FUEL OIL STORAGE AND HANDLING PROBLEMS

Water is a predominant factor in a number of problems faced when using heavy oils. Water not only comes from condensation, ground seepage and leaky heating coils in storage, but also from the **L**oad **O**n **T**op procedure used by today's marine tankers in transporting fuel oils. The LOT procedure means loading the oil cargo on top of the salt water ballast. Inevitably, a portion of the ballast water is dispersed in the oil, and is delivered along with the oil.

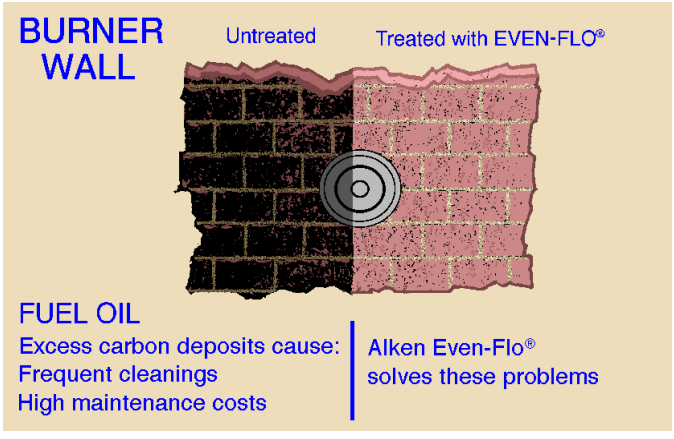
Salt water is one of the sources of fireside slagging. Salt itself often forms a slag, especially on superheater tubes. The sodium in the salt encourages sodium vanadate and sodium sulfate formation, both of which may deposit slag.

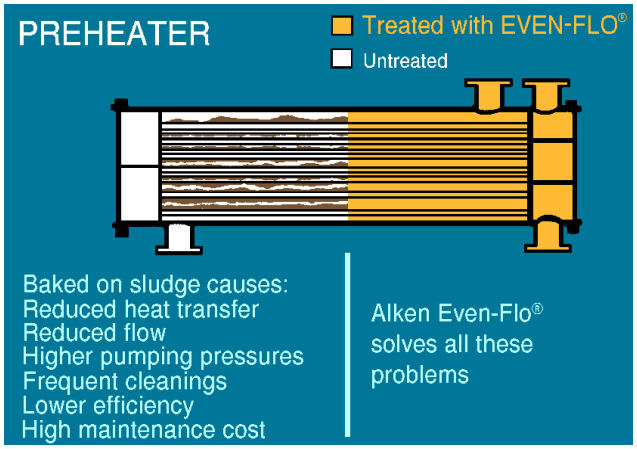
Tank bottom corrosion is caused by water, salt, acidic constituents of the oil (largely sulfur compounds) and bacterial growth in the tank. The bacterial growths produce acid and accelerate metal corrosion.

Bacterial slime masses and viscous oil/water emulsions can be drawn into the fuel distribution system with resultant clogging of lines, strainers, preheaters and burners. Such conditions interfere with proper flow and heating of the oil so that good atomization is not obtained. Combustion efficiency is reduced with the **formation of sticky coke residue** (made up of carbon, heavy hydrocarbons, and ash) which adheres to tube and refractory surfaces. While the carbon may burn out in the combustion zone, the deposits remain and act as adsorbents for other oil-ash constituents and a reaction site where **sulfur and vanadium gases can form condensible compounds** that may build up into corrosive slags in the cooler parts of the boiler.

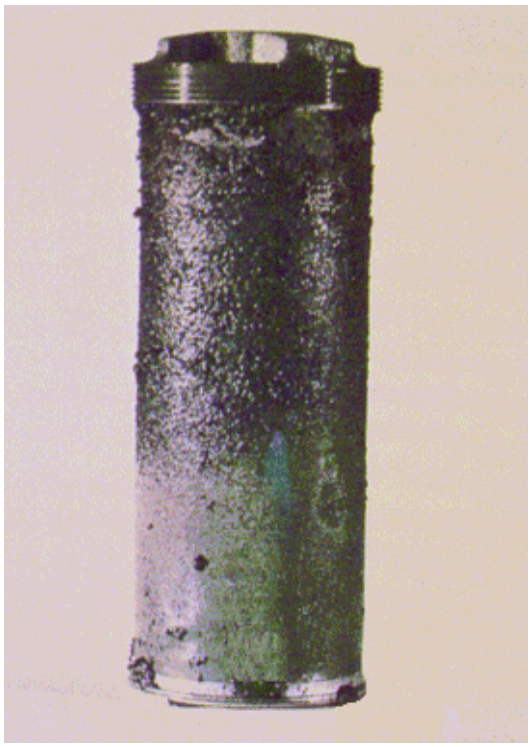
Typical sludge is made up of viscous water-oil emulsions and slime, heavy hydrocarbons, and oxidation residues from unsaturated hydrocarbons in the oil. Heavy hydrocarbons in residual fuels have increased substantially in recent years because of the high demand for gasoline and jet fuel. Intensive refining processes have reduced the percentage of residual obtained from a barrel of crude to approximately 5% from its previous level of about 20%. This has led not only to the **formation of extremely heavy long-chain hydrocarbons** but also to a greater tendency toward **instability in the residual oil**.

Manual cleaning of tanks, strainers, preheaters and burners is expensive, but the increased fuel consumption caused by sludge accumulations is even more costly. Sludge on burners prevents proper atomization and destroys the flame pattern; this encourages buildup of fireside deposits, may cause serious flame impingement and tube overheating, generally reduces boiler efficiency, and adds to maintenance and fuel costs. Sludge in oil heaters leads to difficulty in maintaining proper preheat for atomization; excessive steam or electricity

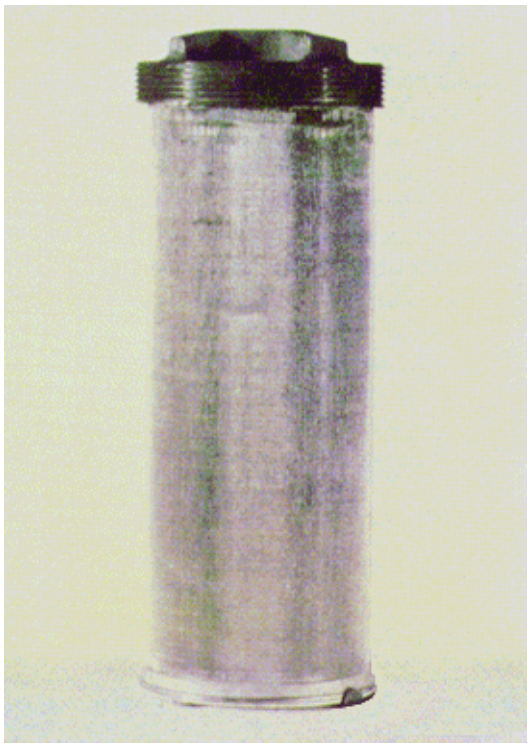




may be needed to maintain preheat or, in extreme cases, it may not be possible to maintain the preheat temperature at all. The fuel cannot be atomized adequately by the burner and the larger fuel particles that are formed are thermally cracked before complete gasification occurs. Heavy hydrocarbons that are formed by cracking often form coke rather than burning completely. An even flow of homogeneous fuel to the burners helps to assure proper preheat and good atomization with a minimum of coke formation.



Typical dirty strainer that is the result of using untreated fuel.



Typical clean strainer that is the result of using Even-Flo® in the fuel.