Looking toward future engines for autos

This week the Environmental Protection Agency announced proposed new regulations for maintenance of emission-control devices on manufacturers' "durability" models. These are the prototype cars that will have to be operated for 50,000 miles, with only limited maintenance, before EPA certifies their emission-control components for use on 1975 assembly line models.

Here is one provision of the proposed new regulations: ". . . the proposed maintenance would be allowed only if . . . failure to perform maintenance is not likely to result in an improvement in vehicle performance." This means that if failure of a certain emission-control component will improve vehicle performance, then auto companies had better make them so maintenance-free that the decision whether to keep them working will not be in the hands of the car owner—who would have a vested interest in their not working. Even if exhaust gas recirculation devices are built so well as to be maintenance-free, there is still nothing to prevent knowledgeable car owners from simply deactivating them. This is just one of a legion of problems in implementing the stringent emission restrictions for 1975 and 1976. Another key one is how to establish reliable state inspection systems for emission controls.

EPA officials say privately that the likelihood is great that some approach other than emission controls must be taken. There appear to be two possibilities: Sharp restrictions on auto travel in air-polluted urban areas and substitution of external combustion, gas turbine or other unconventional engines for the internal-combustion engine.

Some engineers, as well as General Motors executives, have pooh-poohed this latter suggestion, saying the technological problems of the alternative systems are too large to overcome. This is no doubt true regarding the 1975 and 1976 standards; but research during the past two years now indicates that feasible unconventional power sources may be available for mass use as early as 1980.

Last week, for instance, Henry Ford II paid a publicized visit to the laboratories of the Thermo-Electron Corp. (TECO) in Waltham, Mass., to look at progress on a joint Ford-TECO-EPA project for a Rankine cycle engine. Thomas F. Widmer, TECO vice president for engineering, told SCIENCE NEWS that Ford's trip did not signal any dramatic breakthrough; rather, says Widmer, there has been steady progress during the past few years. The TECO engine uses trifluoroethanol as a working fluid in an engine that is, in its barest essentials, like the old Stanley Steamer: the working fluid is heated in a boiler, and the vapor conducted through valves to a reciprocating engine. But the organic fluid is superior to steam. It is miscible with lubricants, has low operating temperatures and does not freeze at ambient winter temperatures as water would. The beauty of the engine is its emission profile. Nitrogen oxide emissions are at a level twice as low as required in the 1976 standards, and hydrocarbons and carbon monoxide four times and ten times lower, respectively, than called for in the 1975 standards. Two other companies are working with EPA and auto manufacturers on Rankine-type engines: Steam Engine Systems in Newton, Mass., is working with Chrysler on both turbine and piston steam engines and Aerojet General Co. in Sacramento, Calif., is working with General Motors on a turbine engine using an organic fluid. EPA will soon begin "pre-prototype" testing of engines and will select the two most promising ones for use in prototype cars.

Another new engine concept—the stratified charge engine—seems promising, but any mass production is years away. □

Predicting where to tap the earth's heat

With supplies of oil, natural gas and coal constantly dwindling, the search is on for new sources of power. One of the more promising is geothermal and Robert Smith of the University of Utah believes he has found a way to spot geothermal features.

Smith has found a correlation between thermal activity and earthquake swarms—concentrations of frequent tiny earthquakes—by plotting all the earthquakes, hot springs and mud spots in the western United States. He and his assistants have identified significant earthquake zones from southern Utah through Montana and in central Idaho that may be associated with potential sources of geothermal energy. The seismic belts intersect in Yellowstone Park, a known geothermal area, and near Cedar City, Utah. Seismographs installed in Yellowstone recorded up to 50 earthquakes a day, and in the Cedar City area, over a thousand quakes a day were detected in a November 1971 swarm. Says Smith: "The prospect of pollutionless hydroelectric plants in Utah is very real." □