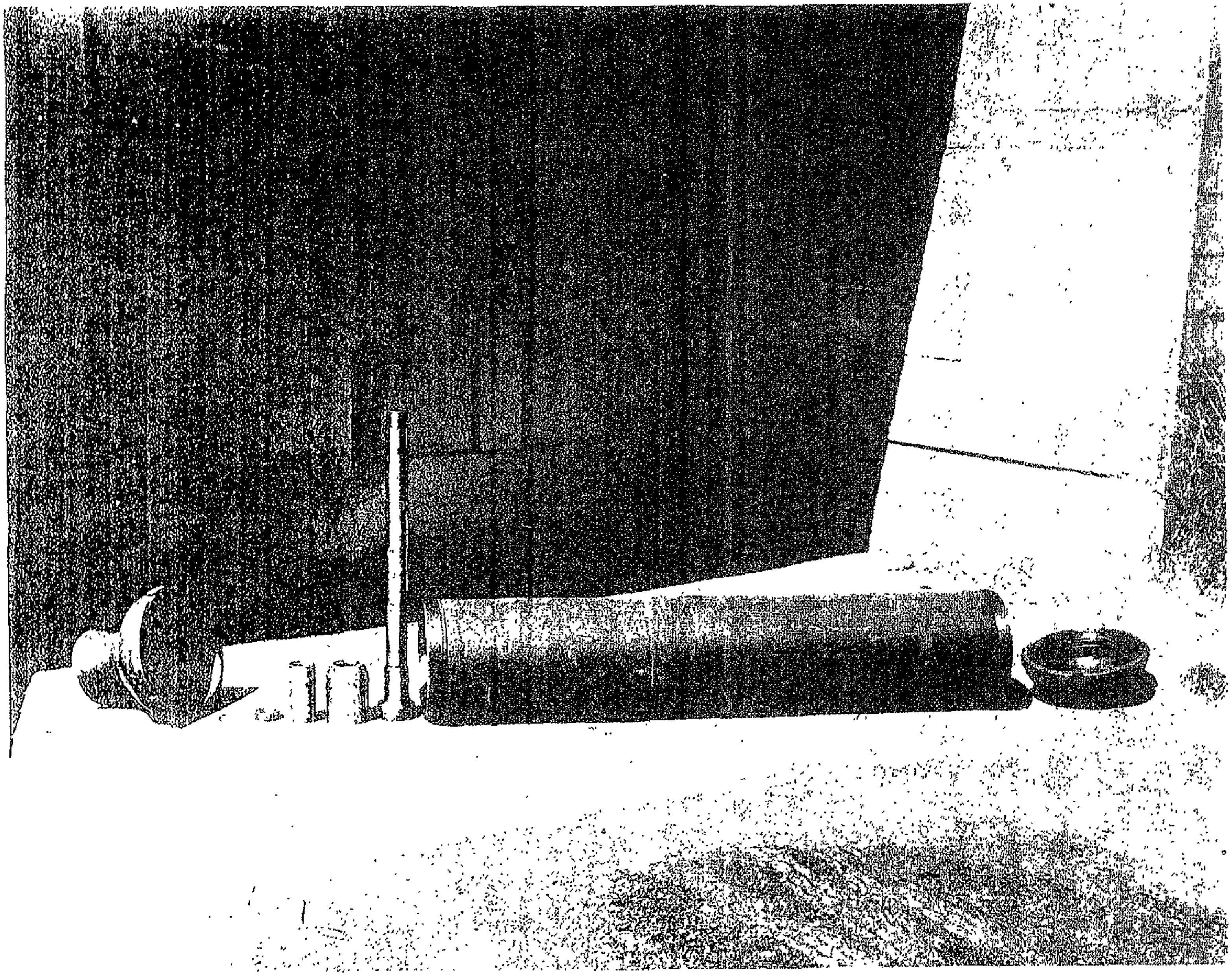
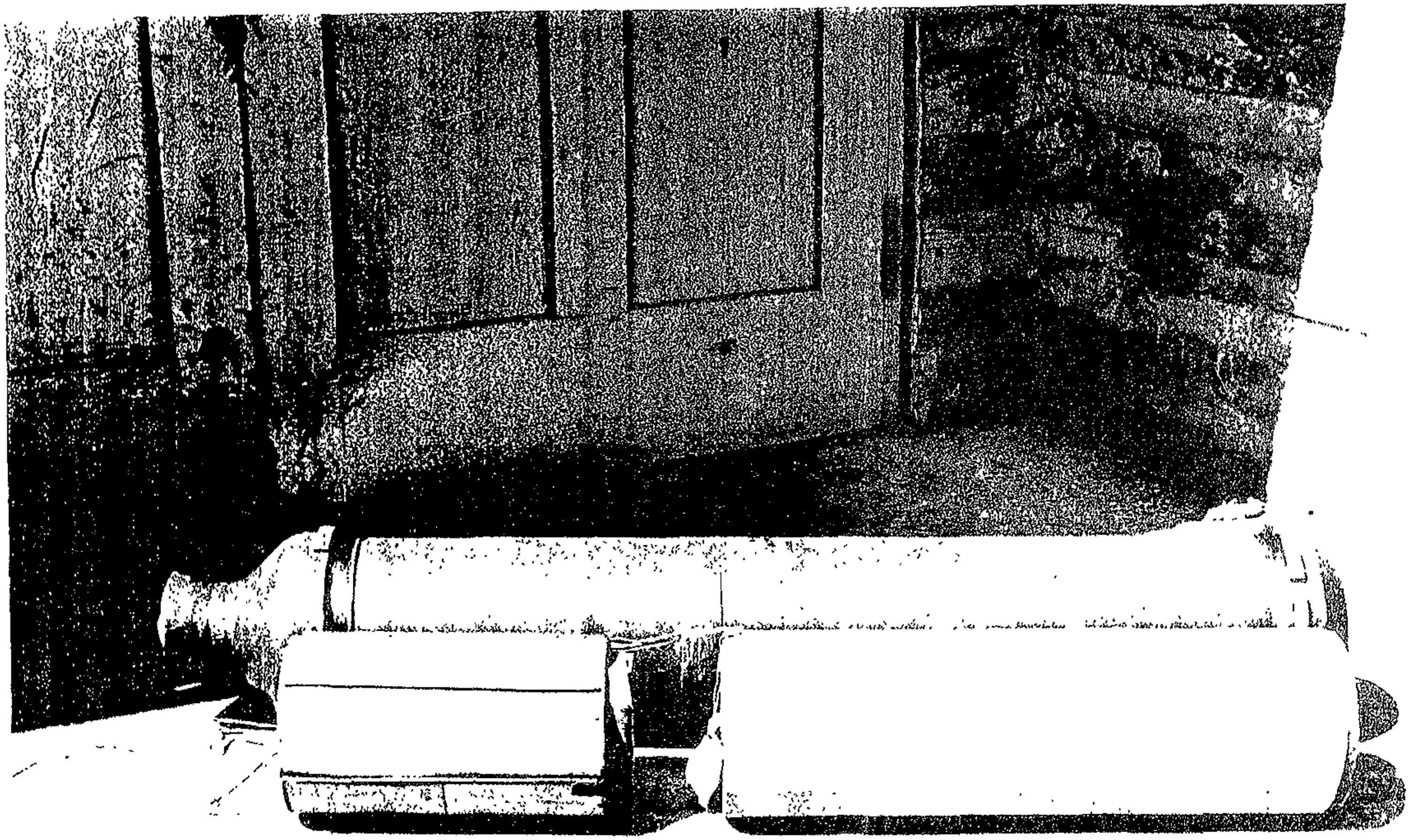
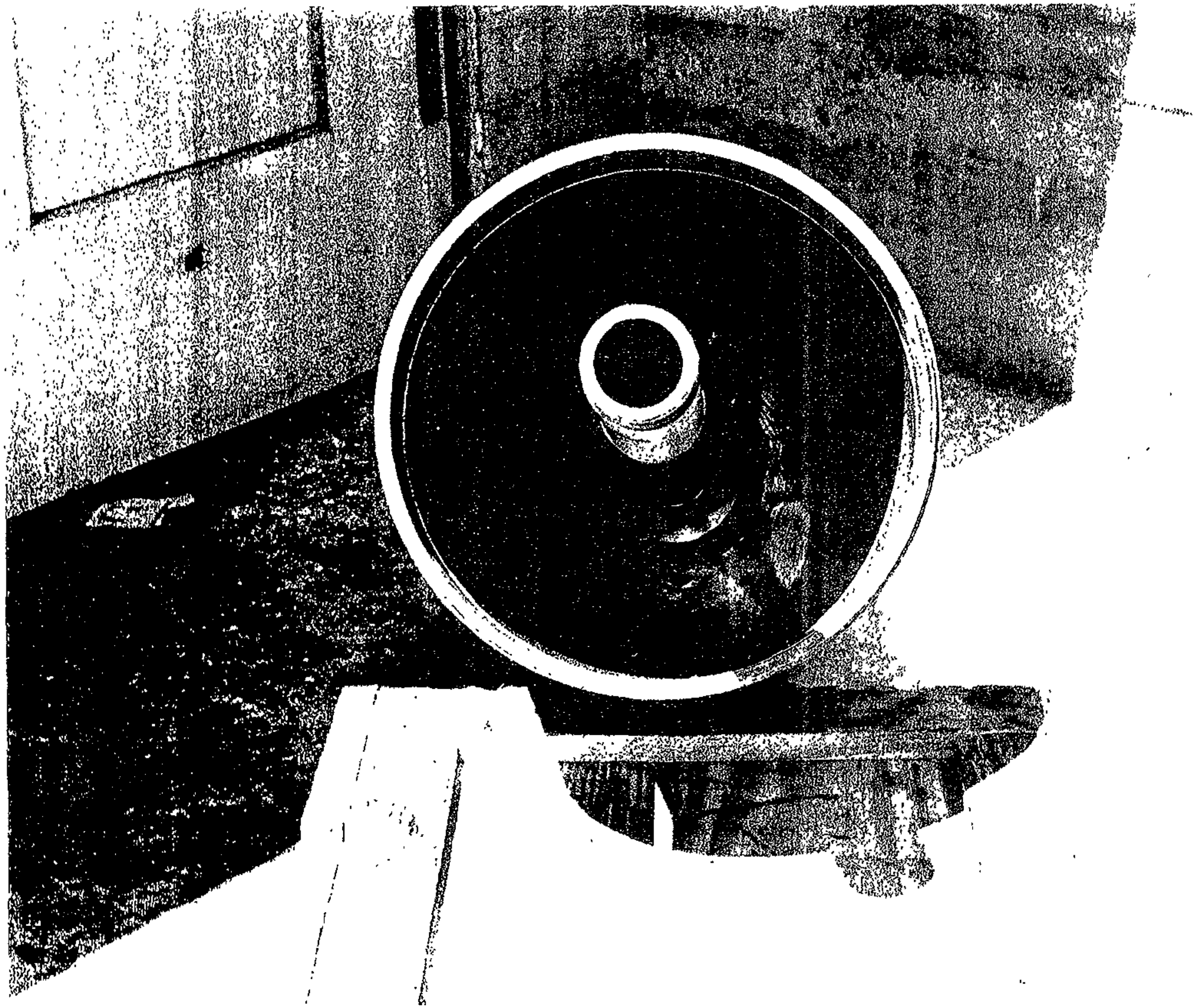
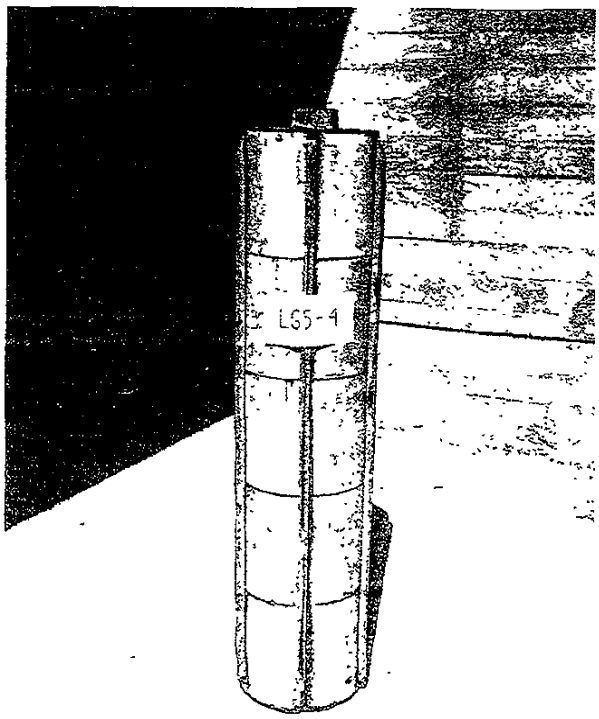
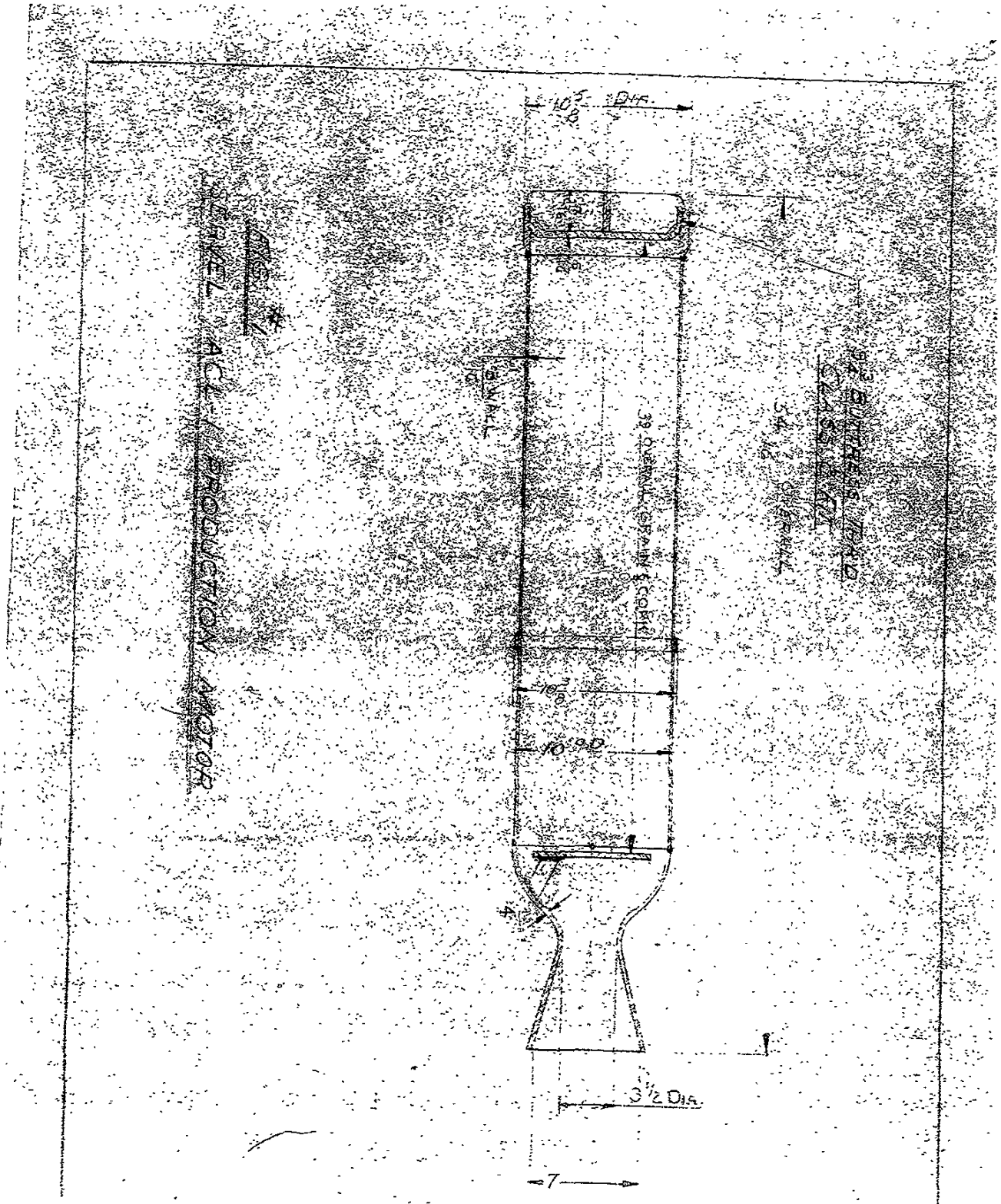


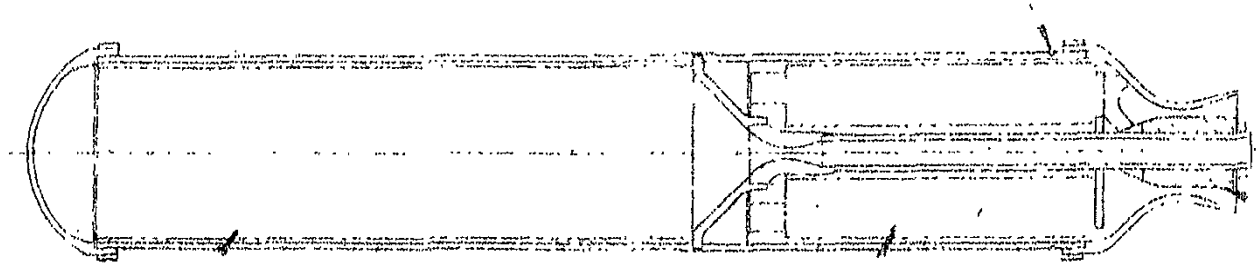





LGS-1


10⅝ DIA.
39 OVERALL GRAIN (CORK)
10⅜ DIA.
3½ DIA.
7

FAILURE PROBABLE



$8\frac{1}{2}$ DIA X 29" LONG SOLID
CP 404

$8\frac{1}{2}$ OD X 2" ID X .5" THK
CP 495

TIAMAT MOTOR

FIG. Nº 2

J. Dewald
6.P.
3-9-65

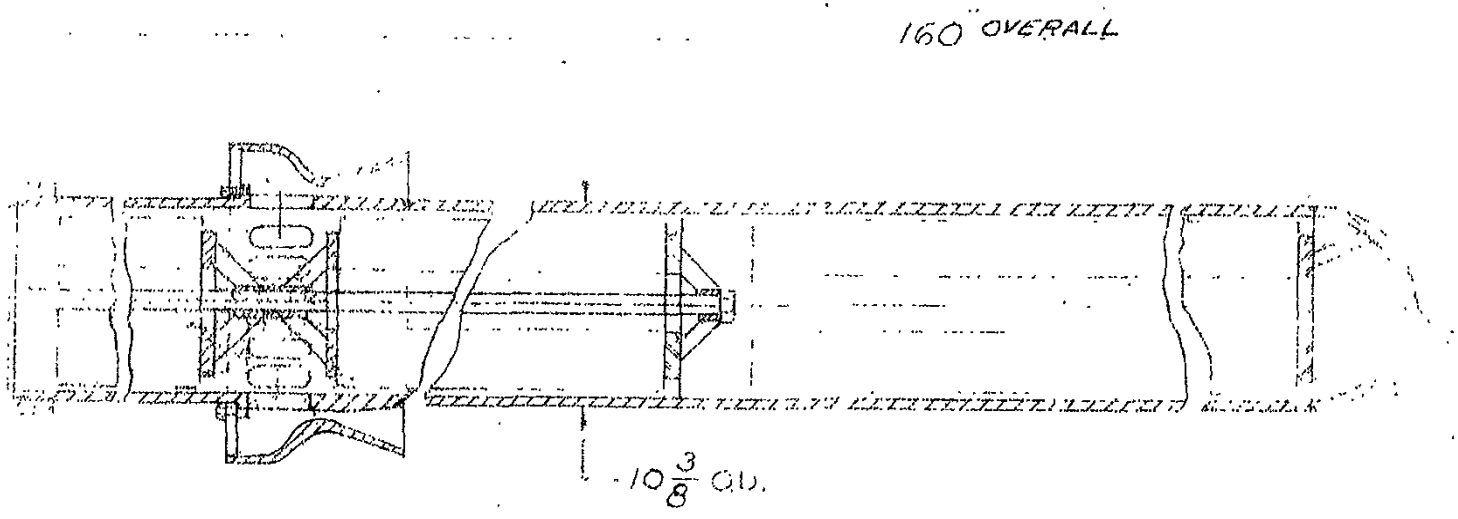
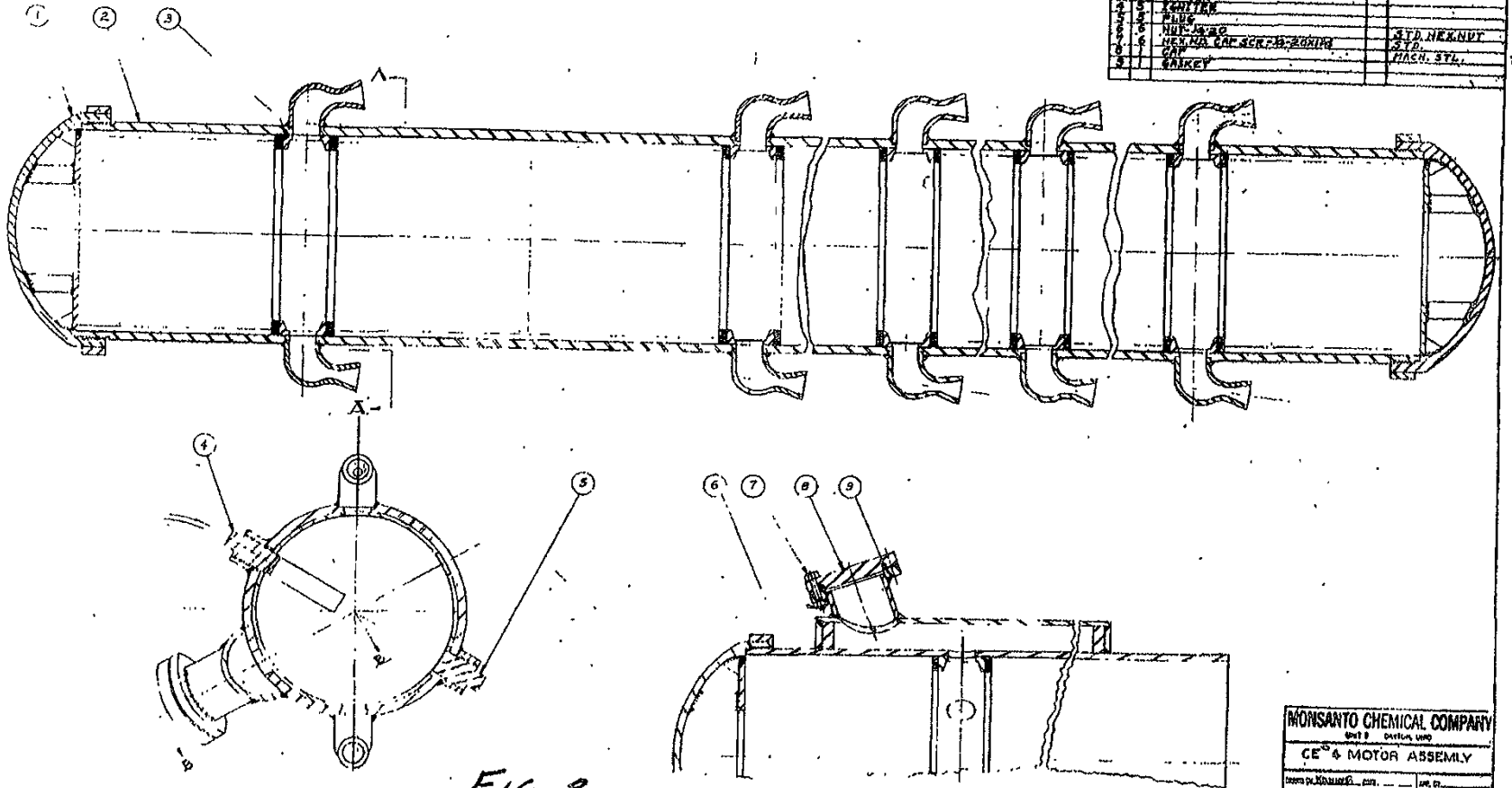


FIG. - 2

MULTIPLE CHARGE

ACL-1 MOTOR



LIST OF PARTS

PT. NO.	NO. REQ'D	NAME	PART NO.	MATERIAL
1	2	HEAD- 3WG NO-C-100A-NK-41-3		SAE #4130
2	1	MOTOR BODY ASSEMBLY		WELDED CONST.
3	1	SPACER		
4	5	CAPTIVE		
5	5	PLUG		
6	5	NUT-3/4-10		STD. HEX. NUT
7	6	HEX HD. CAP SCR. 3/4-10 UNF-2		STD.
8	1	CAP		MACH. STL.
9	1	GASKET		

SECTION A-A

SECTION B B

FIG 3

MONSANTO CHEMICAL COMPANY
Unit 9 DAYTON, OHIO

CE 64 MOTOR ASSEMLY

Dwg No. D -100A-NK-43-1

WAR ACTIVITIES OF THE
CENTRAL RESEARCH DEPARTMENT
MONSANTO CHEMICAL COMPANY

From the beginning of the war period, the Central Research Department of Monsanto Chemical Company has engaged in important research activities for the benefit of the Allied cause. Projects have been undertaken and brought to successful completion in many and varied fields.

Early assignments required the expansion of existing facilities. As the program of war research grew, it became necessary to establish new research units at other locations in Dayton. At the present time, activities at the main laboratories on Nicholas Road are augmented by three new units. Unit 2 is a research pilot plant operated by Monsanto for the government. At Units 3 and 4 a group of scientists are engaged in secret war research for the War Department.

In addition to the work at these new units erected solely for war research, much work has been done at the main laboratories. Most members of the permanent staff of the Central Research Department have been called upon many times to contribute to the varied needs for war research by the armed services and other government agencies.

I. Technical War Assignments at Central Research

The first contribution of the Central Research Department to the Allied cause came long before Pearl Harbor. In October, 1940, a

a contract was completed for research on a problem in the field of liquid fuels. This problem was of vital interest to England during the dark days of the war when invasion of the British Isles by Germany appeared imminent. Research was prosecuted with great vigor, with the result that in April, 1941, a solution to the problem was secured and the contract was successfully terminated.

Perhaps the major contribution of the Central Research Department to the war effort and the work of most lasting and fundamental importance to the future economy of the nation, was the development of a process for the synthesis of styrene for the Rubber Reserve Company. Research in this field was initiated by the technical staff in Dayton in 1939 in connection with the program of plastics development for the Company. By 1941 the fundamentals for a successful process had been established. Pilot plant studies were then initiated in Dayton. To speed the transfer from research to production, an extensive training program for personnel for the production unit was inaugurated. From the engineering data secured from the pilot plant studies, the design for the large scale production unit at Texas City was begun. Construction of this plant started on March 17, 1942, and the first tank car of styrene left the plant just seven days less than a year later.

Because the plant at Texas City was the first styrene plant in the government's synthetic rubber program to go into production, Monsanto may take pride in this significant contribution to the war

effort. On December 8, 1943, an award for chemical engineering achievement was presented to Monsanto "in recognition of its meritorious contribution to the design, construction, and operation of the American synthetic rubber industry -- a great wartime miracle made possible through patriotic sharing of the creative knowledge, engineering experience, and manufacturing facilities of the rubber, chemical, and petroleum industries.... presented by Chemical and Metallurgical Engineering."

The development of new plastics has continued during the war period and many engineering problems have been solved by the application of these new products. One trend in the development of these new plastics has been to speed up the pilot plant research program to enable small quantity production for actual use while waiting for construction of the full scale manufacturing plant.

Plastics

CEHEX was introduced in experimental quantities in 1944; this plastic combines high heat distortion with moldability, good strength, good electrical properties, and dimensional stability. It came from a long search by the chemists of the Central Research Department for new copolymers. It was immediately apparent that it had unique properties and application by various war agencies to special problems followed soon after its introduction.

Among the early applications which were made possible from experimental production in Dayton were battery cases, coil forms, condensor housings, radio crystal holders, radar insulation and as a replacement for mica-filled phenolics. Pilot plant operations at Dayton were expanded to provide sufficient engineering data to

build a CEREX plant at our Plastics Division, and output was sufficient to provide experimental quantities for actual use in many instances, pending completion of the manufacturing plant.

Another copolymer was developed and put into production at Central Research, in cooperation with General Electric Company. This new copolymer is highly desirable for radar insulation in certain confidential applications for the U. S. Navy Bureau of Ships. Our plant is the only source of this material. Production is small, but sufficient to meet the special requirements of the Navy. It has been used in the Pacific and has contributed a great deal to the successful operation of radar in this theatre of the war.

Another liquid plastic was developed and produced in sufficient quantities to supply the needs of a number of aircraft engine manufacturing companies for a sealant for impregnating magnesium castings to prevent gasoline leakage. Pilot plant facilities met immediate needs and further investigations as to other applications were made by the Plastics Division.

Laboratory work was also devoted to development of new synthetic rubbers; this work was done in conjunction with Monsanto's Rubber Service Laboratories. Several copolymers for new synthetic rubbers were developed and these have sufficient promise to carry them through to actual road tests in synthetic rubber tires.

The Central Research staff was instrumental in the development of Santomerse for all-purpose and sea-water detergents for use by the Army and Navy. Our work has been in evaluating and preparing compositions to solve specific problems encountered by the armed

services in their mobile laundry units. These formulations have given an excellent sea-water detergent and an all-purpose personal soap.

Another laboratory development of considerable interest to the armed forces is an easily applied, permanent water repellent. Final stages of the development and practical mill trial of this product (known as Respreof, W. R.) have been reached. This product appears particularly promising.

The Central Research Department has manufactured considerable amounts of dichlor ethylbenzene. This compound is transformed at the Plastics Division to dichlor styrene, which gives a plastic with high melting point. This product has been of benefit to the Navy in applications which are confidential.

Four months before Pearl Harbor, the Central Research Department was requested by the government to initiate research to develop a new rocket and jet propellent which would have superior properties to the available materials. Laboratory research was soon expanded to pilot plant studies at Unit 2. Working in close cooperation with the Army and Navy, our chemists studied various applications of the new propellent in secret weapons.

Recently the staff at Unit 2 has been working with the Army Air Force on the application of our propellent to the launching of robot bombs. A suitable charge has been developed to meet this need and the facilities of Unit 2 have been expanded to insure immediate small scale production of this propellent.

The need for the propellent has become so important that the War Department has authorized Monsanto to provide facilities at Marshall, Texas, for its large-scale manufacture. The scope of this development may be realized from estimates of the final size of the plant at Marshall, which will cover approximately 2000 acres. Eight million dollars will be spent in its construction and it will be staffed by approximately 700 employes. During the period of construction at Marshall, Unit 2 facilities are being used for interim production, the development of engineering data, and the training of supervisors for the Texas plant. It now appears that this plant will be greatly enlarged even twelve fold.

Units 3 and 4 of Central Research were established at the direction of the War Department to participate in a secret war project which cannot be disclosed at this time.

II. How Individuals at Central Research Helped

Along with the general participation of the Laboratories in the war effort, there have been many instances where the technical staff at Central Research has been called upon to make specific contributions.

Charles Allen Thomas, Central Research Director, has spent considerable time as a research consultant to various war agencies. Dr. Thomas served on the Bernard Baruch Committee which formulated the government's synthetic rubber program. In 1940 he was appointed a special investigator and consultant to Division 8 of the National Defense Research Committee, which is concerned with research on explosives; later he was elected Deputy Chairman of this division.

III. Other War Activities

The growth of Central Research reflects its participation in the war effort. At the outbreak of war, slightly more than 100 employes were working at Central Research. Two years after Pearl Harbor, there were approximately almost 500 persons at all four units, most of them on direct war assignments.

One interesting note is the addition of a number of women employes to the Research staff, both as chemists and as assistants. Their contribution helped in meeting the schedules of the various war projects. The contribution made by women in plant work at Unit 2 and their assistance at a time of acute manpower shortages is a noteworthy instance of this.

All employes at Unit 2 with six months or more of service on the project are to be given a citation and certificates of award from the Government for their contribution.

There have been many instances of civilian participation in the war effort. The Dayton laboratories were awarded a Certificate of Distinguished Service rendered in behalf of the War Financing Program in Ohio, a reward for participation in the various war bond drives. Employes purchased war bonds both on the payroll deduction plan and in outright purchases.

Many employes served as air raid wardens and in other civilian defense work in Dayton and Montgomery County. A decontamination corps was formed in Dayton, and many Monsanto employes helped in that work; the following were instructors in civilian training to combat gas

warfare: George H. Deebel, W. R. Derby, Ernest Dybdal, R. G. Fordyce, J. C. Harris, J. W. Heyd, Paul Jacobs, Milton Kosmin, J. H. Lum, P. E. Marling, F. T. Marshall, E. N. Rosenquist, and R. B. Seymour. The company plant formulated a plant air-raid alarm and conducted actual blackout tests.

A number of the members of the technical staff at Dayton have also contributed considerable of their time and experience in presenting courses of study under various government war education plans. This group includes:

David McCullough
R. G. Fordyce
Raymond Myers
T. M. Patrick
Carl Feichtinger
M. R. Sullivan
G. M. Koselopoff
S. Aulabaugh

These courses were given in conjunction with University of Dayton, Y.M.C.A. College, and Miami University.

The rationing program received its share of participation. Plant transformation and share-the-ride programs were established. A number of employes and wives of employes were among those who did volunteer work for the OPA and other war agencies in Dayton.

Monsanto Victory Gardens were established; this gave all employes an opportunity to garden in a centrally located plot. Needed produce was secured at a time when supplies were curtailed.

In addition, Dr. Thomas has been called upon to act as coordinator in a research project by the War Department of nation-wide scope, and primary importance in the prosecution of the war.

Carroll A. Hochwalt, Associate Central Research Director, has served since 1940 as a special investigator and consultant for the NDRC. Dr. Hochwalt is also a consultant for the Office of Production Research and Development of the U. S. government for the duration.

A number of technical men were transferred from Central Research to direct participation in the war effort at Units 2, 3, and 4 in Dayton, as well as at other Monsanto locations.

James H. Lum, groupleader in the Central Research Department, spent a year's leave of absence on special assignment to the National Defense Research Committee. At the Explosives Research Laboratory of NDRC he directed the efforts of a group developing a new application for high explosives. Work was started in November, 1942, and by June, 1943, the new product was in full-scale production by ordanance plants of the Navy. The development has been widely used in the operations of the Navy in the Pacific theatre. On September 1, 1943, Dr. Lum returned to Dayton, and was assigned to Units 3 and 4 as project director.

In addition, a number of Central Research employes have been associated with the war activity at Units 3 and 4. At the present time, Josef Heyd, R. W. Moshier, and Paul Hamilton are engaged in research at Unit 3. On a part-time basis, Gosta Akerlof and Dexter Reynolds

have acted as consultants in physical chemistry and physics to this unit.

John R. Eck was assigned to the initial research at the main laboratories of Central Research Department on the propellent project. With the establishment of Unit 2, he became project director and remained in this position until he was transferred to the Trenton plant on July 1, 1944, as assistant plant manager. He was succeeded at Unit 2 by C. Rogers McCullough, who as project director, has supervised the operations at this unit and has assisted in the establishment of the large plant at Marshall, Texas.

Rodger Schaefer, Robert Henze, William Dunlap, and Robert Schwandt were transferred from Central Research to Unit 2 for the duration. Herbert Morris, Paul Jacobs, Robert Wangerin, and William Slager were transferred from Dayton to Texas City for supervisory positions at the styrene plant.

In addition, there were these transfers from other Monsanto locations to the Dayton war projects: Morris Nielsen from Anniston to Unit 3; George Timpe from the St. Louis Accounting Department to Unit 3; Joseph Soffranko from Marshall, Texas, to Unit 2; Robert Lenz and David Weddell from Anniston to Unit 2; Jack Ray and Darrell Hammett from Trenton to Unit 2; S. Beatty Tanner from Texas City to Unit 2; H. W. Kramer from the St. Louis Treasurer's Office to Unit 2.

Our employes who served the war effort include 32 young men assigned to various branches of the armed services. They have participated in all war theatres.

A large group of Monsanto people responded to repeated calls for blood donors from the American Red Cross; a surgical dressing unit was established for a group of laboratory girls who helped regularly in preparing surgical dressings at the Dayton Red Cross.

Monsanto Women, a group organized for women employes and wives of employes, met regularly and devoted much of its program to various war activities, including a "Health for Victory" Club and discussion of various problems brought on by the war.

- Compiled by J. C. Toedtman

JH
January 20, 1945

HISTORY OF THE DAYTON PROJECT

HISTORY OF THE DAYTON PROJECT

Keith V. Gilbert

June 1969

Monsanto Research Corporation
A Subsidiary of Monsanto Company

MOUND LABORATORY
Miamisburg, Ohio

Operated for
United States Atomic Energy Commission
U.S. Government Contract No. AT-33-1-GEN-53

The development of the $60-million Atomic Energy Commission production and research facility in Miamisburg can be traced to an origin in 1926 when the Thomas and Hochwalt Laboratories were established in Dayton. This firm was acquired by Monsanto Chemical Company in 1936 to carry on long-range and fundamental scientific study on a company wide basis.

In March 1939, only a few weeks after the discovery of uranium fission, the possible military importance of atomic energy was called to the attention of the U. S. Government. In the autumn of 1939, the first Government committee on uranium was created. The initial work was done in various universities with the overall effort being somewhat loosely organized. By the end of 1941, an extensive review indicated that an increased effort on the uranium project should be undertaken under the administration of a more formal organization. This decision was approved by President Roosevelt. In the summer of 1942, the Army Corps of Engineers organized the Manhattan Engineer District for this purpose.

Charles A. Thomas, Project Director, 1943 - 1945.

Dr. Charles Allen Thomas was director of Monsanto's Central Research Department in Dayton when, in 1943, he was called to Washington for a conference with General Leslie Groves. Groves had been assigned responsibility for the Manhattan Project in September, 1942. Also present at the conference was James Conant who had been president of Harvard University prior to his appointment to the National Defense Research Committee. After swearing Thomas to secrecy, they revealed to him the top secret plan to build an atomic bomb. Following several days of meetings and discussions, Monsanto accepted the responsibility for the chemistry and metallurgy of radioactive polonium—work to become known as the Dayton Project.

Polonium was vital to the construction of an atomic bomb as a

James H. Lum,
Laboratory Director,
1943 - 1945

source of neutrons, subatomic particles which would assure initiation of a chain reaction. Discovered by Pierre and Marie Curie in 1898, polonium was named to honor Poland, her home. Prior to Monsanto's involvement in the Manhattan Project no weighable quantities of the pure element had ever been isolated and preparation of the pure metal called for the development of revolutionary scientific techniques.

Monsanto began preliminary organization and personnel recruiting at the Company's Central Research Department on Nicholas Road in Dayton in September 1943. When the Dayton Project began to expand to other temporary locations during World War II, the original Nicholas Road location was designated as Unit I.

Dr. James H. Lum from Monsanto was appointed Laboratory Director

W. C. Fernelius,
Asst. Laboratory Director,
1944 - 1945,
Laboratory Director,
1945 - 1946.

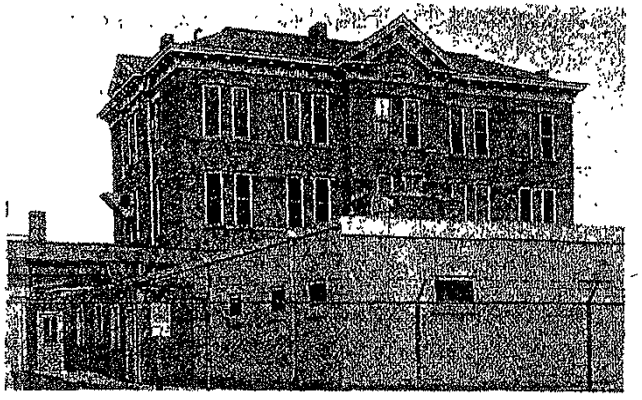
and Dr. W. C. Fernelius from Ohio State University was appointed Associate Laboratory Director.

Early in July 1943 it became apparent that quarters entirely separate from the Unit I were needed for the polonium operation. Construction of a new research laboratory was impossible due to time and material limitations, and rental space was at a premium. An old three and one-half story building at 1601 W. First Street in Dayton, Ohio, was leased by Monsanto. This building had been constructed in 1879 to house Bonebrake Theological Seminary. It was later used as a normal school, then as a warehouse by the Dayton Board of Education. It required considerable repair (every window in the building was broken, many interior walls had to be replastered, and

the staircase from the second to the third floor was missing). Also, extensive renovation was necessary to fit the building for service as a chemical research laboratory. This site became known as Unit III and all activities were transferred in October 1944.

A lack of scientific equipment plagued the project from the outset. Total initial laboratory supplies at the Seminary building consisted of a "bushel basket" filled with assorted chemical glassware. One of the major jobs in the early days was procuring necessary equipment to stock a research laboratory.

Going away party for W. C. Fernelius at Unit III. Shown l. to r. are Joseph Spicka, Ed Larson, Fernelius, Carl Rollinson, Malcolm Haring and Joseph Burbage.



Unit III site in 1948. Cafeteria is shown in foreground and corner of physics building in left foreground.

This was no easy job with the war on; and it was made more difficult due to the secret nature of the project. No official priority rating was obtainable because any official relationship with the Manhattan Engineer District had to be avoided for security reasons. Fortunately, a statement that Monsanto was engaged in critical government work was normally adequate to obtain the necessary materials. Where this failed, scientists either improvised or managed to get by without the equipment. All Manhattan Project work at Dayton was secret and the security regulations were rigid. Armed guards were on-site 24 hours a day to prevent unauthorized access to the laboratory. Employes were not authorized to discuss the nature of their work away

from the laboratory. Even inside the plant extra security precautions were taken. Polonium was referred to by code names to avoid accidental compromise. Security also made it difficult to attract new employes for they could be told nothing specific about the work they would be doing. Indeed, few if any of the employes knew that they were ultimately working on the atomic bomb. Very early in the project's development, Arthur Compton, a leading U. S. physicist, visited Dayton and spoke to the technical employes at Unit III. As his speech progressed he divulged that the work was in the nature of development of a secret weapon, "we don't know how far Germany has progressed; but whoever gets the answer first will win the war". As he reached this point, however, Dr. Lum, fearing a breach of security, rapidly changed the subject. This proved to be the biggest hint about the nature of their work that the Monsanto employes received until the bomb was dropped on Japan.

Growth of the project provided additional problems. New employes were moving to Dayton to apply their scientific skills to the project. Housing was difficult to find, particularly rental housing for men with families. Bachelors found quarters in rooming houses, at the YMCA or shared apartments when they could be found. The project's business office worked with local realtors to locate family housing and anxious employes scanned the newspaper daily. It was through a newspaper adver-

tisement that a 16 room house in the fashionable Oakwood section of Dayton was found for rental. Since the rental fee was much too high for one family, three Monsanto employes rented the structure and three families shared the house. The home was unique both in its size and its lavishness. The living room contained a full size pipe organ which would have been adequate for a large church. The fireplace was large enough for the children to hide behind the andirons. Although there was a four-car garage, none of the new residents had an automobile. The Monsanto wives used children's wagons to bring their groceries home from the store. Shopping expeditions by the wives must have been a sight to the neighbors who were accustomed to sending their butlers to do the shopping.

A group of 30 to 40 men with the Army's Special Engineer Detachment (SED) were also assigned to the Dayton Project. Although military men, they wore civilian clothes for security purposes. The top secret nature of the project presented special problems to these young, healthy, apparent civilians in their off-duty hours. One of these men was stopped by the police who requested his identification. His Class A pass showing special detached duty was not adequate, however, and he was taken to the local jail. Such emergencies were expected and an officer at Wright Field had been designated as a contact man for identification of the SED personnel. As luck would

have it, though, he could not be reached that night and the hapless SED man spent the entire night in jail.

As the magnitude of the polonium production program unfolded and the staff grew to meet enlarged scientific demands, it became apparent that additional laboratory space would be required. The Dayton Project had expanded rapidly from its small beginning to almost 200 persons in less than a year. In February 1944 the Runnymeade Playhouse in Oakwood was rented by the Army Corps of Engineers and turned over to Monsanto. It was difficult, however, to obtain a lease on the property. The Signal Corps had used the property previously and local residents were unhappy with the constant movement of property and equipment in and out of the neighborhood, one of the most prestigious in Dayton.

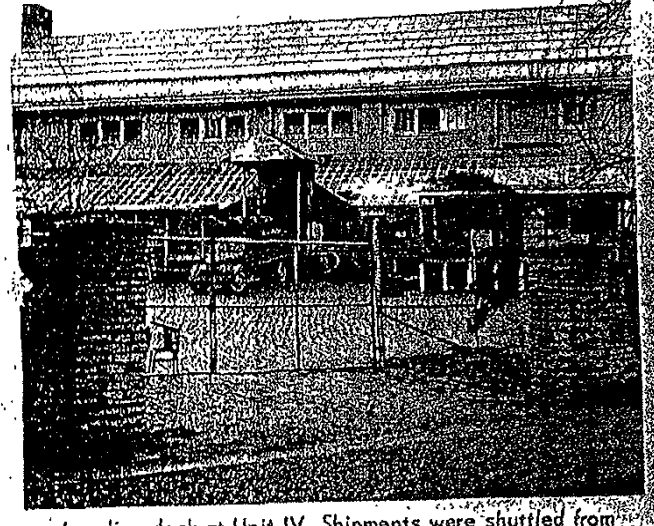
The location, designated Unit IV, was chosen primarily because there stood the only building of adequate size in Dayton that could be occupied immediately. The rental agreement stipulated that the building was to be turned back to the owners in its original condition. The building had been erected in 1927 to provide recreational facilities for the Talbott family, and it provided some of the most unique facilities ever encountered in a scientific laboratory. These facilities included a corrugated glass roof, several greenhouses, an indoor tennis court with

Unit IV site, Runnymeade Playhouse.

Entrance to Unit IV viewed down the columned portico. Only the front doorknob remains today.

green cork floor, a stage, a squash court, lounges, and an outdoor swimming pool.

To quell the neighbors' complaints, no deliveries were made to the site by commercial carriers. Rather deliveries were made to Unit III, where they were reloaded onto smaller government vehicles and shuttled to Runnymeade. Still, the installation



Loading dock at Unit IV. Shipments were shuttled from Unit III using small government vehicles. Corrugated glass roof is visible in the background.

of security fencing, 24 hour per day exterior lighting and armed guards patrolling the site displeased the neighbors, who had no idea of the urgency of the processes being conducted inside the fence.

Extensive alterations to the exterior of the main building were not required, but the interior presented many problems in constructing process facilities and laboratories. Care was exercised in making as few changes as possible in the building to alleviate the problem of restoration upon vacating the site. Precautions were taken to minimize annoyances such as noise, smoke and dirt to avoid undue criticism from the residential area.

It became known, however, after the explosion of the first atomic weapons, that the work at the playhouse utilized radioactive material. The citizens of Oakwood showed a good bit of concern and the frequency of complaints increased markedly. "We found a dead bird in our yard, it must have flown over your plant. Please come over and check it." "There is some brown dust on my porch. You had better look into it." are examples. One resident called to complain that the side of her home was becoming discolored and asked Monsanto to investigate. A local testing laboratory was hired to examine the situation and reported that the problem was caused by

rusting window screens and had no relationship to work at Runnymeade. It is significant to note that not a single accident occurred at either Monsanto location causing any injury to the public.

Great care was taken to assure the safety of the surrounding areas. Trucks equipped with radiation detection equipment made regularly scheduled runs throughout the greater Dayton area. Even as far as 75 miles distant, air and soil and water were sampled to ensure that radioactivity was not released in the community.

Radioactivity in the laboratory had to be carefully controlled. Here, scientists were working with the largest amounts of polonium ever isolated, and the associated radioactivity was significant. Employes who were exposed to significant amounts of radioactivity on a daily basis were checked regularly both for their own health, and to assure that no contamination was leaving the laboratory and entering the community. Schedules were established for delivery of the purified polonium which were exceptionaly hard to meet. It became an art to delay the courier arriving to pick up the polonium. Some deadlines were so close that an employe would be sent to talk with the courier and to keep him occupied while the final touches were put on

the packages. Still, all commitments were met and shipments were made on schedule.

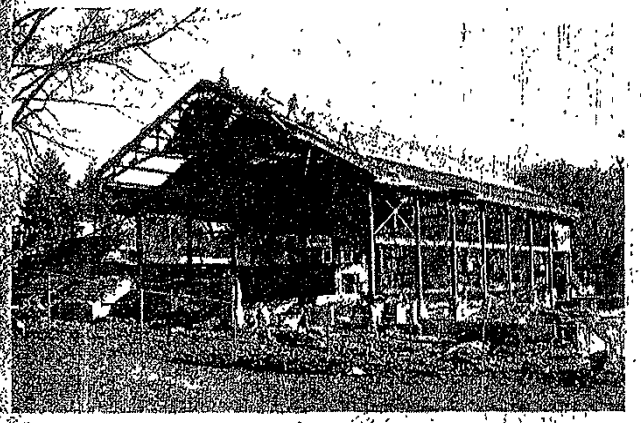
As early as 1946 it became evident that a permanent polonium production facility was needed. Thus a project which some thought might last only six months had grown to a state of permanence. Among the locations considered for the proposed facility was a site midway between the atomic plants at Los Alamos, New Mexico and Hanford, Washington. A Tennessee location near the Oak Ridge Atomic plant was also investigated. The Dayton area was finally selected for a number of reasons among which were a good supply of skilled labor and adequate water and power supplies. The site selected for Mound Laboratory was on a hill 878 feet above the sea level and about 200 feet above the Miami River in Miamisburg, Ohio. Adjacent to the laboratory is the largest conical Indian mound in the state of Ohio. From this prehistoric burial gound the laboratory derived its name.

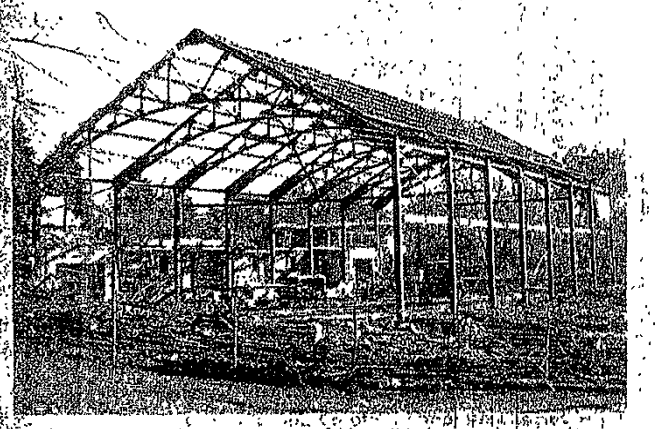
Mound Laboratory became the first permanent Atomic Energy Commission facility when it was first occupied in May 1948. There were, in total, 14 major buildings constructed in the original $25.5-million complex with a total floor area of 366,000 square feet. Polonium processing was started in February 1949.

It was decided that it would be both less expensive and safer to dismantle the Unit IV location than to restore it to its original condition. Surveys made after the transfer of operations to Mound Laboratory showed that the interior of the playhouse was highly contaminated. Demolition was started in February 1950 and completed later the same year. The remains were moved to Mound Laboratory by truck and stored. The excavation was filled with dirt, covered with sod, and returned to the original owners.

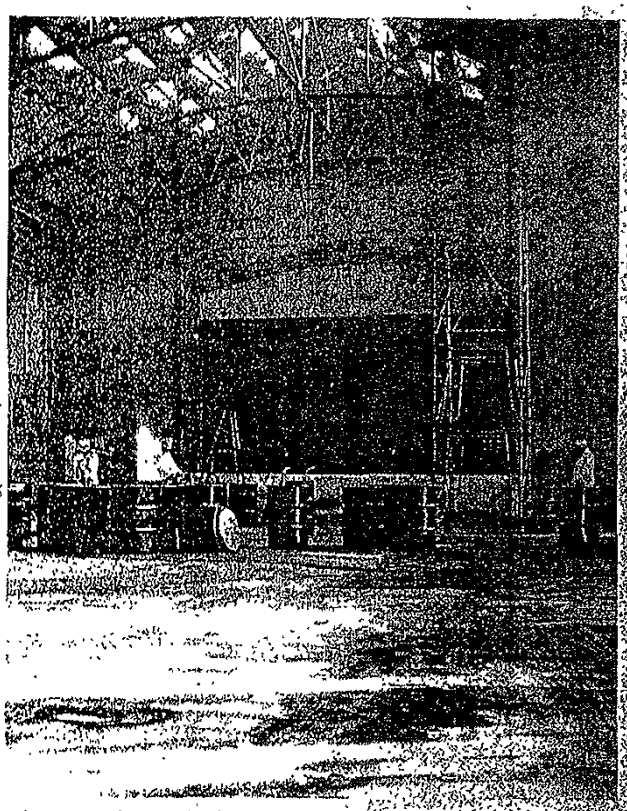
Unit III, on the other hand, exhibited levels of radioactivity which were low enough to allow decontamination. After equipment was removed, the building was cleaned and returned to the Board of Education in 1950. The Unit I location still operates as the Dayton Laboratory of Monsanto Research Corporation.

The defense work that began during 1943 was narrowly based on production of radioisotopes. Since then it has expanded into the development and production of functional components for weapons. For a number of years this light manufacturing has been the mainstay of the Laboratory.





Views of southwest corner of Unit IV during dismantling operations in 1950.



Interior of Unit IV during dismantling operations. All material was loaded into 55 gallon drums for removal from the site. The stage is visible in the background.

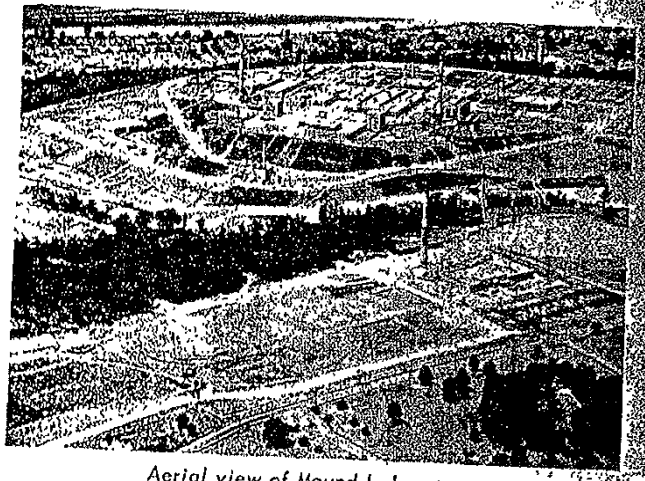
John Bradley Director of Explosives Operations, holds the knob to the front door of Runnymeade Playhouse. Bradley came to the Dayton Project with the Army's Special Engineer Detachment in 1945.

Production of plutonium-238 grew out of our early work with polonium-210. Plutonium-238 is processed in unprecedented quantities to supply a burgeoning demand for heat sources to be used in thermoelectric energy conversion systems. The basic physical, chemical, and nuclear properties of these nuclides are being studied intensively. Our experience in handling radioactivity led also to research with plutonium-239, a fuel for nuclear power reactors.

The isotopic heat source programs began with the development of a small thermoelectric generator powered by a radioactive isotope. Satellites orbiting the earth are confirming the potential of isotopic generators which convert isotopic heat to electrical energy. By the early sixties the Laboratory was firmly established as the country's leading manufacturer of these power sources.

The separation of stable isotopes of the noble gases utilizing thermal diffusion of gases began as an expansion of our isotope research in the mid-fifties. By 1964 theoretical and applied research had established the Laboratory as the free world's chief supplier of these isotopes.

As new programs appear MRC will continue to diversify in its research, development, and production for the Atomic Energy Commission. As new applications are found for isotopes in space exploration, medical research, and other technical frontiers, Mound Laboratory will create its future.



Aerial view of Mound Laboratory.

origins WW II
Gov. Corr.

MONSANTO CHEMICAL COMPANY

Executive Offices, St. Louis, Missouri

March 26, 1942.

Major General C. T. Harris, Jr.,
Office of the Chief of Ordnance,
Washington, D. C.

My dear General Harris:

We find ourselves in a difficult position. We are most anxious to make every contribution of which we are capable to the war, and I believe you are familiar with the full measure to which we have already extended ourselves. The management of this Company believes that no one or no corporation should profit through the misfortune of war, and our participation has been on the basis of either no profit or nominal profit which does little more than cover overhead expenses.

We are, however, mindful of certain elements of the press, certain politicians and others whose philosophy is hostile to business; individuals who are anxious to seize any incident they can interpret or misinterpret to the detriment of industry.

Therefore, we want to place our present position on record for use, if need be, in the event of an unwarranted future attack which these elements might make from the vantage point of hindsight.

It is our understanding that the War Department is urgently in need of a new high explosive; that the important raw material now limiting the production of this high explosive is formaldehyde; and that large quantities are required quickly.

We understand present production of formaldehyde involves synthesis from methanol. A methanol plant requires large quantities of high pressure equipment. The facilities for producing this equipment are urgently needed also in the production of cannon and other weapons, and to increase the productive facilities of formaldehyde through this route would not only involve much time, of which there is none to spare, but that it would be at the expense of the production of other weapons of war.

We have researched three years in the development of a new synthesis for formaldehyde. This synthesis starts with methane, a raw material of which there is an abundance. It does not involve the use of high pressure equipment, which is in such short supply. Laboratory results indicate that the cost of production when our process is fully developed will be materially less than other presently known processes.

ajor Gen. C. T. Harris, Jr. March 26, 1942.

You have sent one of your staff to our laboratories to observe the process. He has been given complete information regarding it. You have suggested to us that we place this process immediately under concentrated research in order to be able to make recommendations to the government as to its practicability.

We regard this process as unfinished. We believe that continued laboratory development would improve it. Our pilot plant has run continuously only one month. We know that further continued operation of our pilot plant may reveal unknown but inherent difficulties. Therefore, in normal commercial development of this process we would not time the erection of a commercial plant now. We would continue pilot plant operation until satisfied that all difficulties to be revealed by its continued operation had been uncovered.

We know, too, from past experience, that unforseen troubles are encountered in translating pilot plant results into commercial production; that it is not possible to duplicate in pilot plants all conditions of commercial plants. In the present instance, this comment is particularly pertinent to the convertor phase of our formaldehyde snythesis.

Now, if due to the urgency of the situation and despite a full understanding of the position of this process, you desire us to proceed with a commercial plant, we are willing to begin immediately the design and proceed with construction at the earliest possible moment.

It is our recommendation, however, that such a plant not exceed a capacity of 12½ tons per day of 100% formaldehyde. It is our belief that such a plant can be built for $1,250,000. It is our belief that the rated output will eventually be obtained. However, due to the uncompleted development of the process and our lack of experience with a large plant, we are unwilling to make any warranties regarding the plant other than that of bending every force of our organization toward its earliest possible successful operation.

Very truly yours

Charles Allen Thomas
Central Research Director
MONSANTO CHEMICAL COMPANY

April second
1 9 4 3

CONFIDENTIAL

Captain Benton A. Bull
Division B
National Defense Research Committee
1703 - 32nd Street, N.W.
Washington, D. C.

Dear Captain Bull: Re: U. P. Propellant

I have discussed the matter of Monsanto rights under our National Defense Research Committee contract with our President, Mr. Charles Belknap, and others in the Company.

As a result of this discussion, Monsanto believes that its greatest contribution to the war effort and to the further continuation of the very satisfactory relations which we have enjoyed with the National Defense Research Committee would be served if the Monsanto Chemical Company dedicates all of its rights to the Government of the United States. Accordingly, you are hereby informed that all of the rights which might have been retained by Monsanto under our contract with respect to the U. P. Propellant are released to the Government.

In view of our decision, as stated above, we will not prepare any patent applications on this development. Should you desire to file patent applications on this development, we will be glad to cooperate with you to the best of our ability in the preparation of the patent documents.

Yours very truly

Charles Allen Thomas
Central Research Director

CAT:rds
cc: Mr. Charles Belknap
Dr. J. B. Conant
Dr. Roger Adams
Dr. G. B. Kistiakowsky
Dr. L. P. Hammett

OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P STREET NW.
WASHINGTON, D. C.

VANNEVAR BUSH
Director

April 13, 1943.

Mr. Charles Belnap, President,
Monsanto Chemical Company,
Dayton, Ohio.

Dear Mr. Belnap:

The procedure which is being adopted in connection with patent matters concerning a recent development on propellants has been reported to me by Dr. Kistiakowsky in a recent letter. He tells me that Dr. Thomas of your Company has informed him that the Company has taken certain steps in this regard greatly clarifying a complex patent situation.

I write because it is certainly my impression that your Company has taken these steps because of a high sense of patriotic duty and a willingness to forego certain possible patent rights in your Company in order to arrive at a solution of the entire matter which is favorable to the United States Government and such as to give a clear-cut position where otherwise there might be some confusion. I would like to tell you personally that I greatly appreciate this attitude on the part of your Company. The relations between this Office and your organization in connection with important developments which have been carried on in the interests of the war effort have been cordial and effective. I believe that you should take great satisfaction in the results that are attained, and in the fact that these will certainly aid in getting on with the war. In addition, you have my personal expression of appreciation of the gracious manner in which you have approached the patent problem which has arisen in connection with this development.

Cordially yours,

V. Bush,
Director.