

of it to reactivate it, and the carbon is recycled with some loss. In the coal process the idea is to use thermal energy because coal is sufficiently cheaper to make energy recovery economically attractive, and it also provides a disposal for the sewage solids and dissolved materials which have been removed. There are some other differences too.

Mr. VIVIAN. Does the carbon-absorption process work on thinner effluents?

Mr. RAYNES. It depends on what basis one uses. A pound of charcoal can take out more impurities than a pound of coal can, but if you have no limit—

Mr. VIVIAN. Let me restate my question.

Suppose you use the secondary plant which is a biological plant in part with a carbon-absorption process, will you then provide some fuel to reprocess the carbon?

Mr. RAYNES. Yes, if you use carbon. You have to put energy in to regeneration of the charcoal.

Mr. VIVIAN. If you use a coal treatment plant and take the heat from the coal to regenerate the charcoal, you could have a combination of a secondary and tertiary plant with self-generated heat, is that correct?

Mr. RAYNES. That is possible; at least part of the energy requirement.

Mr. VIVIAN. Is there any merit to using coal and charcoal in the secondary stage?

Mr. RAYNES. There very well may be. That's a good idea. And I think also merit in considering using coal in combination with some of the other processes Dr. Weinberger described yesterday, such as electro-osmosis and the like.

Mr. VIVIAN. Are plants being developed which include multiple stages?

Mr. RAYNES. No. I don't know that an actual pilot plant would be necessary. I think one could couple the information from each.

Mr. VIVIAN. On this whole subject of pilot plants which you mention on page 4 of your statement, I think the problem has been, and I think you probably will agree, that typical municipal systems have no margin for experimentation.

Mr. RAYNES. That is correct.

Mr. VIVIAN. Most communities are extremely reluctant to buy a plant which has any residual doubt about its operation. They would rather have a 90-percent plant that they are sure of than a 95-percent plant that might go wrong.

Mr. RAYNES. Yes.

Mr. VIVIAN. Is the Federal Government the only agency which is doing pilot plant research in volume? How much work is being done by private, State, and municipal agencies to develop better plants?

Mr. RAYNES. You said the only agency in volume? I think that is correct. I think it is the only agency in volume. There are State programs but they are not generally pilot programs. I can't, sitting here, recall of any.

Mr. VIVIAN. Going down further, do you know of any municipal plants that are doing research and development on treatment plants?

Mr. CONABLE. Chicago is, isn't it?