WATER QUALITY REQUIREMENTS— PROTECTION AND MAINTENANCE FOR STEAM GENERATORS (EXCEPT THOSE EQUIPPED WITH TWO PROBES)

A steam generator, or boiler, unlike other types of water-using kitchen equipment, distills the water in order to make steam. Nearly all feed-water sources contain dissolved minerals in varying degrees of concentration. As this water is boiled, pure steam rises from it's surface, upward to the cooking compartment(s), leaving minerals behind, that can become harmful to the steam generator. If minerals are allowed to accumulate inside the steam generator, they will solidify as a scale. Then, malfunctioning will occur, and serious equipment damage may result.

The use of good quality generator feed water is the responsibility of the owner/user. The use of poor quality feed water could void equipment warranties. The **minimum** treatment required in most areas is water softening, although local water conditions may require more intensive pretreatment than simply a water softener.

Scale problems occur when feed water is high in hardness, total dissolved solids, silica, and alkalinity. Water softening will only reduce the water's hardness, which is the presence of dissolved salts of magnesium and calcium. Water softening will **not** affect the multitude of other minerals found in most water supplies. Because generator scale is the result of the precipitation of many minerals, the best property to control, for generator feed water, is total dissolved solids, not just hardness.

The recommended **minimum** water quality standards, whether untreated or pre-treated, based upon 10 hours of use per day, and a **Daily Blowdown,** are as follows:

TOTAL DISSOLVED SOLIDS	less than	300 parts per million
TOTAL ALKALINITY	less than	85 parts per million
SILICA	less than	13 parts per million
pH FACTOR	greater than	7 5

Consult a local water treatment specialist for an on-the-premises water analysis and for recommendations concerning steam generator feed water treatment (if required), in order to remove or reduce harmful concentrations of minerals.

If the recommended water quality requirements are met without supplemental treatment, or if treatment is applied, resulting in feed water quality meeting the prescribed standards, the steam generator will need to be blown down only once each day. In addition, the inside of the generator requires an inspection (for excessive lime accumulation and consumed corrosion resistors) only once every six months. Replace the corrosion resistor(s) and chemically descale the generator as required.

If a pre-treatment unit cannot be installed, and the recommended water quality requirements are not met, the following procedures should be followed, in order to achieve maximum steam generator service life. The steam generator should be blown down after each 6 hours of use. Have the steam generator inspected, inside and outside, by a qualified technician every 3 months. If the corrosion resistor(s) is totally, or nearly consumed, replace it. If the inside of the generator is heavily coated with scale, have it chemically descaled by a qualified service technician.

INSTRUCTIONS FOR CHEMICALLY DESCALING STEAM GENERATORS (EXCEPT THOSE EQUIPPED WITH TWO PROBES)

WARNING: Steam under pressure may cause serious injury and bodily harm when it is accidentally or carelessly released. Improper handling of acid could cause serious, permanent injury. Therefore, service of the steam generator should only be performed by trained and experienced personnel, thoroughly familiar with servicing generators

There are a number of commercial descaling chemicals available, produced by various manufacturers. Those utilizing a sulfamic acid base, which can be identified by its powdered form, are safe and compatible with our food preparation equipment. It is imperative that the acid used for descaling be FDA approved, for use in food preparation equipment. Various manufacturers may include additional chemicals to increase potency, and therefore, **instructions for a specific brand should be followed carefully.** If instructions are not provided with the deliming chemical you purchase, the following general guidelines may be followed.

WARNING: Exercise care when handling acid. Avoid contact with skin, eyes, or clothing. Wear safety glasses or face shield, along with rubber gloves and rubber apron. In case of exposure to clothing, remove clothing and flush with water. In case of exposure to skin or eyes, flush with water for 15 minutes and get immediate medical attention. Do not take internally. Keep out of the reach of children.

Be sure the generator has been drained, de-pressurized, and is cool. Open the hand hole access plate on the front of the generator and place approximately 8-10 pounds of sulfamic acid inside the generator. Put a new hand hole gasket on the hand hole plate, and replace the hand hole plate, tightening the bar and nut assembly to a maximum of 15 foot pounds torque. The generator must be **completely** filled with hot water (fill the generator beyond its normal, automatic fill point of 2/3 up in the sight gauge). On mechanical fill generators, this can be accomplished by adding weight to the float, or removing the float, and regulating the fill level with a hand valve in the water supply plumbing. On electric fill generators (with probes), this can be accomplished by temporarily jumpering terminals #3 & #4 of the water control relay. Turn the main on-off toggle switch to the "ON" position, then turn the switch to the "OFF" position when the generator is completely filled. Let the solution stand for several hours, then flush with water. Rinse with a solution of bicarbonate of soda to neutralize any acid residue, and again, flush with water.

CAUTION: Never tighten the hand hole plate nut when the steam generator is in use, hot, or otherwise pressurized. Never tighten nut over 15 foot-pounds torque. Overtightening may cause uneven stress, which may result in the weakening and possible breakage of the plate.

INSTRUCTIONS FOR DESCALING TWO PROBE BOILERS

Steps:

1. Disconnect Main Power Supply
2. Turn Off Switch On Steamer
3. Remove Handhole Plate
4. Install Sulfamic Acid
5. Replace Handhole Plate
6. Turn Off Manual Water Valve
7. Remove And Tape The Probe Wires At The Probes
8. Remove The 120 VAC Relay
9. Turn On Manual Water Valve
10. Restore Main Power
11. Turn On Switch On Steamer
12. Fill Until Water Comes Out The Safety Valve
13. Turn Off Manual Water Valve
14. Remove the Blue Wire From The 3-minute Timer - L1
15. Replace Cover
16. Leave Power On
17. Descale Overnight
18. Blowdown Manual
19. Turn Off Switch On Steamer
20. Remove Handhole Plate
21. Install Neutralizer
22. Reconnect The Blue Wire To The Terminal Block
23. Turn On The Manual Water Fill Valve
24. Replace Handhole Plate With A New Gasket
25. Turn On Switch On Steamer
26. Fill Until Water Comes Out Safety Valve
27. Turn Off Manual Water Fill Valve
28. Let Set For Five Minutes
29. Blowdown With Manual Drain
30. Water Rinse To The Top Again
31. Blowdown With Manual Drain Valve
32. Turn Off Power On Steamer
33. Turn Off Power At Main Disconnect
34. Replace 24V Relay
35. Replace Probe Wires

INSTRUCTIONS FOR DESCALING TWO PROBE BOILERS-Cont'd

Steps:

36. Replace Probe Cover
37. Turn On Manual Water Fill
38. Turn On Power At Main Disconnect
39. Turn On Power On Steamer To Fill
40. Amber Light Will Glow When Water Reaches The LWCO Probe
41. Fire Steamer For Test
42. When Pressure Reaches 9# PSI
43. Open Manual Drain Valve To Blowdown and Test The Low Water Cut-off
44. Close Manual Drain Valve
45. Refill and Fire Unit For Use