



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON 98, DELAWARE

EXECUTIVE OFFICES

August 24, 1945

*To all employees of
E. I. du Pont de Nemours & Company:*

All of you have unquestionably read and heard a great deal about the releasing of atomic energy, culminating in the dropping of two atomic bombs on Japanese cities. Some of you have been engaged in work in this field. Those who have not been directly connected with the project have by now almost certainly heard that our company had a part in it.

In preparing this report, the purpose has been to inform all of you of du Pont's connection with this work, so that you will know what was done and what some of us here in Wilmington thought about it. I do not mean to go into the technical details of our operations, as it is the company's feeling that it is up to the Government to decide what should be said on that score. I do want to cover the non-technical aspects of the project with some thoroughness.

In the first place, the Government has indicated that our part of the work was accomplished to its complete satisfaction. In the second place, the du Pont Company did not, and does not, make atomic bombs. Our part in the project has been to produce one of the essential ingredients used in the ultimate construction of the weapon which helped to bring the war to an end. It has been quite a job, and the story of that job begins in the fall of 1942.

It was at that time that Major General Leslie R. Groves, representing the War Department, came to du Pont with the request that our company undertake a share of a project of great importance in the war effort. This project dealt with the release of atomic energy. The atom had been split in laboratory experiments, and scientists believed that if a way could be found to release this force at will and if adequate means of production could be developed, the United States would have an explosive enormously more powerful than any previously known, and could undoubtedly bring the war to a quick end.

All available evidence strongly indicated that our enemies, especially Germany, were seeking the same end. If they got it first, even at the last minute before collapse, the entire course of the war would be changed. This fact was brought to our attention by General Groves.

He also made it very plain that he was asking the company to go into a field about which little was known beyond the fundamental scientific theory. He realized fully that the chance of failure was so high as to make the project inadvisable under ordinary circumstances. He knew that it might well involve dangers for those engaged in the work. But the fact that our enemies were after the same result left the Government no choice. The attempt had to be made, and General Groves explained to us—that is to say, the Executive Committee of the company—that the Government regarded du Pont as the organization best qualified to undertake a major phase of the work.

We hesitated to accept the proposed responsibility for two reasons: the first was that the company was already so heavily burdened with war work, accepted at the urgent request of the armed services, that we feared our personnel would be hopelessly overloaded if we took on anything of the magnitude of this task; the second was that du Pont is a chemical company, and while it has done considerable pioneering work, it has always been in the general field of chemistry, where we had the aid that comes with experience. Now we were asked to enter the field of nuclear physics, and we felt it was out of our line.

General Groves pressed his argument. He told us that President Roosevelt, Secretary of War Stimson, and General Marshall, Chief of Staff, all felt that this was a matter of the utmost urgency. He pointed out that victory in the war would go to the nation that solved the problem first. His presentation of the situation made it evident that, whatever the odds against success, the country could not afford to give the Axis a clear field in the attempt to liberate atomic energy. He reiterated the Government's confidence in du Pont.

This being the case, we felt compelled to give up our hesitation about participating in the project, taking the position that if the Government believed du Pont's assistance was needed, we could not refuse.

We did, however, insist upon two conditions. The first was that du Pont make no profit whatever from the work it did. The contract accordingly gave du Pont a fixed fee of one dollar on work that ultimately was to necessitate the expenditure of about \$350,000,000, and the design, construction, and operation of by far the largest plant that du Pont ever built or operated. The second was that no patent rights growing out of du Pont's work on the project should go to du Pont. Our feeling was that the importance to the nation of the work on releasing atomic energy was so great that control, including patent rights, should rest with the Government. The Government accepted this condition, too.

Having made these two conditions, we felt that we were justified in asking that the Government provide very complete protection to the company as to costs, expenses, claims, and losses. The Government found this request reasonable, and agreed to protect du Pont. It of course agreed to pay all costs of the work.

The project was assigned to the Explosives Department, which organized a new division known as "TNX" to handle the work. The department drew heavily on its own personnel from commercial and war plants as well as from nearly all departments of the company, so that in the end TNX represented a group of the du Pont men best suited for the work, irrespective of their previous locations. Thus it was, and continued to be, an over-all du Pont effort under the able guidance of the Explosives Department.

In this connection, the contributions of the Engineering Department were outstanding, and the design and construction problems met and solved by it were the greatest the company ever encountered.

At the beginning of our conversations with General Groves, the nature of du Pont's share in the project was necessarily somewhat vague. The truth was that no one knew enough about the field into which we were going to be definite. Responsibility for the fundamental research and development essential to the success of the work done by du Pont was entrusted to the

University of Chicago by the Government. By essential, I mean that if the University had not fully done its job, du Pont could not have carried through its share in the project.

We were asked first to engineer, design, and construct a small-scale semi-works plant which was to be operated by the University. This semi-works plant was built by du Pont at Clinton, Tennessee, where the larger Oak Ridge project was also constructed by others. In addition, a number of key du Pont technical men were loaned to the University, which needed skilled assistance along lines of industrial experience.

In the meantime, the pressure on the Government for haste grew to such proportions that du Pont was asked to go ahead with the engineering, design, construction, and operation of a large-scale plant to produce one of the essential materials for atomic bombs, a new chemical element called plutonium.

The request was without precedent. In normal procedure, a large-scale plant is constructed on the basis of the experience gained in semi-works operations. The semi-works is, so to speak, a practice model where the "bugs" can be eliminated and workable methods of production perfected. The Government representatives were frankly doubtful as to whether it was possible to short-circuit this normal procedure by going ahead with a large-scale plant before waiting for the results of the semi-works project. They wanted du Pont's opinion as to the feasibility of such procedure. The company pointed out the difficulties involved, but in the end, as I have said above, agreed to proceed if that was the way the Government wanted it. It was.

Complete secrecy had to be observed. That the secret was well kept is now obvious. Much technical information is still highly secret, and will presumably continue to be for a long time to come.

Many new and unusual problems were encountered by du Pont in carrying through this project. We had aid from the University of Chicago, to which we turned for consultation and advice, using this knowledge to augment our industrial and engineering experience. The University answered many specific questions put to it by us, and in addition studied and concurred in the final du Pont decisions and designs.

The War Department, in a press release concerning the Hanford plant, commented that "The story of its construction and operation is a story of ingenuity, intelligent planning, and bold innovations in design and construction. It is a story of action, sacrifice, high morale, and loyal, hard-working employees. It is the epic of American industry's and the American workers' answer to the challenge of a great emergency."

A few facts about Hanford may be of interest. The area owned or controlled through lease by the Government exceeds 600 square miles. The manufacturing area is subdivided into three large areas, each of which is again subdivided into sections miles square. One of the three main sections contains three enormous groups of structures in which material is produced. The second area contains three huge chemical plants where the material is purified and concentrated. The third prepares the raw materials.

As an adjunct to construction of the plant itself, it was necessary to build housing for construction workers at Hanford, a community which mushroomed to 60,000 inhabitants in the

course of two years. The actual construction force reached 45,000 at its maximum in June of 1944. The separate village of Richland, built to house the plant operating force, has a population of 15,000.

Construction of Hanford involved the use of 8,500 major pieces of construction equipment, and the building of 345 miles of permanent roads and 125 miles of railroad. Twenty-five million cubic yards of earth were excavated and 780,000 cubic yards of concrete were placed along with 1,500,000 concrete blocks and 750,000 cement bricks. Forty thousand carloads of materials were received, including 40,000 tons of steel, 160,000,000 board feet of lumber, and 11,000 poles for the electric power and lighting system.

The plants at the Hanford Engineer Works are huge structures. They are plants in which materials in enormous quantities are handled through many successive processes with no human eye ever seeing what actually goes on, except through a complicated series of dials and panels that enable the operators, in many cases behind concrete walls, to maintain perfect control of every single operation at all times.

Reference has been made to the hazards which we thought might be involved. Largely because of the great care taken by all who worked on the various projects to see that all possible safety measures were provided and rigidly observed, construction and ordinary operating accidents were held to a minimum. There have been no accidents due to the hazards inherent in the process.

Although the semi-works at Clinton was not of use as a complete early edition of Hanford, because design, procurement, and some construction for Hanford had to go on while Clinton was being built, things worked out all right at the Washington State plant. And Clinton proved very helpful in the solution of the many completely new problems encountered in the large-scale operation.

In addition to the Clinton and Hanford projects, on which the Explosives and Engineering Departments did such a splendid job, the du Pont Company made several other contributions to the atomic program. I should mention specifically the Ammonia, Grasselli, Organic Chemicals, Pigments, and Plastics Departments, all of which aided greatly by doing research or supplying materials to Hanford and to other parts of the atomic project. The work these departments did was not covered by the Clinton-Hanford contract, but by other agreements of a more usual nature. The auxiliary departments contributed substantially.

In concluding this report, I want to express the company's profound gratitude to all du Pont employees who had a part in the atomic program. They did their work faithfully and well, and the satisfactory conclusion of their efforts is in itself a tribute beyond any words that I, or anyone else, can address to them.

W. S. CARPENTER, JR., *President*