Figure 11.5a. COSTS OF POOR QUALITY AND PRODUCTIVITY: The Automotive Industry

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Almost two million recall notices being issued on Ford vehicles

BY DAVID CLIMENHAGA
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Ford Motor Co. says it will issue almost two million recall notices to owners of its cars across North America. More than 110,000 of the vehicles were sold in Canada.

The recalls of the vehicles for free repairs are to correct two safety-related problems, one of which could result in engine fires and the other in a wheel falling off, plus a non-safety related excess-emissions fault.

And while some car owners will receive duplicate notices, the total number of vehicles recalled will still be very close to the approximately 1.95 million notices to be mailed out.

The first safety recall involves 1984 model Escort, Lynx and EXP subcompacts and 1985-plus Escort and Lynxes. The second includes 1989 model Ranger and Bronco II four-wheel-drive light utility vehicles. The eall for the emission fault involves 1985-87 Tempo and Topaz vehicles, 1986 and 1987 Taurus and Sable cars and 1987 Escort, Lynx and EXP subcompacts.

The huge recall by North America's second-largest auto maker comes just three days after No. 1 General Motors Corp. recalled 1.7 million vehicles across the continent to fix a cruise-control defect that could cause throttles to stick open.

Neither Detroit-based company will publicly estimate the cost of such big recalls. But auto industry observers say such large recalls can cost tens of millions of dollars to administer and carry out.

Moreover, in the case of both companies, recent vigorous enforcement efforts by the U.S. vehicle safety authorty, the National Highway Traffic Safety Administration, are known to be behind the recalls.

In the first Ford recall, designed to remedy a condition that could lead to engine fires, industry observers say NHTSA officials were involved "up to their eyeballs" in pushing the company to take action.

And while NHTSA won't confirm that its enforcement has grown more vigorous of late, an official of the agency agrees that it was heavily involved in the fire-danger recalls.

"Fires are very difficult to investigate because all the evidence gets destroyed," said spokesman Timothy Hurd in Washington. "Our engineers had a lot to do with identifying the cylinder-hea dcracking and the valve-gasket scratching."

And while NHTSA "did not in legal terms order a recall," the fact it could have done so was a powerful inducement to Ford to go ahead, he suggested. At the end of an engineering analysis – in this case started in December, 1986 – "we can make an informal request for a recall. If they say 'no, then we start to get the information together to go to court."

U.S. highway safety legislation makes such compliance orders easier to get in that country than in Canada. In fact, according to Mr. Hurd, so strong is the U.S. law that in the past two decades NHTSA has only had to take auto makers to court eight times.

As for the reports of NHTSA's renewed efforts, Mr. Hurd said in an interview, "we have 50 engineers, they work hard all the time to keep things safe and it would be very unfortunate to say their zeal went up or down."

In the first recall, Ford said it is notifying by mail the owners of 518,000 1984 model Escort, Lynx and EXP subcompacts, and 1985-plus Escorts and Lynxes, that they should return to their dealers to have two conditions that could cause fires repaired.

Of those vehicles, 36,700 were sold in Canada.

Ford said cylinder heads in 296,000 1984 models will be checked for cracks that could allow oil to leak on to the hot exhaust manifold. And engine rocker-gaskets in 222,000 subcompacts built in 1985 and after could split over time and not seal properly, again causing oil to leak on to the exhaust manifold.

In the first case, Ford said, dealers will inspect and, if necessary, replace the cylinder head. In the second, it will replace all the gaskets.

James Hartford, a spokesman for Ford Motor Co. of Canada Ltd., said the parent company is aware of two engine fires in the United States, both of which caused minor injuries, and none in Canada.

The second safety-related recall involves 28,000 1989 model Ranger and Bronco II four-wheel-drive light utility vehicles equipped with locking front-wheel hubs.

Ford said some of these vehicles may have been built without retaining keys installed in the left front wheel-bearing nut. Without the keys, the nut may loosen, and as a Ford statement yesterday put it, "this could potentially lead to detachment of the wheel from the vehicle and cause a loss of steering control."

A total of 2,020 of these vehicles were sold in Canada.

In the non-safety-related recall, Ford will notify the owners of approximately 1.4 million 1985 to 1987 vehicles, 72,014 in Canada, to ensure acceptable exhaust emission levels.

Included in the recall are 1985-87 Tempo and Topaz vehicles (many built in Oakville, Ont.) with 2.3-litre engines, 1986 and 1987 Taurus and Sable cars with 2.5-litre engines, and 1987 Escort, Lynx and EXP subcompacts with 1.9-litre engines.

Ford said testing by the U.S. Environmental Protection Agency and the California Air Resources Board indicates that hydrocarbon and carbon monoxide levels from these vehicles could be too high.

Ford dealers have been asked to inspect and if necessary replace the fuel injectors in the cars and, in some cases, replace electronic engine control modules and catalysts as well.

Because of the number of vehicles involved, Ford said, the recall will be conducted in phases.

1 The article EM8906 reprinted above describes three faults in Ford vehicles as they were sold to consumers; it does not state explicitly whether the faults were caused by *design* or by *manufacturing* problems.

- Can you *infer* from the article whether design or manufacture was responsible? Explain briefly, dealing *separately* with each fault.
  - Outline conditions under which *both* design *and* manufacture could be involved in a faulty end product.
- Product (or service) faults may be corrected at three stages – design, manufacture, or in the field; describe briefly the relative *costs* of making corrections at these three stages.

(*continued overleaf*)

- What do you conclude from your previous answer about the importance of proper design in the efficient delivery of goods and services? Explain briefly.

2 The third-last paragraph of the article EM8906 reprinted overleaf indicates that the fault involving excessive engine emissions was identified in testing by organizations *other than* the Ford Motor Company. Assuming that Ford's testing had shown that the relevant vehicles *did* meet emission standards, briefly describe the *statistical* issues involved in such differences in test results. [It may be helpful to recall the discussion of vehicle emission testing by General Motors Corporation in Program 5 of *Against All Odds* – see Figure 5.7 of the STAT220 Course Materials.]

3 Explain briefly what is meant by the first sentence in the third paragraph of the middle column of the article EM8906 reprinted overleaf on page 11.23: *Fires are very difficult to investigate because all the evidence gets destroyed*.

- What *statistical* issue(s) are involved in this statement? Explain briefly.

4 In the consideration of *risk*, two matters are usually relevant – *incidence* (or rate of occurrence) of the unwanted outcome and the *severity* of its consequences. For each of the three faults mentioned in the article EM8908, assess briefly the two aspects of risk to the extent possible on the basis of the available information.