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Remarks by John A. McCone, Chairman
United States Atomic Energy Commission
Prepared for Delivery at the
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THE ATOMIC WORLD OF AFFAIRS

Mr. President, faculty, and graduating class, it warms my heart to come to this great University which I have known for so long but never before visited and to find a few old friends and to have an opportunity to make new ones. In my present responsibility it is most encouraging to find here, as I have this morning, a great center of nuclear physics and engineering. Indeed, you pioneered in this effort, being the second University to have a research reactor on your campus.

The Atomic Energy Commission is proud to play a part by helping with this important activity. I assure you, Mr. President, of our continuing interest in you and in all that you do. We are determined to help you whenever and wherever we can. You have made a great step forward by acquiring a particle accelerator -- a most important research tool and we are pleased to join with you in contracts for its use in the field of low energy nuclear physics.

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You are equipping men and women in a field of science and engineering more advanced and difficult than any other. In doing so, you are serving the Commission for we need men and women equipped with this special knowledge. Also, you are serving the great industrial complex which is rapidly building around the atom.

In doing so, you have introduced your students to the most rapidly developing field of science and engineering. The nuclear sciences are young, very young, but they are destined to grow and, as they grow, they will affect every one of our life's activities. Therefore, this subject should be understood by you regardless of the path of your future life. If you are a doctor or a lawyer, a business man or banker, a writer or a teacher of our young, you will find the atom commanding your attention on an ever increasing scale.

I will not now discuss the infinite horizon of the atom in its peaceful role. It is sufficient, I believe, to tell you that its use in agriculture, in research, in industry, and in biology and medicine has increased thirty-fold in the past five years and its use is forecasted to increase another four or five times in the next few years.

Nuclear power is now in its very infancy. It is destined to take its place as one of our principal sources of electrical energy. Power demands in the United States will double every ten years. More and more large generating plants must be constructed to meet the ever increasing needs of our people for electricity. Many of these plants will be nuclear power plants.

We believe the ten years immediately ahead of us will see nuclear plants perfected. They will be competitive in areas where power is costly because of absence of local fuels. We believe that in the ten years following, and these are important years to the young men and women who have today received their diplomas, the atom will furnish a substantial percentage of all new energy sources constructed to meet this country's ever growing demand for power.

Standing here, in the heart of one of America's most productive coal regions, our attention turns, at this prospect, to the question of the impact of nuclear power on coal production.

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It is reckless to say that nuclear energy will replace coal and oil. What it will do is to supplement coal and oil as a source of power. It will provide a percentage of the tremendous growth of the nation's power industry.

The central question here is economics. Nuclear power is proving more expensive, and more difficult to produce than was once thought. It is hard to harness the atom and a plant designed to do it safely is expensive. Consequently, the power produced in the plant is also expensive.

But, this condition will not always exist. Improvements are being made and these improvements will reduce the cost of nuclear power. Then the atom will take its place beside coal and oil as a source of our electrical energy on a strictly competitive basis. Thus, it will prove to be an added resource; an additional tool in our economic structure; a spur to growth of all industry and all of our nation's activity.

The atom must also continue as the guardian of peace and the protector of our way of life. When World War II abruptly ended with the capitulation of Germany and the surrender of Japan, the world looked forward eagerly to peace. Men had suffered for the cause of justice and freedom, and they determined to now go their way of life in a peaceful world.

Our leaders did likewise. They felt that the arrangements agreed upon among the victorious allies would be honored. A peaceful world for years ahead was their confident hope.

We, therefore, turned away from conflict. We were confident that differences, if they arose, would be resolved through understanding, not through military conflict or the constant threat of war.

We found, however, the Soviet dictator felt differently. Joining the Free World in its bitter fight against Nazism was merely an incident in the Communists' plan to dominate all people and subject all people to their dictates.

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We demobilized; they did not. We opened our country freely; they created an Iron Curtain around theirs. We urged nations throughout the world, many of which had been occupied and destroyed, to rebuild and to develop politically as they freely chose. They occupied one country after another, subjugating all to their will, destroying individual freedom and eliminating the most precious of all of man's rights, the privilege to worship as he chooses.

The Soviets intensified the war of international Communism against the Free World. A war designed to destroy our way of life and to replace it with theirs.

It is a "cold war," but back of it to guarantee the Communist dictator's success are 175 line divisions, trained and fully equipped; supported by vast air power and now a missile capability of alarming proportions.

The West faced a danger of being crushed by the sheer weight of the manpower of the East. It was apparent that only through strength could we counter the ruthlessness of the Soviet dictator. How could we provide this strength so necessary for our security? It would be futile to match him man for man or division for division. Hence, we determined to build our defenses around nuclear weapons -- a new and mighty source of power which providentially had fallen into our hands.

This we have done with great determination and skill. Because we have done this well, there is no "hot" war today. Nuclear defense has guaranteed freedom for ourselves and for our allies.

The decision to build our military security around the atom was a wise one. It was a decision of all of America and has stood the test of passing years. I believe the decision valid today, just as it was originally. Nuclear weapons are costly, yet cheap compared to the cost of the massive armies necessary to balance the manpower of the Soviets.

The atom has provided for our security and for the protection of you and of your families. We must never let it deteriorate or take a second place in the armament race in which we are now unfortunately engaged. If we do our strength

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will disappear. Free men throughout the world will fall to the domination of the Soviet dictator. Gradually our own freedom would be lost.

To avoid deterioration of the bulwark of our military strength, the atom has had to keep pace with the latest technological developments. As weapons systems have changed and become more complex, nuclear weapons have had to change and improve. For example, delivery of nuclear weapons by aircraft poses entirely different problems from delivery of nuclear weapons by missiles. Development of new, improved and more efficient nuclear weapons require developmental tests to prove evolving concepts. Such testing is as necessary for nuclear weapons as for any other military equipment, or for that matter commercial products. Testing is equally essential for developing your automobile and your television set.

Have we gone too far with testing? Have we unnecessarily created a radiation condition which endangers our people and our future generations? This question has given me great concern. I have sought the advice of the most competent scientists and as a result have reached two conclusions.

First, the radiation hazard from all tests conducted to date -- ours, the British, and the Soviets' - has not reached dangerous proportions. Second, unrestricted and with no limitations, continued nuclear weapons testing in the atmosphere might so increase the radioactive content of the atmosphere that a serious hazard could result. This must be avoided. Your Government has sought a dependable agreement with other nuclear powers for the cessation of tests. The basic purpose for such an agreement is the hope of easing the world tensions which add momentum to the disastrous conventional and nuclear armament race. While such an agreement will not of itself stop the production of nuclear and conventional arms, it may be a helpful first step toward this vital objective. Moreover, fears of the consequences of radioactivity fallout do exist, even though expert opinion says these fears are greatly exaggerated. Stopping all nuclear tests would allay these fears.

Protracted and exhaustive meetings to accomplish this goal have taken place in recent years in New York, in London, and now are being carried on in Geneva. A principal

concern has always been finding acceptable means of effectively safeguarding an agreement. The American people and the people of the Free World must know as they lay aside their means of further developing their nuclear defenses that the Communists will do the same. We must know the Soviets cannot cheat and proceed in secrecy with their own nuclear weapons developments.

This is an essential point. It must not be discounted. The central point is finding means to assure the world that all parties are abiding by the agreement. The United States Government will give its sacred promise to live up to the letter and the intent of an agreement. It will back up this promise by permitting the installation in the United States of inspection posts internationally manned and equipped with proper instruments, as well as mobile inspection teams. Moreover, we will permit on-site inspection teams to go to any area where the instruments indicate that a nuclear explosion might have taken place.

Adequate inspection is essential. The Soviets will not agree. For months they have attempted to cripple the entire control system by steadfastly insisting on veto rights, particularly with respect to the dispatch of on-site inspection teams. For months they have insisted that the control stations and inspection teams manned by nationals of the country wherein they are located.

Can the American people accept these conditions? Can the American people be expected to lay aside developments so important to the preservation of their security on uncertain Soviet promises? Can we close our eyes to the scores of broken treaties and ignored sacred agreements and enter a treaty in this vital field without reasonably adequate safeguards?

We have answered that question with an emphatic "No." We will continue to insist upon an agreement which will insure to the world that once agreement is reached to stop testing, all parties will conform to the agreement. The world will know by the reports of the international inspection teams that no cheating goes on.

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This we have made abundantly clear in these long months of negotations. World opinion and the constancy of our position has brought limited concessions from the Soviet side. They have agreed that a few American and British personnel might be allowed in control stations in the Soviet Union. They have indicated that they might consider a few on-site inspections over which no veto would be exercised. However, they do not relate this number to what the seismographs say or other instruments indicate. On the contrary, they insist this is a political matter. They ignore the scientific realities of the problem. To this we cannot agree. It is imperative that the number of inspections be based upon the technical capabilities of the control system.

On Monday, negotiations are to resume in Geneva. We are hopeful that agreement can be reached. We will not, however, depart from the basic principles which I have just reviewed.

Nuclear tests can be conducted in three environments. Let me review them briefly.

First, tests in the lower atmosphere. Tests up to about 30 miles in the atmosphere can be adequately detected and there are good prospects of attaining adequate capability for identification. Properly equipped control posts in the principal land masses and oceans of the earth, together with aircraft sampling flights to look for radioactive debris, can determine with an acceptable degree of assurance whether a nuclear explosion has taken place in this portion of the atmosphere. An occasional natural event, such as a volcano, or a very large falling meteor might create disturbances which would confuse the instruments. But we believe the system could adequately distinguish such natural events from weapons tests.

An agreement to suspend tests in the lower atmosphere, to establish the necessary properly equipped control posts, and to man them with an international organization would be a feasible first step that could be taken to solve this problem. This we have proposed to the Soviets.

Secondly, tests in the higher atmosphere and at extremely high altitudes, above 30 miles to thousands and perhaps hundreds of thousands of miles above the surface of

the earth. Tests in the higher atmosphere would not eliminate the fallout problem. However, almost no fallout would be expected from tests well beyond the atmosphere in space. Detection here poses serious questions to known scientific technology. Much further research is necessary before a dependable method of detection can be developed. It is possible, although no one knows, a system of satellites equipped with sensitive instruments for measuring signals and reporting back to receiving stations on the earth might be one of the answers to this problem. The problem of identifying an event as a nuclear explosion, and not a celestial disturbance is even more severe. Moreover, identifying the responsible nation becomes very difficult. As we proposed at Geneva, we believe that the nuclear powers, the Soviet Union, Britain and the United States, should work together on developing this technology and inaugurating a system under international auspices.

Thirdly, there are the underground explosions where weapons are buried in the earth so that radioactive debris does not escape into the atmosphere. Although this is a difficult environment for testing nuclear weapons, it can be done, and very significant advances in weapons technology, particularly with respect to missiles and small weapons, would result from such testing.

In this area detection and identification become extremely difficult. Here, the principal signal to the control system is the earth shock, registered on seismographs spaced around the world. As you know, many thousands of natural earth tremors occur every year. Not only is it difficult to detect many underground nuclear explosions, but once detected, it is difficult to distinguish them from these earthquakes. For this reason, it is necessary for men to freely inspect the area where the instruments indicate a nuclear explosion might have occurred. Even then, final proof that a nuclear explosion had occurred would be difficult, as it requires drilling deep into the earth and securing a sample of radioactive debris.

These are some of the technical difficulties that confront us. Added to this problem is Soviet unwillingness to forego the veto over a great many important aspects of effective inspections. Despite these problems, our objective remains unchanged -- an eventual cessation of all nuclear weapons tests.

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If we are to be sure our agreements are safeguarded, and this is the announced policy of our Government, then we must find ways to detect violations of such an agreement with reasonable certainty. This is the most difficult of all of the problems our negotiators face at Geneva. It is difficult because the instruments, irrespective of how sensitive, may not record and will not identify all explosions. The small ones will go undetected. Therefore, we must have the right to go to the site and actually inspect the area where the event has taken place.

An added complication is the fact that scientists and engineers believe they can devise ways of muffling underground nuclear explosions. Muffling has been done for many years with dynamite and with TNT in mining operations and in construction work. Other techniques producing this effect can probably be applied here. This, then, would further reduce the effectiveness of any detection system and would remove from the people of the world the assurance that the agreement is being properly and adequately safeguarded.

We believe, however, that by research and study answers to this problem can be found. We have proposed that the Soviets join with us in the research necessary to devise an effective control system. We have laid before them technical information of great significance, and will present them with extensive additional information for consideration during the forthcoming meeting.

So far the Soviet negotiators have refused to continue some of the most vital technical discussions. They prefer to adhere to the position that the first conclusions reached by technical experts in the summer of 1958 must be considered as final. With this we cannot agree, for we know as do they that the conclusions reached at the meetings of last summer were based on the limited data, then available, some of which has been superseded by better data from subsequent experiments and research.

There must be a resolution of the technical problems involved in establishing a proper and agreed method for detecting and identifying underground explosions. Unless the Soviets agree to such discussions, and to the necessary experimentation and research, no satisfactory assurances can be given that all parties to a suspension agreement will comply at all times.

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The temptations to cheat will be very great for the Soviet scientists, and military planners will see, as ours do now, that small tactical weapons will enormously improve the effectiveness of ground forces. Indeed, some believe that these weapons might entirely revolutionize ground warfare.

These are the problems which we face in this Geneva negotiation concerning which so much as been written. It is our fervent hope that through patience and careful negotiation the questions can be satisfactorily disposed of. We believe, as I have said, that a dependable and safe agreement to stop nuclear weapons tests is a first hopeful step towards disarmament. This step, if taken properly, and with understanding, could lead to others and better understanding among people will result.

If disarmament, both conventional and nuclear, could be achieved eventually, and an initial step taken now, tension would be relieved. The fear that entire cities, indeed nations, will be instantly destroyed by weapons of unbelievable power will disappear. Then, the full efforts of the nations of the world can be devoted to meeting man's needs and to his welfare and his betterment. This must be our objective. It must represent a goal which we must seek with determination. But in seeking our goal, we must not reach for it recklessly. We must not lay down our arms until we can assure the people of the world that others are doing likewise.

I realize this complex problem of nuclear weapons testing and the arrangements under which it might be stopped is a serious subject for such a pleasant occasion as this graduation. I would have preferred to have devoted these minutes to discussing the vast opportunities of your future; to indicating the extent to which the atom, the subject of my principal concern, will play an ever increasing role in your lives, and to discussing how it will offer to each of you new and exciting interests.

However, the world today with its hope and its great opportunities is in grave danger. This danger will continue until a better understanding is established among men, and this understanding will permit them to willingly and safely lay aside their means to destroy. To accomplish

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this understanding means thought and work and patience. If we succeed, the future knows no bounds; if we fail, suffering and despair is the penalty. This then becomes your challenge. You are the young - the courageous - and the imaginative. You must assume the burden and the challenge of the future.

I congratulate you sincerely and enthusiastically upon your graduation day. Also, I congratulate you on the new duties and responsibilities you will assume tomorrow.

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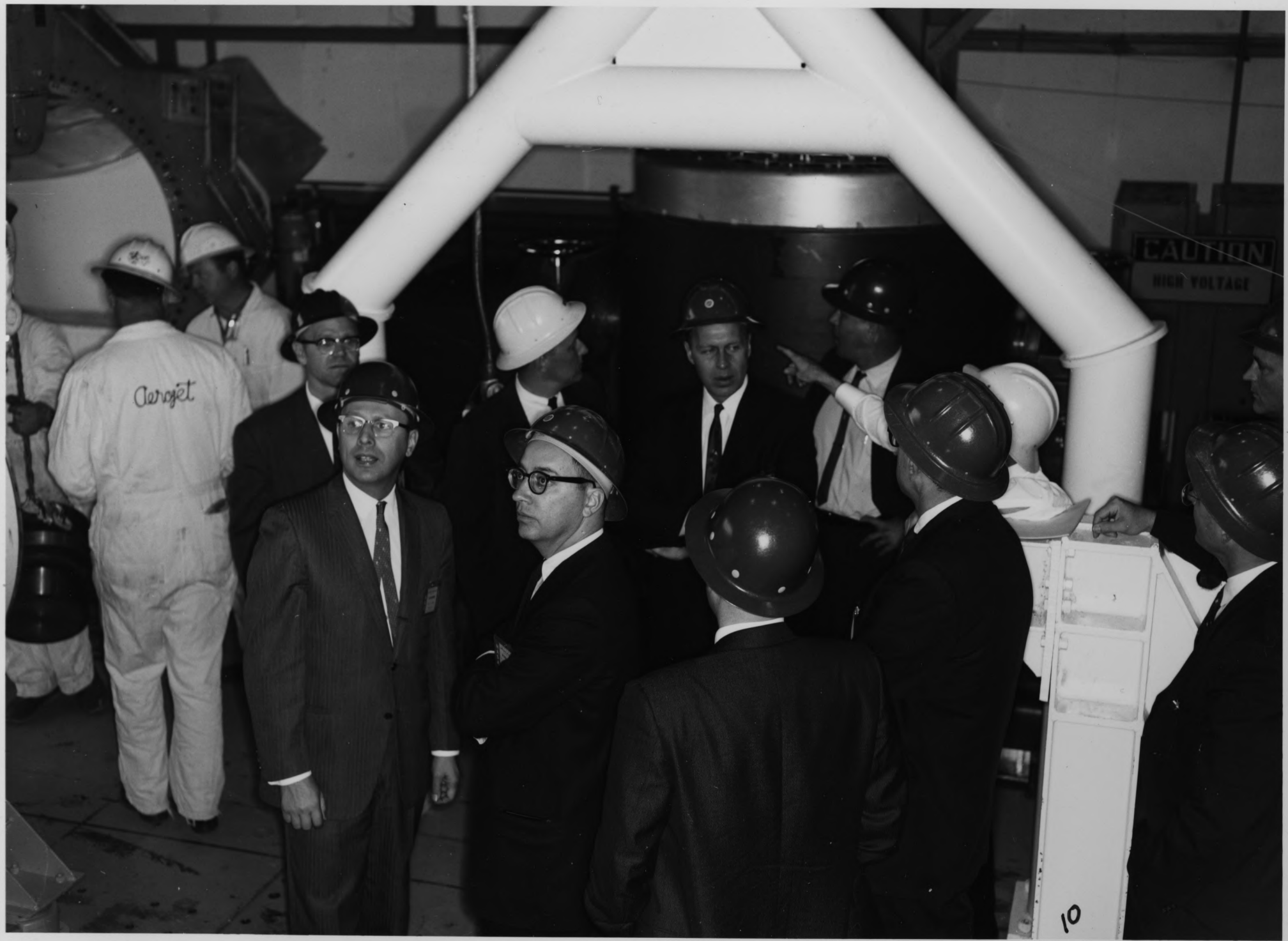
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