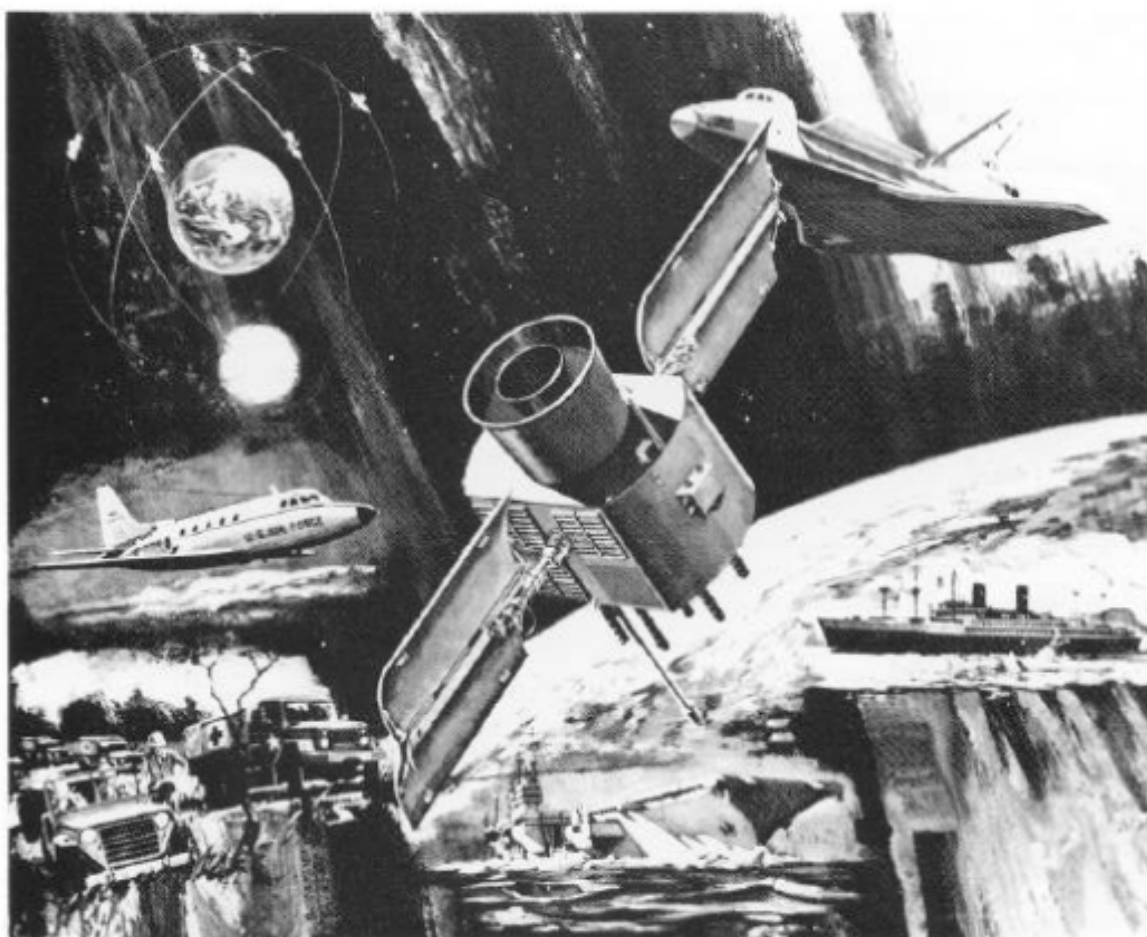




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Control Scale and Save Energy

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It is an age old problem—the control of scale formation in boilers and heat exchangers. The chemical formulations and the time and skill required to perform prudent boiler care have cost the armed forces, as well as private industry, many thousands of dollars each year.

Knowing this, I began searching for a better way and decided to contact the Hydrodynamic Corporation, who had developed a method of scale control without the use of chemicals. This company invited me to query the many industries for whom they had installed corrective equipment. These companies all reported monetary savings through improved operational efficiency resulting from the installation of such equipment on several size systems.

The United States Coast Guard's New Orleans Radio Station was faced with the problem of low water flow and low water pressure. Scale deposit had restricted the plumbing to a point where only 40 percent of the needed flow rate was available. Many of the water outlets were reduced to only a trickle.

I decided to recommend the installation of a hydrodynamic unit in this ineffective piping system as a last resort, as replacing the potable water system would have been too costly.

The following article is a synopsis of the result of installing such a unit at Radio Station New Orleans.

The problem of high scaling of the boiler at Radio Station New Orleans had necessitated the acidizing of the boiler and heat exchanger each year. With this in mind, a sample of the water was taken to the Hydrodynamic Laboratory where it was determined that calcium carbonate was the salt that was causing the trouble. Calcium carbonate, not only a scale, but also an insulator, retards the heat exchange and impedes the flow of water by cutting down on the cross section of the pipe. The piping in the boiler circulation system was approximately 40 percent closed with the build-up of calcium carbonate.

Among other observations, it was found that the flow of water into the garage area had been reduced to a trickle at the faucet in the sink.

This all indicated the need to chemically clean the boiler. This type of cleaning is not only expensive in time and money, but causes a metallic crystallization, as the acid attacks the metal in the system while removing the calcium deposit. Chemically cleaning the potable water system with acid is very expensive and it is virtually impossible to get the acid completely neutralized.

It was at this point in time that our Branch Chief decided to install the hydrodynamic unit.

A hydrodynamic unit was installed in each of the two water supplies at the Station, one for the Operations Building and one for the All-Purpose Building. In these locations the hydrodynamic unit

provides treatment to all water entering the buildings. A special blow down schedule was initiated to remove the loosened scale from the boiler and the return line in the circulating system.

These hydrodynamic units were installed on the fourth of January 1978 in the Operations Building, and on the fifth of January in the All-Purpose Building. On the nineteenth of January, it was noticed that the circulating water temperature in the galley's heat exchanger had risen 5°F. The temperature of the circulating hot water had to be reduced. It was also noted that granular particles of calcium carbonate were observed in the blow down of the heat exchanger at the boiler.

On the third of February, (one month after installation) another 5°F increase was noted at the heat exchanger in the galley. The flow and temperature to the garage area had also increased. Because the blow down appeared gray in color, concern was expressed that the hydrodynamic unit may be causing the iron (ferrous metal) to deteriorate. Magnetic tests indicated that this was not the case, but examples were taken to the Hydrodynamic Corporation and this indication was confirmed. Small amounts of silica were also noted in the blow down water.

On the twenty-first of February, the blowdown from the boiler and heat exchanger showed large amounts of soft granular calcium carbonate. Another rise in temperature at the heat exchanger was noted. Some of the loosened deposits caused difficulty in faucet closures.

On the twenty-third of February, the heat exchanger showed another 10°F rise in temperature and another cutback in the circulating water temperature was required. The water flow to the garage was better.

On the ninth of March, by inspecting the blow down from the boiler, it was found that large amounts of calcium carbonate were being discharged. On the third of April, it was found that large quantities of calcium carbonate were being blown from the boiler and the lines. Normal water

flow was completely restored to the garage sink.

On the nineteenth of April, the boiler was opened for inspection: the tubes that had been 40 percent closed with calcium deposits were clean. There was a film of magnetite [sic] coating the metal which illustrated there had been no metal loss.

The inspection manhole in the hot water storage tank was removed and four garbage cans full (30 gallon size) of loose, soft calcium carbonate were removed.

The equipment now had a clean heat transfer surface, the transfer of heat being no longer insulated by a blanket of calcium carbonate. The cost savings is being reflected in the amount of oil used; all due to more efficient heat transfer. Prior to the installation of the Hydrodynamic unit, the boiler used, in a two week period, from 80 to 90 gallons of oil. After the unit had cleaned the tubes, the oil consumption dropped to 40 to 60 gallons for the same two week period, providing an approximate 30 percent savings in fuel.

This savings will pay for the Hydrodynamic unit in a short period of time and prolong the life of the boiler and heat exchanger. This equipment has been virtually maintenance free since and its installation was simple. It continued to combat escalating fuel costs and to provide energy savings and improved equipment life.

Due to the above success, the Eighth Coast Guard District has installed Hydrodynamic units at the following locations: Station Grand Isle, Grand Isle, LA; Base Galveston, Galveston, TX; Station Port Isabel, Port Isabel, TX; Brownsville Moorings, Brownsville, TX and Loran Station Cape San Blas, Cape San Blas, FL. Results have been similarly impressive for each of these installations.

[Caption for Photo]:

Replacement fitting in boiler operated for 90 days. There are no calcium carbonate [deposits].