

Boilers and Heating System Applications



STRAIGHT-THROUGH PROCESS STEAM BOILER

GENERAL DESCRIPTION OF EQUIPMENT

In a straight-through process steam boiler system, all the steam is utilized or wasted in the plant and there is no condensate return to the boiler. All feed water to the boiler is raw water.

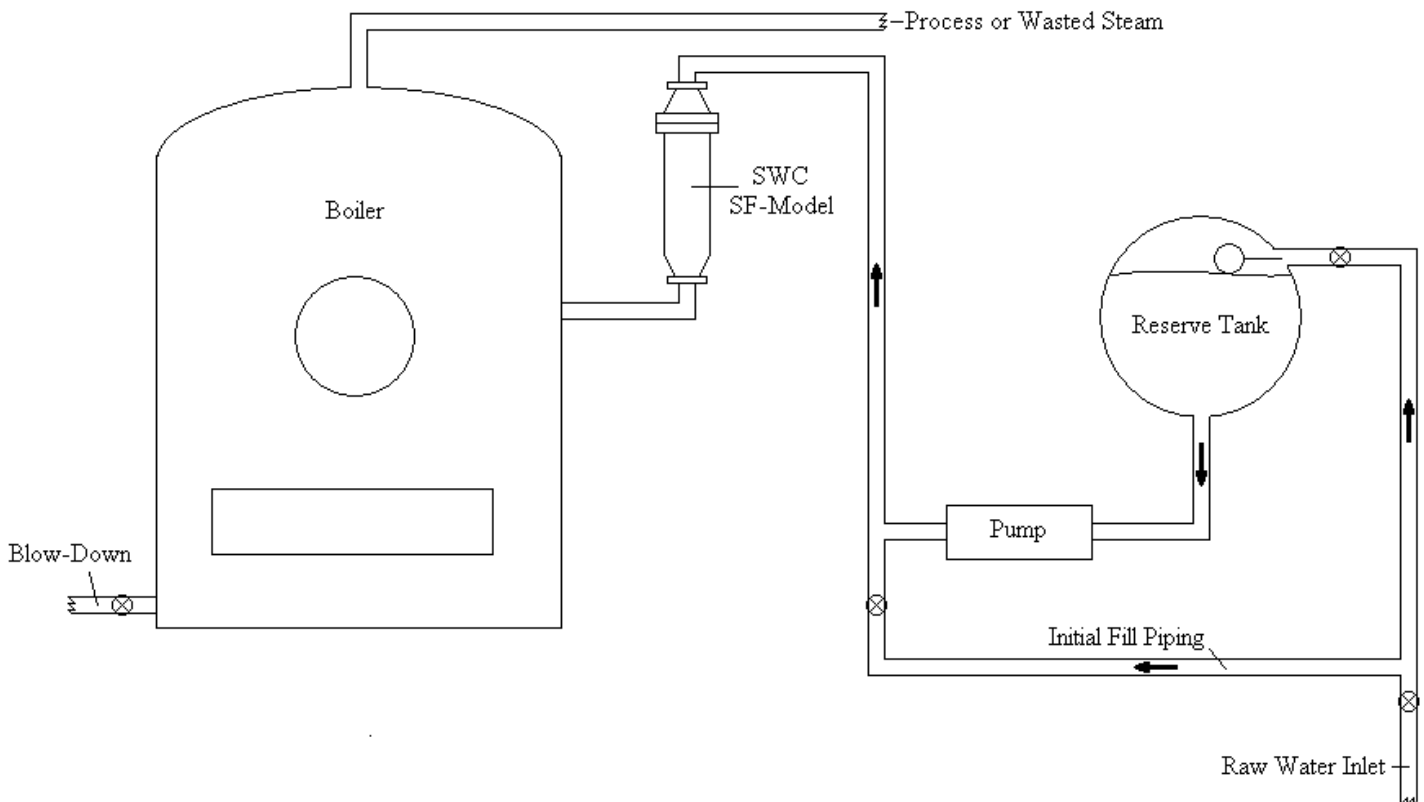
SIZING AND LOCATION

Take an actual measurement of water flow rate whenever possible, either by bucket measurement or flow meter, whether dealing with water pressure or pump capacity.

If Superior® is installed in the raw water inlet (no feed pump), sizing should be determined by an actual measurement or by the flow chart in accordance with water pressure and pipe size.

If Superior® is installed between the pump and the boiler, sizing should be determined by an actual measurement or by the pump capacity secured from the pump manufacturer. The pump capacity must be based on its maximum capacity when pumping against the lowest operating pressure within the boiler. There are certain seasons or times of the day when the boiler may be throttled down to a lower pressure than normal, and this must be taken into consideration when determining maximum flow rate against the reduced pressure.

If the boiler exceeds 150 lbs., install Superior® on the suction side of the pump in a vertical position.



CIRCULATING OR CONDENSATE RETURN PROCESS STEAM BOILER

GENERAL DESCRIPTION OF EQUIPMENT

In the circulating or condensate return boiler system, only a portion of the steam is lost or wasted in the plant, and the balance is condensed into water returned to a condensate receiving tank. It is then pumped back into the boiler feed water. The balance of the feed water to the boiler is made up with raw water, which enters through the condensate tank or directly into the boiler.

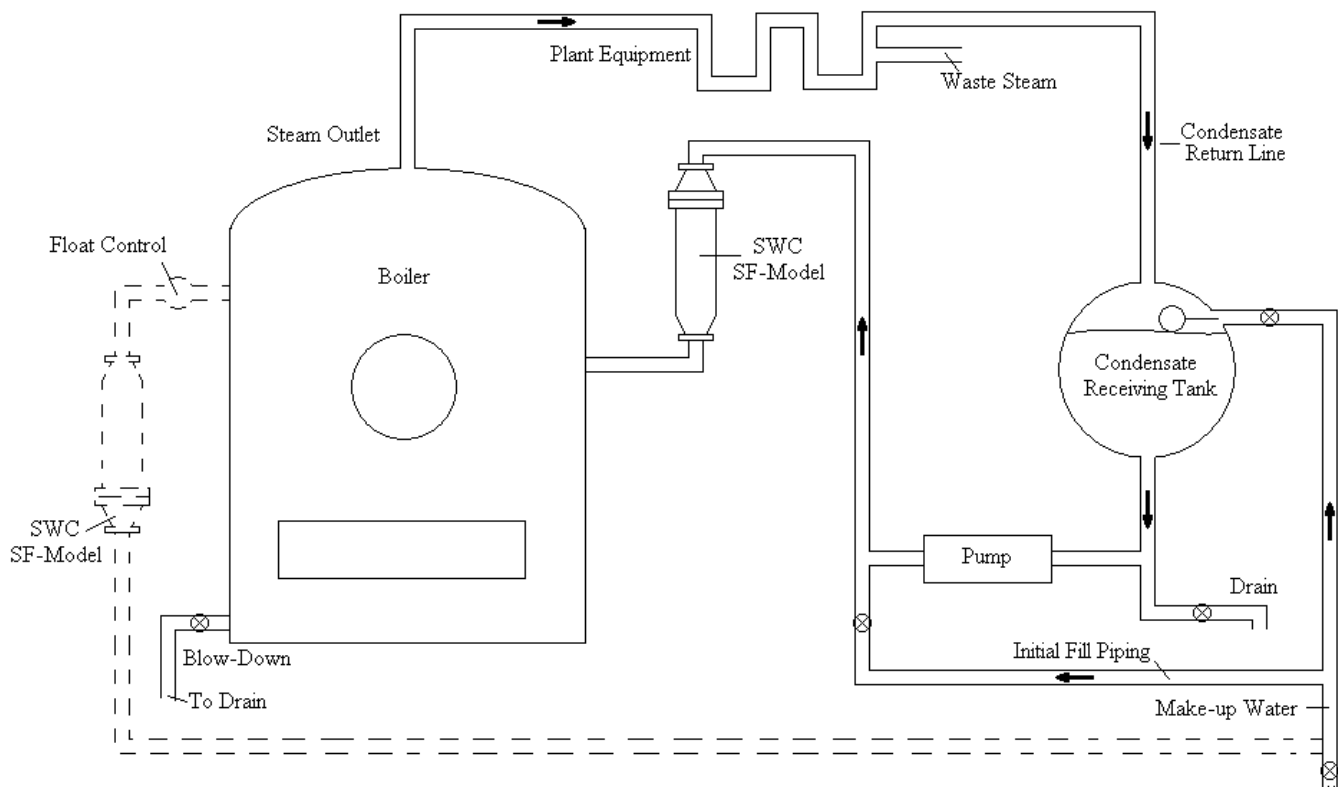
SIZING AND LOCATION

Take an actual measurement of the water flow rate whenever possible, either by bucket measurement or by a flow meter. Sizing is determined by an actual measurement or by the pump capacity secured from the pump manufacturer.

The pump capacity must be based on its maximum capacity when pumping against the lowest operating pressure within the boiler. There are certain seasons or times of the day when the boiler may be throttled down to a lower pressure than normal, and this must be taken into consideration when determining maximum flow rate against the reduced pressure.

When condensate return and make-up water both enter the condensate receiving tank, Superior® should be installed on the discharge side of the pump between the pump and the boiler. If boiler pressure exceeds 150 lbs., install Superior® on the suction side of the pump in a vertical position.

In cases where make-up water enters directly into the boiler, instead of into the condensate tank, install another Superior® vertically in that line. However, if less than 5% make-up water is added, another Superior® is not necessary, as the unit on the feed water line will be sufficient, unless the boiler is in very bad condition and more blow-downs are recommended, so there is additional make-up water required.



OPERATING PROCEDURES FOR PROCESS STEAM BOILERS, STRAIGHT-THROUGH AND CIRCULATING SYSTEMS

When a Superior® system is installed on a boiler in which scale exists, it is necessary to purge the system of the extra suspended/precipitated solids resulting from the gradual breaking down of the old scale in addition to whatever minerals and salts normally precipitate from the feed water. Explain to the customer that the excessive suspended, dissolved, and precipitated minerals must be removed from the system because any build-up can cause damage to the boiler.

During the de-scaling period:

1. Insist that blow-downs and washouts be increased at least twice as often as before the Superior® installation.
2. 50% of the capacity of the reserve or condensate tank must be drained daily during the clean-up period or until the float valve opens to aid in a flushing action.
3. Agree on a checkpoint that can be used to see and watch conditions improve.
4. Try to retain a sample of the removed piping or piece of scale for comparison.

After the clean-up period, the number of blow-downs and washouts can be cautiously and gradually returned to the original procedure, based on the periodic visual inspection of the boiler during the washout operation. On operations where conditions are controlled by the total dissolved solids count in PPM, the same procedure can be followed to determine the amount of blow-downs and washouts that were employed prior to the Superior® installation. After the clean-up period, draining of the reserve or condensate tank is not necessary but should be periodically checked and drained, if needed.

Some types of boilers cannot have all the sludge removed by blow-downs. Excessive mud or sludge must be flushed out with a high pressure hose immediately after opening. It is important to flush out the system before the mud dries and sets up. Show caution on boilers with elevated or remote “blow-down sediment tanks” as many solids will remain in the bottom of the boiler. This situation calls for a bottom drain-down occasionally.

In the event a boiler does not clean up properly in a normal length of time, recommend a continuous surface bleed, plus more frequent manual blow-downs and washouts.

Because of the excellent job Superior® does at removing existing scale, some installations can produce temporary problems for the customer. The customer should be made aware of these possibilities, and that if and when they do occur, it is proof that the Superior® is working well. These possibilities include:

1. Possible leaks in boiler tubes, piping, fittings, etc. as existing scale and corrosion is removed.
2. Blocking of water level gauge and boiler feed water controls by pieces of loosened scale.
3. Stoppage of gauges, valves, strainers, and traps on steam lines by loosened and dissolving scale.
4. Resetting of temperature and time controls to correct changes caused by improved heat transfers.

MULTIPLE STEAM BOILERS

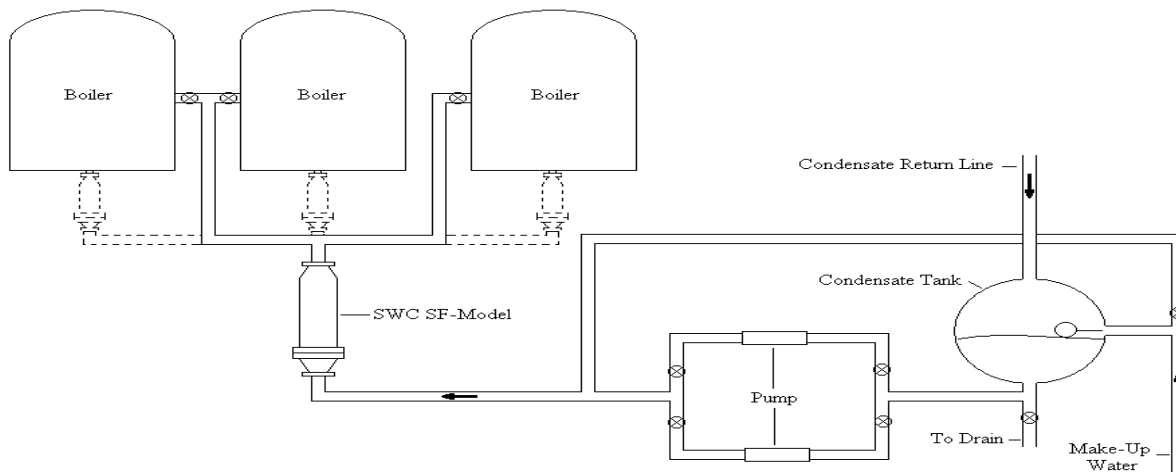
General description of equipment

Multiple steam boiler systems involve two or more boilers with the same water source.

Sizing and location

The best way to size and install Superior® on multiple boilers is to use a unit before each boiler, sized to treat the maximum flow based on actual flow rate or pump capacity divided by the number of boilers in the system.

If it is desirable to use only one unit on the main water line going to the boilers, it is necessary to determine how many pumps are used at one time during maximum operation. If the pumps alternate, size Superior® for the capacity of one pump, but if the pumps run at the same time when boilers demand, size for the maximum flow.



Note: It is important to look for all water sources entering the boiler. If the make-up water does not pass through the Superior® unit, make changes so that it will.

HOT WATER & LOW PRESSURE STEAM HEATING BOILER

General description of equipment

This type of boiler is used primarily for heating. How water or low-pressure steam circulates through a closed system with little or no loss. Little make-up water is required, so corrosion is the main problem rather than scale.

Because of the absence of any concernable amount of scale, the prospect may feel he does not have a problem. However, you can show that corrosion is prevalent in the system and that he does need Superior®. Draw off a glass of water from the boiler drain, hold magnet against the side of the glass and then empty the glass while still holding the magnet against it. The metallic particles (deterioration of metal) will remain in the glass, showing the presence of corrosion and the need for Superior®.

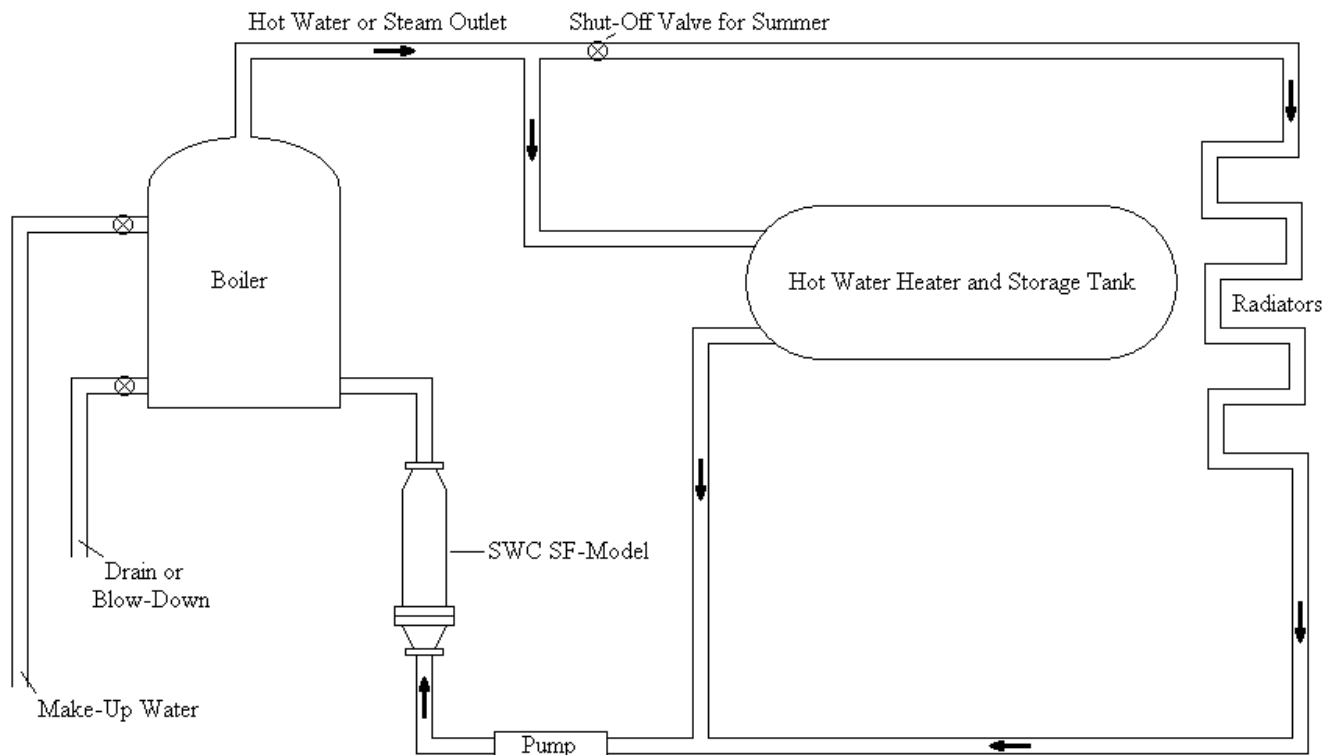
Sizing and location

Size Superior® to treat the full capacity of the pump and install between the pump and the boiler. Because this is a closed system with little make-up water, it is not necessary to install another unit in the make-up water line.

Operating procedures

The hot water heater must be purged regularly. During the clean-up period, drain 5% of the system's volume from the lowest point each day, preferably in the morning before the peak period. After the clean-up period, drain 20% of the system's volume from the lower point once a week.

If the building is old and the customer has a history of leaky pipes, more leaks may become obvious when Superior® removes the existing scale and corrosion build-up.



STRAIGHT-THROUGH DOMESTIC WATER HEATER SYSTEMS

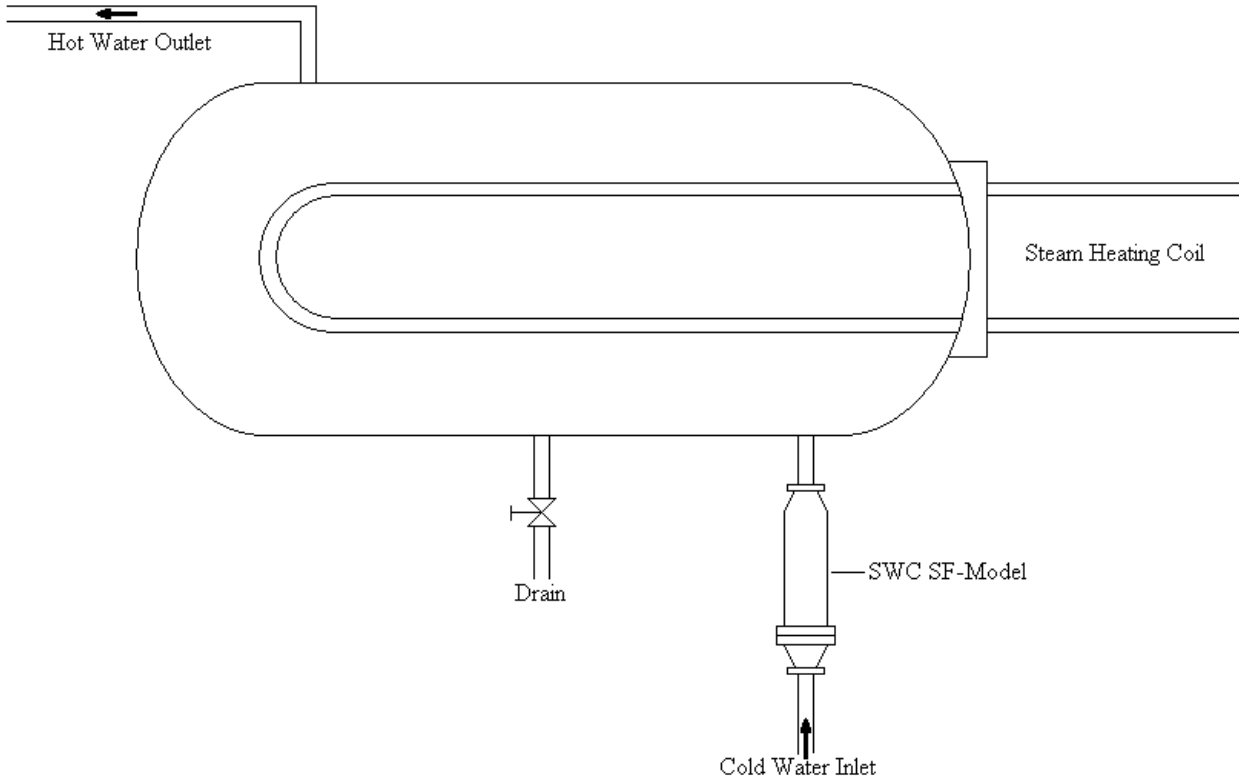
General description of equipment

A domestic water heater is usually a tank with a heating coil. Steam flows through a coil to heat the water in the tank and scale will potentially build-up on the outside of the coil. Another type of domestic water heater system (primarily for residential use) uses electrical elements or gas to heat the water. In an electrical system scale builds up on the heating elements and in a gas fired system the scale forms in the bottom of the heater.

Sizing and location

Install Superior® in the cold water inlet sized to treat 100% of the water used during the peak period. If possible, fully open all hot water outlets at the same time and take an actual measurement. If all the outlets are alike and the same size, it is only necessary to measure one of them and multiply it by the number of hot water outlets.

If it is impractical to take an actual measurement, use 2 GPM for each faucet, one faucet per bathroom (it is not likely that the sink and tub or shower will be running at the same time) and use only 75% of this amount since all faucets will not be used at the same time. Any additional equipment (dishwashers, washing machines, etc.) must be added to this figure.



CIRCULATING DOMESTIC WATER HEATER SYSTEMS

General description of equipment

A circulating domestic water heater has essentially the same construction as the straight-through hot water heater except the hot water is recirculated back to the heater tank.

Sizing and location

Install Superior® in the cold water inlet, sized in the same manner as for the straight-through water heater system to treat 100% of the water used during the peak period.

Another Superior® unit should be installed in the circulating water line on the discharge side of the pump, sized to treat the full pump capacity.

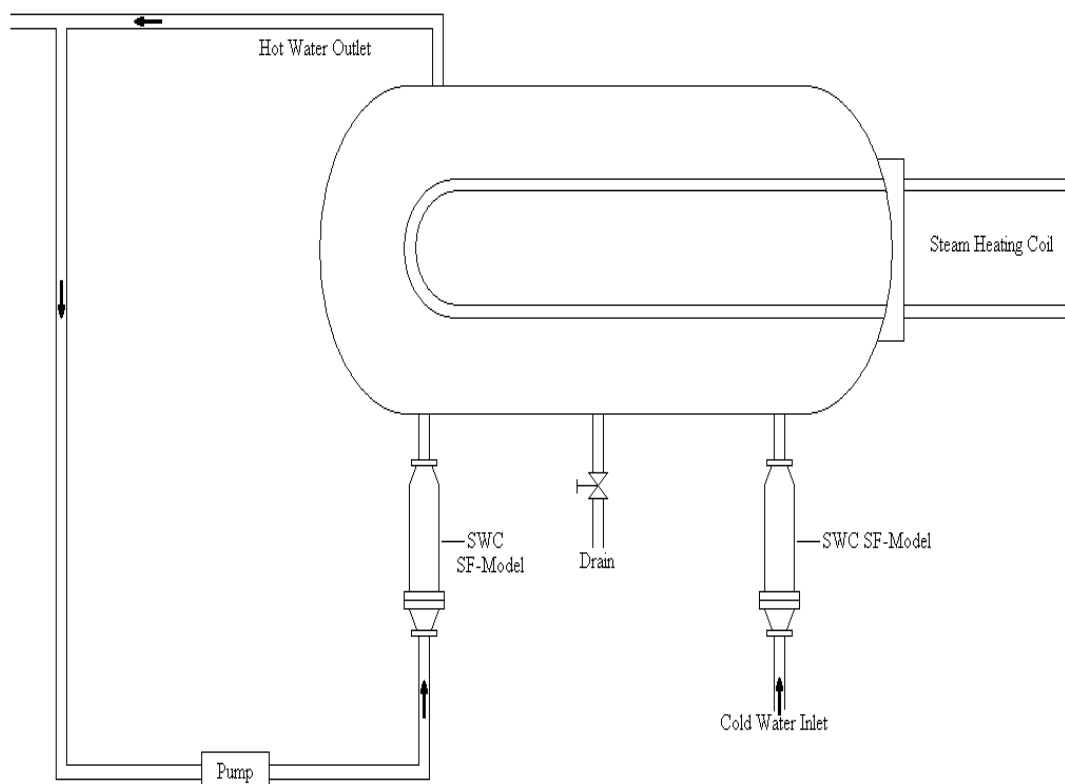
Operating procedures

This type of system must be purged regularly. During the clean-up period drain 5% of the system's volume each day from the lowest point in the tank.

In addition, drain 15% of the system's volume once a week. After the clean-up period, it is only necessary to drain 15% of the system's volume once a week.

This draining is necessary to remove loosened scale and corrosion. Minerals from the added make-up water will provide a microscopic aragonite coating on all wetted surfaces to prevent further corrosion.

Establish a checkpoint to watch for results and try to retain a sample of the removed piping or piece of scale for comparison.



HEAT EXCHANGER

General description of equipment

A heat exchanger is a simple medium for the exchange of heat. Two types are generally found; a shell and tube type, and a plate and frame type. (The diagram below shows a shell and tube type heat exchanger)

Sizing and location

Install Superior® in the water inlet to heat exchanger, sized to treat 100% of the total water passing through the system.

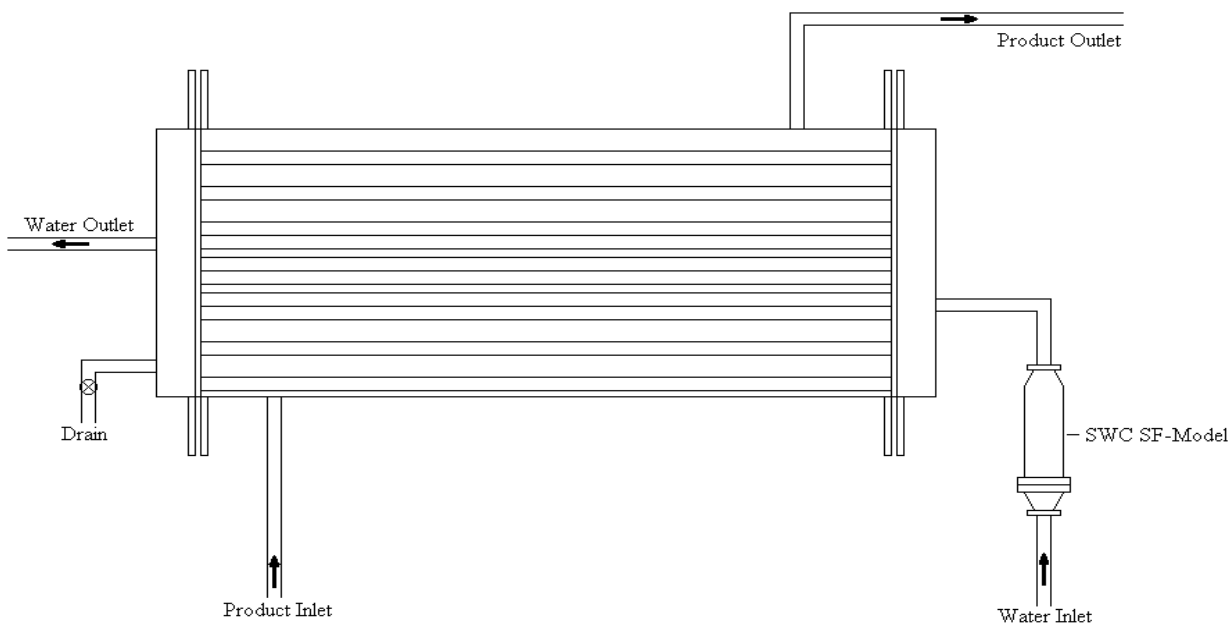
Take an actual measurement of the water flow rate on the outlet side as the water leaves the heat exchanger. This measurement must be taken during the peak period of operation and allowance must be made for the season. Look for control devices, which might cause surge periods and take the flow measurement at the surge period.

If unable to take an actual measurement, Superior® can be sized by the water pressure and pipe size.

Operating procedures

The heat exchanger should be opened and visibly inspected before installation, and a check point established to evaluate Superior's® effectiveness.

During the descaling period, the heat exchanger should be opened and the loosened scale removed. After this clean-up period, drain the heat exchanger periodically to flush out suspended minerals that may settle on the bottom.



Service Reporter

The magazine that works
for contractors and implant engineers

Boilers operate better with water treatment

System eliminates chemical use

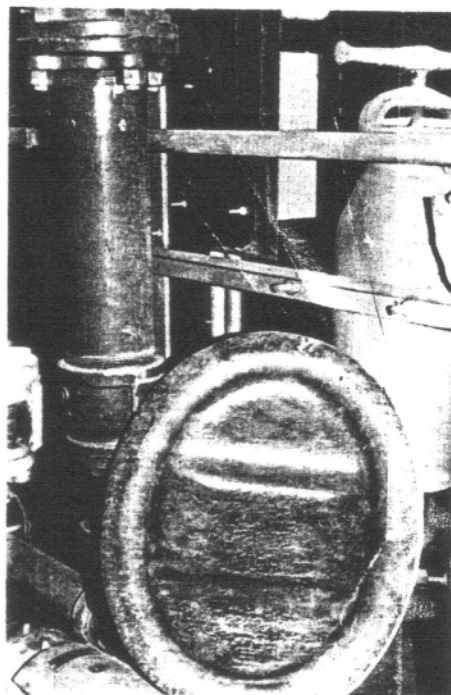
Bob Havener has been working with the Building Department of Ft. Wayne Newspaper Inc., since the Indiana plant opened over 25 years ago. When Havener became the building manager in 1975, he assumed responsibility for all building maintenance, including the safe and efficient operation of the boiler equipment in the 150,000 sq ft, two-story plant. The two 100 hp boilers at the plant had been chemically treated for years, and, although they were still operating well, a lot of lime/scale buildup was present.

Havener decided to consider the advantages of adding the Superior water treatment system with non-chemical water conditioners from Kemtune Inc., Ft. Wayne, Ind. The system was designed to prevent hard lime/scale buildup, which would allow the boilers to operate at peak efficiency. By using the conditioner, Havener would no longer have to mix the chemicals and constantly monitor their effect on the boiler system. The multifield Permacore contained in the conditioner would suspend the minerals, preventing them from forming lime/scale. Normal blow down procedures would then purge the system of the minerals.

Installation takes place

In fall, 1981, water conditioner model RT-2000 was installed on the 2" common water line that feeds both boilers from the condensate supply tank. A smaller unit, an RT-1000, was placed on the 3/4" city water line that feeds make up water into the condensate tank. Don Schiebel, a consulting engineer with Wayne Pipe Supply, a Ft. Wayne industrial plumbing and heating wholesaler,

was in charge of the installation. "The treatment system really cleaned up the boilers," he states.

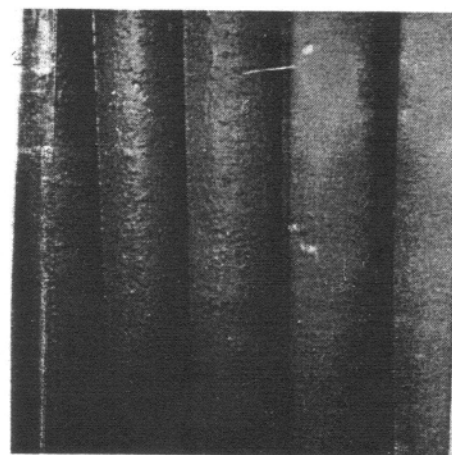


Last June the boiler at Ft. Wayne Newspaper was opened for inspection. The manhole cover was lime/scale free. The cover is displayed by the Superior water conditioner.

"Before the installation I was treating my boilers with the various chemicals you use on boilers," says Havener. "Then, the idea of using this water conditioner came up, and I thought I'd give it a try. The idea was to eliminate all my chemicals, and this is what I did. This is my third heating system with the water conditioner on the boiler."

"The difference I saw right off the bat," reflects Havener, "was when I used the chemicals, after removing the handhole and manhole covers, I always had to use a wire brush to clean them before I could put them back together."

Every year the boilers at Ft. Wayne Newspaper are torn apart, cleaned and inspected by Havener. "I always had to clean the manhole and handhole covers. Since the water conditioners were put on the line, those covers look like the day I installed them."



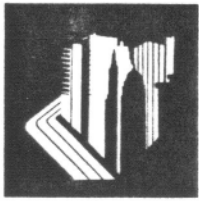
The boiler tubes were found to still be in excellent condition. A thin coating of aragonite, a by-product of the suspended minerals, protects the pipes from corrosion.

The tubes

"As for the tubes," Havener explains, "the water conditioner is supposed to eventually take all the scale off them. Now, I can't look at those tubes and say that the scale was less than it was, but I sure can say it's not any worse."

He adds: "By going from what's happening to the manhole and handhole covers, I can just about say the tubes don't have any additional buildup, as there's nothing being put on the covers themselves."

Although Havener can't provide a production estimate as far as fuel consumption savings, as steam production at the plant is not measured in proportion to degree days, he claims the system has saved dollars as no chemicals for water treatment have to be purchased.



FORT WAYNE NEWSPAPERS

The Journal-Gazette ♦ The News-Sentinel

600 W. Main Street ♦ P.O. Box 100 ♦ Fort Wayne, Indiana 46801 ♦ 219/461-8444

December 27, 1990

Mrs. Beth A. Hill
Director of Public Relations
Kemtune, Inc.
2015 South Calhoun Street
Fort Wayne, IN 46857-1325

Dear Beth:

I have worked for the Fort Wayne Newspapers, Inc., for 38 years and have served as Building Manager for the last 15 years. Some of my duties as Building Manager include taking on the responsibility for the safe and efficient operation of the boiler equipment in the plant.

Prior to 1981, chemicals were used to treat the boiler water. This required accurate mixing, injection, and then monitoring to assure the proper p.p.m. of each of the four (4) chemicals to make sure that they were correct in providing the right concentration for the control of scale and corrosion. Approximately 4 to 5 man hours were required each week just to pull water samples for analysis, mix and add chemicals.

Perhaps the most troublesome problem that I experienced prior to the installation of the Superior Water Conditioner, was the frequent priming of the boilers. I cannot say for sure the exact cause of the carry-over and flood-ing of the header, but it was a very severe problem that required a lot of time and involved losing all the chemicals in the boiler, and the loss of energy to reheat the cold water pumped into the system.

Even though we hired an outside consultant and followed his instructions closely, the flooding of steam headers continued and could only be corrected by shutting everything down and draining the boilers and start over again with fresh cold water and injecting more chemicals.

In 1981, we installed a model R-2000 Superior Water Conditioner on our two (2) two-hundred-horsepower Clever-Brooks Steam Boilers. The boilers are inspected every two years by the state boiler inspector and have been found to be as clean or cleaner than when we were using chemical treatment. Besides the four (4) water treatment chemicals, I also used a condensate return line chemical treatment prior to the installation of the Superior Water Conditioner.

The two (2) boilers are thirty-three (33) years old and have never been retubed. The boilers are opened annually and a mere flushing with water is all that has been required since 1981.

Mrs. Beth Hill
December 27, 1990
Page 2

We employ approximately 550 people, and print over 150,000 Sunday newspapers, 65,000 morning papers and 65,000 evening daily papers, so the boilers are considered a very important part of our operation.

All chemical additives have been discontinued, the time-consuming testing, monitoring, and adjustments have been eliminated plus the priming of the boilers have totally disappeared since the installation of the non-chemical water conditioner.

I can say with certainty that we have experienced as good as or better results, and we are still able to prevent water pollution, save time, energy and money, as well as to eliminate the storage handling and use of what is considered to be hazardous material. Needless to say, we are well pleased with the performance and will continue to use this "user-friendly" method of treating our boiler water.

Sincerely,

A handwritten signature in cursive script that reads "Bob Havener".

Bob Havener
Building Manager

Going with the flow

Superior Water Conditioning combats harmful minerals, creates better water

To hear the Sandersons—Chuck, Sr.; Chuck, Jr.; and Scott—talk about Superior Water Conditioners, one might think their company is the only one of its kind in the world.

There's probably a good reason for that.

It is!

Superior Water Conditioners, established in 1964, holds patents in the United States and foreign markets for its unique water conditioning systems—designed to remove harmful minerals from water, while protecting the environment.

"We do have numerous patents that cover our process," says Scott Sanderson, sales representative for the Superior Manufacturing Division. "Anymore, as time goes on, people are becoming more aware of our equipment. We have over 300,000 different pieces of equipment in place. Our main goal is to get our name

out there more. Anybody that uses water in a plant, or anywhere, industrial, commercial, residential, needs our product. Any place that uses water could use our product."

Superior Water Conditioners magnetically change the physical characteristics of water-borne minerals so they will not cling to pipes or equipment surfaces. No scale is formed because the minerals remain in a rinsable, or powdery solution. This increases the efficiency of equipment and reduces periodic maintenance and shut-downs needed to remove lime or scale build-up.

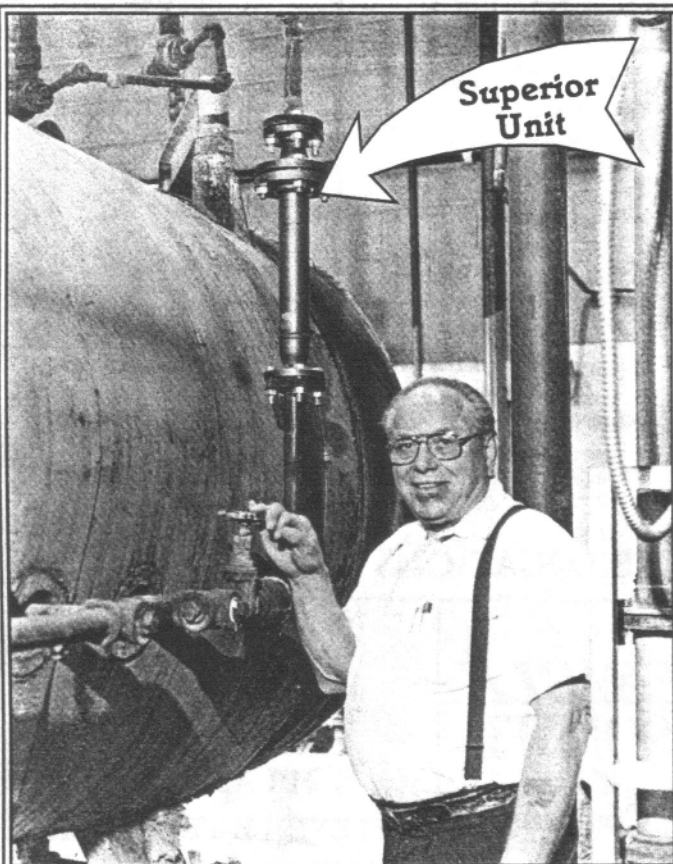
No chemicals or additives are used during this process, water purity is not affected, and there is no change in taste or odor.

A core of cobalt-content alloy maintains a permanent series of powerful alternating magnetic fields through which the water passes (see figure). No external source is required and case fit-

tings are made of copper for lifetime service.

"What our product is used for in industry applications is the elimination of chemicals that are used to treat the water so they don't have problems with scale and corrosion within their equipment," says Chuck, Jr., technical sales engineer. "This unit eliminates the need for all these chemicals, so it's saving companies big money and it provides a better treatment and a better effectiveness than what they were using prior."

A success story of how a Superior Water Conditioner has helped a customer is the Las Prado Golf Course in Las Vegas. The course has reduced its water usage by 35 percent—resulting in a cost savings of \$15,000 to \$20,000 a month on its water bill. The maintenance manager at the golf course credits the water and money savings to the chemical-free water-treatment equipment installed in line on the irrigation system.



Estell Murphy, Assistant General Manager, Troy Textile Service

"It's environmentally safe."

"We put in a Superior Water Treatment System in 1987. Before that, we used chemicals to treat our water.

"Today, our insurance inspector says ours is one of the cleanest boilers he's ever seen. Plus, we no longer use hazardous chemicals that contaminate our environment. We also save money with the Superior System.

"It's a good product and Superior people are good people to work with."



Since 1964
U.S. and Foreign Patents

2015 South Calhoun St.

Fort Wayne

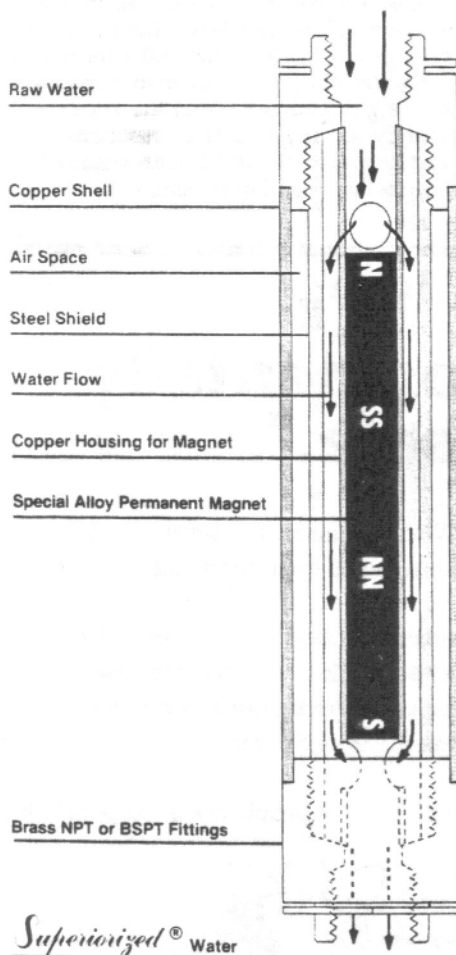
456-3596 • 800-348-0999

"Water acts as a catalyst," says Chuck, Sr., general manager of the water-conditioning company. "If we can cause the water to penetrate to the roots, the roots grow deeper.

"Instead of the roots coming up to the water, the roots grow deeper and you get a better root base. It has the ability to make the water more soluble and it absorbs fertilizer better and transports it into the ground more effectively."

Henry J. Hoevel, senior advisor and consultant for Superior Manufacturing Division, believes in the products he sells.

"We're eliminating chemicals and not polluting the water," says Hoevel. "We're doing something for our kids' kids and so on down the line that has never been down before." *SRP*



Columbia Land Title Company

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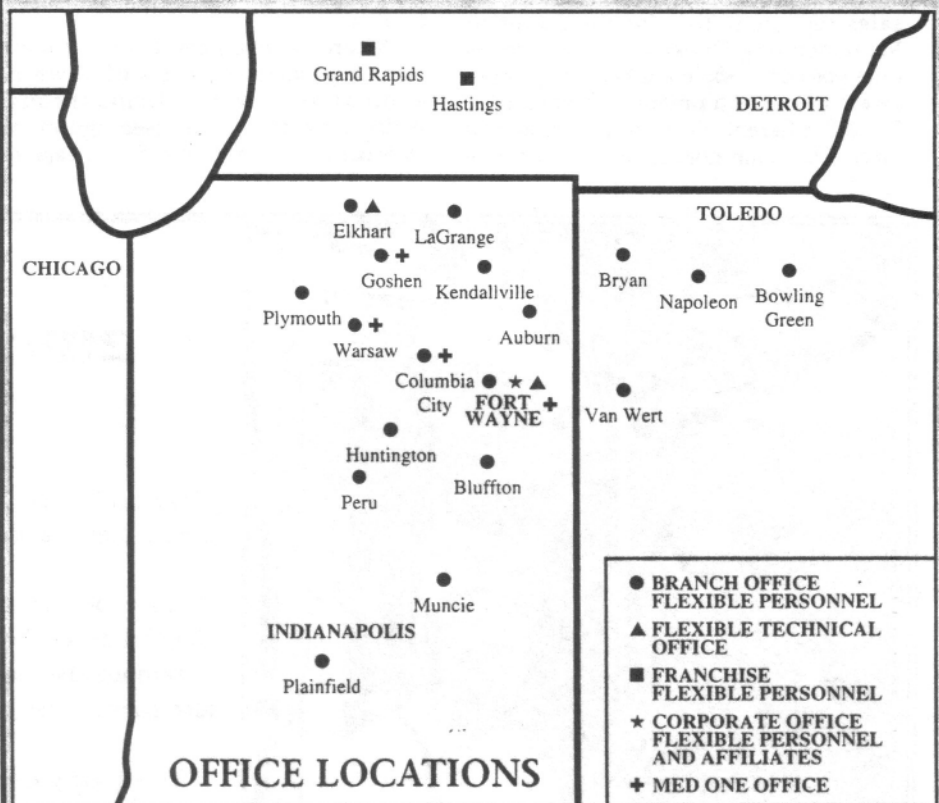


John W. Moser
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FLEXIBLE PERSONNEL

GROWING OUR WAY?



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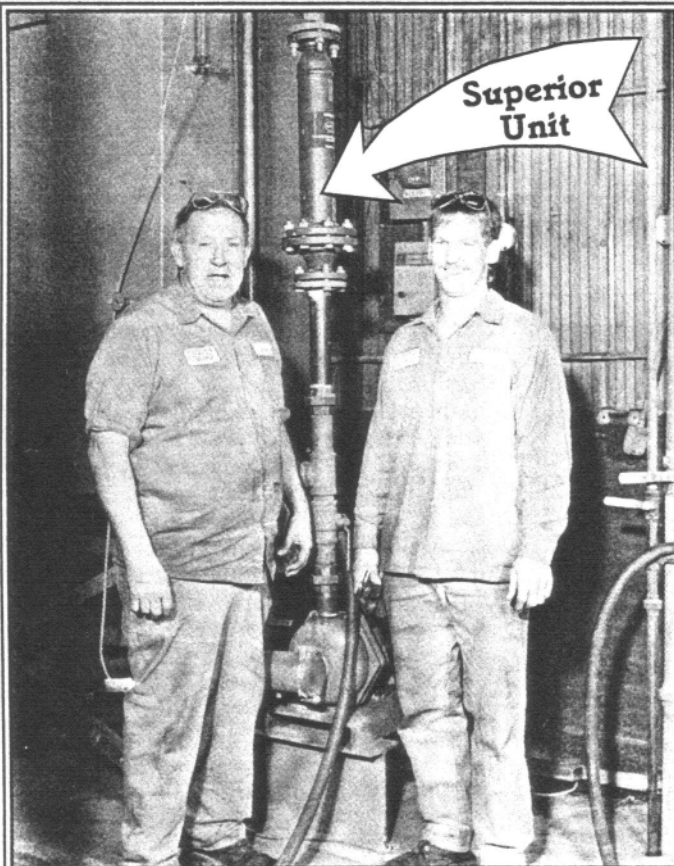
Affiliates:

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FLEXIBLE TECHNICAL

FLEXIBLE MANAGEMENT



Bob Bernardin and Ron Byers; Protective Coatings Inc.

"No more hassle with chemicals."

"Eight years ago, we installed our first Superior water treatment unit. Prior to that time, we had a boiler repairman in here every three weeks.

"Our boiler is much cleaner with the Superior unit than when we used chemicals.

"The Superior unit saves our company thousands of dollars each year.

"In fact, we've recommended this unit to over 30 other companies and engineers—including the EPA."



2015 South Calhoun St., Fort Wayne
456-3596 • 800-348-0999

HOLSUM BAKERY SAVES \$2,000/MONTH ON FUEL COSTS

One of the people really excited about Superior Water Conditioners® is Dan Shiebel with Holsum Bakery, Fort Wayne, Indiana.

In the past Dan poured a great deal of money into chemicals and maintenance for his boiler system. When the State Boiler Inspector came by to look at his boilers, he told Dan that if he didn't do something to remove the scale build-up, his boilers would have to be washed down with acid. Since the boilers were too old to handle the acid, they would have to be re-tubed. Fortunately, Dan had heard about Superior® from a local dealer and decided to give it a try.

A Superior® unit was installed in October 1979. At that time, there was 1" build-up of scale and no space between the tubes. It took 45-46 minutes for the boiler to satisfy itself and turn off. Knowing how important it was to check the progress at all stages, Dan kept a record of the conditions and performance before and during each phase of the cleanup. Eight weeks after the installation, the scale was down to ¼" or less and the boiler was turning itself off in 17-18 minutes. Some of the scale was just laying on the tubes and could be easily picked off by hand, as opposed to the hard build-up that had been in the boiler before Superior® was installed.

By December, 1980 there was no build-up in the boilers and the tubes were completely clean with a soft microscopic powdery coating on them. The boiler took 13-14 minutes to turn itself off, down from the 45-46 minutes it required before Superior®. Dan is able to use their small boiler instead of the large one, which was to be only a back-up for the larger boiler when the temperature got too low for the large boiler to handle the heating alone. The small boiler was turned on in May 1980 and has run ever since, supplying all their needs including heat, except during subzero weather, at which time they switch back to the large boiler for heating. The small boiler uses less gas than the large one...the large boiler costs \$1.10/minute while the small boiler uses only \$0.10/minute. Superior® is currently conditioning all water into the plant for the boilers and water heater.

Some advice from Dan: Take your boiler down before installing Superior® to see how much build-up you have, take pictures, and pull scale samples, if possible, then you can compare results to the original condition of the boiler. Blow-down morning and night (may vary depending on the type of system used) after the unit is installed. Otherwise the scale will lay on the bottom of the boiler and get hard again. In 7-8 days you will start to notice mud in the blow-downs. If you had bad pipes before using Superior®, you may need to change them because Superior® will clean out the lime scale build-up that was plugging the leaks.

Dan has saved a great deal of money for Holsum by using Superior®. In 1980, they saved about \$2,000 a month on gas bills alone by being able to use the smaller boiler. Because of the good results in the Fort Wayne plant, Holsum has installed Superior® in five additional plants, with each one saving between \$600 and \$1,000 per month (at 1982 prices) in chemicals.

Service Reporter

JULY
1983
\$2.00

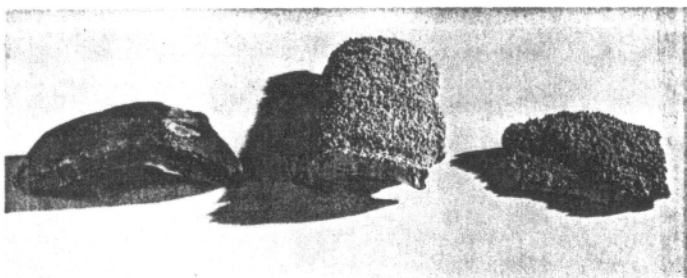
The magazine that works
for contractors and inplant engineers

Two case histories

Bakery, clinic/hospital solve scale build-up with water conditioning

In the past, Holsum Bakery had poured a lot of money into chemicals and maintenance for their boiler system. When the state boiler inspector came by to look at their boilers, he told Dan Scheibel, then plant engineer for Hol-

sum is installed. "Otherwise the scale will lie on the bottom of the boiler and crystallize," he says. He also recommends monitoring the build-up periodically, taking pictures and pulling scale samples, if possible.



As an example of the dissolution of existing scale, from left to right, scale taken from a boiler before treatment, three months later, and six months later.

sum, that if he didn't do something to remove the scale build-up, his boilers would have to be washed down with acid. Since the boilers were too old to handle the acid, they would have to be retubed.

Scheibel had heard that water conditioning was one possible answer to this kind of problem. After investigating various methods, he decided to install Kentune's Superior water conditioner in October, 1979. At that time there was a 1" build-up of scale and no space between the tubes. Knowing how important it was to check the progress at all stages, Holsum kept a record of the conditions and performances before and during each phase of the clean-up period. Eight weeks after the installation, the scale build-up was only 1/8"; after another 8 weeks, the scale was down to 1/4" or less. Some of the scale was just lying on the tubes and could be easily picked off by hand as opposed to the hard build-up that had been in the boiler before the water conditioner was installed.

By December, 1980, there was no build-up in the boilers and the tubes were completely clean with a gray filament on them. The boiler takes 13-14 minutes to turn itself off, down from the 45-46 minutes it required before the new equipment was installed. The small boiler, which was supposed to be only a backup for the large boiler when the temperature got too low, was supplying all their heating needs independently of the large boiler.

Scheibel, well versed in the care and maintenance of boilers, recommends blow down morning and night after the

Holsum saves big bucks by using magnetic water treatment. They save about \$2,000 a month on gas bills alone since they can now use the smaller boiler.

Because of the good results in this plant, Holsum has since installed the water conditioners in five additional plants with each one saving on the use of chemicals and also on gas due to the increased efficiency of the clean boiler.

Magnetic water treatment

The Caylor-Nickel Clinic and Hospital is one of the most well-known and respected diagnostic clinics in the midwest. They were having a problem with lime/scale build-up in their boilers when they first became interested in magnetic water treatment.

The clinic/hospital has an off-site laundry facility which includes one 450 lb. capacity washer, one 125 lb. capacity washer, one 100 lb capacity dryer and a large steam ironer. Since 1949, a James Leffel Co., 75 hp boiler had been in use at this facility and was being used solely in providing the steam for this equipment. A 3/8" lime/scale build-up was found when the boiler was opened; a Superior water conditioner, model RTU-1250, was then installed. Jim Flowers, who manages the facility, immediately noticed the clean-out effect of the water conditioner.

Soon, a new York-Shipley 125 hp boiler was installed to handle the busy laundry facility and a model RTU-1500 water conditioner was included in the installation. For approximately one year, the boiler had to be blown-down four times a day due to the added minerals and sludge from the dissolu-

tion of the pre-existing lime/scale in the old system which was not replaced when the boiler was installed. Thereafter, the blow-down procedures were reduced because the system was sufficiently cleaned.

Jim Smith, head of maintenance, Caylor-Nickel Clinic/Hospital, is quite meticulous when it comes to his buildings and equipment. This is evident when touring his boiler and equipment rooms. His years of experience and his training in the Navy in engine rooms is reflected in the hospital.

"When it was evident that magnetic water treatment was a cost efficient and energy efficient way to treat lime/scale problems, I looked for other possible applications," he says.

The clinic/hospital was also having a problem with lime/scale on their kitchen equipment. Their steamer and booster on the dishwasher required an acid cleaning approximately every 30 days to remove the build-up.

They investigated and then pur-

chasing another water conditioner. To correct this particular problem, a special unit was manufactured by Kentune Inc. with offset fittings to be installed horizontally on a 14 stage electric water heater. Since installation, they have had very little problem with scale in their kitchen equipment or in the rest of the section of the hospital which this water heater serves.

Also in the main building, two 70 hp Powermaster boilers were being ineffectively treated with chemicals. With the results of the other magnetic water treatments, Caylor-Nickel naturally installed water conditioners on these two boilers, cutting down on time and money spent on water treatment.

The Caylor-Nickel Clinic and Hospital realized the low cost and maintenance involved with their water conditioning units. The clinic had lost one boiler after four years of service using chemicals to treat the water. Their cost of using chemicals was approximately \$4,000 a year. Thus, the payback on the water conditioner is a very short period of time, reports Smith.

Labor is also minimized. The water conditioner needs only to be checked and cleaned periodically. The time

consuming task of loading chemicals, even with an automatic feed, is eliminated. To date, a total of five water conditioners have been installed at Caylor-Nickel Clinic/Hospital by Reliable Service, Inc., Fort Wayne, Ind. The water conditioning system utilizes magnetics, changing the physical characteristics of water-borne minerals so they will not cling to pipes or equipment surfaces.

The patented system, when installed in a water supply line, controls the formation of scale and corrosion deposits without the use of chemicals. Water passing through alternating magnetic fields causes the minerals to stay suspended in the water so they cannot form a hard, brittle scale.

Rather than the usual hard, crystalline structure formed by waterborne minerals, heated water keeps minerals in a soft, amorphous powder form. This amorphous powder deposits a thin film of aragonite talc on the inside of pipes and the water side of boilers which

"When it was evident that magnetic water treatment was cost and energy efficient, I looked for other possible applications."

prevents free oxygen in the water (One of the most common causes of corrosion) from attacking the metal surfaces. Excessive solids settle to the bottom of the system in a soft, purgable form which is easily removed through manual or automatic blow downs.

In systems with an existing scale or corrosion build-up, this method can be used to gradually dissolve this build-up. The system must be purged on a regular basis of the extra suspended/precipitated solids resulting from the gradual dissolution of the old scale and added to whatever minerals normally precipitate from the feed water. In systems where sludge cannot be removed through blow-downs, a high pressure hose can be used to flush out the excessive solids.

Occasional removal of the unit for inspection and cleaning may be necessary in systems with existing corrosion build-up or iron content in the water. Units are designed for ease in installation and removal and can be taken apart for cleaning at the job site.

Information for this story was supplied by Kentune Inc., an Indiana-based manufacturer, which builds and markets a broad line of water conditioners under the name Superior.

LESS THAN ONE MONTH RETURN ON INVESTMENT AT FORT WAYNE ANODIZING

One of the major problems boiler maintenance people face is trying to keep their boilers clean of scale build-up. When scale builds up on boiler tubes, it causes hazardous conditions. Boiler insurance inspectors condemn hundreds of boilers daily because of scale.

Many boiler maintenance people use chemicals in the feed water to try and keep the problem of scale build-up under control. However, chemicals are not always effective in preventing this build-up, and in some cases they can be dangerous or hazardous to health.

Fort Wayne Anodizing in Fort Wayne, Indiana had a history of scale build-up in their boiler, which they were unable to control with chemical additives. They were using approximately \$300 of chemicals for water treatment each month and still had a scale problem in their boiler.

After regular inspections by the boiler insurance inspector, they had to acid clean and repair parts due to scale build-up. They even tried changing chemicals, but to no avail. The scale in the boiler caused it to be so inefficient they had to start it up at 10 o'clock Sunday morning in order to have it at operating capacity for Monday morning's production.

In March 1981 the boiler was opened for one of its regular inspections and was full of scale. The boiler inspector recommended it be acid cleaned or else they would have to replace it. Fort Wayne Anodizing had been introduced to Superior's® treatment and decided to discontinue using chemicals and switch to Superior® since the chemicals were not doing the job.

A Superior Water Conditioner®, Model No. RT-1000 was installed on the water inlet to the boiler. The boiler was opened in June and July after the Superior® installation, and was found to be completely clean with no scale build-up. The efficiency of the boiler improved so much they can now fire up their boiler at 10 o'clock Sunday evening in order to have it running at full capacity for Monday's production. This is a savings of 12 hours worth of fuel a week!

The Superior® installation paid for itself in chemical and fuel savings in less than a month. Fort Wayne Anodizing reports they are saving approximately \$1,000 per month in fuel bills and \$300 per month in chemical costs. While they are pleased with these savings, they are also glad to be back in the good graces of their boiler insurance inspector by having a clean boiler.

JASPER VENEER MILLS

The Jasper Veneer Mills in Jasper, Indiana have been using Superior® on their boilers since 1976 with excellent results. A test of their water shows a pH level at 7.5, 121 ppm hardness, 107ppm CaCO₃, and 0.1 ppm iron.

In August 1976, their Brownell and Company 150 horsepower wood and coal fired boiler required re-tubing. Prior to the Superior® installation, they had been using chemicals to protect their boiler, but it still required re-tubing because of heavy scale build-up. Superior® was installed in August 1976 and all chemical use was discontinued.

The first year after installation, they saved over \$300 in chemical costs. At today's prices that would likely exceed \$1,000. Boiler energy operation was equal to, or better than, when chemicals were used.

SCALE PROBLEMS SOLVED

Stero Dishwashing Company, Petaluma, California solved their scale problems THE SUPERIOR WAY™

In 1976, Stero opened a new factory, installing a new Peerless Boiler (60 psi, 3150 sq. ft. steam). Initially, they used chemicals to control their scale, but boiler problems were a constant headache. Two years later, the “new” boiler burnt-out.

On March 17, 1978, Stero installed a Superior® Model No. RT-1000 and discontinued the use of chemicals on their boiler. The boiler was checked monthly for the first six months and showed a slight soft powdery deposit, but no hard scale. In January 1979, they opened the boiler and found a little scale which flaked off easily, so they increased their blow-downs. By June the flakes were almost gone from the top and they found only about one cup of soft powder at the bottom of the boiler.

Their boiler is now entirely clean of scale and has given them no problems since Superior® was installed and chemicals use was eventually completely discontinued.

The owner and sales staff at Stero are avid supporters of Superior® and recommend it for use with their dishwashers when scale problems exist.

Stero is another example of Superior's® many satisfied customers. When scale problems exist, **SUPERIOR® IS THE ANSWER!**

DRAMATIC RESULTS SEEN

The Jefferson County, Kentucky Physical and Environmental Services now uses Superior® to protect their boiler from scale, after years of costly maintenance. The results of the installation of just one unit are dramatic.

Prior to the installation of a Superior® Model No. SF-3000 on their kitchen hot water system, they were replacing about one or two element bundles a year at an expense of about \$2,000 per bundle, not including labor. The boilers were opened about twice a year and had to be manually scraped to remove the scale deposits from the elements but eventually, even with the cleaning, the elements would rupture and burn out.

After the installation of Superior® the boiler was opened as usual. They were shocked to see that there was actually less accumulation on the elements than there was when it was closed up the last time. Even the very deep places in the element were starting to be exposed! When opened again a few months later, virtually all of the old accumulated scale was gone and no new scale was there to replace it. In the year that followed, not a single element had to be replaced and they don't expect to have to for many years to come.

In less than a year's time the unit had already paid for itself and started saving money. Needless to say, they are now very interested in using Superior® for other applications.

HOSPITAL SAVES \$1,000/MONTH IN FUEL BILLS

Tulare District Hospital, Tulare, California had a problem—heavy scale build-up in their two boilers. They had been using chemicals in an attempt to control this scale build-up, but nothing seemed to help.

On March 5, 1981, a Superior Water Conditioner® was installed on boilers 1 and 2 at the hospital. Both boilers were 130 horsepower, operating at 90 psi pressure. A Superior® Model Number SF-1500 was placed ahead of each boiler on the high-pressure side of the feed pump. At the same time, turbulators were placed in the fire tubes, several steam traps replaced, and small leaks in the system repaired.

On July 2, 1981 boiler 2 was opened and inspected by the Boiler Inspector. All chemical treatment had been stopped at the time of the Superior® installation, and when inspected, the boiler had no scale build-up.

Southern California Gas Company ran usage figures comparing the hospital's 1980 gas usage against the same months in 1981 after the Superior® installation. The results showed \$1,000/month saved!!! Plus \$850/month on now unnecessary boiler treatment compounds.

The Superior Water Conditioner® was the primary source for these savings. The turbulators could possibly save 10-15% of the fuel and the leakage of steam and traps possibly another 500 therms. The remainder (about 1,800 therms) is the result of Superior's® removal of scale build-up from the boilers.

Inspections were made during the clean-up period and boxes of scale were removed. They now utilize a 10 second blow-down, twice a shift, to remove settled minerals.

As a result of chemical savings and reduced fuel bills, the Superior® units paid for themselves in about 3 months. This figure does not take into consideration the labor saved in chemical handling, storage costs, and constant control tests required for chemical treatment.

The Tulare District Hospital is another in the long list of satisfied Superior® customers.