Secret Weapons, Forgotten Sacrifices

Scientific R & D in World War II

By Adam Kline with Robyn Dexter

It was June 16, 1942, and the United States was still reeling from the attack on Pearl Harbor six months earlier. The nation was building up its Army and Navy as quickly as possible by training draftees and volunteers.

And America's industrial machine was converting from automobiles to tanks and other machines of war.

In fact, Carl Sanborn was working on a "secret weapon" called the "Mousetrap," an antisubmarine rocket. He was doing something he had done "at least a dozen times"—which was constructing primer charges with magnesium and highly explosive potassium perchlorate.

Somehow, in mixing the new powder, it ignited—because of friction, others surmised. The explosion blew parts of the table top 20 feet away and knocked Sanborn to the ground.

"Am I burned too badly to live?" Sanborn, shivering from shock and unable to see, asked when he was found prone on the ground. He was bleeding from his swollen nose, with "a white cloudy film" in his eyes and his hair singed. Both legs were burned, both of his arms had multiple compound fractures, and "both [his] hands [were] partly gone, including several fingers and thumbs." Medical help arrived, but Sanborn died early the next morning.

Sanborn became another casualty of war, but not on the battlefields of Europe or the islands of the South Pacific.

Sanborn was an employee of California Institute of Technology working with the U.S. Office of Scientific Research and Development (OSRD) near Pasadena to develop the antisubmarine rockets. Throughout the war, the OSRD worked to find new weaponry for America's military to defeat Hitler's Third Reich and the Empire of Japan.

A wide variety of "inventive" proposals passed across the OSRD's desks as the war effort brought fresh problems, which demanded creative solutions. Some projects never saw the light of day, while others filled up the files with myriad details of their development, testing, and shipping to the field.

While historic breakthroughs such as the atomic bomb and the invention of penicillin were widely covered products of U.S. scientific research during the war, many of the OSRD projects, whether successful or failures, remain largely unknown.

The Office of Strategic Services (OSS)—the precursor of the Central Intelligence Agency—and the military services turned to the OSRD and its director, Vannevar Bush, when they needed new equipment, whether it was a solution to malaria or a silenced pistol.

Under Division 19 (Miscellaneous Weapons), OSRD scientists brainstormed everything from edible plastic explosive (code-named "Aunt Jemima") to pyrotechnic "panic creators."

FDR Taps Vannevar Bush To Oversee War Research

The OSRD's work, however, often met with tragedy.

OFFICE OF STRATEGIC SERVICES
WASHINGTON, D.C.

SECRET

December 8, 1942

Dr. H. M. Chadwell
National Defense Research Committee
1703 32nd Street, N.W.
Washington, D. C.

RE: SAC-16, AUNT JEMIMA

Dear Chad:

You are directed to evaluate and furnish a formula on an edible mixture of flour and RDX to conform to the following characteristics:

1. It shall be reasonably undetectable in the dry state, that is, by casual observation.
2. It shall be capable of producing upon the addition of yeast, baking powder, and optionally eggs or milk, a normal appearing, edible bread, biscuit, or muffin.
3. Prior to baking, the flour and RDX shall be separable by simple means, such as decanting after lixiviation.
4. It shall be safe to transport as flour in sacks, without undue hazard to common carriers.

Very truly yours,

-signed-

Stanley P. Lovell
Director, Research and Development

SPL:acd

One of the out-of-the-ordinary products OSRD scientists were directed to create was an edible plastic explosive, code-named "Aunt Jemima." The mixture had to be undetectable, safe to transport, and able to be baked into normal bread, biscuits, or muffins.

By the end of May 1943, the OSRD acknowledged 10 fatalities "occurring in connection with . . . OSRD work." Other deaths would follow. In the course of their duties to develop innovative weapons and gear, scientists and workers perished in work-related accidents.

Just as OSRD projects were overshadowed by reports from the front, the deaths of its personnel in pursuit of scientific research fell into obscurity, despite the enduring popular interest in World War II.

The OSRD traced its origins to the creation of the National Defense Research Committee (NDRC) in June 1940. President Franklin D. Roosevelt appointed Vannevar Bush as its chairman.

Bush, president of the Carnegie Institute and chairman of the National Advisory Committee for Aeronautics, had a distinguished career. He had taught electrical engineering at Tufts University and Massachusetts Institute of Technology, helped create the Raytheon Company, and developed a machine that could solve differential equations. A prodigious tinkerer, Bush even created a special bird feeder "inhospitable to greedy pigeons and blue jays."

After the war, when President Harry S. Truman told him he had a politician's instincts, Bush replied, "Mr. President, what the hell do you think I've been doing around this town for five or six years?" Under Bush, the NDRC was to "conduct research for the creation and improvement of instrumentalities, methods and materials of warfare," which it did with the help of scientists and engineers from U.S. companies and universities.

However, the NDRC was soon succeeded by another body: the OSRD.

The frontispiece of an OSRD report on studying underwater ballistics illustrates the launching equipment for projectiles and spheres.

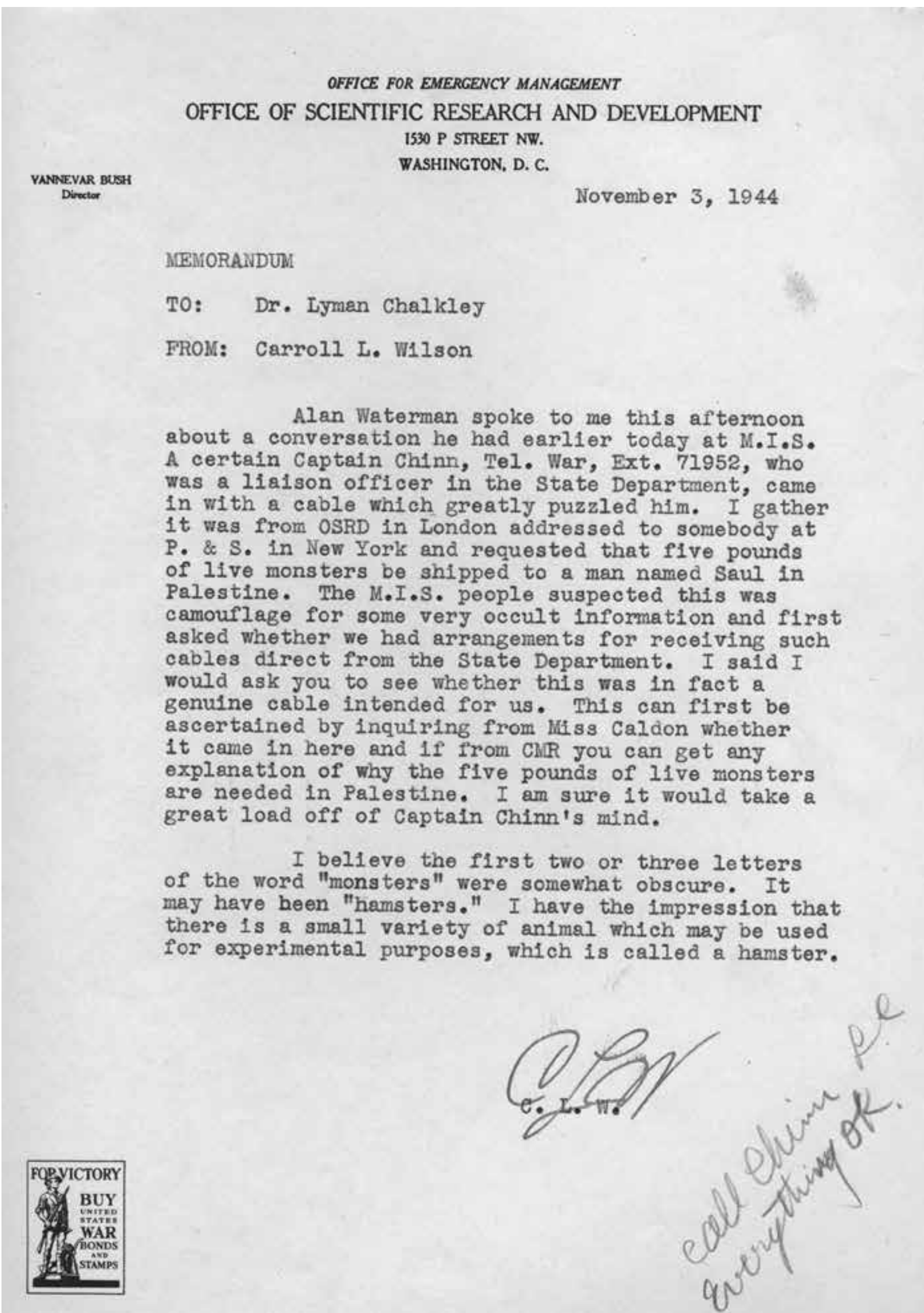
Because the NDRC was only research-focused, it was necessary to create an agency that would handle both the research and development of projects. In addition, a new organization could properly coordinate research between military branches and manage much-needed medical research.

Accordingly, Executive Order 8807, issued June 28, 1941, by President Roosevelt, established the OSRD. Bush became its director, and the OSRD would comprise the NDRC—now with only the power to "advise and assist the Director"—along with the Advisory Council, Committee on Medical Research, Administrative Office, and Liaison Office. (Other divisions were later added.)

The OSRD also had the power to use government resources and to make contracts with individuals, companies, and other scientific organizations. This new organization provided the impetus for critical scientific research during the war.

"Evil Smelling Substances" Proposed as a Weapon

The most unconventional suggestions could succeed in the OSRD. On November 20, 1943, Stanley P. Lovell, director of OSS's research and development, sent an unusual request in a letter to Division 19 head Harris M. Chadwell. He wanted "to provide civilian populations with . . . a liquid . . . [that] will produce unmistakable evidence of extreme personal uncleanliness."



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

VANNEVAR BUSH
Director

November 3, 1944

MEMORANDUM

TO: Dr. Lyman Chalkley

FROM: Carroll L. Wilson

Alan Waterman spoke to me this afternoon about a conversation he had earlier today at M.I.S. A certain Captain Chinn, Tel. War, Ext. 71952, who was a liaison officer in the State Department, came in with a cable which greatly puzzled him. I gather it was from OSRD in London addressed to somebody at P. & S. in New York and requested that five pounds of live monsters be shipped to a man named Saul in Palestine. The M.I.S. people suspected this was camouflage for some very occult information and first asked whether we had arrangements for receiving such cables direct from the State Department. I said I would ask you to see whether this was in fact a genuine cable intended for us. This can first be ascertained by inquiring from Miss Caldon whether it came in here and if from CMR you can get any explanation of why the five pounds of live monsters are needed in Palestine. I am sure it would take a great load off of Captain Chinn's mind.

I believe the first two or three letters of the word "monsters" were somewhat obscure. It may have been "hamsters." I have the impression that there is a small variety of animal which may be used for experimental purposes, which is called a hamster.

CLW
C. L. W.

call Chinn p.e.
everything OK.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

Amid the serious letters and reports in OSRD records is a memorandum concerning confusion over an apparent request for "five pounds of live monsters." The puzzle was cleared up when someone realized that by correcting three letters, the monsters became "hamsters."

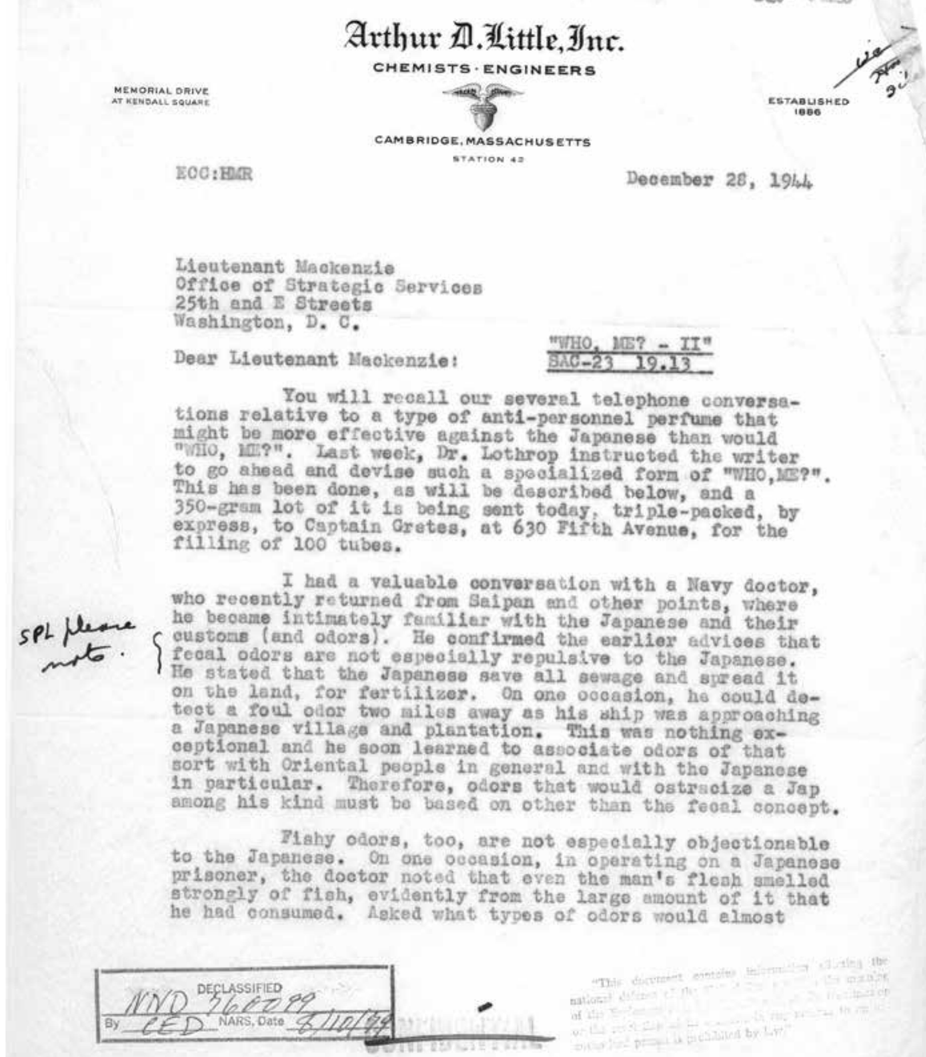
Vannevar Bush headed the OSRD after President Roosevelt created the office in 1941. Bush had previously served as chairman of the National Defense Research Committee.

This memorandum inaugurated project "Who, Me?" (SAC-31), a joint venture with the Arthur D. Little Company, a chemical and engineering consulting company.

Researchers mulled over formulas for their "evil smelling substances," focusing on "strange or novel" odors to alarm the targets, disperse crowds, and contaminate enemy supplies. They considered using mercaptans, sulphides, methyl telluride, ammonium valerate, and thialdine as ingredients.

Eventually, the first "Who, Me?" formula was developed in February 1944 to use against the Japanese. It consisted of n-Butyric acid, n-Valeric acid, n-Caproic acid, and Skatole; this particular batch had a "powerful and lasting" fecal odor.

By late 1944, the team decided that such a smell would be ineffective, so Dr. E. C. Crocker instead recommended a "skunky" mixture of alpha ionone, butyric acid and amyl mercaptan. After grappling with nagging difficulties—fragile glass containers breaking, accidental dripping onto users, and leaky tubes—the OSS finally shipped out 500 tubes of each formula on February 27, 1945.



Arthur D. Little, Inc.
CHEMISTS · ENGINEERS
MEMORIAL DRIVE
AT KENDALL SQUARE
ESTABLISHED
1886
CAMBRIDGE, MASSACHUSETTS
STATION 42

ECC:HMR

December 28, 1944

Lieutenant Mackenzie
Office of Strategic Services
25th and E Streets
Washington, D. C.

"WHO, ME? - II"
SAC-23 19.13

Dear Lieutenant Mackenzie:

You will recall our several telephone conversations relative to a type of anti-personnel perfume that might be more effective against the Japanese than would "WHO, ME?". Last week, Dr. Lothrop instructed the writer to go ahead and devise such a specialized form of "WHO,ME?". This has been done, as will be described below, and a 350-gram lot of it is being sent today, triple-packed, by express, to Captain Gretes, at 630 Fifth Avenue, for the filling of 100 tubes.

I had a valuable conversation with a Navy doctor, who recently returned from Saipan and other points, where he became intimately familiar with the Japanese and their customs (and odors). He confirmed the earlier advices that fecal odors are not especially repulsive to the Japanese. He stated that the Japanese save all sewage and spread it on the land, for fertilizer. On one occasion, he could detect a foul odor two miles away as his ship was approaching a Japanese village and plantation. This was nothing exceptional and he soon learned to associate odors of that sort with Oriental people in general and with the Japanese in particular. Therefore, odors that would ostracize a Jap among his kind must be based on other than the fecal concept.

SPL please note.

Fishy odors, too, are not especially objectionable to the Japanese. On one occasion, in operating on a Japanese prisoner, the doctor noted that even the man's flesh smelled strongly of fish, evidently from the large amount of it that he had consumed. Asked what types of odors would almost

DECLASSIFIED
NND 760099
By CED NARS, Date 8/10/99

The Arthur D. Little Company worked with the OSRD to fill a request from the OSS. The OSS wanted a foul-smelling substance that could alarm a population or contaminate enemy supplies. The "Who, Me?" research came up with several stinkers before settling on a "skunky" mixture.

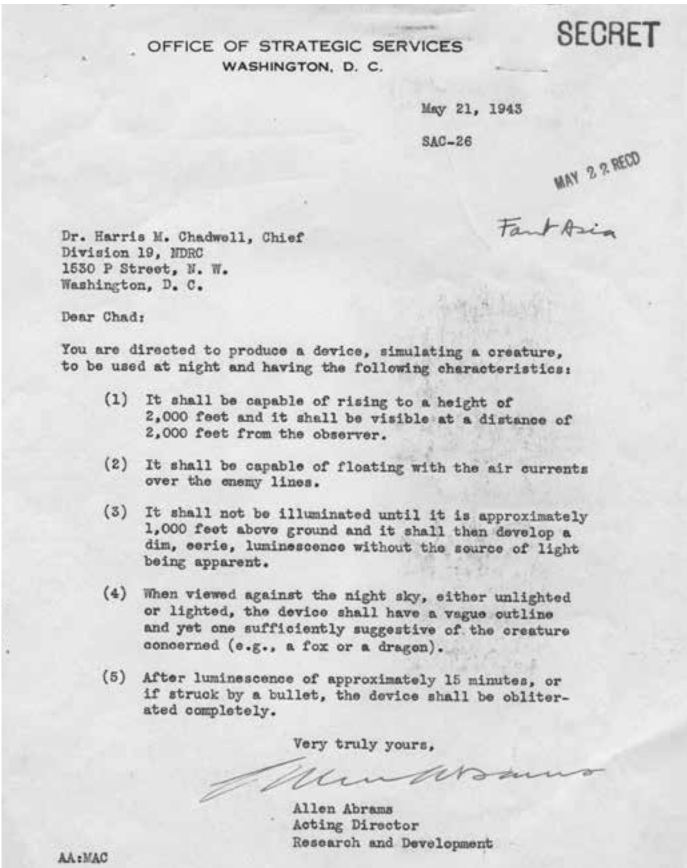
Night Landings and Smokescreens Proposed for Army and Navy

Other ideas were less offbeat but equally innovative.

In 1941, the NDRC considered developing "illuminated smoke clouds" for use "in night operations against attacking aircraft." Shells, rockets, or airplanes placed the smokescreen, then flares would blind the marauders and silhouette them against the night sky, easy targets for anti-aircraft guns and fighters. Unfortunately, this method required tens of thousands of shells and flares an hour. Scientists estimated that 500 tons of smoke for every 100 square miles were needed to create "a totally obscuring cloud of minimum thickness." The amount of equipment and materials needed was deemed "prohibitively large" by Division A (Armor and Ordnance) Chair Richard C. Tolman, who recommended that the plan be dropped.

When the Army Air Forces asked for a means of landing aircraft while hiding the bases from the enemy, the NDRC created ultraviolet reflector beacons that would demarcate the runway and aircraft-mounted UV lights that would pick them up, enabling a safe landing. In August 1942, flight tests were successful. The markers were viewed up to 4,000 feet "on a hazy night," and the test plane was able to land.

The Navy was interested in using the system on its aircraft carriers and received another demonstration. However, the Army Air Forces advised against using the system, saying that "greater secrecy in night operation" was not necessary.



SECRET

OFFICE OF STRATEGIC SERVICES
WASHINGTON, D. C.

May 21, 1943

SAC-26

MAY 22 RECD

Fant Asia

Dr. Harris M. Chadwell, Chief
Division 19, NDRC
1530 P Street, N. W.
Washington, D. C.

Dear Chad:

You are directed to produce a device, simulating a creature, to be used at night and having the following characteristics:

(1) It shall be capable of rising to a height of 2,000 feet and it shall be visible at a distance of 2,000 feet from the observer.

(2) It shall be capable of floating with the air currents over the enemy lines.

(3) It shall not be illuminated until it is approximately 1,000 feet above ground and it shall then develop a dim, eerie, luminescence without the source of light being apparent.

(4) When viewed against the night sky, either unlighted or lighted, the device shall have a vague outline and yet one sufficiently suggestive of the creature concerned (e.g., a fox or a dragon).

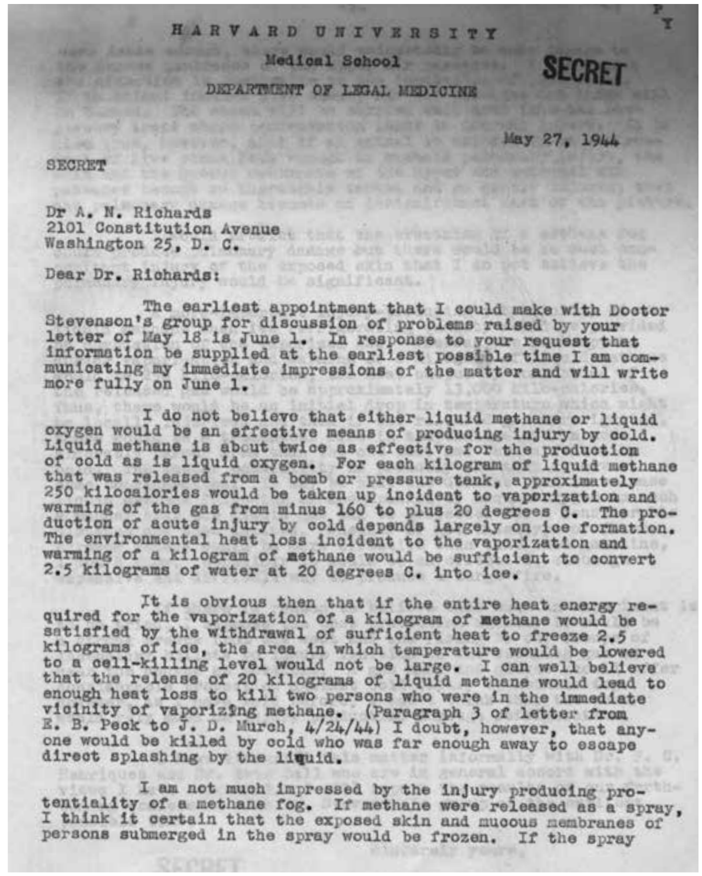
(5) After luminescence of approximately 15 minutes, or if struck by a bullet, the device shall be obliterated completely.

Very truly yours,

Allen Abrams
Acting Director
Research and Development

AA:MAC

The OSS's Project Fantasia was an attempt at psychological warfare. OSRD scientists were asked to create a device that would simulate a fearsome creature to terrify the Japanese.



HARVARD UNIVERSITY
Medical School
DEPARTMENT OF LEGAL MEDICINE

SECRET

May 27, 1944

SECRET

Dr A. N. Richards
2101 Constitution Avenue
Washington 25, D. C.

Dear Dr. Richards:

The earliest appointment that I could make with Doctor Stevenson's group for discussion of problems raised by your letter of May 18 is June 1. In response to your request that information be supplied at the earliest possible time I am communicating my immediate impressions of the matter and will write more fully on June 1.

I do not believe that either liquid methane or liquid oxygen would be an effective means of producing injury by cold. Liquid methane is about twice as effective for the production of cold as is liquid oxygen. For each kilogram of liquid methane that was released from a bomb or pressure tank, approximately 250 kilocalories would be taken up incident to vaporization and warming of the gas from minus 160 to plus 20 degrees C. The production of acute injury by cold depends largely on ice formation. The environmental heat loss incident to the vaporization and warming of a kilogram of methane would be sufficient to convert 2.5 kilograms of water at 20 degrees C. into ice.

It is obvious then that if the entire heat energy required for the vaporization of a kilogram of methane would be satisfied by the withdrawal of sufficient heat to freeze 2.5 kilograms of ice, the area in which temperature would be lowered to a cell-killing level would not be large. I can well believe that the release of 20 kilograms of liquid methane would lead to enough heat loss to kill two persons who were in the immediate vicinity of vaporizing methane. (Paragraph 3 of letter from E. B. Peck to J. D. Murch, 4/24/44) I doubt, however, that anyone would be killed by cold who was far enough away to escape direct splashing by the liquid.

I am not much impressed by the injury producing protentiality of a methane fog. If methane were released as a spray, I think it certain that the exposed skin and mucous membranes of persons submerged in the spray would be frozen. If the spray

When two colonels asked about using methane to "freeze a neighborhood," the expert at Harvard Medical School pointed out the plan's shortcomings.

Still, they encouraged further investigation into, and testing of, an "invisible beacon" for landing.

OCRD Told to Produce Device, "Simulating a Creature" for Night

Some Division 19 projects, though, were truly absurd. The foremost among them was Project Fantasia (SAC-26), which arose from a May 21, 1943, OSS directive asking Chadwell for an "eerie," luminescent balloon as a psychological weapon against the Japanese. Even though OSS official Lovell deemed it "questionable, [and] outre," research began into the device.

The OSS stipulated that Fantasia would need to be visible from 2,000 feet and "obliterated completely" after 15 minutes. Researchers at the drawing board postulated using radium salts, special paint, fireworks, UV devices, or even "phosphorescent gas" to illuminate Fantasia and "instill fear, terror, and despair." Hoping to exploit perceived Japanese superstitions, the OSRD considered building the device in the shape of "a harmful demon, evil eye or a 'hex,'" or perhaps a "grotesque animal" such as a fox or dragon. To incinerate the hydrogen-filled balloon, project members proposed using a delayed incendiary.

Still, doubts lingered.

In a July 5 memorandum to Lovell, it was clear that "We do not contemplate widespread . . . use of the device," and that it might only be effective against Japanese "under extremely trying conditions."

Memorandums suggested using the device "over Chinese lines" or possibly deploying it against "isolated groups" of Japanese. (These were considered vulnerable to panic.) Shortages of qualified personnel, high potential costs, and a general lack of enthusiasm finally put an end to Fantasia.

In response to a September 18 letter from Chadwell seeking an end to the project, Lovell complied. The failure of Fantasia "will serve as a critique to us in the field of pure reason," the latter wrote. The OSRD seemed happy to dispose of Fantasia. The minutes from Division 19 on November 4 stated, "This problem of Fantasia has been mercifully completed," and SAC-26 was relegated to "Dead as Dodo" status by July 6, 1944.

OSRD Rejects Some Projects For Those "Of Great Importance"

Similarly, a number of other OSRD initiatives were discarded on the grounds of their implausibility. When two colonels inquired in 1944 about "using methane bombs to freeze a neighborhood," Alan R. Moritz of Harvard's medical school dismissed the proposition, saying that such a weapon would only harm those within "the immediate vicinity." He also mentioned that methane gas would cause severe injury. He stated that using incendiary rounds to ignite a kilogram of methane gas would release "approximately 13,000 kilocalories," as opposed to the mere 250 kilocalories taken in by warming liquid methane.

Another Division 19 research project, "Blackout" (SAC-20), was more practical than Fantasia. It sought to engineer explosive lightbulbs for use in China, presumably against the Japanese occupiers. On May 17, 1943, a month after Chadwell received the order, Blackout ran into trouble. George Kistiakowsky, head of Division 8 (Explosives), wrote emphatically that "*It is absolutely impossible* to put enough explosive into the base of a transparent light bulb to make the result more harmful than the popping of a cracker." Fragmentation would be limited, he wrote, the device's lethal range would be two or three feet at best, and liquid explosives would be noticed in the clear bulb. Blackout experienced the same fate as Fantasia by July 6, 1944.

The most colorful proposals of all came from those eager to market a "death ray" to the government. From 1940 to 1943, no fewer than six separate inventors approached the NDRC and OSRD with their plans.

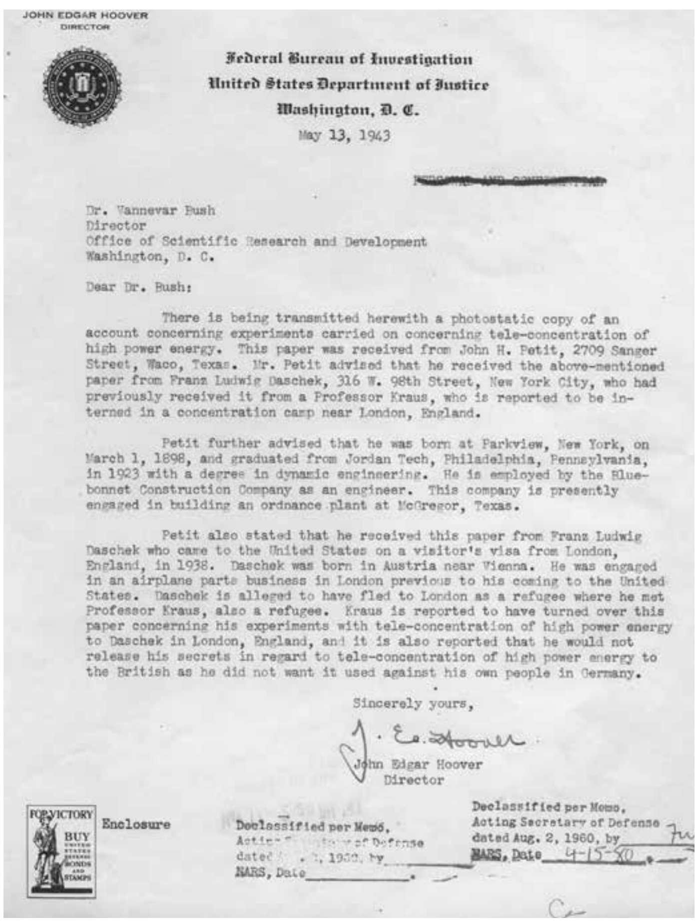
Christian H. Kenneweg was the first. He claimed to have a device that could produce a "highly concentrated molecular vibration" and destroy enemy aircraft "at or over experimentally ascertained distances of several miles." He had already sent a letter to British Prime Minister Winston Churchill, without success.

Undeterred, Kenneweg wrote another letter to President Roosevelt days later, appealing to "The great humanitarian complex of the Chief Executive" and noting that "The era of the large bombing plane will definitely pass" thanks to his invention.

The government's response was unenthusiastic.

K. T. Compton of the NDRC was "not optimistic about the possibilities of this invention," noting that any blast energy would be "rapidly dissipated." By year's end, Antonio Longoria, George A. Finch, John C. Roberts, and Mike Cronis attempted to interest the government in their creations.

One official scoffed at Finch and Roberts, saying, "The technical description reads like 'Amazing Science Tales.'" Despite the scientists' claim to have killed five ducks in flight with their device, Tolman believed that they had sim-



JOHN EDGAR HOOVER
DIRECTOR

Federal Bureau of Investigation
United States Department of Justice
Washington, D. C.
May 13, 1943

[redacted]

Dr. Vannevar Bush
Director
Office of Scientific Research and Development
Washington, D. C.

Dear Dr. Bush:

There is being transmitted herewith a photostatic copy of an account concerning experiments carried on concerning tele-concentration of high power energy. This paper was received from John H. Petit, 2709 Sanger Street, Waco, Texas. Mr. Petit advised that he received the above-mentioned paper from Franz Ludwig Daschek, 316 W. 98th Street, New York City, who had previously received it from a Professor Kraus, who is reported to be interned in a concentration camp near London, England.

Petit further advised that he was born at Parkview, New York, on March 1, 1898, and graduated from Jordan Tech, Philadelphia, Pennsylvania, in 1923 with a degree in dynamic engineering. He is employed by the Bluebonnet Construction Company as an engineer. This company is presently engaged in building an ordnance plant at McGregor, Texas.

Petit also stated that he received this paper from Franz Ludwig Daschek who came to the United States on a visitor's visa from London, England, in 1938. Daschek was born in Austria near Vienna. He was engaged in an airplane parts business in London previous to his coming to the United States. Daschek is alleged to have fled to London as a refugee where he met Professor Kraus, also a refugee. Kraus is reported to have turned over this paper concerning his experiments with tele-concentration of high power energy to Daschek in London, England, and it is also reported that he would not release his secrets in regard to tele-concentration of high power energy to the British as he did not want it used against his own people in Germany.

Sincerely yours,

J. E. Hoover

John Edgar Hoover
Director

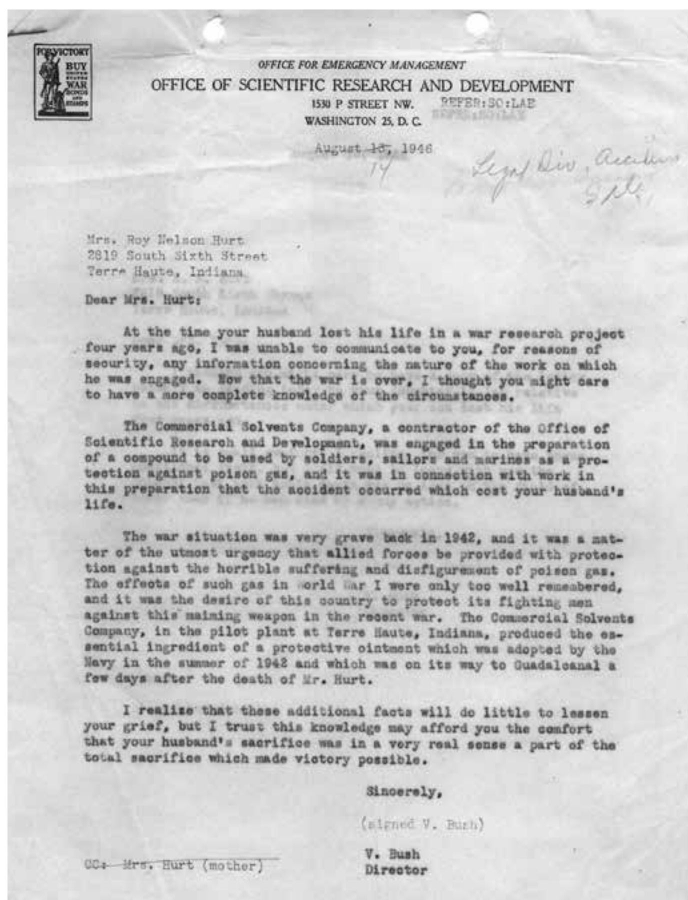
FOR VICTORY BUY UNITED STATES DEFENSE BONDS AND STAMPS

Enclosure

Declassified per Memo,
Acting Secretary of Defense
dated [illegible], 1960, by ______
NARS, Date ______.

Declassified per Memo,
Acting Secretary of Defense
dated Aug. 2, 1960, by ______
NARS, Date 4-15-80.

The government received several proposals to take the "death ray" from science fiction to fact. FBI Director J. Edgar Hoover forwarded a paper on "tele-concentration of high power energy" to the OSRD, which deemed it "entirely without technical content or import."



FOR VICTORY BUY WAR BONDS AND STAMPS

OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT
1530 P STREET NW.
WASHINGTON 25, D. C.
REFER: SO:LAB

August ~~16~~ 14, 1946

Legal Div, Accident File

Mrs. Roy Nelson Hurt
2819 South Sixth Street
Terre Haute, Indiana

Dear Mrs. Hurt:

At the time your husband lost his life in a war research project four years ago, I was unable to communicate to you, for reasons of security, any information concerning the nature of the work on which he was engaged. Now that the war is over, I thought you might care to have a more complete knowledge of the circumstances.

The Commercial Solvents Company, a contractor of the Office of Scientific Research and Development, was engaged in the preparation of a compound to be used by soldiers, sailors and marines as a protection against poison gas, and it was in connection with work in this preparation that the accident occurred which cost your husband's life.

The war situation was very grave back in 1942, and it was a matter of the utmost urgency that allied forces be provided with protection against the horrible suffering and disfigurement of poison gas. The effects of such gas in World War I were only too well remembered, and it was the desire of this country to protect its fighting men against this maiming weapon in the recent war. The Commercial Solvents Company, in the pilot plant at Terre Haute, Indiana, produced the essential ingredient of a protective ointment which was adopted by the Navy in the summer of 1942 and which was on its way to Guadalcanal a few days after the death of Mr. Hurt.

I realize that these additional facts will do little to lessen your grief, but I trust this knowledge may afford you the comfort that your husband's sacrifice was in a very real sense a part of the total sacrifice which made victory possible.

Sincerely,

(signed V. Bush)

V. Bush
Director

~~CC: Mrs. Hurt (mother)~~

Doing research on and testing new weapons was dangerous work. Roy Nelson Hurt was killed in an accident at a chemical facility producing a protective compound against poison gas.

ply used strychnine-laced grain, a "favorite stunt of self-styled death ray inventors."

The OSRD soon tired of the "Death Ray Atomic Energy Machines" and "Lethal Ray Projectors." After reading a 1943 report by one "Professor Kraus" on his supposed death ray, Bush personally rejected the proposal in a letter to J. Edgar Hoover, calling it "a rambling statement with a liberal use of scientific terms which makes . . . unsupported claims." Little came of the death rays.

"A Very Secret and Very Important Matter"

As the war took millions of lives at Saipan and Stalingrad, at Caen and Cassino, at Kasserine and Kursk, and at countless other battlefields across the globe, OSRD members also gave their lives in the line of duty.

On June 8, 1942, while U-boats roamed the Atlantic Ocean in search of Allied cargo ships, the OSRD tested a new anti-submarine weapon—underwater flares—off of Manasquan, New Jersey. In order to shoot photographs, the Navy lent two blimps. On board airship G-1 that night were C. R. Hoover, L. S. Moyer, and F. C. Gilbert, while airship L-2 carried A. B. Wyse and I. H. Tilles. Accompanying the scientists were eight Navy servicemen.

According to eyewitnesses on a Coast Guard boat, at 9 p.m. L-2 "passed over the bow" of the vessel, signaling with its blinker, but the crew below asked that they signal again "as none of the seamen aboard clearly read it." As L-2 circled to repeat the signal, "the gondola of L-2 struck the bag of G-1," and both plummeted into the dark ocean. The boat picked up one survivor and fired off all its red flares to call for help.

The two blimps, held afloat by air pockets, were being towed back to shore in the hopes of rescuing any survivors, but G-1 detached along the way. The crew decided that it would be better to continue towing one blimp rather than risk losing both by trying to retrieve the second blimp. Another boat picked up the G-1, but it sank once more in water estimated to be 60 feet deep and was not recovered. Upon reaching shore, the bodies of Wyse and two crewmembers were found in L-2. Tilles's body was found in the water the next morning.

Altogether, 12 men died, and one lucky ensign had escaped. Each scientist left a widow. Wyse, the youngest at 32 years old, left behind two young sons; Hoover, the oldest at 56 years old, had one son in medical school and another in the Army.

Four days later, Bush composed identical letters to each grieving widow.

"No word that I can write can of course lessen your grief," he explained. "Not every man who serves his country does so in uniform." While unable to disclose the "very secret and very important" flare project, Bush wrote that each man "made a real contribution to the work . . . he has given his life for his country . . . as though he had been in the front line trenches."

> *"Not every man who serves his country does so in uniform"*

However, the OSRD's work was not done here. Due to a bureaucratic loophole, the scientists "were in a unique and unfortunate situation." As they were affiliated with universities and paid by them, they did not fall under the Employees' Compensation Act. In May 1943, Bush sent a drafted bill designed to correct that problem to the House Committee on Claims, and later urged the President to approve it.

The bill, which designated Wyse, Hoover, Moyer, and Tilles as civil employees (Gilbert had insurance and was deemed "adequately provided for"), entitled their families to government compensation and was signed by Roosevelt on March 24, 1944. Sadly, Bush's sympathy letters would be repeated many times to yet more survivors of fallen OSRD workers.

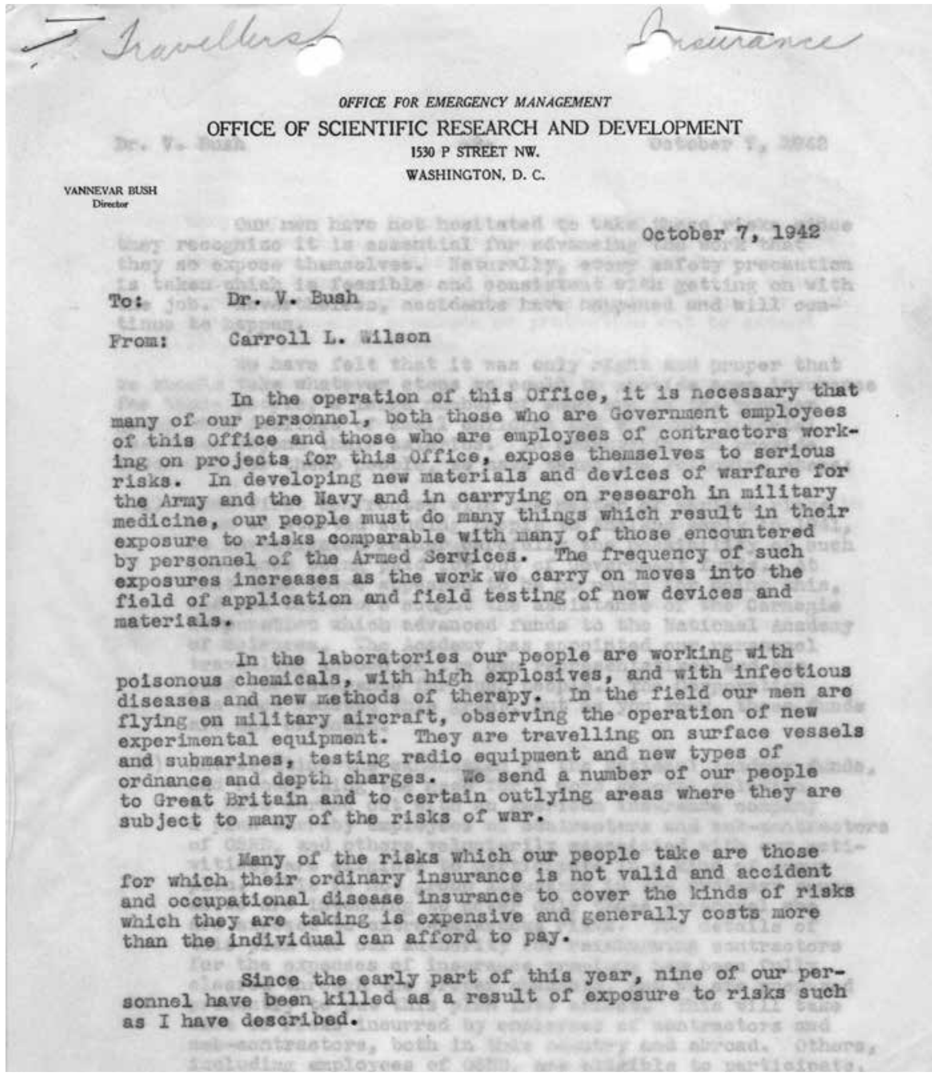
Developing Protective Gear Risky Business for Staff

Even OSRD personnel working to develop protective equipment were at risk. In an effort to avert the horrors of the last war's chemical weapons, the Commercial Solvents Company was given a contract to produce "a compound to be used . . . as a protection against poison gas." The resulting product, S-461 protective ointment, was produced in Terre Haute, Indiana, where 28-year-old laborer Roy Nelson Hurt worked in the drying facility.

At 6:45 in the morning of September 23, 1942, smoke billowed from the dryer building's south door, and Joseph Roman, a fellow plant worker, dashed inside. With a cloth around his nose and mouth to ward off the thick, noxious smoke, he stumbled toward Hurt and managed to help him out of the building, despite being "nearly overcome by the fumes and by shock." An ambulance arrived within eight minutes, but a doctor caring for Hurt at the hospital found him "semi-conscious," with "second and third degree burns involving practically the entire body." Even Hurt's eyes had suffered third-degree burns and "practically complete destruction of the corneas." Despite blood plasma infusions and hot paraffin dressings, Hurt died at 7:30 p.m.

An investigation soon determined the cause of the accident. "Inferior quality" S-461, unstable with impurities, had decomposed. Over a half-ton of the material had been destroyed. Mrs. Hurt received $2,000 from a company insurance plan, plus $5,000 more from Indiana's Workmen's Compensation Act. Homer Adkins, who inspected the plant, added that he hoped "that it may be possible for O.S.R.D.

to assist Mrs. Hurt financially," but noted that "No mention of this possibility . . . has been made by anyone so far as I know." On August 14, 1946, Bush wrote to Mrs. Hurt to explain the circumstances of her husband's death. The fear of "horrible suffering and disfigurement [by] poison gas" had driven the need for S-461, which had been shipped out to Guadalcanal just days after Hurt's death. Bush even thanked Roman for his heroism, commending his "quick thinking and prompt action." While the property damage to the plant was dismissed by Adkins as "inconsequential," the human cost was anything but trivial.



F. Travellers Insurance

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

VANNEVAR BUSH
Director

October 7, 1942

To: Dr. V. Bush
From: Carroll L. Wilson

In the operation of this Office, it is necessary that many of our personnel, both those who are Government employees of this Office and those who are employees of contractors working on projects for this Office, expose themselves to serious risks. In developing new materials and devices of warfare for the Army and the Navy and in carrying on research in military medicine, our people must do many things which result in their exposure to risks comparable with many of those encountered by personnel of the Armed Services. The frequency of such exposures increases as the work we carry on moves into the field of application and field testing of new devices and materials.

In the laboratories our people are working with poisonous chemicals, with high explosives, and with infectious diseases and new methods of therapy. In the field our men are flying on military aircraft, observing the operation of new experimental equipment. They are travelling on surface vessels and submarines, testing radio equipment and new types of ordnance and depth charges. We send a number of our people to Great Britain and to certain outlying areas where they are subject to many of the risks of war.

Many of the risks which our people take are those for which their ordinary insurance is not valid and accident and occupational disease insurance to cover the kinds of risks which they are taking is expensive and generally costs more than the individual can afford to pay.

Since the early part of this year, nine of our personnel have been killed as a result of exposure to risks such as I have described.

An internal memo to Vannevar Bush noted the risks—sometimes fatal—OSRD personnel faced.

"The Whole Thing Had Gone"

The Budget and Finance Office's "Accident" file mentions that one E. R. Barnard, an assistant project director at Standard Oil, was injured in a flamethrower accident, but gave few details. The full story is held in the Standard Oil contractor files. The company, which frequently worked on OSRD projects, was tasked on April 1, 1943, with creating a tank-mounted flamethrower. Engineers devised a tank-towed trailer containing jellied gasoline fuel and compressed air. The pressure chamber was highly problematic and required multiple repairs after leaks during tests.

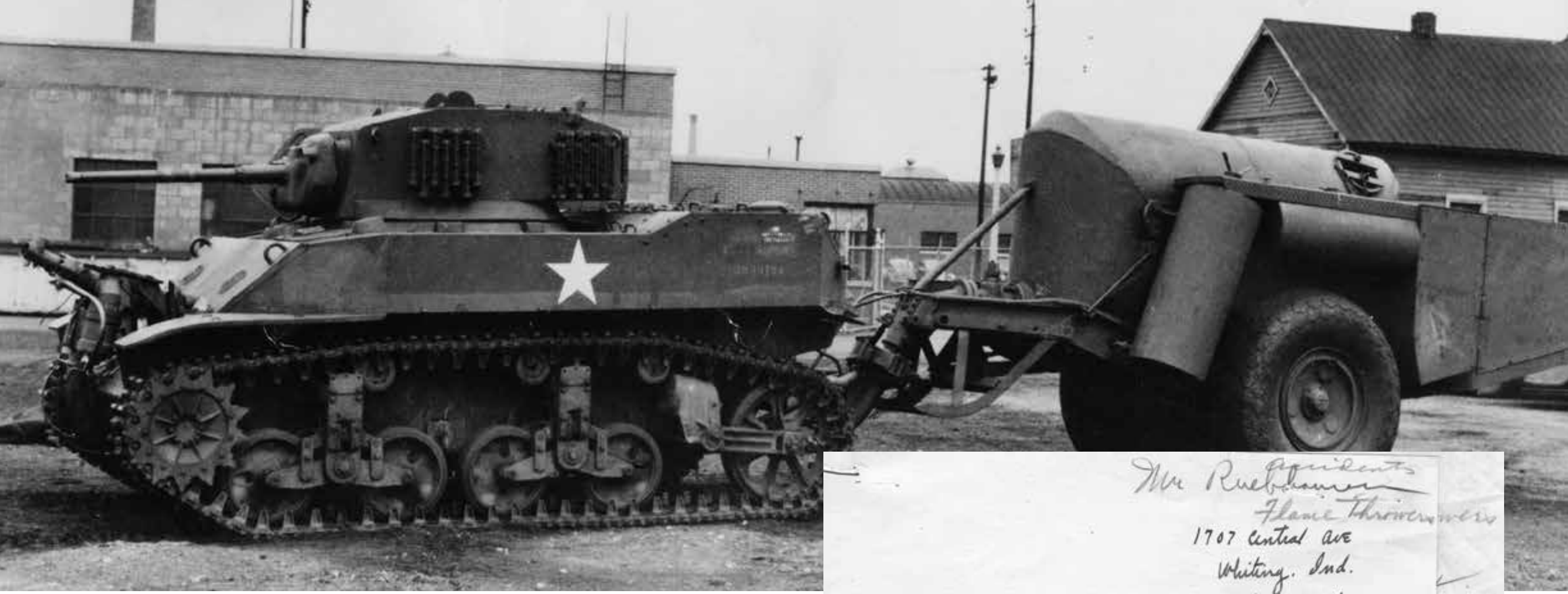
On May 29, 1944, the flamethrower was due for another test involving 13 workers, ranging from the project director to the driver. As the compressors were brought up to a pressure of 500 psi, the right compressor failed but was soon restarted. Its low-pressure unloading valve remained open, but a tap with an iron bar solved that problem. As research engineer W. A. Proell turned his back and walked away, he heard "some strange noise," but when he turned his head, "he realized that the whole thing had gone."

Another bystander saw a "sheet of flame on the left side of the trailer," then was hurled to the ground by "a violent shock wave" as the pressure chamber exploded. Two others remembered little more than that "everything was on fire." The tank was "completely burned out," and the wreckage of the "badly disintegrated" pressure vessel was strewn across over half a mile. Senior research engineer F. K. Ovitz, research engineer J. G. Nellis, and experimental mechanics J. J. Hanusin and J. M. Leonard were all mortally wounded. Nine others were injured, two of them seriously.

Inquiries by Standard Oil, its subcontractor Merz Engineering, and the OSRD eventually determined the cause of the catastrophic failure. The vessel was flawed from the start. Analysts

To learn more about. . .

- Records relating to World War II research and development in the National Archives, go to *www.archives.gov/research/guide-fed-records/groups/227.html.*
- Records relating to World War II research and development at the Library of Congress, go to *www.loc.gov/rr/scitech/trs/trsosrd.html.*
- Records of the Office of Strategic Services in the National Archives, go to *www.archives.gov/research/military/ww2/oss/.*



During testing of a flamethrower towed by a tank, four personnel were mortally wounded when the poorly designed and fabricated vessel catastrophically failed.

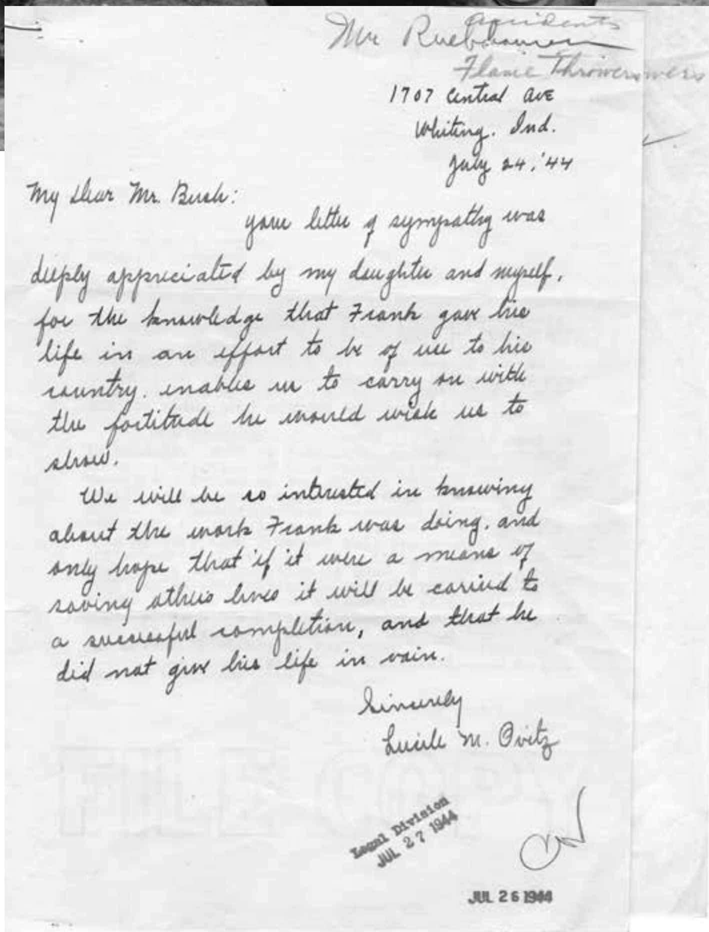
complained that it did not abide by industry standards, was poorly welded, and had an unsound design. Weakened springs and lubricating oil deposits had caused the right compressor's troublesome valve to stick open; as a result, recompression and high temperatures ignited carbon or oil deposits. Fuel leaking into the compressor was set ablaze, then "forced back into the fuel chamber, thereby igniting the entire supply of fuel." An OSRD memorandum regarded the disaster as "just one of those unfortunate mishaps which may occur in the course of any research on dangerous instrumentalities of war performed at an accelerated pace." (In a bit of twisted irony, the earlier "Firefly" project assigned to Standard Oil was a device designed to detonate gas tanks.) It was concluded that "direct connection of an air compressor to the fuel container is extremely hazardous." A faulty valve and shoddy engineering had cost the lives of four men.

Mixing of Chemicals Can Produce Explosion

Other grave accidents merited attention in the OSRD files. On April 3, 1943, an explosion at Servel, Inc., which produced oil smoke pots for the OSRD, "destroyed the laboratory," fatally injuring technical aide Clarence O'Bryan. He suffered serious burns and critical injuries to his legs and lower body. He died three days later in the hospital from kidney failure. O'Bryan had been married for less than a month. The cause of the blast was unknown, but it was speculated to have been the spontaneous combustion of the chlorated sawdust and charcoal in the dryers.

When the OSRD conceived a device capable of "extracting oxygen from the air" and recycling it, they contracted the University of Pennsylvania to develop it. Scientists working on the project, which was deemed "of great importance to the war effort," used salcomine, a "cobalt-containing organic chelate," to absorb and release oxygen. On April 18, 1944, the pressurized experimental device sprang a leak, spraying salcomine into the air. Theodore A. Geissman stopped the leak but suffered "severe toxic hepatitis" in the process, which required expensive medical treatment. Years later, the OSRD urged passage of a relief bill for Geissman in a July 29, 1947, memorandum to the Bureau of the Budget. (A scribbled annotation confirmed the bill was approved.)

Under another OSRD contract, Samuel Ruben, "the best young experimental chemist in the country," in one colleague's eyes, worked at the University of California, Berkeley. In late September 1943, an experimental vial of phosgene shattered,



Mr Ruebhausen
Accidents
Flame Throwers

1707 Central Ave
Whiting. Ind.
July 24, '44

My dear Mr. Bush:

your letter of sympathy was deeply appreciated by my daughter and myself, for the knowledge that Frank gave his life in an effort to be of use to his country. enables us to carry on with the fortitude he would wish us to show.

We will be so interested in knowing about the work Frank was doing. and only hope that if it were a means of saving others lives it will be carried to a successful completion, and that he did not give his life in vain.

Sincerely
Lucile M. Ovitz

FILE COPY

Legal Division
JUL 27 1944

JUL 26 1944

The widow of Frank Ovitz, one of those killed in the flamethrower explosion, wrote to Vannevar Bush expressing the hope that her husband's research work would eventually save other lives.

spraying the contents into his face. He was rushed to an oxygen tent, but his condition deteriorated. He died the next day, leaving "a wife and three small children." Since he had previously been involved in ordinary research on non-toxic butane gas, he did not have extra-hazardous insurance. These lamentable cases and others like them would stay out of the limelight, effectively forgotten.

In the OSRD, sacrifices were made and conspicuous heroism was displayed, from Joseph Roman's attempt to save his colleague to Geissman's stopping the toxic salcomine leak with disregard for his own safety. In October 1942, in the wake of the fatal blimp crash, Commercial Solvents fire, and Caltech deaths, OSRD Executive Assistant Carroll L. Wilson acknowledged that "Many of our personnel . . . expose themselves to serious risks . . . our people are working with poisonous chemicals, with high explosives . . . with infectious diseases . . . Our men have not hesitated to take these risks."

One notable death was that of Wallace B. Caufield, Jr., an employee of Harvard's Radio Research Laboratory, who was strafed by *Luftwaffe* aircraft in Luxembourg on January 1, 1945, as the Battle of the Bulge raged. As shown by its drafted relief bills and lobbying, the OSRD was reluctant to leave the families of its fallen employees in desperate financial straits and worked to compensate them.

The story of the OSRD, encompassing both its unconventional projects and the losses it suffered, is a potent reminder of the risks and rewards of scientific research during World War II.

Carl Sanborn's death in June 1942 was not the first civilian victim claimed by the war at sea. Caltech had already suffered a death in connection to Mousetrap on March 27, when assistant mechanic Raymond L. Robey was fatally burned.

In a letter to Caltech, Bush conceded that "It is an exceedingly difficult thing to strike a proper balance between . . . security of personnel on the one hand and . . . an important and dangerous undertaking on the other." The final chapter of the Sanborn tragedy came on January 6, 1948, when Congress passed a law to relieve his dependents, with Bush lobbying for recognition of Sanborn's "supreme patriotism."

While he emphasized the need for vigilance and safety precautions, he added: "It is never possible to be absolutely perfect. . . . If we were to strive for absolute perfection, we simply could not . . . work at the speed which the war effort warrants." Bush pointed out that "If we can make speed we will save lives . . . [and] we will increase the safety of this country in a critical period of the anti-submarine effort."

Relatively little public interest in the U.S. experience in World War II has focused on the efforts on the home front to supply troops with war-winning equipment, and even less attention is devoted to the OSRD's work. While its inventions were not always accepted, any research organization makes missteps. The endless ingenuity of its scientists demonstrated the extent of human creativity.

Note on Sources

A special thank you to Elizabeth Fortson of Special Media for her quick thoughts and able assistance in acquiring some of the images used.

Little has been written about the Office of Scientific Research and Development in World War II. In the 21st-century definition of "information accessibility" determined by the number of Google hits, the OSRD rates 18,000 hits. Many of these hits repeat short biographical information, giving dates, creation process, and senior leadership. Little has been written about breadth of the projects; most of the focus on the Manhattan Project, and even less about the men and women who staffed them. In 1948, Irvin Stewart wrote a 358-page administrative history that gives an excellent view into the office structure, the administrative evolution, and notes in no less than five places that they were heavily encouraged to hire women. The Library of Congress also holds a significant amount of OSRD's documentation, making research documentation, final results reports, and other administrative material available to both the research community and the public alike.

The Records of the Office of Scientific Research and Development (Record Group 227) are in the National Archives at College Park, Maryland. Records of the Committee on Medical Research—Rad Lab, contain information about liquid methane bombs, supersonic generators to repel malarial mosquitoes, monster/hamster confusion, and the Dieppe raid "truth serum."

General records, 1940–1947, has information about the blind landing UV landing system, illuminated smoke cloud countermeasure for night landings, and "death ray" (DUKW) research.

Correspondence in the Budget and Finance Office Records, 1942–1944, has information about the Carl Sanborn incident, blimp crash, Theodore Geissman incident, Roy Nelson Hurt incident, the Standard Oil flamethrower incident, Clarence O'Bryan incident, Raymond L. Robey incident, as well as enclosed legislation, deaths chart, letters to families, various reports.

Projects Fantasia (SAC-26), Blackout (SAC-20), Firefly (SAC-21), Who, Me? (SAC-23B) material can be found in Division 19 (Miscellaneous): Project or Problem Files.

Reports on the investigation of the November 1944 flamethrower explosion are in Records of the Administrative Office: Contractors' Reports: Division 11: Standard Oil Dev. Co, Standard Oil Co. (IND.).

Information about the oil smoke pots accident that killed Clarence O'Bryan.is in Records of the Administrative Office: Contractors' Reports: Division 10: Rochester, Univ. Of, Servel, Inc.

Additional accident reports can be found in Records of the Administrative Office: General Records, OSRD: Accidents to Accounting.

Authors

Adam Kline is a research intern studying the OSRD at the National Archives at College Park, Maryland. A high school senior, he plans to study international relations with a focus on global security. He has also contributed to the online publication *Student World Report.* This is his first article for *Prologue.*

Robyn Dexter is the supervisory archivist for the paper. She has been with the National Archives for five years, serving in the Anchorage, Alaska, San Bruno, California, and College Park, Maryland offices.