

have again been changed and they will require an additional investment to meet the new goals—which is a pretty wasteful way of doing it.

One of the other major companies recently announced that they are going to invest \$120 million in their big refinery in Venezuela to desulfurize their residual fuel for the east coast market and I presume they are planning to bring the sulfur down well below 1 percent. That is a big investment.

Mr. DADDARIO. This is an answer to a question I previously asked. Your ability to improve the situation is somewhat encumbered by the fact that you might make the necessary capital investments to reach a certain standard, and then find that that will not accomplish what the regulatory agencies want. It puts you in a position where you have a plant which is brand new and is perhaps not even used?

Mr. GAMMELGARD. Yes.

Mr. DADDARIO. A plant which is now obsolete though better than what you have and still unable to meet the requirements. We would like to have some understanding as to that before you make such capital investment.

Mr. GAMMELGARD. That is right.

Mr. DADDARIO. There is already at least one incident, and others, where such investments have been made to meet an improved criteria which you have already been advised is inadequate?

Mr. GAMMELGARD. That is correct. I know of one such company.

Mr. DADDARIO. Is it possible that you can get the background of that situation so that we may have it for the record, Mr. Gammelgard?

Mr. GAMMELGARD. I believe so. I will ask them, certainly.

Mr. BELL. Where is the gravity of a black oil where you have a considerable problem with sulfur and the higher oils or lighter oils where you don't have, such as you just described? What gravity is that?

Mr. GAMMELGARD. A typical No. 6 is around 12° A.P.I. gravity, just a little bit lighter than water.

Mr. BELL. You are talking about real heavy oil?

Mr. GAMMELGARD. Real heavy. With a high B.t.u. content per gallon. Much higher than gasoline or propane.

Mr. BELL. As far as most of the companies are concerned, the overwhelming amount of oil they sell then is really the higher gravity oil?

Mr. GAMMELGARD. That is correct.

Mr. BELL. You are really talking about the bottom of the barrel at the refinery. In other words, you have a breakdown for lower ends in your fuels; is that what you are saying?

Mr. GAMMELGARD. Yes.

Mr. DADDARIO. Proceed, please, Dr. Eckardt.

Dr. ECKARDT. It should also be noted that once an air quality standard has been adopted the question of how best to achieve it still must be answered. Because of variations in meteorologic and topographic conditions, types, and concentrations of industry, prevailing fuel use patterns, and other factors, translation of air quality goals into specific control measures—or emission standards—is a complex task.

If pollution is to be controlled—as we believe it should be—on a cost effectiveness basis, there is a real need for research into methods of determining what combination of control measures can do the best job at the lowest overall cost to the community.