

Abilene, Inc.

2402 Neptune Avenue
Brooklyn, N.Y. 11224

Phone: 718-372-4210
Fax: 718-372-0255
www.abileneinc.com

An Introduction to Boiler Maintenance

One of the most important systems in your building lies behind a closed door in your basement. Behind that closed door is a maze of pipes, wires and gauges the function of which is to keep your building warm and your water hot. All too often, very little attention is paid to this equipment... until it malfunctions. With a little work and a lot of concern, your boiler room equipment can be maintained in a safe, efficient and reliable condition almost indefinitely. Hopefully, the information being passed along here will assist you and your building personnel in the long term maintenance of one of the most expensive systems in your building.

Boiler room maintenance can be divided into two distinct categories: work which should be performed by your building staff; and work which should be performed only by a trained service technician. Having your building personnel attempt adjustments or repairs to equipment which was designed to be serviced only by trained technicians can not only endanger your personnel, but will usually lead to premature failure and/or inefficient operation of your equipment. Bear in mind that heating equipment installed within the past ten to fifteen years utilizes technology which requires years of training and experience to adjust and repair. Leave these repairs to the experts, you will save money.

First, let's address maintenance items which should be handled by your building personnel. These items can be broken down into two categories, **Daily Maintenance** and **Weekly Maintenance**. I can think of no maintenance item which should be left unattended for more than one week.

Daily Maintenance

Your building personnel should inspect your boiler room at least once-a-day, twice would be preferable. At a minimum, the following areas should be carefully examined and, where applicable, a **written log** of the conditions found should be scrupulously maintained.

A. Fuel Supply: If your heating system operates only on natural gas, it is unlikely that there is a fuel oil storage tank in your basement. If however, your system operates on oil or is a dual-fuel system, then the fuel level in the storage tank should be checked and recorded every single day. Most fuel oil storage tanks located in apartment buildings are equipped with a fuel gauge called a "Petrometer". This gauge may be found next to the fuel tank enclosure or in a remote location in the boiler room. The Petrometer is very simple to operate, simply pump up the gauge from the top, wait for the red liquid in the gauge display to settle, and record the reading. The gauge display should be equipped with a chart that displays the fuel level in both inches of oil in the tank and the corresponding gallons. If your gauge does not display this information, ask your service company to provide the proper calibrated chart for your gauge/tank/grade-of-fuel combination. These charts are inexpensive and will aid in the record keeping process of fuel used and fuel stored. With the price of fuel rising all the time, this small investment could result in very large savings. The fuel level in your tank should never be allowed to fall below one third the capacity of your tank.

B. Fuel Oil Strainers: If your heating system is burning fuel oil, the fuel strainers will eventually become dirty, possibly clogged. A clogged fuel oil strainer can not only cause damage to your equipment, but will definitely lead to a shut-down of the system and a resultant lack of heat and hot water services to the building. As a service technician, I was astounded at how many service calls were the result of dirty or clogged strainers.

If your building is burning #6 fuel oil, the strainers **MUST** be cleaned at least once a day. Although highest in heating value and lowest in price, even the best quality #6 fuel oil contains a high percentage of particulate matter and impurities.

If your system is burning #4 fuel oil, the strainers will require slightly less maintenance. Exactly how much less is hard to say. I would recommend that the maintenance personnel begin by cleaning the strainers every day and recording the condition found. If the written record indicates that the strainers are usually found to be clean, then the procedure can be extended to every other day. Under no

circumstances should the cleaning of the strainers in a #4 oil burning system be left uncleaned for more than one week. The purest grade of commercial heating fuel oil is #2. This grade of fuel is usually utilized in smaller heating plants and as the backup fuel on a dual-fuel systems. As the most expensive of all grades of fuel oil, #2 oil has undergone the most refinement and will require the least strainer maintenance. If you are purchasing #2 fuel oil from a reputable fuel oil distributor, and your storage tank is reasonably clean, then the required strainer maintenance will be at a minimum. I suggest that initially, the same procedure recommended for #4 oil be followed, however if upon inspection the strainers are continually found to be clean, then this maintenance procedure could possibly be scheduled on a monthly or bi-monthly basis.

When cleaning fuel oil strainers your building personnel should shut-down the heating plant, and be sure all manually operated fuel valves are tightly closed. Strainers should be thoroughly cleaned using a commercial cleaning solvent in a well ventilated area, and when reinstalled, the cover gaskets of the strainer housing should be carefully cleaned and/or replaced as necessary. The small gasket, which cost only a few dollars, can shut-down your entire heating plant - care should be exercised.

Remember to reopen all closed valves.

C. Boiler Water Level: On every steam boiler there is a small glass tube located on the outside of the boiler. Commonly called a "Gauge Glass", this tube indicates the precise level of the water in the boiler. In order for the steam boiler to function properly, the correct water level must be maintained within the boiler vessel. Since all boilers and buildings are different, I would suggest that you have your service company permanently mark the correct water level on your gauge glass. A little trick that I found to be effective was to install an extra gauge glass washer (your service technician will know what that is) in the center of the glass tube. The washer can then be moved to the correct water level for your boiler. A fringe benefit of this little trick is that in order to install the "extra" washer the technician will have to remove the gauge glass, a perfect opportunity to clean or **replace** the glass and to install new main washers on the tube!

Your building personnel should check and record the water level in the boiler every day. A permanent record should be maintained to indicate how often and how much water must be added or removed from the boiler. This information is critical! Water loss from a boiler has a direct effect on how much fuel your system will burn and how long your boiler will last. A permanent record of boiler water loss should be made and kept in a safe place. If your boiler was installed within the past several years, the installing contractor should have installed a small water meter on the pipe that provides fresh or "make up" water to your boiler. This meter will allow you to track precisely how much water your system is losing. If your boiler does not already have this water meter, ask your service company for a price to install one, its cheap insurance for an expensive piece of equipment.

Maintain a log of boiler water losses!

D. Smoke Detection Equipment: Commonly referred to as a smoke alarm, this device is located on the boiler breeching (the large pipe which connects the boiler to the chimney). In larger heating plants, installation of this device is required by the Department of Environmental Protection - Bureau of Air Resources. It is my opinion that all oil fired heating systems, regardless of size, should be equipped with this device. The operation of the smoke alarm is simple; a beam of light emitted from a special light bulb passes through the breeching and shines upon a receiver unit located on the opposite side. After proper calibration by your service technician, the receiver unit will sense the presence of smoke in the boiler breeching because the intensity of the light it receives will be reduced if there is smoke present in the breeching. If the presence of smoke is detected for a period in excess of two minutes, the smoke alarm should automatically halt the operation of your boiler and activate an alarm located outside of the boiler room. If properly adjusted and maintained, your system should not produce any visible smoke - **no visible level is acceptable**. The presence of smoke will not only seriously degrade the efficiency of your heating plant, but will subject you to stiff fines and penalties imposed by the Environmental Control Board.

Your building personnel should examine both the light source and the receiving unit daily. A soot or dust accumulation on either unit should be carefully wiped off. Should the building personnel find that the light bulb is inoperative or damaged; your service company should be notified immediately. It would be advisable to keep a spare bulb on hand.

E. General: A close look at all of the boiler room equipment is in order on a daily basis. Your building personnel should be looking for leaks, drips, soot and inoperative gauges.

I am of the opinion that any fluid leak, regardless of size, is unacceptable. A small leak is the precursor of a large problem.

A visual examination of water and fuel piping and connections will reveal any leaks in these areas. If a leak is detected, have it repaired immediately.

Many new boilers have gaskets or seals around the perimeter of the access doors to the boiler. These doors should fit tightly, and there should be no visible signs of soot or smoke accumulations in these areas. If any are detected, have them repaired immediately.

Every gauge in your boiler room was installed for a reason. Every gauge tells a story about your equipment. If a thermometer or pressure gauge is not functioning there is no way to tell if your equipment is operating properly. Have any inoperative

gauges replaced by a properly trained technician. Your building personnel should become familiar with the "normal" readings of all gauges and record them regularly. Your service company can assist you and your building personnel in determining the normal readings for your systems gauges. Deviations from the normal readings should be reported to your service company.

Boiler room lighting is critical. Many types of boiler room equipment can cause serious injuries to personnel. Good lighting is essential to the safe operation of your heating plant. Have inoperative bulbs or fixtures repaired or replaced immediately. At a minimum, there should be one large light fixture at either end of your boiler, more if conditions permit.

Weekly Maintenance

A. Drains and Blow Downs: All boilers will accumulate some degree of rust and sediment inside the boiler. Most rust and sediment is the result of oxidation of the steel surfaces within the boiler and associated piping. Most of the piping connected to your boiler was installed when the building was constructed. Over the years the interior surfaces of this piping has deteriorated. When the deterioration becomes severe enough you will have to replace the piping, but for the time being you must remove as much of this sediment as practical from the boiler.

In various locations on the boiler you will find drain valves. If properly installed these valves are located in areas most likely to accumulate rust and sediment. Once a week the building personnel should remove a small amount of water from each and every one of these drains. How much water should be removed? A safe rule of thumb is that the drain should be left open until the water runs clear. Care should be exercised since the water being drained is usually hot. Ideally all boiler drains should be connected to a manifold which runs to the boiler room sump pump pit. This would reduce the possibility of injury to the operator as well as help keep your boiler room clean.

Of special importance in this area is the draining and testing of the "Low Water Cut Off" device on your boiler. Believe it or not, the failure of this relatively inexpensive device can result in the total destruction of your boiler. The low water cut off is designed to immediately stop the operation of the heating plant in the event that the boiler water level falls below a safe height. If this device should fail, and the boiler is operated without the proper amount of water, serious damage will result. Imagine putting an empty pot on your stove and leaving the stove on... the dry pot will be quickly destroyed.

Your building personnel should drain and flush this device weekly. A simple test can be performed to check the operation of the low water cut off. The cut off can be drained and flushed while the boiler is in operation. Draining the cut off while the boiler is operating will simulate the loss of boiler water. When this happens the flame inside the boiler should extinguish immediately. Once again I caution that care should be exercised to avoid possible injury when draining hot water from the low water cut off.

I firmly believe that all boilers should be equipped with at least two low water

cut off devices. One cut off should be of the electro-mechanical type described above. The second, or backup device, should be of the electronic probe type. Your service company should be able to recommend the proper devices for your particular boiler.

B. Draft Controls: Every boiler should be equipped with a device to control air flow through the boiler. Excessive air flow will lower operating efficiency and inadequate air flow will result in soot accumulations in the boiler.

Two types of draft controls are commonly found on modern boilers. The first control is the barometric draft control. Without going into a long explanation as to how this device works, suffice it to say that it can usually be identified as a round hinged, or swinging damper door located on the boiler breeching (remember the large pipe that connects the boiler to the chimney). At least once a week your building personnel should inspect this device to see that it swings freely, the weights that hang from the side are properly secured, and that the entire device is securely fastened to the boiler breeching.

The second type of draft control is the sequential draft control. This device is much more complicated than the barometric draft control and is not user serviceable. However, your building personnel should check to see that the device returns to the fully closed position when the heating plant is off, and to an open or intermediate position when the heating plant is in operation. Your service technician can demonstrate the normal operation of this device for you.

C. Ventilation: All boiler rooms require ventilation (fresh air) to support the combustion process taking place inside your boiler. Louvers or fans that may be located in your boiler room are there to allow a carefully calculated amount of fresh air to enter the boiler room. **Exhaust fans are not permitted in boiler rooms.** An inadequate amount of fresh air in the boiler room will result in decreased operating efficiency of your boiler and the formation of soot within the boiler and on surrounding areas.

Once a week your building personnel should check louvers to see that they are not obstructed. Ventilating fans, if installed, should be operating any time your boiler is in operation.

D. Fire Protection: Every boiler room must be equipped with either round bottom fire pails or proper fire extinguishers. I would suggest both.

At least four round bottom pails, filled with ordinary sand, should be permanently located in the boiler room. Ideally, two pails should be located in front of

the boiler room and two pails located in the rear of the boiler room. In addition, I would recommend that two fire extinguishers, of the proper size and type, be located in the boiler room in the vicinity of the entrance. Your building supply vendor should be able to advise you as to the type and size of fire extinguisher most appropriate for your boiler room.

E. Sump Pump: Someplace in the floor of your boiler room is a hole. At the bottom of that hole is a small pump. Most people, building personnel included, have never seen this pump. Yet, if this pump is inoperative and you develop a serious leak in your boiler or boiler room piping, you could wind up with enough water in your boiler room to cause serious damage to your equipment.

The operation of your "sump pump" should be checked on a weekly basis. It's simple enough to test your pump. Just fill the hole with water and see if the pump does its job of emptying the water. If not, replace it... immediately.

Your sump pump should be of high quality. Department store quality is simply not good enough for boiler room applications. The pump should have a discharge port of at least one and one quarter inches, and should be rated for pumping temperatures of at least two hundred degrees. A pump of this quality should cost approximately five hundred dollars, plus installation costs. Don't skimp here, it's not worth it.

The "sump hole" should be cleaned, and kept clean. Dirt accumulations in the hole will ruin your pump. It's a good idea to put some type of sub-base in the bottom of the hole. For example, rather than having the pump rest on the bottom of the hole, place a few bricks on the bottom and rest the pump on the bricks. Heavy debris will settle below the level of the bricks thereby protecting the pump. Remember to clean the bottom of the hole regularly.

F. General: Your boiler room is as much a part of your building as the lobby. In fact, notwithstanding the aesthetic value of the lobby, the boiler room is a far more important part of your building. The same attention to detail and cleanliness should be paid to the boiler room as is to the lobby. The boiler room is not a storage area; in fact, local Codes prohibit storage in the boiler room. The boiler room should be kept immaculate, the walls and floor should be kept clean and painted, yes painted, (you paint the lobby don't you?). I would recommend a flat white or flat off-white latex paint for the walls (a flat white paint is easy to clean and maintain) and a grey epoxy based enamel for the floor. While painting the boiler room may sound extreme, believe me it is not. The care and housekeeping of your boiler room makes a clear and concise statement to your building personnel and to the service technician who services your equipment, "We demand the best, and will settle for no less!" I know of a particular heating plant installation where the housekeeping in the boiler room is so meticulous that when I visited the site I instinctively looked for a place to wipe my feet off before entering boiler the room! Just for the record, this particular heating plant has been in operation for over seven years without a single shut-down, or nuisance service call... it still looks and performs as well as the day it was installed.

Following the daily and weekly maintenance suggestions discussed above will result in significant improvements in the operation, efficiency, safety and longevity of your boiler room equipment. Some jobs, however, are better left to the experts. The following procedures should be performed only by skilled technicians, thoroughly trained in their respective fields.

NOTES:

Outside Maintenance

A. Tube Cleaning: The tubes in your boiler should be thoroughly cleaned at least twice a year.

Many years ago, tube cleaning was required more often, but with new "smoke free, high efficiency" equipment, I have found that twice a year is usually adequate. Whether you are burning #2, #4, #6 fuel oil or Natural Gas, this recommendation stands - no exceptions. Very small accumulations of soot on the boiler tubes result in very large decreases in fuel efficiency. If you have experienced repeated service problems with your equipment which resulted in smoke being generated, consult with a professional boiler cleaning vendor. It may be necessary to have your boiler tubes cleaned more frequently or at least one additional time after your service problem has been resolved. It is difficult to find a high quality tube/boiler cleaning company so select your vendor carefully. It's also a good idea to have your building personnel present while the boiler is being cleaned.

B. Boiler Water Treatment: If you are not presently under contract with a professional boiler water treatment company, do it today. You cannot afford to skimp in this area!

The lack of a proper water treatment "program" has resulted in the destruction and/or premature failure of more boilers than any other cause. Do not trust your building personnel to handle this chore. Water treatment requires experience and technology which your building personnel simply do not have. Hire a professional.

Water treatment should be done on a monthly basis. A reputable vendor will visit the boiler room, draw off a sample of the boiler water, analyze the sample, and add chemicals of the type and quantity determined by the analysis of the sample.

To stress the importance of this maintenance let me first remind you that untreated fresh water contains oxygen, lots of it. Now, think back to your high school chemistry. Combine oxygen (in the water) and iron (the shell of your boiler) and we have... iron oxide, commonly known as rust. The more untreated water (oxygen) we add to the boiler, the more rust will form. Remember I told you that your boiler feed water should be metered and monitored. Now you'll find out why.

Many buildings, especially cooperatives, have had boiler replacement projects completed within the past ten to fifteen years. The original giant "dinosaur" boiler was removed and this new smaller high efficiency boiler was installed. One of the reasons

that the new boiler is more efficient is because it is smaller and contains a lot less water. We know that a certain amount of water loss in a heating system is inevitable. Buried pipes begin to leak, air valves on radiators and steam mains fail, and other events too long and complicated to explain here begin to occur. For the purpose of providing a simple explanation, let's assume that the system water losses in your building amount to one hundred gallons of water per day, and that your old "dinosaur" boiler had a water content of five thousand gallons. Some simple calculations tell us that the system losses represent two percent of the boiler water content every day. Now, out comes the old boiler and in goes the new "smaller" boiler, with a total water content of only one thousand gallons. Our system losses are still one hundred gallons per day, only now the one hundred gallon loss represents ten percent of our boiler water content... a five hundred percent increase in **relative** boiler water loss! It's no wonder that the new boilers don't last as long as the old "dinosaurs".

Obviously we must monitor and correct water loss in our system, but since it may not be practical or possible to cure all of these ills immediately, we must protect our very expensive boiler. Among other things, a proper water treatment program will minimize the amount of oxygen in the boiler water and significantly extend the life of your boiler.

Have the water in your boiler chemically treated on a regular basis and have the boiler "boiled out" (a thorough chemical cleaning procedure) once a year.

One final thought on boiler water losses: when water leaves (leaks from) the boiler or associated piping, it is hot water, which we have burned precious fuel to heat. We must now add cold water to the boiler to replace that which was lost, and burn additional fuel to reheat the cold make up water. How much additional fuel? Well that's a discussion we'll save for another time. But rest assured, the amount is significant.

C. Burner Overhaul: Your burner, whether it is fired with #2, #4, #6 oil, Natural Gas, or a combination of several, should be completely disassembled and overhauled at least once a year. This is a job strictly for the trained technician.

Throughout the year the firing assembly of your burner is exposed to extreme heat as well as the impurities present in the fuel supply. At least once a year these components should be completely disassembled and thoroughly cleaned. Expendable items such as gaskets, electrodes and nozzles should be replaced with exact replacement parts. Your service company should be able to tell you what items require annual replacement.

Your annual overhaul should not be limited strictly to the burner. All boiler controls should be tested and calibrated, safety relief valves should be tested (pull chains should be installed if not already in place) and all gauges should be checked and replaced as necessary.

If you have a Service Contract with your service company, an annual overhaul of your burner should be included in the Contract. If you are experiencing excessive shut-downs of your system, if your system is more than ten years old, or if you have been experiencing any other unusual problems, you might consider overhaul of your equipment more frequently. Consult with your service company for their recommendations for your particular equipment.

D. Fuel Tank Maintenance: Your fuel tank will eventually get dirty. No matter how reputable your fuel oil dealer is, or how high a quality of fuel you are purchasing, eventually you will have to clean your tank.

Choose a reputable tank cleaner. Wait until the fuel supply in your tank is reasonably low (about one third), and have the tank cleaned and the fuel lines steamed. Tank cleaning should be done from inside the tank. Above ground tanks are easily accessible through a manhole in the top of the tank. Buried tanks can be accessed by digging to the top of the tank (usually only two feet below grade) and either cutting the tank or locating the buried manhole. The fuel lines should be steam

cleaned, the fuel tank gauge line should be checked and cleaned, and if not already in place, a tank "Vent Alarm Whistle" should be installed.

After the tank cleaning is complete a NEW gasket should be installed on the manhole, ALL manhole bolts on buried tanks should be **replaced**, and the tank securely closed. **Do not return any oil previously removed to the tank.** If the level in the tank was low enough to clean the tank, then the loss of usable fuel oil will be small. Besides the reason we cleaned the tank in the first place was to remove the sludge and contaminated oil. Remember to have the tank cleaner examine the inside steel surfaces of your tank for corrosion. A little preventative maintenance here can save big dollars later.

Arrange for a fresh delivery of clean fuel oil, and have your service technician on hand to start and adjust your heating plant.

How often? I would recommend tank cleaning at least every three years, more often if you are experiencing problems with fuel oil quality, less often if you are using #2 fuel oil.

Administrative

Most apartment house and commercial heating plants require a Certificate of Operation from the Department of Air Resources. Operating Certificates are valid for a three year period and the responsibility for timely renewal rests with the property owner.

Your Certificate of Operation MUST be POSTED in the boiler room.

Failure to do so will eventually result in a fine. Check with your service company or a Licensed Professional Engineer regarding the renewal of your Certificate of Operation. I would not recommend undertaking this process yourself since the renewal process can be complicated and reinspection fees are high. Delays in the issuance of the Certificate could subject you to fines and court appearances.

Every year you are required to complete and submit to the Department of Buildings, prior to December 31, a heating plant inspection form. Although many insurance companies will provide this form to you, I suggest that you contact your licensed service company regarding the completion of this form.

The boiler inspection form SHOULD be POSTED in the boiler room along with the Certificate of Operation.

Fuel oil storage tanks of 1100 gallons or more must be registered with the New York State Department of Environmental Conservation. The tank registration must be renewed every five years, a simple process but one that it is easy to overlook.

Underground storage tanks containing #2 or #4 fuel oil must be tightness tested every five years. Tightness testing is a difficult and expensive process that must be performed only by certified and licensed tank testing companies. Chose your vendor carefully!

If you have an underground storage tank that requires testing, and some extra room in the basement of your building, you would be well advised to consider abandoning the underground tank and building a new aboveground storage tank inside of the building. Speak with a qualified **New York State Licensed Professional Engineer** or **New York City Licensed Fuel Oil Burning Equipment Installer** regarding this possibility.

Which brings me to my final bit of advise;

When selecting a heating Service or Installation contractor, insist, without exception or compromise, that an **ACTIVE PRINCIPAL** of the company has a current Class-A (preferably) or Class-B (for #2 fuel oil burning equipment only) "**New York City Fuel Oil Burning Equipment Installer**" license. Ask for a copy of the license for your files. Also remember to request a Certificate of Workmen's Compensation insurance, and a Certificate of Liability insurance with at least five million dollars of liability and/or excess liability insurance coverage.

There are dozens of unlicensed mom-and-pop Service and Installation contractors. While there may be a few decent ones, typically these companies are under staffed, under capitalized, under trained, and usually under qualified to provide thorough and SAFE service and installation of today's complicated heating equipment. Although not all service problems can be solved on the first attempt, there is a better chance of resolving the problem if the technician is completely qualified.

While it is not possible to cover every aspect of heating plant maintenance, because that would require volumes, I hope that the information presented here will help you to improve your current maintenance program, or establish a new one!

Remember to use good judgment, licensed, experienced and qualified service organizations, and reputable vendors. Do not shop price alone, often the cheapest price leads to the highest cost.

Jeffrey Solomon, President & CEO
Abilene, Inc.

WHY DO THE PIPES IN MY BUILDING BANG?

One of the most common complaints, especially after a new steam heating plant is installed in a building, is that the pipes in the basement bang like crazy when the heat is on, especially in the morning.

When your boiler is firing, steam is traveling through the pipes at high velocity. Being a gas, the steam is able to negotiate bends in the piping rather easily. However, should there be steam and water, traveling through the same pipe at the same time... it can get noisy.

While steam can change direction quickly and almost silently, the water droplets cannot. While traveling through the buildings piping system the water always tries to continue its **forward** path so it strikes, rather than silently passes through the bend in the pipe. A droplet of water, moving at sixty or seventy miles per hour, can

strike an elbow, or any other fitting in a pipe, hard enough to break the fitting.

By the way, the correct term for this problem is "Water Hammer".

Why didn't I have this problem before the new boiler was installed?

You will recall that earlier I told you that your new boiler was more efficient partially because of its smaller size and lower water content. These characteristics result in faster steam cycling and lower steam quality (steam quality being a measure of the water content of the steam - lower is better). While making steam with your new boiler in ten minutes may be less costly than making steam with your old boiler in forty five minutes, in most cases:

the distribution system of your building cannot handle the high velocity, low quality steam that is being forced through it!

This is not to say that water hammer is always caused by the buildings distribution system, there are many mistakes that can be made during the installation of your new boiler which can cause, or at least exacerbate, water hammer problems in the distribution system. Although a full analysis and explanation of the many potential causes of water hammer would take far too long to deal with here, I'll try to touch on the most common causes and solutions.

1. Have a qualified professional confirm that the piping arrangement connecting your new boiler to the buildings distribution system is correctly configured and sized. The boilers steam header and equalizer are critical points of this evaluation. Condensate return piping connections are equally critical (and unfortunately are usually done incorrectly). If a "vented" boiler makeup feed tank was added to your previously "closed" distribution system, very careful attention must be paid to the condensate return piping configuration at the receiver tank as well as to the settings of the boiler pressure controls. Generally speaking, problems in these areas are easily correctable. However, if the relationship between the normal water line in the new boiler and the height of the steam main in the building as not been properly maintained (usually an installation oversight), you may have a problem with no practical solution, or at least with a very expensive solution.

2. Make sure the buildings distribution system is properly vented. VENT VENT VENT. Where applicable, install high capacity air vents at the ends of the steam mains in the basement. If the apartment radiators are equipped with thermostatic air vents REPLACE THEM ALL, I repeat REPLACE THEM ALL. Proper sizing of the new radiator air vents will not only help heat the building evenly, but will save you lots of

money on fuel. Remember, install higher capacity vents on the radiators furthest from the boiler.

3. If there are thermostatic steam traps on the apartment radiators, **consider the replacement of the traps or trap elements to be a part of the boiler replacement project, not an after installation consideration.** REPLACE ALL RADIATOR STEAM TRAPS OR TRAP ELEMENTS. This may sound overwhelming, but it's really a simple process if approached in a methodical and logical way.

It is not possible for your boiler to operate properly if the buildings steam traps are not functioning properly. Sure, you didn't have this problem before the new boiler, but you also weren't trying to heat the building as fast.

4. Your boiler is probably steaming too fast. Reduce the burner firing rate and slow down the cycle. Most boilers installed today are far too large for the buildings in which they are installed. Believe it or not, it is usually a worse mistake to oversize a boiler than it is to undersize one. Your boiler should not make steam in less than twenty five or thirty minutes.

5. Make sure that the boiler water is free from contaminants. Have the boiler thoroughly "boiled out" to remove all traces of oil from the surface of the water. Oil in the boiler water is often the result of sloppy installation practices but can occur even in the best of circumstances.

6. It is possible that the condensate return piping system in your building has been affected by so much corrosion and may be filled with so much rust and sediment over the years that it simply cannot handle the volume of condensate being generated by your new boiler. In this event, the only solution to your problem will be the complete replacement of all the condensate return piping in your basement. This is a major undertaking and requires the involvement of a very qualified Licensed Professional Engineer for design and a very qualified licensed contractor for installation.