An Expansion Program for the Anderson Sewage-Treatment Works

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There are a few things about Anderson that I feel I must tell you in order to justify the planned expansion program for our sewage-treatment works. In 1938, under the Federal Emergency Administration of Public Works, Project No. 1225 F was started and in June, 1940, the treatment plant was placed in operation. The plant has a designed capacity of 8 m.g.d., using the Guggenheim biochemical process, which is a patented process licensed to the City of Anderson by the Guggenheim Brothers.

At the time this plant was placed in operation, Anderson had a population according to the U. S. Bureau of Census of 41,572. The plant was designed for a detention time of two hours for primary settling, 1.8 hours for aeration, and 2.3 hours for final clarifying, which is, as you all well know, a very short detention time to accomplish the reduction in suspended solids and B.O.D. generally required. However, the plant is capable of giving a good percentage of reduction at the designed capacity and has been doing a fairly good job at overloads considerably in excess of the designed capacity.

Population Growth

Everything went along very well until Anderson began suffering from growing pains. With World War II, Anderson started on a rather spectacular growth in population, and it is important to study the population increase in order to explain the need for the expansion program.

In 1830 Anderson had a population of 150. It is believed that the opening of the Erie Canal had a very decided influence on Anderson’s growth. While the Erie Canal did not pass through Anderson, it did, we believe, exert an influence on the growth of our city for about 23 years.

In 1840 the population was given as 350, which shows for the first 10 years of Anderson’s existence a 133% increase. In 1850 the population was 385, an increase of 10% over 1840.
In 1853 Anderson got its first railroad in operation, and by 1860, a period of seven years under the combined influence of the Erie Canal and the railroad, the population jumped to 1,168. In 1870 the population was 3,126. In this year Anderson got its second railroad, and the population in 1880 was 4,126. In this year the railroads were extended and a very pronounced influence was exerted on the growth of Anderson.

Then in 1887 a really big thing happened; natural gas was discovered, and was rapidly developed into a highly productive boom. In 1890 the population was 10,741. The gas boom continued for 10 years and gave Anderson a population in 1900 of 20,000. Then the gas played out and, in the ten years following, Anderson made a gain of only 2,476, making a population of 22,476 for the year of 1910.

However, at this time Anderson started another spectacular growth, perhaps due to the rumblings of World War I. From 1914 to 1918 industrial employment increased 600% in one key industry. The population of Anderson increased 7,291, making the total population 29,767 in 1920. The population continued to grow at a slightly faster rate for the next ten years, giving us a population in 1930 of 39,804.

It is interesting to note that after World War I industrial employment dropped off to approximately the level of just before the war. In the next eight years there were ups and downs in business, and then the boom. Some of you will remember too well the crash of 1929 which dropped employment away below the peak attained during World War I. But strange as it may seem, all during this period Anderson had a very spectacular growth, comparable to that of the gas-boom years. From 1930 to 1940 Anderson gradually grew from a city of 39,804 to 41,572. This increase represents but little more than would be expected from the natural birth rate.

As previously stated, construction of the sewage-treatment works was started in 1938 with a designed capacity of 8 m.g.d. This would appear to almost anyone as being proper and adequate. However, by the time the plant was completed and placed in operation in June, 1940, Anderson had started on another rapid increase of population directly influenced by World War II. From 1940 to 1945, Anderson grew from a city of 41,572 to a city of 61,000, according to post office count, while industrial employment in one key industry increased by 9,000. The sewage flow and the B.O.D. loading of the sewage have kept fairly well in step with this increase; therefore, it is easy to see why an expansion program is badly needed at Anderson.
PILOT PLANTS

A great deal of study has been made of the ever-increasing load on the sewage-treatment works, and in 1944 experiments were started in the hope of developing a faster process of sewage treatment. The first experimental plant was constructed from old oil drums, the idea being to eliminate the use of chemicals and to set up the optimum environment for aerobic bacterial action. After many alterations and adjustments, the results of this experiment became very encouraging. However, we were not inclined to jump at conclusions, and experiments were continued in this small pilot plant until June, 1945. Work was then started on the building of a much larger pilot plant in order to see if the results obtained in the miniature pilot plant could be duplicated on a much larger scale.

The second experimental plant was designed for a capacity of approximately 300,000 gallons per day, and we are pleased to report that this larger experimental plant is working very satisfactorily. Our master plant, using the Guggenheim biochemical process, requires approximately four hours detention time for aeration and final clarification, while the detention time for the past 16 weeks for aeration and final clarification in the experimental plant has averaged two hours.

This newly developed process is an exceptionally high-rate activated-sludge process. The principal difference between the conventional activated-sludge process and our new idea is the continuous 100% return of sludge. This is accomplished without mechanical collectors or pumps. When this procedure with activated sludge is followed, the aerobic bacteria are at all times furnished with sufficient oxygen and food, to enable them to accomplish more work in a given length of time than would be done under less favorable environment. The experimental work on this process has been very interesting and, we believe, well worth while. We now have no doubt about the successful application of this process.

It has been our observation in the operation of the experiments on the new process that shock doses of industrial wastes containing such things as chromic acid, steel-mill pickling liquor, and packing-house wastes have less detrimental effect on the pilot plant than they do on the master plant. We have also made this observation—when shock doses of unusual industrial wastes upset the operation of the pilot plant and the master plant, the pilot plant recovers in much less time than does the master plant. All in all, the results of our experimental work have convinced us that we may safely proceed with plans
to convert the existing aeration tanks to this new type of activated-sludge process and feel sure that by so doing we will easily take care of Anderson's sewage-treatment needs. If we are correct in our belief, this procedure will effect a very substantial saving in time and expenditure of money.

I have not gone into detail in my description of the process because of the fear that a technical discussion of the process at this time would be tiring and uninteresting. The pilot plant is in continuous operation, and, if any of you gentlemen are interested in seeing it, we will be pleased to have you as visitors at any time.