjustments made to safety devices and the date of their return to service.

c. Qualifications of individuals performing inspections and testing must be documented and retained with the testing records.

d. **Performance Data.** Performance data must be retained for at least 3 years and must include:

(1) Total steam/production and fuel consumed (daily, monthly and annually).

(2) Daily outside temperature range.

(3) Make-up water quantity and the percent of make-up in relation to amount of steam generated.

(4) Minimum and maximum steam demand per shift.

(5) Boiler efficiency based on steam output or fuel input (daily).

(6) Water treatment data, including all test reports and chemicals utilized.

(7) Boiler flue gas oxygen and stack temperature in relation to burner firing rate.

e. **Training Records.** Qualified boiler operator training records must be retained for at least 3 years. This includes all training required by this directive, as well as those developed at the local level as part of the written boiler/boiler plant training program.

## VHA BOILER AND BOILER PLANT REFERENCES AND REQUIREMENTS

### 1. INCIDENTS OR PLANNING THAT REQUIRE NOTIFICATION TO THE OFFICE OF HEALTHCARE ENGINEERING

The Veterans Health Administration (VHA) Office of Healthcare Engineering (OHE) must be notified in the following situations:

a. **Planned Installations.** There are plans for the installation of new, temporary or replacement high-pressure boilers, installation of new fuel burning equipment on existing boilers, or re-tubing 30% or more of a single boiler. Sufficient (determined by OHE) technical and operational information must be provided for plan evaluation and to obtain approval to proceed with design development. For approved plans, design development documents must be submitted for review by OHE and the Department of Veterans Affairs (VA) Office of Construction and Facility Management at the 30, 60 and 100% design stages. This also includes incremental reviews for Design-Build projects.

b. **Planned Equipment Changes, Decentralization or New Technologies.** There are plans for changes in equipment sizing, implementation of new technologies or decentralization (partial or total). These events must be evaluated and approved by OHE prior to completion of concept development as well as at the 30, 60 and 100% design stages. Equipment and projects required to be submitted for review includes, but is not limited to:

- (1) Non-steam producing fluid filled (e.g., oil-filled) boilers.
- (2) Low mass boilers.
- (3) Combined Heat and Power Plants of any type or energy output capacity.
- (4) Biomass plants of any type or energy output capacity.
- (5) Any steam generating or boosting equipment that operates more than 15 pounds per square inch gauge. This includes equipment that uses alternative heating fluid, such as oil or other fluid.
- (6) Utilization of electric boilers.
- (7) Any upgrades or replacement of boiler controls and safety systems.
- (8) Any backup fuel sources other than fuel oil (i.e., propane).
- (9) Conversion from high pressure steam to low pressure, decentralized boiler systems or hot water heating systems. Prior to beginning the design phase, the VA medical facility must submit to OHE for review and concurrence a full analysis of redundancy, emergency power and the backup fuel. The proposed actions must be

reviewed for compliance with VA requirements and long-term sustainability and viability. If the requirements of these systems are not defined in other VA documents, the VA medical facility must request clarification and guidance from OHE. In addition, non-recurring maintenance projects to support conversion from steam to a fully functional heating hot water system must be approved and funded upfront.

c. **Incidents and Occurrences.** Within 12 hours of any of the occurrences identified below, notification must be made to OHE. A thorough investigation by the Veterans Integrated Services Network (VISN) and VA medical facility, including root cause analysis, must be performed, with a written report submitted to OHE within 30 days of occurrence.

(1) A rupture or explosion of a boiler or pressure vessel.

(2) A furnace explosion or extensive damage from overheating.

(3) Boiler leaks or problems with continued operation.

(4) When boilers and equipment required to meet the VA medical facility redundancy requirements for the supply of the maximum steam demand, exclusive of load shedding, are out of service for more than 24 hours for maintenance or repairs, resulting in compromise of the N+1 requirement (N+1 requirement refers to the requirement for the availability and functionality of a redundant system or equipment).

(5) Backup fuel systems or combustion equipment is out of service or inoperable.

(6) Repeated maintenance issues with boilers, safeties or ancillary equipment.

(7) The acquisition and operation of rental boilers to meet any part of the N+1 requirement.

(8) Any boiler safety device is non-functional, regardless of the status of the boiler (e.g., spare, backup).

(9) Any other unusual occurrence or activity.

## **2. BOILER PLANT ON-SITE FUEL REQUIREMENTS**

a. VA medical facilities must store a sufficient supply of fuel to meet the normal demands of continuous operation as defined below.

(1) VA medical facilities, firing coal as fuel, must store a sufficient supply of fuel to meet the normal demands of continuous operation for a period of 15 calendar days under weather conditions typical in the most extreme winter conditions. If the VA medical facility is equipped with an on-site (stored) backup source of fuel, such as natural gas, propane or fuel oil, the coal supply can be reduced to 10 calendar days. The combination of on-site primary and backup fuel supply must be sufficient for 15 calendar days of continuous operation in the most extreme winter conditions. Plants that

generate less than 50% of their annual steam demand by natural gas for 2 consecutive calendar years are coal-fired and must meet the supply requirements for coal-fired plants.

(2) VA medical facilities firing oil as fuel must maintain a supply of fuel sufficient to meet the normal demands of continuous operation for a period of 15 calendar days under weather conditions typical in the most extreme winter conditions. If the VA medical facility is equipped with a backup source of fuel, such as natural gas, propane or coal, the oil supply can be reduced to 10 calendar days. The combination of on-site primary and backup fuel supply must be sufficient for 15 calendar days of continuous operation in the most extreme winter conditions. Plants that generate less than 50% of their annual steam demand by natural gas for 2 consecutive years are oil-fired and must meet the supply requirements for oil-fired plants.

(3) VA medical facilities firing natural gas as the main fuel with fuel oil or propane back-up must maintain a sufficient supply of back-up fuel to meet the normal demands of continuous operations for a period of 10 calendar days under weather conditions typical of the most extreme winter conditions.

b. VA medical facilities with electric steam boilers must have them connected to either the VA medical facility's essential electrical system (emergency power system) or a standby power system(s). The decision as to what system will support the equipment must be based on a VA medical facility's risk analysis, which must be kept on record for review. On-site storage of generator fuel for boiler use must be sufficient for a minimum of 10 days of continuous operation.

### **3. REQUIRED BOILER PLANT MAINTENANCE, TESTING AND INSPECTION FREQUENCIES**

Inspections/testing must be performed in accordance with the following:

a. Hydrostatic testing of boilers and pressure vessels must be conducted after a repair or a tube replacement, or when the boiler or pressure vessel integrity is in doubt. Hydrostatic pressure must be limited to 150% of normal operating pressure of the boiler or pressure vessel.

b. All inspections and testing of boilers must be completed by a qualified testing contractor as defined in paragraph 6.1.

c. Evaluation of failure and remaining useful life must be completed by a qualified and licensed contractor. See requirements and Scope of work template at the following website: <http://vaww.hefp.va.gov/healthcare-engineering/boiler-and-boiler-plant-operations>. **NOTE:** *This is an internal VA website that is not available to the public.*

**Table 1: Abbreviation Key and Legend**

<b>Term</b>	<b>Abbreviation</b>
High Pressure Steam Boiler	HP
Low Pressure Steam Boiler	LPSB
Hot Water Boiler	HWB
Electric Hot Water Boiler	EHWB
Electric Steam Boiler	ESB
Hourly	H
Once every 4 hours	4H
Once a shift	S
Daily	D
Once per month	M
Once every 6 months.	6M
Once per year	Y
Once every 6 years	6Y
depends on capacity	+

**Table 2: Boiler Plant Equipment Inspection and Testing Frequency**

<b>Inspection</b>	<b>HP Frequency</b>	<b>LPSB Frequency</b>	<b>HWB Frequency</b>	<b>EHWB Frequency</b>	<b>ESB Frequency</b>
1. Inspect furnace and other internal surfaces, closures and accessories.	Y	Y	Y	Y	Y

Inspection	HP Frequency	LPSB Frequency	HWB Frequency	EHWB Frequency	ESB Frequency
2. Inspect exterior of Unit, casing, supports, closures, accessories, valves, controls.	Y	Y	Y	Y	Y
3. Deaerator: Inspection and wet magnetic particle testing of welds of pressure vessel interior.	6Y	6Y if equipped	N/A	N/A	6Y if equipped
4. Check all Boilers for fouling and combustion gas flow.	Y	Y	Y	N/A	N/A
5. Tube leak check on all boiler types.	Y	Y	Y	Y	Y
6. Deaerator: interior cleaning and visual inspection.	Y	Y if equipped	N/A	N/A	Y if equipped
7. Condensate Tank: interior cleaning and visual inspection.	Y	Y	N/A	N/A	Y if equipped
8. Adjust burner combustion settings and calibrate oxygen trim.	6M	6M	6M+	N/A	N/A



Inspection	HP Frequency	LPSB Frequency	HWB Frequency	EHWB Frequency	ESB Frequency
9. Check vibration of burner fans.	6M	6M	6M	N/A	N/A
10. Calibrate instrumentation, monitoring, and control systems.	6M	6M	6M+	6M+	6M+
11. Calibrate pressure gages and thermometers.	Y	Y	Y	Y	Y
12. Test functionality of UPS systems.	Y	Y	Y	Y	Y
13. Boiler chimneys and stacks, by a qualified inspector.	6Y	6Y	6Y	N/A	N/A
14. Emission control system inspection and testing (SCRs etc.).	Y	Y	Y	N/A	N/A

**NOTE:** Items (1) through (14) in the table above must be accomplished by a documented qualified contractor. Such a determination must be carefully made for each item and each individual.

**Table 3A: Boiler Plant and Equipment Safety and Operational Documentation Duties**

Duties	HP Frequency	LPSB Frequency	HWB Frequency	EHWB Frequency	ESB Frequency
Document and track overall plant operation.	H	4H	4H	4H	4H

Duties	HP Frequency	LPSB Frequency	HWB Frequency	EHWB Frequency	ESB Frequency
Document operating equipment and systems, including tag number of operating equipment.	H	4H	4H	4H	4H
Inlet and outlet temperature of all equipment (e.g., Condensate, DA, economizer, boiler).	H	4H	4H	4H	4H
Inlet and outlet pressure of all operating pumps.	H	4H	4H	4H	4H
Plant temperature, outside air temperature, and exhaust gas temperature (before and after economizer if installed).	H	4H	4H	4H	4H
Fuel flow (instantaneous and total) and firing rate for each boiler on line.	H	4H	4H	N/A	N/A
Steam or hot water flow to the system.	H	4H	4H	4H	4H
DA pressure and temperature.	H	4H	4H	4H	4H

Duties	HP Frequency	LPSB Frequency	HWB Frequency	EHWB Frequency	ESB Frequency
Readings for make-up water meters, including totalizer and condensate return rate.	H	4H	4H	4H	4H
Fuel train pressures and flows for each boiler that is on line.	H	4H	4H	N/A	N/A
Boiler pressure or temperature.	H	4H	4H	4H	4H
Note any leaks, system problems, or abnormal operating conditions.	H	4H	4H	4H	4H
Header pressure, temperature, and, if branches, pressure and temperature of each branch leaving the plant.	H	4H	4H	4H	4H
Calculated boiler combustion efficiency.	S	S	S	S	S
Other readings as required or determined by the medical facilities.	H	4H	4H	4H	4H

**NOTE:** Logs must be taken by hand even if automatic logs or Supervisory Control and Data Acquisition system is in place.

**Table 3B: Boiler Plant and Equipment Safety and Operational Duties**

<b>Duties</b>	<b>HP Frequency</b>	<b>LPSB Frequency</b>	<b>HWB Frequency</b>	<b>EHWB Frequency</b>	<b>ESB Frequency</b>
Blow down water columns.	D	D	D	D	D
Test and adjust water treatment.	D	D	M	M	D
Check furnace pressure.	6M	6M	6M	N/A	N/A
Check combustion gas leaks into boiler room.	6M	6M	6M	N/A	N/A
Clean waterside of boilers.	Y	Y	Y	Y	Y
Clean fireside and repair refractory.	Y	Y	Y	N/A	N/A
Document boiler economizers; temperatures in or out.	H	D	N/A	N/A	N/A
Review written procedures.	Y	Y	Y	Y	Y