NABO Now!

2012 No. 2

Audit is success for ARISE

Pictured left to right on the back row: W. Jones, Chief Inspector, J. Sturch, CoEO, T. Rhodes, President, D. Peetz, Sr. Technical Specialist. Front row, left to right: R. Kainec, ASME Admin, J. Keenan, ASME Consultant, F. Harrison, ASME Team Leader, R. Francis, AIS, A. Spencer, ASME Consultant.

Once every three years an Accredited Authorized Inspection Agency must be audited by a team of highly qualified individuals from the American Society of Mechanical Engineers. During their audit a thorough review/critique of the agency existing quality assurance program is performed to determine compliance with an established set of rules and requirements having been established by ASME and ANSI and in our case the nuclear regulatory commission, as we have the ability to perform and provide certifications for pressure retaining items that are needed by the nuclear industry.

Their audit is not limited to a review/critique of our established QA Program but also includes verification of implementation. The aspects of this verification extends to our organization structure, program description, document control, training, records, necessary corrective action, and audits of our inspectors and clients.

During the ASME teams exit meeting with ABIIC staff they reached a favorable recommendation to be submitted to the ASME Board of Conformity Assessment to re-issue our current accreditations which includes ASME Section I, III Div-1 & 3, IV, VIII Div-1,2,3, X, and XII.

Peetz joins ASME Subgroup

Darryl Peetz

Darryl Peetz has been appointed to the Subgroup General Requirements for ASME Code Section IX.

Peetz was the first chariman of this Subgroup about 30 years ago, however in that time, it has expanded from answering questions on the Section IX forms to having the responsibility for the general requirements of Section IX. His new duties as Sr. Technical Specialist include participation in ASME Code Committee meetings. Section IX is undersgoing a significant change by including other joining processess, likely with the 2013 Chode. This will also mean a change in the title Section IX with the QW-100 and QB-100 general paragraphs becoming QG or general paragraphs. So that means, ARISE is on the ground floor of a significant change.

Congratulations on this honor, Darryl; we know you're the right man for the job!

B-04-401F 650# RENTAL BOILER

Internal Inspection Results – Week of June 16th – 20th

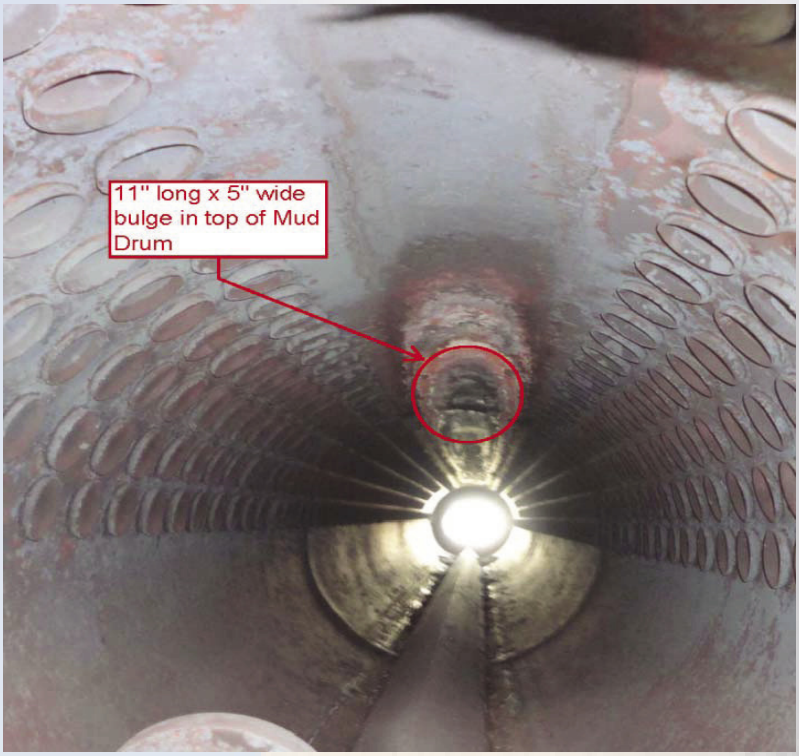
BACKGROUND

In the second half of 2010, a rental 650# Steam Boiler was installed to supplement the steam load for Valero St. Charles Refinery. This boiler, which has a nominal capacity of 60,000 PPH, was put into service in January of 2011. On Monday, July 16, 2012, the Boiler was taken out of service to perform some Maintenance work. While down, a Jurisdictional Inspection was performed for compliance with the State Boiler Law. This inspection was performed by Mr. Spencer Newman from Arise and Jeremy Landry from Valero.

INSPECTION FINDINGS & CAUSE

The internal inspection of the Boiler revealed a "bulge" approximately 11" long and 5" wide located on top of the mud drop just beneath the Superheater.

View from top of Mud Drum



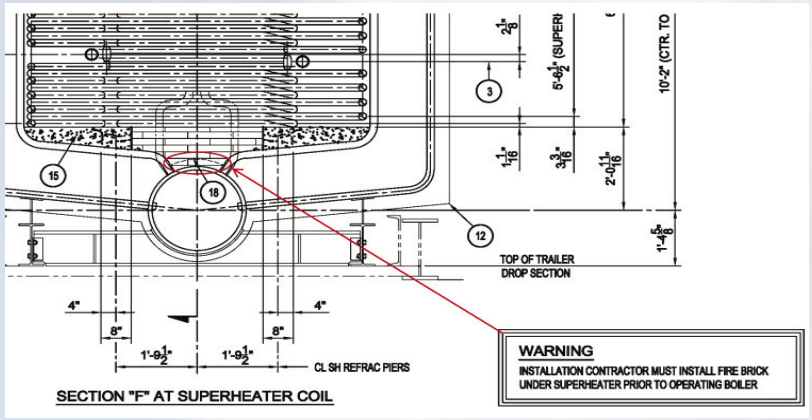
View from Inside Mud Drum

Non-destructive Examinations were performed to reveal that there was approximately ¼" wall loss at this location on the 24" I.D. SA-516-70 mud drum with a nominal wall thickness of 1.098". The thinned area at the bulge seem sot have occurred from the deformation of the wall and not from active erosion/corrosion issues.

After reviewing the equipment documentation and having representatives from Wabash Power Equipment Company and Optimus Engineered Products visit the site, the cause of this deformation is the lack of refractory or fire brick at this location in the boiler. Review of the internal inspection photos prior to commissioning this equipment show that the horizontal section of fire brick at this portion of the mud drum was never installed.

See Internal Inspection, page 6

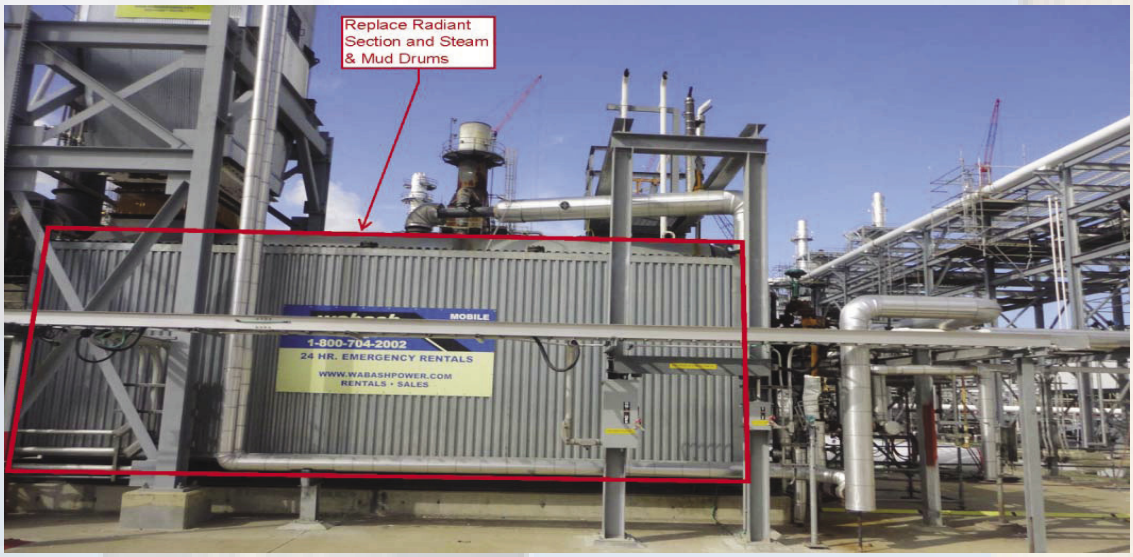
-Continued from page 2, Internal Inspection



The normal repair of this would be to check the hardness readings of the mud drum around the area of the deformation. Once "good" metal is found, cut out a section of the mud drum and replace it in kind with a patch. Per Optimus, this repair is not possible due to the location of the deformation just below the Superheater tubes.

REPAIR PLAN

The repair plan is to replace the radiant section of the boiler along with the steam and mud drums. This section is approximately 30' long x 11' wide x 14' high.



Replacement of this section of the boiler will require disconnecting and removing

- Burner
- Ductwork
- PSVs
- Utility Piping
- Expansion Joint
- Equipment Trim
- Drain Pipe
- Instrumentation
- Electrical

Additionally, structural steel cross members will need to be added to roll the boiler to the east to allow for the boiler to be lifted from the Northwest corner of the 3700 Sulfur Unit. Slight concrete work will be required to fix a crack in the existing foundation. Miscellaneous pipe modifications will be required to accommodate slight variances in nozzle elevations and projections for the replacement unit.

STEAM USAGE (Information received from Mark Deeble)

The current capacities of the four (4) 650# Steam Boilers in Utilities is as follows:

- B-04-401C – 165,000 PPH
- B-04-401D – 165,000 PPH
- B-04-401E – 250,000 PPH
- B-04-401F – 60,000 PPH

Potential Dangers of Carbonated Beverage Systems

By Gary Scribner, National Board Member

Recent incidents involving high concentrations of carbon dioxide (CO_2) gases caused by improperly installed and poorly maintained carbonated beverage systems led to over a dozen hospitalizations in Pooler, Georgia, and Phoenix, Arizona, and identified the acute need to raise awareness of potential safety concerns related to these systems.

Currently, there are over 1,250,000 beverage systems that are filled on-site in the United States alone. Carbon dioxide liquid has an expansion rate of approximately 555%. Its vapor is 1 ½ times heavier than air and displaces oxygen. The dangers associated with CO_2 exposure are based on the concentration percentage and amount of time a person is exposed.

The Occupational Safety and Health Administration's (OSHA) permissible exposure limit for an eight-hour time weighted average is only 0.5%. A 3% concentration results in deeper breathing, reduced hearing, headaches, increased heart rate, and has a short-term exposure limit of 15 minutes. Concentrations of 10% and greater lead to unconsciousness in under a minute, and death if no actions are taken.

TRANSPORTED CYLINDERS

Liquid carbon dioxide (CO_2) was developed in the early 1900s specifically for making carbonated beverages. Historically, cylinders are filled with liquid CO_2 at the distributors' facilities and transported to businesses for use in carbonated beverage dispensing machines. This method still exists today and utilizes cylinders ranging from 10 to 100 pounds of liquid CO_2. The cylinders are classified by the actual weight of liquid CO_2 used to fill them.

These distribution systems have a good safety record since the cylinders are filled off-site and are designed for a much higher working pressure than the ones at which they normally operate. Problems associated with this process typically result from improper handling and storage of the cylinders, as well as lack of employee knowledge about the potential dangers of CO_2 systems. These cylinders fall within Department of Transportation (DOT) regulations since they are transported via roads and highways. Other than DOT regulations, few regulations exist for this type of process.

CYLINDERS FILLED ON LOCATION

Approximately 20 years ago the carbonated beverage industry developed a system to fill cylinders on-site at businesses that use carbonated dispensing machines, giving CO_2 distributors/suppliers the capability to service more customers less often by filling the larger storage vessels using tank trucks. Today, almost every gasoline station, convenience store, bar, and restaurant has a carbonated beverage system. Cylinders used in this system contain a much larger volume of liquid CO_2 and can range from 200 pounds to 750 pounds of liquid CO_2. The size of the storage cylinders is based on both the volume of beverages served at the location and the delivery frequency of the distributor/supplier.

Photo courtesy of Chart Industries, Inc.

Cylinders which are not transported are not DOT-regulated or -certified cylinders, and are designed for a working pressure from 300 psi to 350 psi and are double-walled. The inner vessel is the storage area while the outer area has a coil and is under a vacuum to facilitate the change of state from liquid to gas.

Most systems using these tanks utilize a fill box that is installed on the outside of the building. It should be noted that in some instances the owner of the building will not permit a fill box to be installed. In these cases, the distributor /

-See Potential Dangers on page 5

Potential Dangers, Continued from page 4-

supplier either disconnects the piping from the CO_2 cylinder or brings the fill hose inside the business to fill the cylinder. If a fill box exists, the box is fitted with a fill connection and a vent or relief connection, both of which must be properly piped out of the storage cylinder.

The internal pressure of these CO_2 cylinders varies based on the amount of liquid, ambient temperature, the vacuum in the outer vessel, and the volume of CO_2 changing state at that time. Cylinders may reach the maximum working pressure when being filled or immediately after high-usage times resulting in the excess pressure being vented through the safety relief circuit of the system. This creates the highest potential for risk of CO_2 to be released from the cylinder. Most cylinder manufacturers are very explicit regarding the installation instructions for these systems and require the vent or relief circuits to be piped to a fill box installed at a safe point of discharge outside the building. Additionally, the location of the vent or fill box should not be below grade or in any enclosed area outside the building. Several incidents involving injury and even death have occurred when the vent circuit was not in a free air flow area outside the building.

These systems are seldom regulated by local jurisdictions. Lack of knowledge of how the systems function, lack of proper detection equipment, and change in environment between the time of incident and an investigation have led to the lack of reporting and/or misreporting of incidents and near misses.

The following are incidents directly related to carbonated beverage system malfunctions due to: improper installation and/or maintenance, renovation to rooms or areas where the systems were installed without an engineering evaluation of the effect on the systems, and/or lack of knowledge about the dangers of CO_2 gas:

- September 2011 – Ten people hospitalized, including two firefighters, and one fatality at a fast food restaurant in Pooler, Georgia.
- June 2011 – Evacuation of a fast food restaurant in Dorchester, United Kingdom.
- May 2011 – Three hospitalized, including two firefighters, at a fast food restaurant in Phoenix, Arizona.
- May 2010 – Evacuation of a movie theater in Des Moines, Iowa.
- July 2008 – Two hospitalized from an incident in a bar in Benson, Nebraska.
- April 2008 – One fatality in a hotel in Victoria, Australia.
- August 2007 – Fatality of a waiter at a restaurant in Coronado, California (DOT cylinder).
- January 2005 – Two fatalities, employee and delivery driver, outside a fast food restaurant in Sanford, Florida.
- March 1998 – Two hospitalized and two treated at the scene at a fast food restaurant in the US. Location unknown.
- 1996 – Fatality of a delivery driver outside a restaurant in Cincinnati, Ohio.

Some jurisdictions do require inspection of beverage systems that are filled on-site. Initial inspections revealed a violation rate of over 25% related to the safety/vent circuit installation statewide, with some isolated communities having close to a 100% violation rate.

Local considerations should be given as a means to detect carbon dioxide in businesses or places of public assembly that utilize bulk CO_2 systems, and can include:

- Prohibiting CO_2 systems of any type from being installed below grade.
- Prohibiting the filling of storage tanks inside a business and/or disconnecting any system piping to facilitate filling.
- Mandating posted signage warning employees, customers, and first responders of the utilization of CO_2 and the potential risk and symptoms associated with carbon dioxide exposure.

Additional consideration should be given to CO_2 awareness training for emergency responders, businesses, and places of public assembly utilizing CO_2, as well as obtaining CO_2 detection equipment for first responders.

The public and jurisdictional authorities should be aware that carbon dioxide exists and has many uses within industry, especially the food industry. The OSHA incident reporting system has 20 pages of incidents and fatalities involving CO_2 exposure. Additionally, carbon dioxide systems (almost identical to the carbonated beverage systems) have recently been discovered being utilized with large swimming pools to control pH and is now being used as a refrigerant in what are advertised as "green systems."

Awareness and inspection of carbonated beverage systems is the key to ensuring the safety of emergency responders and the public.

For further information regarding CO_2 systems, please contact the chief boiler inspector of your jurisdiction.

For a video presentation of a CO_2 incident, visit: www.youtube.com/watch?v=eY__H-CMvw0

Temperature and Pressure (T&P) relief valves

Temperature and pressure (T&P) relief valves used on residential water heaters are typically designed and manufactured to relieve on pressure at 150 psig and on temperature at 210 degrees F. These ASME, ANSI and CSA (AGA) approved relief valves protect the water heater from excess pressures and temperatures by discharging water.

In normal operation of the water heater and T&P valve, no water should be discharged from the valve. A T&P valve that discharges is an indication of an abnormal condition in the system and by discharging, the T&P valve is meeting its designed safety purpose. The causes of discharge can be thermal expansion, excess system pressure, low temperature relief, too high a setting on the water heater, or something in the water heater causing excess temperatures in the heater.

Thermal Expansion: When water is heated it expands. In a 40 gallon water heater, water being heated to its thermostat setting will end up expanding by approximately 1/2 gallon. The extra volume created by this expansion has to go somewhere or pressure will dramatically increase, such as when water is heated in a closed system.

A good indication of thermal expansion is when the T&P valve releases about one cup of water for each 10 gallons of heater capacity with each heating cycle. The T&P valve is functioning properly when it relieves pressure caused by thermal expansion, but frequent relief can build up natural mineral deposits on the valve seat, rendering the valve inoperative. This condition can be addressed by the installation of a Watts thermal expansion tank or other Watts thermal expansion device to protect your system from overpressure caused by thermal expansion. If there is no discharge from the valve, there is no need to replace the valve.

System Pressure: If installation of a thermal expansion device does not relieve occasional dripping from the T&P valve, then the system pressure should be checked. If system pressure is excessive (typically more than 75 PSI), a Watts pressure regulator should be installed on the incoming water line.

Warning: The discharge from a T&P valve can be very hot. It is very important that all T&P valves be installed properly with a discharge line piped downward to an adequate drain to avoid property damage and to minimize possible human contact. Please read and follow the instructions on the warning tag attached to your T&P valve.

Correct Installation of T&P Relief Valves

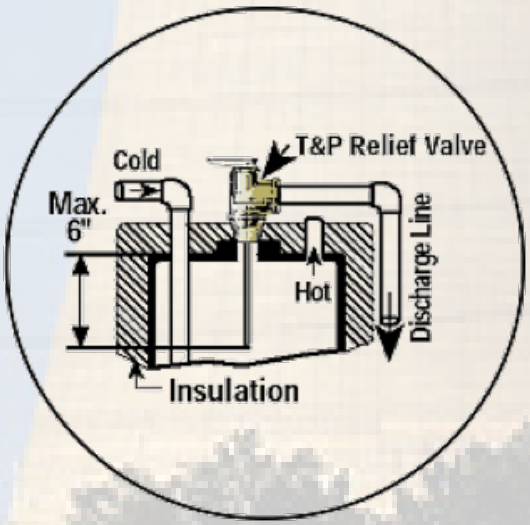
Important Instructions: Relief Valves and Automatic Gas Shut-Off Devices Combination temperature and pressure relief valves with extension thermostats must be installed so that the temperature-sensing element is immersed in the water within the top 6” (152mm) of the water storage tank. They must be installed either in the hot outlet service line or directly in a tank tapping. Combination temperature and pressure relief valves that do not have extension elements must be mounted directly in a tank tapping located within the top 6” (152mm) of the water storage tank. Valves must be located so as to assure isolation from flue gas heat or other ambient conditions that are not indicative of stored water temperature.

WARNING: To avoid water damage or scalding due to valve operation, discharge line must be connected to valve outlet and run to a safe place of disposal. Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length. Discharge line must pitch downward from the valve and terminate at least 6” (152mm) above a drain where any discharge will be clearly visible. The discharge line shall terminate plain, not threaded. Discharge line material must conform to local plumbing codes or ASME requirements. Excessive length over 30’ (9.14m), or use of more than four elbows or reducing discharge line size will cause a restriction and reduce the discharge capacity of the valve.

No shut-off valve shall be installed between the relief valve and tank, or in the discharge line. Valve lever must be tripped at least once a year to ensure that waterways are clear. When manually operating lever, water will discharge through discharge line and precautions must be taken to avoid contact with hot water and to avoid water damage. This device is designed for emergency safety relief and shall not be used as an operating control. If discharge occurs, a licensed contractor must evaluate the system and determine the cause for discharge and correct the cause immediately.

To ensure proper operation, this valve must be installed by a qualified service technician or licensed plumbing contractor in accordance with these instructions and the local plumbing codes and standards. Repair or alteration of valve in any way is prohibited by national safety standards/local codes.

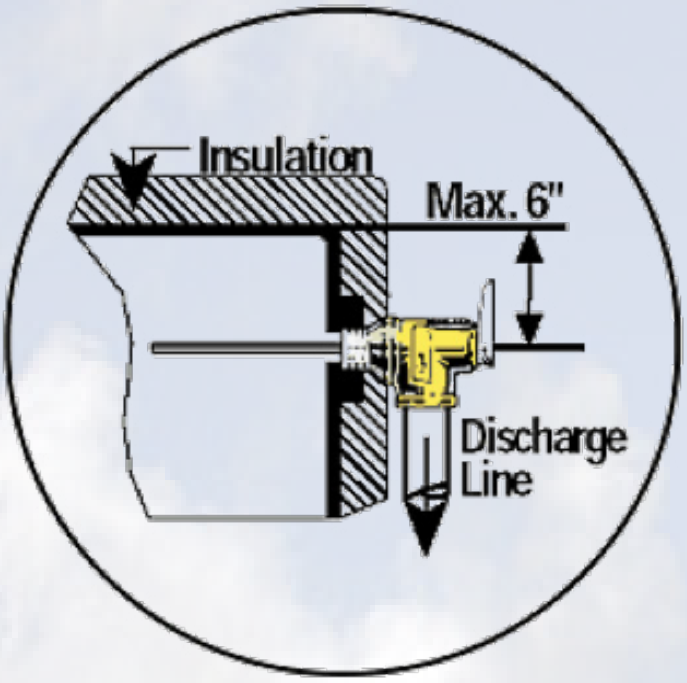
For Heaters with Direct Top Tapping:
Always use an extension type thermostat T&P relief valve which permits the end of the thermostat to extend into the top 6” of the tank.



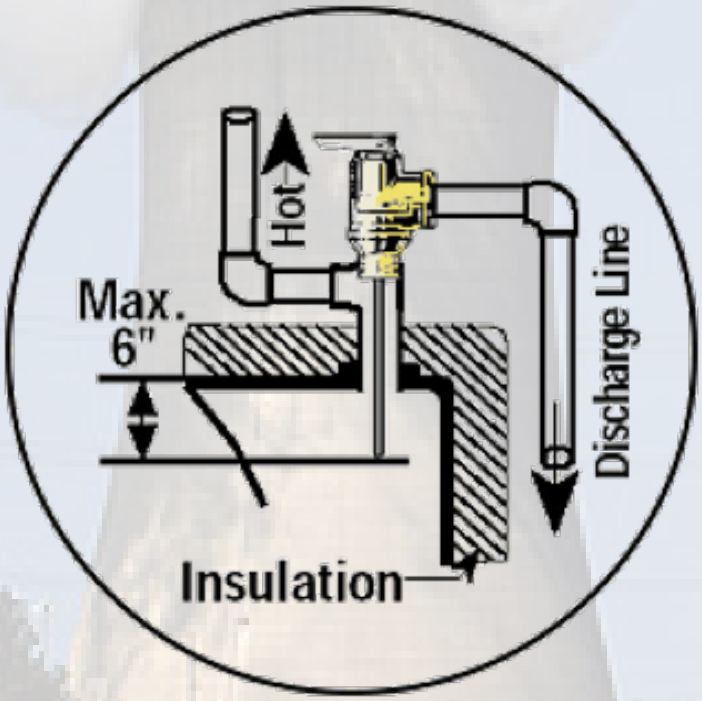
-See T&P Safety Valves on page 7

T&P Safety Valves, Continued from page 6-

Direct Side Tapping:
FOR EXTERNAL FLUE HEATERS: Use extra length extension thermostat to extend into water storage tank. FOR INTERNAL FLUE HEATERS: Use short or standard length thermostat. Vertical discharge line must be installed with its direction downward.



"Alternate" ONLY when the tappings are not provided:
Use standard or extra length extension thermostat which permits the end of the thermostat to extend into the top 6" of the tank.



Important: A relief valve functions, in an emergency, by discharging water. Therefore it is essential that a discharge line be piped from the valve in order to carry the overflow to a safe place of disposal. The discharge line must be the same size as the valve outlet, and must pitch downward from the valve.

ANNUAL OPERATION OF T&P RELIEF VALVES:

WARNING: Following installation, the valve lever MUST be operated AT LEAST ONCE A YEAR by the water heater owner to ensure that waterways are clear. Certain naturally occurring mineral deposits may adhere to the valve, blocking waterways, rendering it inoperative. When the lever is operated, hot water will discharge if the waterways are clear. PRECAUTIONS MUST BE TAKEN TO AVOID PERSONAL INJURY FROM CONTACT WITH HOT WATER AND TO AVOID PROPERTY DAMAGE. Before operating lever, check to see that a discharge line is connected to this valve, directing the flow of hot water from the valve to a proper place of disposal. If no water flows when the lever is operated, replacement of the valve is required. TURN THE WATER HEATER "OFF" (see your water heater instruction manual) AND CALL A PLUMBER IMMEDIATELY.

REINSPECTION OF T&P RELIEF VALVES:

WARNING: Temperature and Pressure Relief Valves should be inspected AT LEAST ONCE EVERY THREE YEARS, and replaced, if necessary, by a licensed plumbing contractor or qualified service technician, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions can only be detected if the valve and its components are physically removed and inspected. Do not attempt to conduct an inspection on your own. Contact your plumbing contractor for a reinspection to assure continuing safety. FAILURE TO REINSPECT THIS VALVE AS DIRECTED COULD RESULT IN UNSAFE TEMPERATURE OR PRESSURE BUILD-UP WHICH CAN RESULT IN SERIOUS INJURY OR DEATH AND/OR SEVERE PROPERTY DAMAGE.

If discharge occurs, CALL A PLUMBER IMMEDIATELY. Discharge may indicate that an unsafe temperature or pressure condition exists which requires immediate attention by a qualified service technician or licensed plumbing contractor.

TYPICAL INSTALLATION:

- Caution: Valve must be installed so that temperature sensing element is immersed in the water within the top 6" (152mm) of the tank.
- No valve may be placed between the relief valve and water tank.
- Install in hot water outlet or in extra side relief valve tapping if one is provided.
- To avoid water damage, discharge line must be run to a safe place of disposal and must pitch downward.
- Do not install a shut-off valve, plug, or cap in the valve discharge line.
- Follow local codes where they vary from these instructions.

For more information or to submit materials for the NABO newletter, contact Tim Rhodes at tim.rhodes@ariseinc.com