Computational Fluid Dynamics and Combustion Engineering

Computational fluid dynamics is a mathematical technology that enables you to study and simulate things that flow—like gases and liquids—but more germane to our gathering here---heat and mass transfer, chemical reactions, and the physics of the firestorm process.

Computational Fluid Dynamics modeling has become one of the best tools for understanding the dynamics of wild fires. It has shattered some pre-conceptions about extraordinary cause and effect—as well as improved our understanding of the basic science of fires and fire storms in Australia. In California, little basic science has been truly done relative to Australia on the UWI problem. All the real hard science literature I discovered over the past two weeks came from foreign sources—like Australia and South Africa.

The primary fuel for California and Australian fires are native grasses, brush, and dead and dried woody/brush like matter of all types—and the age of the sageland, distribution pattern, topography, weather, and wind patterns and velocities determine the extent to which these foehn winds {dry, down slope}, like those in California, which we call Santa Ana's—become so turbulent as to create the horizontal torrent and plume effect---or a sea of whirls and fire plumes---which by definition must be an organized source of angular momentum to produce the large-scale effects. {"which we have witnessed so sadly—especially over the last decade principally here and in Rancho Bernardo"}.

These vorticity driven fires--over a large length of range and hilly canyon-rutted terrain significantly alter the entrainment and combustion dynamics of fire. New models that focus on angular rotation and temperature variation and dissipation dynamics allow us to better understand large temperature and density variations and identify best practices for engaging and preparing for these fires.

In Australia clear cutting—gum bark {eucalyptus} trees--- is not considered the best practice for containment in canyon-like regions and finger-like topographical areas--or probably any other—even though it is sometimes done for economical reason. Gum barks, as a species, use fire to survive—because fire removes the brush and undergrowth that strangles them—and they generally survive in enough quantity to perpetuate the species.

Gum barks are used for both wind and fire protection. Tall and older gum barks of various varieties are considered better than some others for actually deflecting embers and retarding the advance of airborne embers. The major culprit in long distance leap-ahead of plume effects and plume creation are the flying embers as well as the advancing firestorm's tsunami-like heat torrent. Flying embers can leap 1-2 km's ahead--and are usually the major cause of home ignition in advance of the firestorm—with embers lodging under eaves or in other wood joined exterior components of the home. On the Big Island of Hawaii they plant non-indigenous ironwood and gum bark wind and fire breaks--all over the dry western part of the island—especially between the lava fields and the populated west coast of the island—and have done this for years--precisely because these trees break up the turbulent flow dynamics {although the probably didn't understand this at that time} and can reduce the flying embers advancing numbers.

This attack on the gum barks is beyond ill-considered . It has no basis in science or empirical evidence. All the evidence points to the opposite conclusion.

It appears this clear cutting—as well as the practice of mandatory evacuation---makes us more unsafe than safe—and should be stopped immediately In fact we should consider a solid shield of gum barks be planted by the Marines above Birch Bluff and other topological bowling ball entrances to the ranch—rather than a removal of what could be one of our best defenses.