

**PRESENTATION OF DR. DONALD HORNIG
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UNIVERSITY OF COLORADO-Boulder**

DR. MITCHAM: Good evening. It is my pleasure this evening, to welcome you to the sixth in a series of speakers on Policy, Politics and Science in the White House. In the process, I also want to thank Roger Pielke, Rad Byerly and others, for all the work that they have done in organizing this extremely informative, year-long symposium on science advice to the President.

For anyone interested in science policy, whether scientist, engineer, social scientist or humanist, it is crucial in our high-science, high-tech society, to reflect on the policy foundations and utilizations of science.

Our speaker this evening, Dr. Hornig himself, wrote in an 1978 examination of the health of the scientific and technical enterprise, and I quote: "The most distinctive feature of a 20th Century developed society is the complete integration of science and technology into its basic way of thinking." "Because of this," he added, "it is appropriate for Congress, the administration, the scientific and technical community and the public to ask, periodically, how are we doing?" That is, are we thinking and acting in the right ways for and with science and technology?

And we are grateful this evening, that Dr. Hornig is able to share with us his perspective on precisely such questions and, thus, to increase our intelligence in policy research and democratic assessment of the scientific and technological world we are collectively in the process of creating.

It is because we are all, scientists and non- scientists alike, creating a world through and with science and technology, that science policy is increasingly important for all of us.

As a professor at a specialized, technological university, I have found myself encouraging my students to appreciate science policy, and have therefore worked to encourage them to participate in this series. For myself, too, as someone educated in the humanities, I have felt called upon to attend, more than ever before, to science and technology policy questions.

It is for this reason that I worked to get my own institution to participate with the Center for Science and Technology Policy Research, both in developing a collaborative graduate certificate in science and technology policy, and in contributing support to this series.

Again, my thanks to Roger Pielke and to others for their hard and creative work in creating this event.

DR. PIELKE: Thanks, Carl. We, again, appreciate Carl's support in the Colorado School of Mines.

It's been a few weeks since I've seen most of you so, I missed you guys. Welcome back to our next event here. We're extremely pleased tonight to welcome Donald Hornig, who

was Special Assistant for Science and Technology to Lyndon Baines Johnson, 1964 to 1969.

Some of you could probably give my introduction by now, but what I'd like to do is thank our sponsors. Without our sponsors, this event and the others in the series would not be possible.

Major support for this year-long series has been provided by the Cooperative Institute for Research in Environmental Sciences (CIRES) here at CU. We also gratefully acknowledge the support of the graduate school, and Office of the Vice Chancellor for Research, the Provost's Office, the College of Engineering and Applied Science, and the College of Arts and Science's Dean's Fund for Excellence.

And from beyond CU, we also appreciate the support of Southwest Research Institute, Colorado School of Mines, and the Boulder-based ICAT Managers.

Any event like this requires the hard work and dedication of a number of individuals. And two people in particular I'd like to thank are Bobbie Klein, who's the Managing Director of the CIRES Policy Center who convened the series and thought of it, really, from start to today. And Ami Nacu-Schmidt has been instrumental in the project. So, thank you, to both of you.

This is our last event of the fall, I'm sad to say. But we will have one more Science Advisor visit in January -- January 31st -- and that's George Keyworth, who was Ronald Reagan's Science Advisor. And that'll end our series.

We do have a content-rich website and I'd encourage you to visit. For those of you who haven't been able to see all of the Science Advisors, we have all of their videos -- streaming videos -- transcripts from their public lectures, and I would encourage you to take a look and you can find that on the program.

We also have a video of Bob Palmer, who is a former congressional staffer, who participated in the series.

So, now, to the main event for tonight. As usual, we have three parts. We'll start out with Dr. Hornig giving his prepared remarks. After he's done with his prepared remarks, I'll spend a little time asking him some questions up here on the stage. And, following that, we'll turn it over to you so you can ask your questions of Dr. Hornig.

I could spend the balance of the evening describing Donald Hornig's resume and his experiences, but due to time constraints, I will just give the high points.

Donald Hornig earned his doctorate degree in physical chemistry from Harvard University in 1943. He then worked in the Underwater Explosives Laboratory of the Woods-Hall Oceanographic Institution, until he joined the Los Alamos Laboratory in 1944.

In 1946, he moved to Brown University as an assistant professor, becoming a professor in 1949, as well as associate dean of the graduate school.

In 1957, he left for Princeton, where he served as chairman of the chemistry department. He served on a variety of government advisory committees, and in 1957 was appointed to the Space Science Board of the National Academy of Sciences.

He served on the President's Science Advisory Committee, PSAC, something you'll hear about this evening, under Presidents Eisenhower and Kennedy before being confirmed as President Johnson's Special Assistant for Science and Technology in 1964. He served in that role until 1969, when he became a vice president of the Eastman-Kodak Company.

Beginning in 1970, Dr. Hornig served as President of Brown University. Subsequently, he became professor of chemistry and public health at Harvard University.

And from 1987 to 1990, when he retired, he was chairman of the Department of Environmental Health in the Harvard School of Public Health.

So, please join me in welcoming Donald Hornig.

DR. HORNIG: Sorry to hold up the proceedings. I'm very grateful to have been invited to be here. I've enjoyed meeting some of you today, but not many. I wish it were more. And I thank you for the nice introductory remarks.

I thought a lot about how I might contribute to your consideration of the place of science in the White House. You've already heard from five distinguished Science Advisors who've had to deal with problems of the Presidency -- that is the President himself, plus the associated White House.

You know, the Cabinet, the National Security Council, the Bureau of Budget, the Council of Economic Advisors, plus the staff, which the White House staff supports the President, but it's also directly powerful in its own right. If any of you have dealt with them, you realize that.

I wish I had heard some of the discussions earlier, because each of them dealt with a different President, each of whom faced different problems, domestic and foreign, and had to deal with different political realities. I hope I won't repeat what has already been said.

I will confine myself to my own experience with Presidents Eisenhower, Kennedy and Johnson. Before I proceed, I should remind you that I'm a Neanderthal, with a fading memory, but a lively imagination.

My experience relates to a time before many of you were born. On the other hand, although the actors have changed and the times have changed, a surprising number of problems look very much the same.

What are the problems? Some of the discussions and much of the analysis concerns the management of the enormous collection of programs carried on by the federal agencies or funded by the federal government. Each has its own body of scientists, its particular management organization and traditions, and its particular problems. I don't know if you'll

all agree with me, but I don't think there can be a single science policy when it encompasses this whole spectrum. So, I won't attempt to discuss one.

Still, despite all its diversity, the ship of state needs to be led, and steering it is ultimately the job of the President. The ultimate goal for us has to be to assist him in all matters which require scientific and technical judgments. This shows up in the appointment letters of most, if not all, of the Science Advisors -- I haven't checked this out, I have to say -- but where the key phrase is, "to advise and assist the President in all matters affected by or pertaining to science and technology." I know that's true in several, and is also incorporated in the 1976 Act which establishes the office at a much later date.

Now, the military have faced the problems of utilizing new inventions, for example, the machine gun, throughout history. It was World War II that saw the introduction of weapons such as radar and sonar, which utilized new science to deal with strategic problems, such as the submarine war or the air assault on England.

Universities got seriously involved, probably for the first time in that sort of thing, starting in 1940. The White House itself only got involved when the possibility of developing an atomic bomb was brought to the attention of President Franklin Roosevelt in 1941. Now, I'm not entirely exactly sure of that date, plus or minus one year. But, the resulting program, the Manhattan Project, was subsequently pursued, again, within the framework of the Armed Forces and didn't involve the kind of organization we're talking about now - - civilian organizations.

The kind of discussion we are now having started in 1957 when the Soviet Union launched Sputnik. I had previously participated in various government advisory committees, such as one on the application of infrared radiation to warfare, which taught me about the problems in dealing with very high-ranking military officers. That isn't always a good experience -- but, anyway. In any case, Sputnik was a very different matter.

Against the background of an on-going Cold War, the launch of a long-range rocket capable of carrying nuclear weapons produced a major public shock. Not only because of its military implications, because it stimulated public concerns and public discussion of the whole state of American science. Our relative technological capabilities, the quality and nature of American higher education, and so on. I mean, really a very fundamental national self-examination.

What quickly emerged was that except for the military, the President had no one he trusted to turn to. President Eisenhower understood the importance -- as a general -- of a reliable and loyal staff to back him up. But in the government, there were economists, lawyers, businessmen with a variety of backgrounds, and so on. But no one equipped to think about this new range of critical problems.

President Eisenhower's response was to create the post of Special Assistant to the President for Science and Technology, to which he named James Killian, then president of MIT.

A little later, the President's Science Advisory Committee (PSAC), which has already been mentioned, appointed by the President -- and this is unique, because it doesn't happen

now -- and reporting directly to the President was established. Neither one of them, though, had any statutory authority.

PSAC consisted of distinguished scientists, some academic and some with industrial backgrounds, but all with dealings and broad experience in dealing with large public problems, mostly acquired, incidentally, in World War II. We haven't any similar training ground now for public servants.

You'll recognize that although the scale, the application, the sophistication and variety of problems have grown enormously, this problem remains. The President's advisors, mainly, are non-scientists.

Whether the White House needs its own science and technology apparatus and what its role should be or could be, has been debated ever since. And I imagine we will discuss this and related matters in our sessions here in the next day or two.

I've already indicated that I don't think we need a science oversight or management staff. We have an OMB and the various agencies also can do that.

We need a source of wisdom, experience and perspective drawn from the entire world-wide scientific and technical community. We should ask how we can help the President to lead in the midst of an on-going transformation which is, in historical times, proceeding with breathless speed.

Think of it. Petroleum-powered transport began during my grandparents' lives. The first airplane flew when my parents were children. Commercial radio could first be heard when I was a child. I remember my father bringing home an acid battery-powered radio in 1924 to listen, miraculously, to voting reports on the presidential election. Sulfa drugs were introduced in the '30s, followed shortly by penicillin. Technical advance helped turn the tide in World War II, and the atom bomb ended the war.

Since then, the process of scientific discovery and ideological -- huh, ideological -- technological advances has not only continued, but has been speeding up. In many ways, it has become the central initiator of large-scale changes in the economy, in the structure of society, and in many facets of our culture, even. It is even a political force.

Although I have participated in a variety of government advisory committees, my direct experience with events at the level of our considerations here started in 1958, when I was named to the newly-created Space Sciences Board for the National Academy of Sciences, which Lloyd Berkner was chairman.

Its mission was to help design a program for the NASA, which had just been started and didn't have a staff. Well, we worked at it.

In 1959, I first met President Eisenhower. He asked me to serve on the Science Advisory Committee, and in January of 1960, I was formally appointed. Peace at that time focused on military intelligence and arms control problems, nuclear test ban and nuclear energy. It also devoted itself to a major effort to stimulate education in the sciences. And that's important. That was conceived from the beginning. It was a critical role for the presidency.

President Kennedy continued my term on PSAC. He was an interested president, and a good listener, and a great support to Jerry Weisner, who was then the Science Advisor. But, it is chastening to realize, when one tries to make stories that say how great all the Science Advisors were, that he consulted neither PSAC nor his Science Advisor in arriving at his decision to go to the moon, which may have been the biggest decision of the time.

My subsequent contact with him was as Chairman of the PSAC Booster Panel and Space Science Panel, to be invited to accompany him on a trip to visit nuclear and space installations in Colorado and New Mexico. Maybe -- I say maybe -- our conversations on Air Force One led to his asking me to become his Special Assistant, but I haven't the faintest idea.

People always ask, "Well, why?" I don't know.

At any rate, he was assassinated shortly thereafter, so I was in no-man's land until in January, Lyndon Johnson asked me if I would stay on. On January 24th, he formally appointed me as Special Assistant, and on the same day, sent up my nomination for a completely separate job -- and one could have a discussion about that complication -- Director of the Office of Science and Technology. And he sent it to the Senate and, in what must be record time, I was confirmed on January 26th; two days later.

My agenda quickly broadened beyond national security problems. In 1964, when task forces were being organized to provide the new president with initiatives he might undertake, Rachel Carson had just written her highly-acclaimed book, *Silent Spring*, which some of you may have read. And, I sent a memo to Bill Moyers that pollution and the problems with the environment were going to be one of the big political issues of our time and that it was important for that administration -- or our administration I would say -- to take the lead. He liked the idea, as did the President.

That summer, we set up a task force chaired by John Tooke of Princeton to develop it. And then the report, "Restoring the Quality of the Environment", was issued by the President, who wrote a foreword to it.

In the next five years, we tackled many issues, mostly dictated by my sense of what mattered to the President at any given time or trying to anticipate for him what was going to matter. This led to efforts in such areas as developing the potential of the oceans, coping with the world food problem, dealing with urban problems, and very importantly, meeting the need for basic research and advanced research in science and technology.

Another activity of the office then was to provide support to the scientific and technical leadership in the various government departments, many of whom had seen the same problems of communicating with their own colleagues and bosses that we did in the White House. You know, talking to guys who didn't know a thing about science. I hope, though, you'll appreciate the wondrous powers of small nudges from the White House. It helped smooth lots of things.

We were also important channels of communication between the agencies and relevant offices and officers of the BOB, Bureau of the Budget then. It's now OMB, the Office of Management and Budget.

Well, I could go on and chat about numerous examples, but I will leave that to questions and personal discussions.

Lastly, I would mention that science is a wonderful lubricant for foreign policy initiatives. It is relatively apolitical and, by and large, everyone loves science. That may not be as true anymore as it used to be.

I first realized that when, in 1964, Rudnyov, whose first name I can't remember, a Deputy Premier of the USSR, invited me to come to the Soviet Union as the first half of an exchange, of which he would be the return visitor. We sensed the vested interest in that. I thought it would be a good idea to accept, and the President concurred.

Immediately after he won the 1964 election, I made the trip in one of the President's airplanes, a 707, accompanied by a distinguished group of industrial scientists. Piore was a vice president of IBM, Hershey was a vice president of DuPont, Fisk was president of Bell Labs, and Holloman was the Assistant Secretary of Commerce. And that made the Russians take us seriously.

The outcome was to raise real questions as to whether our policy of trying to inhibit the flow of industrial technology to the Soviet Union was productive or might even be self-defeating. I can't give you an answer.

The visit was, I believe, the first time that it really became clear to the President that science and technology had a role to play in the conduct of science of foreign affairs. Something similar happened in the spring of 1965, when President Park Chung-Hee of Korea met President Johnson in Washington.

The day before his meeting with Park, the President called me on the phone saying that the stuff he had from State (that's capitalized, the State Department) was a lot of crap and he wanted something creative. PSAC fortunately was meeting that day, so we closed down our agenda and discussed various possibilities, homing in on the idea of an industrial research laboratory.

After PSAC adjourned, a rump group, including Frank Long of Cornell and Ken Pitzer, then president of Rice, and I, worked on a plan for what we called the Institute for Applied Research and Industrial Development, which I presented to President Johnson approximately one -- this shows how well the government's organized -- approximately one hour before President Park arrived the next morning.

President Johnson liked it. President Park was completely surprised because he thought you had to be notified in advance of these things, but he was pleased. At the end of the meeting, President Johnson had agreed, without consulting with me, to send me, backed by a distinguished delegation -- whatever that might mean -- to Korea, to see whether the idea could be implemented.

Well, the program was enormously successful. Now, 40 years later, KIST, K-I-S-T, the Korean Institute for Science and Technology, is thriving, has been a model for at least one aspect of development in several countries. It also has a whole string of off- shoots in Korea.

Well, these outcomes obviously gave the President ideas. The next summer, when President -- when Prime Minister Sabo of Japan was visiting, the President called me at home when I was at dinner at home -- while I was in the kitchen, sort of second- guessing Lilli at the stove -- the night before their meeting to say he wanted a fresh idea. You know, on demand.

This time, I proposed a U.S.-Japan medical cooperation program for Southeast Asia. Medical cooperation is always safe. And worked all night on it, consulting medical experts all over the country by telephone. The Japan-U.S. medical program went through and has been implemented. It is going strong right now. It's a good one.

This led to visits to Pakistan, India, Taiwan, Australia, many other places -- but, what I haven't talked about is Vietnam. We were not directly involved in the conduct of that war, but panels of PSAC continued to work on military questions. In fact, over half of the efforts of the Science Office throughout that period were devoted to defense, intelligence and space. That's as opposed to, perhaps 90% in the period -- the earlier period. My staff had about 35 professionals, and they worked closely with the Office of Management and Budget -- although it was still called BOB then -- on evaluating programs and budgets.

However, from 1967 to 1969 -- I got my text mixed up here, but it doesn't matter -- we went on working, but there was a continuing erosion of confidence in the loyalty of our office and PSAC through the President's goals, particularly the plans for an ABM -- the anti-ballistic missile -- and for super sonic transport. And once that came up, there was a gradual erosion in everything else we did.

The fact is there was never a conflict -- that's been discussed much in various places overtly, but there was a cooling off. You know, who works for you and who are your friends? That contributed to a total breakdown under my successor under President Nixon, leaving the reconsideration of the role of the Science Advisor and the Office of Science and Technology, which is the subject, I believe, of much of the meeting we're holding now. And with that, I thank you. *(applause)*

DR. PIELKE: From everything we've learned in this series, listening to the Science Advisors come through, the influence of the Science Advisor on policy- making, as we have heard, is probably at its peak under Eisenhower and Kennedy's presidencies, pretty clearly sunk to a low point under President Nixon when he got rid of the position. Some would say that we're at a low point today. But, I wonder, from your experience as a participant in and advisor to and an observer of science advice at the highest level of government, what are your reflections on how it's evolved over the last 40 to 50 years?

DR. HORNIG: Well, there are really two eras: One was the one -- the first one, which I would call the Eisenhower/Kennedy and the first half of the Johnson administration -- for which the issues were clear, but they weren't many of the ones we were considering. They were the things related to the Cold War, and I went into that. Then, all of these -- because

there was a clear need for the President -- this all became a part of what you might call a presidential family, you know, the PSAC eating in the President's Mess -- I remember the President's Mess and that sort of thing -- none of that's followed since then. And, so there's this difference in the role. I mean, it was much more personal then than it has become since.

What else? Well, recently, I'm simply not privy to these questions. No one -- you don't ask and you don't tell, I guess. It's as simple as that. So I can't answer very well. I can only say that if I read professional journals and from The New York Times and other newspapers, I don't hear very much about the office, and that's all I can say. I'm not any more perceptive than you could be.

DR. PIELKE: You were involved in the early years of the Space Science Board, the creation -- or following the creation of NASA -- the implementation of NASA. Can you talk a little bit about the early years of the space program and your involvements, particularly, during the 1960s leading up to the moon mission?

DR. HORNIG: Well, that's interesting because there was a lot of fumbling, of course. The scientific community didn't have much use, incidentally, for men in space. And that was a source of maybe some friction within the White House. But the whole question of what would you do -- I mean, what should be flown was a great debate and a very exciting one. Pictures of the moon and the back side of the moon were obtained for the first time, you know? It was all great. But, there was nothing -- it was very ambitious, yeah.

DR. PIELKE: Well, in a very real sense, the decisions about the space program that were put in place basically at the end of your term as Science Advisor, early in the 1970s after you left, continue to shape the space program today. The space shuttle was first proposed in 1972. What are your thoughts about the current direction of the space program? And some of these same debates that you mentioned, such as humans in space versus robotic exploration are still raging.

DR. HORNIG: Well, I'll just get into trouble if you make me talk about that. I think the program is going well. I don't know why we built the shuttle but, anyway, we did. On the other hand, there have been really marvelous achievements, which Hubble may be the crown of them all. But, nevertheless, there have been missions out to all of the planets and good ones with beautiful results, so you can't fault the nature of the program, except for, perhaps, that one fault and that's we're still having that debate. Are we going to Mars? Well, I think it's marvelous to go to Mars but, you know, when we're in the laboratory here we're perfectly content to use an electronic instrument and see what it says on the dial and not insist that we feel it with our fingers. So that I don't think there's this distinction between men and robots. The question is, whether the man has to sit there holding a steering wheel or whether you can stay on earth and through various kinds of instruments either tag the robots or do lots of things. Obviously, to me, the latter makes much more sense.

I, for one, incidentally, am rather pleased to find that we're now having problems with the shuttle, using the Russian vehicles to forward supplies and men to the International Space Station, because we can do it ten times cheaper than we can with the shuttle. And the only trouble that we have -- congressional legislation which says that after the first of the year,

we can't do that but we're not going to -- obviously, abandon those guys up there. That's the only way they could be supplied. We'll having to keep revving Russian vehicles.

Anyway, but there's still the question what the long-range direction is. I don't think it's very well settled, but I don't have any strong views except to say that there are just fantastic possibilities, but almost all of them rely on having sophisticated robot devices.

DR. PIELKE: I'd like to turn attention back for a moment to the Vietnam War issue and ask a few questions on that.

DR. HORNIG: Um hmm.

DR. PIELKE: Bruce Smith, in his book *The Advisors*, described how during John F. Kennedy's presidency, the scientific community came to be seen as divided between the "peace scientists" from academia, and the "war scientists" from the National Labs. He also describes how President Kennedy's Science Advisor, Jerome Weisner, was gradually frozen out of national security issues. I guess -- was this characterization of the peace and war scientists and the diminishing influence of the Science Advisors -- does that jibe with your experience?

DR. HORNIG: Yes and no. I wasn't aware of any such division as a structural thing. I was aware that there were a group of people, and I didn't think of them so much as National Lab people, but anyway, a group of people, some of them associated with the atomic energy lab, particularly Edward Teller, who were hawks, yeah. We thought of them as the "other side," I suppose.

But, anyway, I wasn't aware of anything. As to Weisner, I have no personal experience. I do know that what you quote from Smith fits well with what I've heard -- and I only say heard -- from what the newspapers would call, usually we all have these sources, I won't mention any names. And that's all I can say.

DR. PIELKE: President Johnson was not characterized as a favorite fan of academics and he was characterized as having a life-long distrust of intellectuals and he called the "brain trust" he inherited from President Kennedy, the "Harvards". You came from academia --

DR. HORNIG: I also came from Harvard.

DR. PIELKE: -- and Harvard. So can you tell us a little bit about your relations with President Johnson and how did he relate to you as an academic and as a scientist?

DR. HORNIG: That's a very complicated subject. I mean, the relations were cordial. He was really very good. He's a warm person, contrary to what some people said. I remember one time we were giving out the National Medals of Science and Lilli was sitting in an aisle seat with our daughter watching the thing. The President walked in, because he was the one who handed out the medals, and saw them, stopped, gave my daughter a hug and said how glad he was to see her there and he said, "You know, your dad," -- I'm not sure, Lilli can tell you the exact words, but anyway -- "Your daddy is doing a good job," or something of that effect. I just thought that was pretty nice.

So, that's one side of him. On the other hand, I won't go into details, he could be hard as nails. I remember one time when a governor thought that he had promised an oceanographic laboratory and the governor made the mistake of utilizing what he thought he knew in the election campaign and then he heard that the laboratory was going to Florida, in Miami. Well, I can tell you, the governor called me -- I didn't know what to say when he said, "You guys betrayed us." So, that's the other side.

And I think the statement about his feelings toward university people is overstated, incidentally. He was, in a sense, awed a little bit by them, a little bit afraid of them. It's a funny statistic that after he complained about how there were too many Harvards, while he was there, he put in more Harvard people than anyone had before. And I have no comment about the merit or demerit of that, but it's not consistent. Well, that's all I have to say.

He's a very complicated man, though, and very hard-boiled, and probably the most politically astute person I have ever encountered anywhere.

I should give him credit on one thing. Lilli and I arrived just before his Civil Rights speech in 1964, and it was absolutely amazing. Everyone in the White House, everyone around said he wouldn't dare to give it. It was impossible to do. He did. And, what's more, in a political display I couldn't imagine, I mean one way or another -- I have no idea what he promised to who or whether he twisted arms or wrists or necks -- he had the votes and it passed solidly. And it's quite clear that that's something that Kennedy would never, never have been able to manage. Not that year -- who knows about the future. But, at that time, it was his tour de force.

Okay. Enough said.

DR. PIELKE: Well, you gave us a few examples when President Johnson called you in the kitchen to ask for some input to foreign policy issues. And I was wondering if you could give us an example of a situation where he called on you to, perhaps, arbitrate on some scientific question or to provide some scientific advice on an issue that he was handling?

DR. HORNIG: I know of no example of being called to arbitrate a scientific question. I don't think it would have occurred to him that it was any of his business to arbitrate a scientific question if you put it that way.

I'll give you one example, sure, when the northeast power crisis came -- and I've forgotten the year, 1965 was it Lilli? '64, yeah. As you know, the whole northeast was down from Buffalo through New York and down to Philadelphia. It was out. Many millions of people were out. And on that occasion, I mean, I have to say the way I learned about it was because my daughter was a student at Harvard at that time, called Lilli in a panic because she thought probably an atom bomb had wiped me out in Washington by then when everything went out.

But that was the first Lilli heard of it. Lilli called me right away and said, "Do you know what's going on?" And I said, "No, I haven't heard about it." She said, "Put your TV on right away." And then we quit talking and I immediately called Bob McNamara and said,

"What do you know about this?" And he said, "I hadn't heard about it yet, but I'll get people on it, right away."

This all was happening within a minute or two, mind you. This was all very quick action. And it wasn't much later I got a telephone call from the President who said, "Bob McNamara tells me we've got a problem on our hands." Give me credit on this thing. And, yes, he wanted me to get in touch with everybody that needed to be gotten in touch with and find out what was going on and advise him on what we should do next. So, I had a long, busy night ahead. So, that's one example.

DR. PIELKE: In 1967, you delivered a petition to President Johnson, and it reminds me of some of the things we hear about in today's contemporary science policy. It was signed by 5,000 scientists protesting the administration's use of defoliants and incapacitating gases in Vietnam. Reportedly, the President was furious at you for delivering the petition, and the scientists were furious at you when President Johnson refused to issue a "no first use" policy. Can you talk a little bit about being in the middle between the demands of the scientific community?

DR. HORNIG: Well, you told me about this, but you caused me a problem. I cannot remember such a petition. And so I don't know. I'm sure the petition probably existed, but I don't remember it's coming to me. I don't remember it being sent to the White House. I don't remember as it being refused by the White House. But it was a real issue. My assistant director was a medical doctor and he felt strongly about the use of defoliants in Vietnam. But, anyway, I can't enlighten that issue.

DR. PIELKE: Well, can you talk about, I guess, a little bit more generally about, you know, what happens when, in your experience, PSAC had one view on policy actions or political courses of action and the President had another perspective and you all have to work together. How did some of those issues play out?

DR. HORNIG: They're not two independent entities who have to work together. PSAC is appointed by the President, they considered themselves and wanted to be part of the President's family, and their job was to make the presidency work. And, so, I don't know of any case -- I know of cases where there was, in quiet ways, all sorts of points of view sent over and they produced varying degrees of assent. But, there was never any attempt to confront the President directly. I think the feeling was, very simply, you had every right to your own view but, in that case, you ought to resign. So, I don't have any good examples of that.

Now, towards the end of my stay, on the issue -- two issues -- ABMs and the SST -- there was at that point again to show you how it worked. When the ABM question got to be more difficult and there were both in many places -- the Department of Defense, PSAC, everywhere, people who really, including me, didn't think it made sense. But, at any rate, what happened was they called a meeting in the White House. I happened to be out in the Virgin Islands, which was everyone -- defense, assistant secretaries, all the previous Science Advisors, Harold Brown, various people -- to discuss this thing in front of the President. He wanted to hear first-hand. And, either by accident or by design, I was away in the Virgin Islands, so no one bothered me about it. But for anyone who thought we were out of the defense, I can tell you that Bob McNamara called me at Caneel Bay and my

children were impressed by the fact that the manager of Caneel Bay came down to our house to talk to me and McNamara was at the other end of the telephone. But to send an airplane down to get us back so I could be present at the meeting.

Well, nevertheless, I think that resulted in mostly, as you remember, that was '68, mostly eliminating programs except to bring the Russians, we each had one base, and McNamara produced the doctrine of sort of the Chinese defense, and we'd have a weak system which was capable of capturing an accidental launch at the United States or maybe two or three -- that's where the Chinese came from, who'd launch if they wanted to. That was a source of friction. Even if, as I said, there was no discussion, it settled right away.

The SST issue, again, I mean, there again, there was a presidentially agreed-on committee which was looking at it, because everyone knew the Concord was uneconomic, and the one that Boeing wanted to push, for which there was big Congressional support, it wouldn't have been noisy. We couldn't have flown it over the continental United States without breaking windows, so that was the other alternative. At any rate, I was only part of that committee. It was well-known, though, that I wasn't battling for any other program and the committee was plainly going to come down negatively. So, yeah those -- but on the whole, the plane was -- we never got closer than what you might call family friction.

Now, the minute after I had left and two members of PSAC -- Frank Long and David Garwin -- testified before a Congressional hearing and said flat out that both programs made no sense whatever. And they said it in just those words. And that produced -- I wasn't there at that time -- that produced real rife and was one of the principal stimuli in eliminating the Office of Science Advisor and so on.

DR. PIELKE: One last question and then we'll turn it over to the audience. What advice do you have for the students, faculty in the audience, and folks that may want to get a little bit closer or more closely involved in policy and politics on science issues? What advice do you have for them?

DR. HORNIG: Well, I think -- the main thing is, I don't think -- I mean, my problem's with the word "science policy." As I said at the beginning, I don't think science is sort of a thing in the government. Science is kind of like economics, where we have a Council of Economic Advisors and such. A critical part of all sorts of things the government does, and I think for the students, there's lots of things they can do. Most of the jobs are in one or another of the agencies. And I haven't mentioned NIH at all. Health is -- anyway, health is one of them.

So, therefore, you have to identify issues which both are important to the President, to the public and so on, and then what they think about it now is how to deal with them. I think there's a lot to be done because it's only begun to be realized how many things require such an analytical scientific input, but it's not a formal ritual.

DR. PIELKE: All right. For those of you who are new, I'll just go over the ground rules for the question and answer. In order to get it on the tape, we have to repeat the question, so we encourage concise, well-formed questions that we can repeat up here. And the quicker

we go through it, the more we'll get through. So, why don't we just start with a show of hands. Back by the pole,there. *(male asks question)*

DR. PIELKE: All right. I'll try to rephrase that and I'll remind you of the ground rules, again. So, the question is that -- and correct me if I get it wrong -- but some people don't -- in our society -- don't seem to appreciate science, and the gentleman used the example of creationism versus evolutionism as an example of that. The question is: Do you think those sorts of perspectives will harm the U.S. role in science and technology into the future? Is that fair?

DR. HORNIG: You know, that requires a very wise man to answer, and I don't know if I'm it. The answer I would tend to give is, the issues you raise tend to be, in the democratic society, important. Some, maybe many people, but they're isolated things. Almost everyone in most respects, I mean, respects the fact that the increasing knowledge base is what moves all of the, what you might call, the information revolution -- all of the technology, everyone sees the examples coming on Hubble in The New York Times every other day. New discoveries among nebulae and such. New things about disease. So through a very wide part of our culture, I think there is a solid faith that our understanding and using science and technology is just part of our society.

Now, these special issues are ones that don't involve, if you like science per se, but the issue of what and how science should apply. You know, even on evolution, hardly anyone debates what is, I'd say, the experimental facts about the evolution of animals and geologic structures and the earth and such. The question that you want to ask about relates, though, to what it means with respect to creation. That's a matter of faith, because there's no evidence in scientific circles that bears on it, one way or another. I mean, Newton faced that problem many hundreds of years ago and he was an ardent with religious people, and he just said science is one thing and my religion is another.

Of course, John Kennedy said that when he was the President. I don't know the answer to your question, but I cannot believe that these issues -- they may affect elections, they may affect politics, but I can't believe they're going to affect most of the basic attitudes of our society.

DR. PIELKE: All right. One in the upper deck. *(male asks question)*

DR. PIELKE: So, the observation -- I'll just try to rephrase that -- that science advice seems to have evolved from being on science more to matters of policy, and the question is: Where does Dr. Hornig think the best quality scientific advice comes from to the President?

DR. HORNIG: Well, I guess my first part of the advice would be all of the above, because the main role of the Science Advisor is from all of those sources to bring into focus for the President what by some lights is the best. And that's the main role of, for instance, what was -- it doesn't exist anymore -- the Science Advisory Committee was to help filter and find the best sources from all of these things. Because where the best advice comes from could be any of them, depending on the nature of the issue. I don't know of a general answer, I think, to that question. *(male asks question)*

DR. PIELKE: All right. The question is: Without putting you on the spot, anything you regret or mistakes made that you'd like to share?

DR. HORNIG: Well, I'm glad you added a qualifier on mistakes relating to advice to the President, because otherwise I'd say do you want me to talk for the rest of the evening?

Well, I can't -- I'm having a hard time answering it, because I think there are lots of things where my off-the-cuff advice wasn't very good, but I can't identify any things that were dead wrong. I'm sorry that I can't give you a better answer. *(male asks question)*

DR. PIELKE: So, the question is, and it refers to the Hornig Report on the Creation of a Space Telescope Science Institute, and asking Dr. Hornig to reflect back on the success of the recommendations of that report, from 1976, I think.

DR. HORNIG: Personally, it's one of the things I'm happiest about, and I'm not an astronomer, so that, you know, you may have reasons for asking the question that would suggest it wasn't so smart. But, the problem, basically, in that report is that NASA had, even within itself, about four or five different parts of it that would have liked to have had a piece of running the telescope and had an operating section for flying instruments and had a separate communications thing. And aside from that, there was the astronomical community that thought all of these jerks were going to mess it up.

And -- well, yeah -- even among the astronomers, there were two schools of thought. There were those who said they only did good astronomy west of the Sierras and then the rest of the world. And so that -- and if you read that report and read the foreword, that's explained pretty well.

Considering all of that, the fact that out of it and the solution was, by and large, to have this unifying force which was not any one of these but which part of the instructions were it was going to be integrally tied to every one of them, and be sure they felt they were part of the solution, it worked. And so as far as I'm concerned, I mean, by and large, it's worked out very, very, very well. If I'm wrong, I'd like to be corrected. *(male asks question)*

DR. PIELKE: All right. The question is: Where do we stand on science and technology and education?

DR. HORNIG: Well, that I could give a whole speech about. But the first thing I would say is, since 1957, we've certainly evolved the best university system in the world, by far, for producing good people across the board. Now, there's lots of things one may quibble, but the outcome you can count Nobel Prize winners or whatever to justify that statement.

For a long time, that backed up by the fact that the dream of almost everybody, and I spent time in England and elsewhere, was to come to the United States for at least a sabbatical and spend some time here in what they regarded as just the Mecca of science. The thing that makes this a good question is that what we know now is that from what you might call those "best days," the number of people applying for visas to come to the United States has dropped by half -- the number of scientists who want to come to the United States. The number of people who have been educated here from abroad who

want to return home. For a long time it was a problem in dealing with the Europeans. Everyone wanted to stay once they'd come here. That is no longer true.

Now, the question is: What does that portend? Do we have a problem or don't we? There are other problems. We look at the performance level of our high school seniors -- I think we are twenty-second in the world in the performance in mathematics and science. And this is ominous. But it's not, at the moment -- at the moment, there's no particular problem that I know of. But it looks scary.

That is not a very good answer, but it's a good question to ask. *(female asks question)*

DR. PIELKE: The question is: Is there a relationship between ethics and science, and in particular with respect to the atomic bomb?

DR. HORNIG: Well, I think that's a very good question, and I was in the middle of it. The ethical questions, I think many of them have to be answered in relation to the circumstances and situations in which you want to apply the question. And in the case of the atomic bomb, it was complicated. At the time, the question of its use came up finally, we had taken tremendous losses in Okinawa; we had built a 50,000-bed hospital to receive casualties from the anticipated landing on Japan. We knew from Okinawa that this was going to be a fearful cost. And the prospect was that one could end the war.

And that is a difficult ethical question. How do you weigh ending the war and the probable saving of very large numbers of lives, both Japanese and American, against what is really a horrendously cruel act, and I can't answer that for you. At the time, my answer was -- clearly to myself -- that well, if we could end the war, it would have been worth it. And that was the outcome. And I'm afraid that's all I can say.

DR. PIELKE: A couple more questions. Yeah, in the back over here. *(male asks question)*

DR. PIELKE: The question is: Noting Rachel Carson's book, you mentioned in your talk came out in 1964, what were some of the debates in the President's Science Advisory Committee, and where do you think we stand now with respect to, I guess, the contemporary version of those same sorts of debates?

DR. HORNIG: We they weren't mainly in the committee, they were in the panel which was mainly people associated with those things. They mainly didn't concern, it was really the validity. The public debate was whether what you had to say was just the hysterical hype of somebody who was fearful of this. And, so, the real debate for many was did we have facts on our side, not about the political question. And the conclusion was, flatly, she had facts on her side. This was plainly happening and was plenty bad in many sections. People were being poisoned by chemicals, there were problems on hand, and they were going to get worse. And now, what's done? Well, we obviously haven't solved all the problems. Nevertheless, we have set up an EPA. Most of the world has set up some kind of organization, so we have joined the Kyoto Pact, but also 135 countries have.

So, I'd say -- and it's proved healthy and good in the sense that the whole world is now onto it and aware that you have to get straight maybe just what the dimensions of it are and then if you do something about it, what do you do instead? You know, if you shut

down all the use of coal, oil, and gas, then what do you do about all the freezing children?

I don't know. So, I guess my answer to your question is, I think there's lots of progress and we still have problems at least as big as we had at that time. *(male asks question)*

DR. PIELKE: The question is: Whether the issue of global cooling was ever on the agenda in the 1960s?

DR. HORNIG: I don't think there's any known reason for expecting any long-term cooling. If you increase the cloud cover and reflectivity of the earth's atmosphere, the temperature goes down. There is historical and some physiological, because we did have the Ice Ages, things have gone up and down. And it's anticipated that there could be now. The oceanographers say they've, curiously enough, global warming may lead to -- let's see, Lilli's better on oceanography than I am, but any way, can lead the currents out of the Arctic, which will then lower surface ocean temperatures everywhere and that's a possible outcome, then. Possibly even a whole new Ice Age.

So, I doubt that there is a clear answer. The one thing that is clear, that is what keeps on adding heat-absorbing gases from the atmosphere as we have had then and we've seen it dramatically for two centuries now. I mean, there will be on average, there's going to be an increase to the temperature. But, I'm sorry, it doesn't answer your question quite.

DR. PIELKE: All right. Last comment for the evening. *(male asks question)*

DR. HORNIG: Insight into the government's what? *(male asks question)*

DR. PIELKE: So, the question is: Whether President Johnson's strong support for NASA -- and you may want to throw in the district and state that President Johnson came from -- whether the strong support of NASA reflected political motivation, such as getting support for President Johnson's broader political program?

DR. HORNIG: I can't tell you. I think he was too late for that, though. That had been done by Kennedy. I mean, Kennedy plainly picked the space program as a strong countermove to the Soviet Union and as a symbol of strength after all these concerns as to whether we were losing in a general way the race with the Soviet Union. That, in fact, this was a country in action.

By the time Johnson came in, it was all entrained. By 1972, the men had been landed and it was a symbol of strength that hadn't been matched. And, of course, the Space Center had been set up in Houston, which was from his point of view, a great thing. But, as I said, in a sense he came in rather late on that game, so, I rather doubt that was a primary motivation. I think he would have fought like a dog if anyone had tried to take it away.

DR. PIELKE: I want you to join me in thanking Dr. Hornig for speaking with us tonight. *(applause)*

The David proceedings were transcribed from a digital recording and reduced to typewritten form by Christopher Boone, Digital Reporter.