WASHINGTON ROUNDTABLE
ON SCIENCE & PUBLIC POLICY

WHO IS POLITICIZING SCIENCE? Understanding the Interactions and Interests in Science and Politics

By Adam Keiper, Michael Gough, Steven Hayward,
Robert Walker & William O'Keefe

GEORGE C. Marshall INSTITUTE

Washington, D.C.

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Robert Walker is Chairman of Wexler-Walker Public Policy Associates. During the 2000 presidential campaign, Walker served as the Bush advisor on science, space and technology. In August 2001, Bob Walker was appointed by President Bush to be Chairman of the Presidential Commission on the Future of the United States Aerospace Industries. As a Member of Congress from Pennsylvania's 16th District, Walker served much of his twenty-year career in the Republican leadership as Chief Deputy Whip, Chairman of the Leadership, and Speaker Pro Tempore. In 1995, he was selected as Chairman of the Science Committee and Vice Chairman of the Budget Committee. As a lecturer, writer and commentator, Walker appears regularly on Fox News, CNBC and PBS, among others, and lectures at the Brookings Institution, the Georgetown University Government Affairs Institute, the Kennedy School at Harvard University, the Cato Institute, the Heritage Foundation, the Woodrow Wilson Center and at several colleges and universities.

WHO IS POLITICIZING SCIENCE?
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Tuesday, March 23, 2004

William O'Keefe: Good afternoon and welcome to this Marshall Institute Roundtable on politicizing science. We are very pleased to have four very knowledgeable and distinguished people to address the question about who is politicizing science.

This is a topic of great interest to Marshall because our mission involves trying to ensure clear communications on science that bears on public policy issues and to challenge the misuse of science. Last year we published a book with the Hoover Institute that documented the experiences of scientists who had observed politicization first-hand. Fred Singer, who is here today, was one of the authors and Mike Gough was another. Over the past month or so, this topic has gotten a great deal of media attention and commentary. At first I was surprised and then I thought that it is no mere coincidence that all this is taking place in an election year. We seem to have a quadrennial phenomenon; the allegations tend to stay the same, only the packaging changes. The fact of the matter is that science is rarely, if ever, definitive on public policy issues. Policy always involves judgments and the philosophies of those who are making those judgments but the interface of science and policy always creates opportunities to raise charges of politicization. As we document in our book, serious problems arise when data and the scientific process are manipulated and misused to justify and promote a preconceived point of view. I can personally say that climate change may be the most flagrant example of politicized science.

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Science should illuminate and inform; it should be transparent; it should be verifiable; it should provide a basis for objective policy analysis, but it is not a substitute for that analysis or judgment and certainly should not be an ideological marketing tool. Much of the recent commentary has dealt with disagreements over policy and related analyses rather than the underlying science. Much of this has come from groups that are very skillful in using the great increase in knowledge and information we have seen in recent decades and in communication mechanisms to influence public attitudes by routinely politicizing science. They have, I think, exploited and are exploiting the gap between what an informed citizen can know and should know and what I fear is a trend toward a loss of critical thinking in our society. That will be the end of my introduction. I will primarily be a timekeeper and traffic cop with the questions afterwards.

We will begin with Adam Keiper, then Michael Gough and Steve Hayward and finally Bob Walker will wrap things up. Then we will open it up for questions and answers. I would like the panelists to try to keep their comments to somewhere between five and ten minutes. With that, Adam, I will turn it over to you.

Adam Keiper: My name is Adam Keiper and I am managing editor of *The New Atlantis*, which is a journal about technology and society published by the Ethics and Public Policy Center. As a journal that cares about the questions of ethics and politics and how they are connected to issues of science and technology, we also care deeply about wisely governing science and technology, and the role that scientists and technologists have to play in governance.

This is just the right occasion to be having an event like this. Today is March 23, 2004, and it was exactly fifteen years ago, on March 23, 1989, when two researchers announced the discovery of cold fusion – from which, of course, we are all benefiting amply today! It just so happens that the cold fusion announcement, which was among the last few decades' most notorious cases of scientific fraud, holds a number of lessons about the interplay of public policy and science. But for the purpose of introducing today's discussion, it's simply worth noting there are still people who believe that cold

fusion is real and that there is a vast conspiracy, probably controlled by the oil industry, keeping cold fusion down. Similarly, there is a new sort of conspiracy theory now being propagated largely by activists, and mostly from the left. This new conspiracy theory suggests that the Bush Administration is engaged in a systematic effort to politicize science.

The Bush Administration has been accused of everything from Luddism to Lysenkoism, but the facts don't actually support this charge. Much of the criticism of the Administration is built upon distortions, either from the press or politicians. In the case of the press, the distortions are often unintentional because the subjects related to science, technology and public policy are complicated and sometimes difficult to get right. In the case of the politicians, the distortion is often intentional, to score points. So, for example, "President Bush is putting arsenic in our drinking water." You may remember that from not that long ago. Of course, it is a fundamental misrepresentation of the history of the arsenic regulations, but you would hear politicians saying that sort of thing. A more recent example has been the stream of misrepresentations in the discussion about the President's Council on Bioethics and the replacement of a couple of members of the Council. The story had been incompletely reported and largely misrepresented.

Aside from the questions of global climate change, probably the worst example of fundamentally shoddy reporting that affects the science policy debate has been the question of stem cells and the policy the President announced in August 2001, just about a month before the terrorist attacks completely changed our nation's public policy priorities. Listening to the people who are opposed to the Bush Administration on the matter of stem cells, it would seem that the President banned all stem cell research or severely limited it, when in fact, the research is continuing. The President's policy relates specifically to questions of federal funding and the chief confusion, and one that is often misrepresented in the press, is between stem cell lines that are *eligible* for federally funded research and stem cell lines that are *available* for federally funded research. It happens that some seventy-eight lines of stem cells are actually eligible for federal

funding, which is more than the President originally thought would be eligible. And the number that had been made available and distributed to scientists is now up to seventeen – which is seventeen more lines of stem cells than were available when President Bush made his announcement. And if in fact, "Henny Penny, the sky is falling," there was no money going into stem cell research at all, then we wouldn't be seeing headlines like we saw almost a week ago in the *Wall Street Journal*, "Geron Hopes to Stage Stem Cell Tests in Humans Starting Next Year." The research is continuing, but it is being badly misrepresented.

Much other criticism of the Bush Administration's science and technology policy is essentially just disagreement with particular policies. Just because those *policies* don't match the preferred policies of those on the left, the critics have been claiming that the *science* itself is being distorted. This seems to be a basic failure to recognize that science is just one part of the policymaking process. There are others, including national security concerns, economic concerns, and social concerns, and all of these play into the public policy mix. But on issues like the Kyoto Protocol, ANWR, missile defense, obesity and ergonomics, again and again there is a basic failure to recognize that the science may make suggestions, but there are other concerns that need to play a part in the policymaking sphere.

Kyoto, of course, is another great example of something that has been badly misrepresented. Some of you may have seen Senator Kennedy on *Meet the Press* this weekend complaining about how the Bush Administration unilaterally withdrew from Kyoto and the ABM Treaty; it is worth remembering that in 1997 the Senate – including Senator Kennedy himself! – unanimously voted down the Kyoto Protocol in the Byrd-Hagel resolution.

The news that precipitated today's event and much of the controversy in the past few weeks is a report from the Union of Concerned Scientists. I assume some of the other panelists will talk about that report in detail. It seems to be basically a collection of dubious facts – some of which are misreported, many of which are not given full context – and these are sketched out and drawn together

and made to look like a trend. When you start to look closely at many of the items in the report and follow up on some of the footnotes, the claims begin to fall apart. It is my understanding that Dr. Marburger and the Office of Science and Technology Policy will be issuing a comprehensive response to this report in the coming weeks, which we can all look forward to reading.

Meanwhile, the Administration has done its best to stay away from *ad hominem* attacks, to stay away from talking about the history of the Union of Concerned Scientists. But it seems to me that a few remarks on that subject are in order. You might think from their name, "Union of Concerned Scientists," that it is a union of scientists. In fact it is an organization that touts itself on its website as representing "100,000 concerned citizens and scientists." You don't actually need to be a scientist to become a member of this organization. In fact, it is a left-wing group that famously called for a nuclear freeze back in the 1980s and that in 1983 co-authored with the National Education Association a lesson plan for junior high school students that was designed to indoctrinate them into leftist nuclear policy. It is a group that, far from being scientifically unbiased and open-minded, is in fact predictably on the left side of every issue: on the wisest nuclear policy, on overpopulation, and on depletion of resources. The bottom line is that this is essentially a predictable election year tactic by a left-wing group.

It is worth noting in conclusion that the statement that was attached to the UCS report and signed by a large number of scientists, including some twenty or so Nobel laureates, is in fact not a statement endorsing the report. It is a separate statement, although the two have been conflated sometimes in the public commentary. But at least some of the people who signed the statement condemning the Bush Administration's science and technology policy have admitted publicly that they had *never even read* the Union of Concerned Scientists' report that they were portrayed as endorsing. Scientists in the public square should behave more responsibly. With that I will wrap up and we will move on to the next panelist.

Michael Gough: First of all, I would like to thank everybody for showing up. I know this was announced recently and it is a pleasure to have this large an audience.

Our government has always been interested in science. The drafters of the Constitution provided for a Patent Office to encourage advances in science and technology. From its beginning, the government used prizes and contracts to encourage improvements in military and naval technologies and in public works. It ventured into the funding of medical research in 1798 when it founded the precursor to the Public Health Service. Now we are surrounded by the effects of the massive expansion of government funding of scientific research that followed the contributions of science to World War II and the frightening prospects of Soviet technical advances after 1957's Sputnik. It is also apparent that the growth of the federal regulatory agencies has been accompanied with research tailored to those agencies' needs.

Disputes over government funding inevitably arise. From time to time, the apparent silliness of some research projects raises complaints, and ethically or religiously based objections about certain areas of research often accompany administration changes in Washington. There was some reference made to the Bioethics Advisory Panel. This is part of politics. But overall, the rich pork barrel of federal funding dampens complaints and objections and funding decisions are seldom the topic in discussions of politicized science.

Several chapters in the Marshall Institute book, *Politicizing Science*, describe disagreements about the use of scientific findings in making estimates of future risks to human health or the environment. It is those disagreements that are the usual topic of discussions about "politicized science." Some disagreements are, indeed, about science, such as questions about how well an epidemiology study was conducted or about which controls were necessary in a laboratory test. Far more commonly, disagreements about "politicized science" are about estimates of what bad effects may occur under conditions different from those that have been examined and measured. For instance, there is no question that some past exposures to lead and

exposures to asbestos in some workplaces caused disease and death. There is no doubt that well over 50 percent of all chemicals tested — whether they are naturally occurring or synthetic — cause cancer in rats or mice.

But what do those findings mean for human beings who are exposed to levels of these materials far, far lower than those examined in the studies or tests? Our efforts to look at populations exposed to environmental levels of suspect materials produce equivocal results. Some researchers find effects; some researchers do not. Some results are frankly contradictory. Commonly, there is an absolute block to planning a study to examine the direct effects at usual exposure levels. The number of estimated disease cases is so small that they cannot be teased apart from the much larger number of cases that occur from all causes.

What do we do in those situations? We rely on risk assessments, which are statistical analyses, or projections, or estimates, or guesses – take your choice – about possible effects at lower exposure levels. Risk assessment is a necessary function in modern society, but in it, we venture away from science, with its reliance on counting and measuring, and into a realm where we cannot measure projected effects.

Given that inability, it is no surprise when judgments about equality and equity and social, political, or ethical stances influence scientists, risk assessors, regulators, politicians and the public in their choice of risk assessment methods. Disagreements don't stop there. They extend into questions about "How low do we have to go?" "How much is this worth?" and "Who pays?" Those are not disagreements about science.

There are important differences between and among science, risk assessment, and policy. Science is about results that can be measured or counted. Unless it can be counted or measured, it is not science. Risk assessment requires scientific information, but it also depends profoundly on models and estimates and extrapolations that can seldom, if ever, be validated by counting or measuring. Science

and risk assessment, when important to policy, can be only two among myriad factors considered by elected officials and their designees.

Ignoring these differences can be useful. No organization will get headline attention by talking about "politicized policy." Policy is politics. It might do a little better by talking about "politicized risk assessment," but most people realize that risk assessment can involve compromise and opinion and consideration of costs and likelihoods — the very stuff of politics. The organization that claims science has been politicized may grab the brass ring of headlines and press attention.

Conflation of risk assessment and policy with science can be used to advance and publicize contentions about how science is to be interpreted and applied. Whatever its intent, it confuses the already difficult and demanding process necessary for making the best use of science and the other instruments of policymaking in an ever more complicated society.

Steven Hayward: Good afternoon, I am Steve Hayward from the American Enterprise Institute. I just want to make two or three observations, a couple of them general and a couple of them particular to the Union of Concerned Scientists report. Reports from advocacy organizations are usually discounted to some extent by the news media and the public because they know they are coming from advocacy organizations. I happen to think that the discount is not as large as it ought to be on a lot of environmental reports, but nonetheless, things do tend to be discounted to some extent. So it is surprising to me that the Union of Concerned Scientists report seems to have been greeted with more credulity than other reports of its kind and I suppose it is probably because of the fascination we all hold for a list of Nobel Prize winners. Of course, it is a very great honor to win a Nobel Prize, an enormous distinction. I know a couple of Nobel Prize winners, by the way who would never have signed this statement, like Milton Friedman and Gary Becker, although I think one should step back and say that having a Nobel Prize does not necessarily mean

your expertise translates to public policy or politics. Otherwise we might have been listening more closely over the years to Nobel Prize winners like William Shockley and Linus Pauling. I suppose here one ought to use the old cliché from Casablanca that we are "shocked, shocked to find to find politics involved in science."

I have a little quote from Michael Crichton's speech last year at the California Institute of Technology where he says,

> "I regard consensus science as an extremely pernicious development that ought to be stopped cold in its tracks. Historically, the claim of consensus has been the first refuge of scoundrels; it is a way to avoid debate by claiming the matter is already settled. Whenever you hear the consensus of scientists agrees on something or other, reach for your wallet, because you're being had."

To be sure, the Union of Concerned Scientists report mentions that the Bush Administration is flouting scientific consensus. I don't myself, unlike some people, think that scientific consensus is an oxymoron, but I do think it is a bit like sauerkraut ice cream. You ought to be a little skeptical about it when you hear those claims. I think that there is a little irony in the Union of Concerned Scientists because what emerges from the report, as has been suggested, is that their concern is very selective and related to their policy biases. One can point to symmetrical examples from the previous Administration. In 1993, Princeton's William Happer was fired from the Department of Energy (DoE) because he disagreed with Vice President Gore's views on ozone depletion. We know that the Environmental Agency (EPA) fiddled in a rather dramatic way with the protocols for evaluating second-hand smoke (environmental tobacco smoke) and meanwhile that they have refused to release the research that they relied on for the new .085 ozone standard to other researchers to review on their own. None of these things were ever mentioned as a matter of concern by the Concerned Scientists.

I also noticed that they mention in one passage of the report the FDA delaying a recommendation from its science advisory board on contraceptives because of pressure from conservatives. They also mention that the FDA overruled the science advisory board's recom-

mendations on allowing breast implants to be used again. The complaint against breast implants did not come from conservatives; it came from liberal feminist groups. Instead of delaying that ruling, they overruled it, which should tell you something about the asymmetries of constituency groups, I suppose. If I had the time, I could go into the number of government scientists who think our ozone policy is quite backwards because of something called the "weekend ozone effect." I have written a paper on this so I won't get into it now.

Our corollary point is that the Union of Concerned Scientists does not cite a single example of science abused for a policy with which it agrees, like environmental tobacco smoke, the ozone standard and so forth. A little bit more on discounting: a report was issued in October of last year by Environment 2004, which is a group explicitly founded to elect Democrats on the issue of environment. They are quite clear and open about what they are about. Good for them. But I was arrested by the language on the cover of the report about Bush's "unprecedented assault" on America's environment. So I decided to go back and look at what environmental groups said about Ronald Reagan twenty years ago. They are nearly identical. I will hand this to the environmentalists today – at least they are practicing recycling! You can play a nice parlor game with the reports out now from the environmental groups and this report from environmental groups in 1982; you can't tell the claims apart. There are many of the same things, almost word for word.

I review here some of the things said. I just think we have to set a base line for these things. In 1982, the report from the environmental groups said, "pollution will increase," meaning air pollution. In the table below, you can see that air pollution fell for every category in the 1980s during Reagan's presidency, and by the way, I am predicting it is going to fall in the Bush presidency as well, especially if there is a second term.

Pollutant	Emissions	Ambient Level

Sulfur Dioxide	-12.0%	-16.7%
Ozone*	-17.6%	-8.8%
Nitrogen Oxides	-6.3%	0.0%
Carbon Monoxide	-13.4%	-24.4%
Lead	N/A	-85.2%
Particulates*	N/A	-52.0%

Table 1: Air Quality Trends During the Reagan Administration, 1981-1989

(Source: EPA Data Tables
(www.epa.gov/ttn/chief/trends/trends01/trends2001.pdf))

The report said that Reagan is going to close off major acquisitions of new land.[1] As it turns out, the Reagan Administration added 38 million acres of various protected land categories. I don't follow all these appropriation things on Capitol Hill, but the Land and Conservation Water Fund is still out acquiring land now, probably more than we ought to have.

* Ozone emissions figures are for VOCs (volatile organic compounds); data unavailable for lead emissions; particulate emissions and ambient data are for TSP (total suspended particulates) and PM10; EPA measurements and methodology were changed in 1988.

[1] Statement by Greenpeace, www.greenpeaceusa.org/, accessed May 29, 2003.

Protected Land Category	Million Acres Added
National Parks	3.1
National Wildlife Refuges	19.2
National Forests	4.02
National Wilderness Preservation System	11.75
Total	38.07

Table 2: Millions of Acres of Protected Land Added During Reagan Administration

(Source: Council on Environmental Quality, 1993 annual report, Data tables 66, 67, 68, 69.)

The UCS report (pp. 8-9) is very upset about mercury and it talked about how someone at the Environmental Protection Agency (EPA) had to leak the report that was being suppressed showing that 8 percent of women of childbearing age had high levels of mercury, and then added, "Perhaps most troubling about this incident is that the report entitled 'America's Children and the Environment' may never have surfaced at all had it not been leaked to the press." Well, this is just silly. The data for that report had been released months previously by the Centers for Disease Control (CDC). If you look at figures 1 and 2 (and here is something again that Michael knows all about), you can see why the CDC did not raise a flag on this. What the EPA does, as you may know, is take the health studies which they do and that other people do, find out what the threshold is for harm, and then divide by ten as their margin of safety for regulatory purposes. So what you see in figure 1 is that there is no one in that CDC sample who actually approaches the health threshold that the CDC uses for harm for mercury. What you have is 8 percent of people, potentially at the 95th percentile of confidence level, who are above their reference dose for regulatory purposes. We are once again frightening a lot of people with the mercury scare.

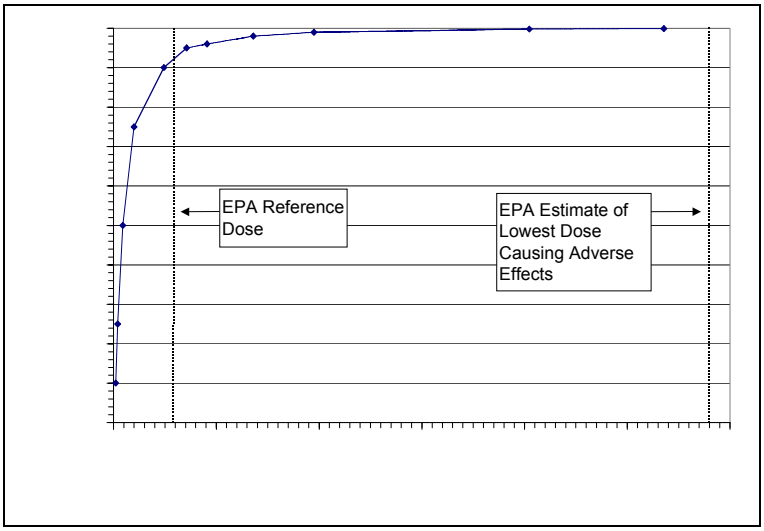

Figure 1: Mercury Exposure, Women 16-49
(Source: CDC Second Annual Report on Human Exposure to Environmental Chemicals, 2003.)

Figure 2 below is a figure that I did last year that compares mercury with some of the other heavy metals in the CDC report. I could talk more about that.

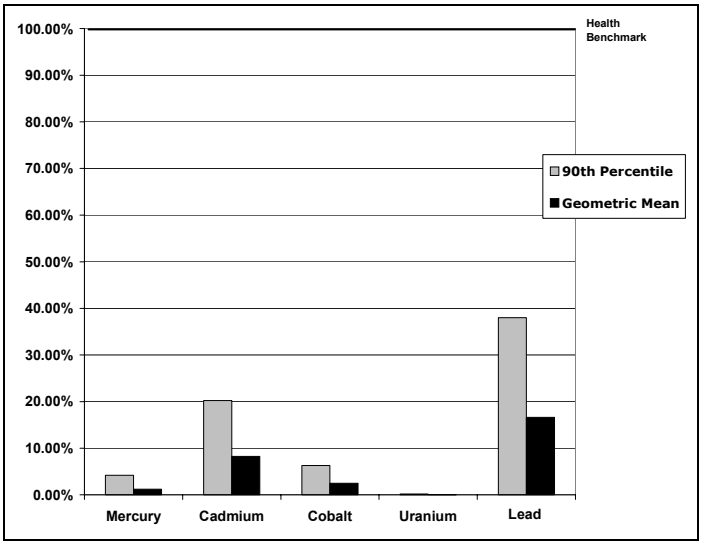

Figure 2: Heavy Metal Exposures As a Percent of Health-Based Benchmark
(Source: CDC Second Annual Report on Human Exposure to Environmental Chemicals, 2003)

A recent article in *Science* magazine essentially says the science on mercury is very uncertain and that we are not sure what we are getting for all this. It also highlights the fact that the EPA and others admit that we don't have a very good monitoring network in place for mercury right now:

> "Rhetoric aside, much of the underlying science [on mercury] is still uncertain. Recent studies do suggest that in some locations cutting emissions can help wildlife – and thus presumably human health – within years. But how general these results are, or what are the magnitude of benefit from the new regulations is, remains unclear. 'There's a fundamental disagreement about what the overall benefits will be,' says geochemist David Krabbenhoft of the U.S. Geological Survey . . .
>
> "The net result is hard to quantify because of the lack of long-term monitoring. But findings released in November are encouraging. This 10-year study of the Florida Everglades showed that mercury levels have declined by as much as 75% in fish and wading birds at half the sample sites.
>
> "Scientists are uncertain about important details, from the idiosyncratic chemistry of coal combustion to the myriad reactions that determine when mercury falls from the sky and how toxic it becomes."[2]

We do know that mercury emissions from industry have declined about 75 percent and we do have some samples of the effect this is having and one of them is shown from the Michigan Department of Environmental Quality of mercury levels falling in nesting bald eagles, up in the Michigan area.

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[2] Erik Stokstad, "Uncertain Science Underlies New Mercury Standards," *Science*, Vol. 303 (January 2, 2004), p. 34.

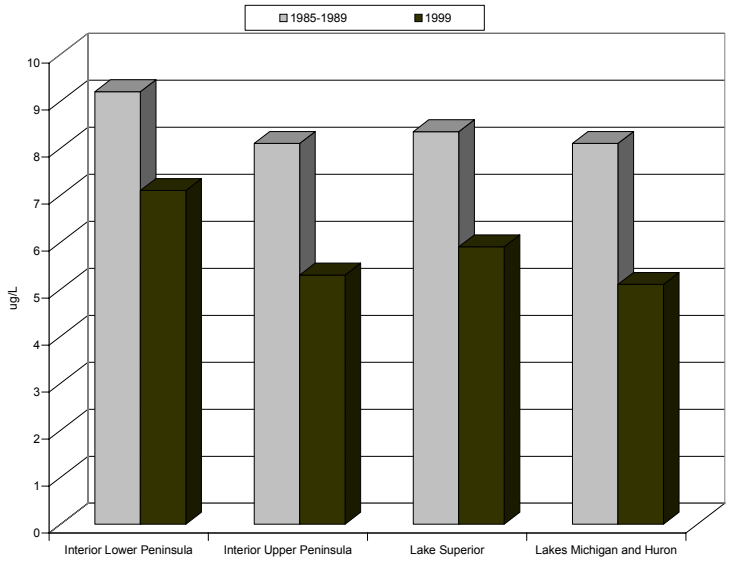

Figure 3: Mean Mercury Levels in Nesting Bald Eagle Feathers
(Source: Michigan Department of Environmental Quality)

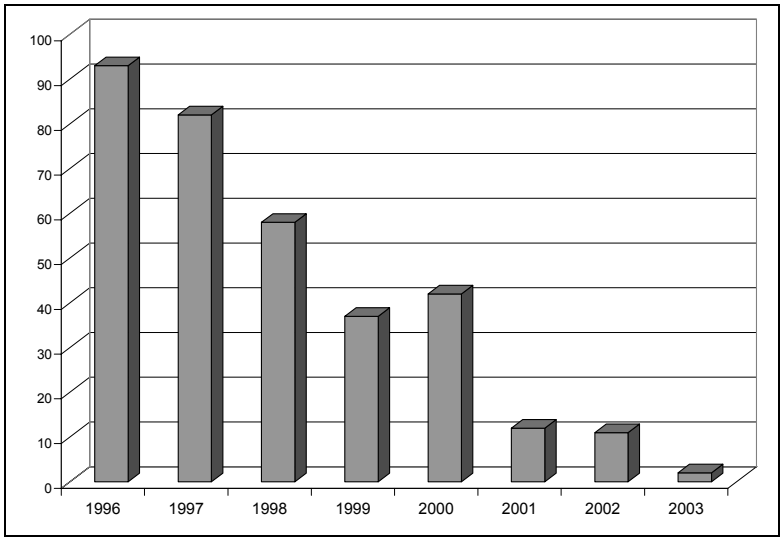

Figure 4: Endangered Species Act Listings

You know the old story about someone who drowns in a lake that only averages two feet deep. The UCS is very upset that the current administration has listed only 25 species under the Endangered Species Act – all under court order– whereas the Clinton administration listed an average of 65 species per year. Figure 4 shows that the decline in listing species began very precipitously during the Clinton years, in part having to do with how the Endangered Species Act is working out in practice, which is not very well. This, by the way, is completely beside the point of whether the ESA is an efficacious way to address the species extinction problem.. We can argue for a long time about how well the Endangered Species Act works or not, but you can see that this is a longstanding problem. I also mention briefly that the General Accounting Office says "there are concerns over the adequacy of the data used to support critical habitat designations"[3]; there are in fact good reasons to doubt some of the science being used for the Endangered Species Act.

Finally there are a number of complaints in the UCS report about the Lead Advisory Panel at FDA. I guess Secretary Thompson rejected a number of nominees from the FDA's Advisory Board. It occurred to me that in all these reports from environmental groups and from the UCS, most of these complaints are about process. Few of the complaints are about what is happening on the ground or when they are, as we have seen in the case of mercury, it is distorted or simplistic. In the case of lead, again, one question to ask is, is this an acute problem that is getting worse? Is this a crisis? Or is this something we are making considerable and steady progress over and are likely to continue doing so, whether you have some renegade lead expert at FDA or not.

Figure 5 shows the CDC data on the number of children with blood lead levels above the current threshold we use. Of course the big problem with lead these days is not so much in the air anymore;

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[3] *Endangered Species: Fish and Wildlife Service Uses Best Available Science to Make Listing Decisions, but Additional Guidance Needed for Critical Habitat Designations*, GAO Report 03-803, (available at www.gao.gov/cgi-bin/getrpt?GA)-03-803).

that is almost 110 percent solved. It is from lead-based paint and a few industrial sites, mostly in the older Eastern cities. Chicago is a good case in point. The Chicago Department of Public Health has data showing the decline in the percentage of children who are testing with blood lead levels that are too high (Figure 6). That is for putting things in context and perspective.

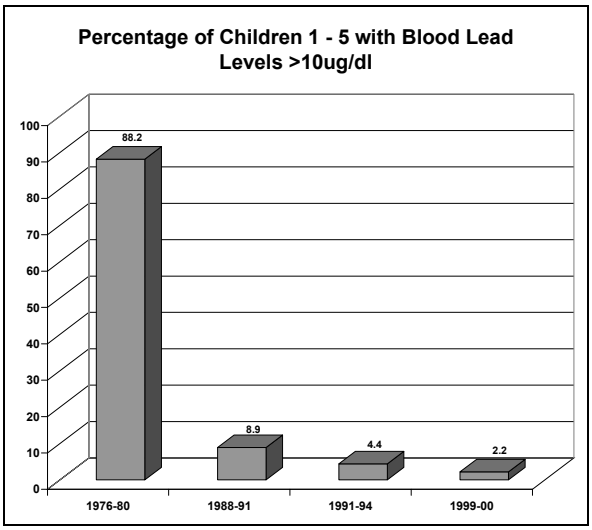

Figure 5: Blood Lead Levels in Children Ages 1-5
(Source: CDC)

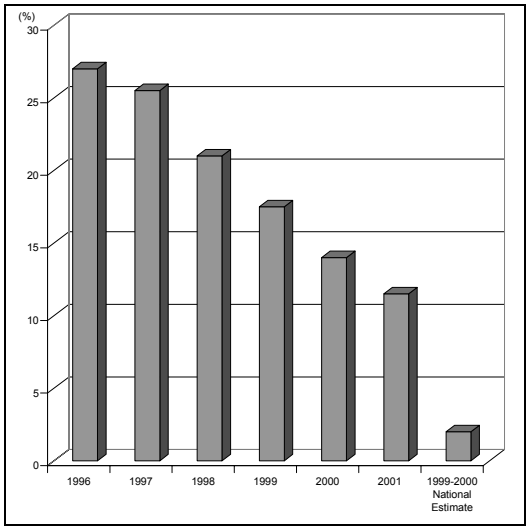

Figure 6: Percentage of Chicago Children with Blood Lead Level Above
10 ug/dl, 1996-2001
(Source: Chicago Department of Public Health)

Robert Walker: Well, it seems to me that there is going to be a common theme here today that deals with the Union of Concerned Scientists' report. I have a couple of things to say about it myself, but I thought I would start off talking about my experience as a member of the Science Committee for a number of years and later as Chairman of the Science Committee in watching this interrelationship between politics and science. It seems to me that that interrelationship is an extremely complex one. Scientists tend to pose questions, propound theories, and ultimately develop conclusions. On the other hand, policymakers look for evidence to buttress the conclusions that they arrive at through politics and through compromise. Scientists rely upon the political process for a substantial amount of the funding for their research. Policymakers look to the scientists for justifications for the spending that is required for those research priorities. What that creates, then, is an interdependent and yet conflicted relationship. And it should not be surprising to anybody that both policymakers and scientists bring agendas into that relationship.

So what you have are people with a variety of agendas. If your agenda is to increase the size and power of the federal government, you tend to believe in regulation and that the way in which you solve society's problems is to use the power of government to reach out and deal with those problems. And therefore you seek science that allows you to bring about that kind of regulation. If somebody suggests that instead of having that kind of confrontational relationship, you ought to have a cooperative relationship, let's say with the industry involved in the regulation, some people then see that as a back-tracking on the commitment to good science. Well, it is not; it is an argument over power, it is an argument over political structures, it is an argument on how you, in fact, arrive at the conclusions on how we govern ourselves in this country.

That is what really was interesting as I went through this recent report by the Union of Concerned Scientists. What struck me as I went through it was that this isn't a scientific document, this is a political document. I recognize it well; this is the kind of document that they used to bring to me when I was fundraising for my political

campaigns. They would bring to me a letter that had these outrageous statements in it and I would say, "I don't want to say those kinds of things. Why don't we say it this way?" And they would say, "You can't raise any money saying things in that kind of tone. It has to be an absolute calamity that you're suggesting, in order to raise money."

Well, this document is a fundraising document. That is what it is; it is issued by a bunch of people whose job it is to go out and raise money. And, by the way, they managed to get a cover letter with some Nobel laureates on it. That, sadly, makes the report then accepted somewhat uncritically by the media, by the public, by the Congress and many other folks. And yet, my experience was – guess what? There are Nobel laureates that have their own agendas, and they usually surround funding. You hear it played out all the time inside the process.

In order to come up with this fundraising document, what did they do? Well, they skipped a few things. They skipped, for instance, the commitment that the Administration had made to increase substantially the funding that goes into scientific pursuits, which it seems to me is a pretty big skip. The 2005 budget request has a 44 percent increase for federal research and development since the year 2001. The new budget in federal research and development is the greatest share of GNP devoted to federal in R&D in ten years. The basic research spending is up 26 percent since 2001. That should be of great interest to the science community, since those numbers are in fact a huge commitment on the part of the Administration.

The other big commitment that I have seen by the Administration is their willingness to use the National Academy of Sciences (NAS) to evaluate a number of the programs that they bring forward. I have been involved in several of the programs that this Administration is doing in the area of transformation, even technologies that ultimately may be disruptive overall – the hydrogen program, the program for the Moon and Mars missions, the nanotech programs – and the interesting thing is the Administration spent a lot of time and

energy putting forth those programs and then allowed the National Academy of Sciences to go in and evaluate them.

Now I am a huge fan of the hydrogen program, and yet the National Academy of Sciences came back recently with a report that had some good things in it about the hydrogen program but was also critical of it in some points. The Administration did not react to that by saying, "Isn't this a terrible thing what the National Academy of Sciences did." People at the Department of Energy said, "Hey, there is some pretty good stuff there. We are going to figure out ways to adopt that into what we have done as a way of giving ourselves more credibility in the future." I thought that was the way the process is supposed to work. I think it is really important to have an Administration that is willing to take on transformational kinds of technology work and transformational science in an era where the changes are so apparent. You take a lot of heat and you don't get much credit for transforming what exists, but the willingness to put resources into transformation seems to me is a pretty important thing.

Another thing that concerned me is that when the UCS does comment about things, the report is devoid of any critical analysis and is even somewhat petty. For one thing, they issue a good deal of criticism and then never bother to check with the people whom they criticized to find out what their answers might be. It seems to me that that is pure politics; it does not have any scientific basis at all.

As I said, some of it is just petty. One of the pieces in here is a criticism of a man who used to work for me at the Science Committee. Their main criticism of him is that he doesn't have a degree. Now look: this is somebody who I worked with, who I know gave me quality advice, who understands how to blend this business of science and policymaking, exactly the kind of person who ought to be in an advisory role in the White House doing things that help to move the science agenda forward. But he doesn't have a degree! This is the ultimate academic put-down. The fact is that there are many people who come out of the experience of public policymaking who may not be degreed, but who may have a wealth of experience to bring. I

think when you get down to that kind of a judgment, it is just absolutely petty. I will be happy to take some questions.

***William O'Keefe*:** I am sure there are many questions after those provocative remarks. If you will raise your hand, I will try to call on everyone. Sometimes at these sessions, we get statements as long as the statements of the speakers, so try to focus on questions. We will start right here.

***Question*:** I have a question for you, Congressman, involving the NAS reports. I know now that NAS was testing and researching perchlorate standards. Perchlorates are a great problem in the western United States and are cropping up more in the east. The Environmental Protection Agency has been unwilling or incapable of coming up with suggested standards. Many see policy as the cause of EPA's inability to come up with those standards. How do you see that?

***Walker*:** I don't really know enough about the subject to comment adequately on it. It seems to me, though, that one of the area in which you can use science responsibly is where there regulators ultimately have difficulty in coming up with what is always kind of a politically derived standard. You go out and find the kind of science that may give them a basis on which ultimately to make a decision. And so what you are describing to me sounds like an attempt to go out and provide some good science to underpin what, up until now, may have been largely a politically driven agenda. I don't know that to be the case, but it sounds to me as though that is one of the attempts. That has certainly been what this Administration has done in some other instances and that is to try to use good science as the base from which they build regulatory patterns.

***Question*:** Three minor remarks here. There is no Nobel prize for geophysics, atmospheric physics or anything having to do with the earth sciences. I think it is ironic that Nobel prize winners would sign a statement related to global warming when their knowledge of the subject is probably less than that of the average TV meteorologist. It really is. My second point, I just want to add a footnote to Steve's

excellent compilation of statistics, which is very valuable, and that relates to mercury. The scientific situation on mercury is it is a global problem since it's stored in the atmosphere. The United States contributes roughly 1 percent of the global total, so the data says. Now the Administration has been criticized for setting the mercury standard at 70 percent removal from power stations instead of the 90 percent that the Clinton Administration had planned to set. They never actually did set it. If you calculate it out, it means that under the Clinton plan, if it were to have gone into effect, it would have reduced the total from 100 percent to 99.1 percent, whereas the Bush plan reduces it to 99.3 percent. That is the difference. It's good to keep these numbers in mind. A final point about the excellent speech by Crichton, I didn't know that he had taken it off his website

***Hayward*:** I just found out this morning. I was surprised.

***Singer*:** Well, I think it is an excellent speech and it's on the website of the Science and Environmental Policy Project which is sepp.org.

***Question*:** I want to go back to the question on perchlorates. Congressman, you gave an excellent answer without even knowing the situation. Essentially the EPA did a risk assessment, and I want Michael Gough to comment. But Department of Defense and DoE also had their own risk assessments and evidently they had some disagreements. They went to the Office of Science and Technology Policy for settlement and they moved it over to NAS, which addresses your point and I'd like you to comment on that. But also EPA does have a draft document on risk assessment practices at the Agency. I am not sure if Dr. Gough has seen that or not, but it would be of interest to determine whether or not there are standard practices within the federal government for assessing risk, or can we expect different agencies to assess risk in different ways.

***Gough*:** I can answer those questions only from a standpoint of ignorance about the specifics. I don't know anything about perchlorates. I have seen earlier drafts, I think, of the EPA's risk assessment. There has always been a conflict between, for instance, EPA and the Food and Drug Administration (FDA) on setting standards for

food. It's not about what the tests say and it's not about what the epidemiology studies say, it's about what levels of safety we want. Science goes into those things, but it is not science, and it shouldn't be called science. EPA in 1994 called together a group of people to look at its risk assessment for dioxin. The agency had spent ten years revising that risk assessment. The experts in 1994 rejected that dioxin risk assessment. It is now 2004 and the agency has still not issued a dioxin risk assessment. I think the reason for that is EPA is struggling to get its perspective that environmental dioxin is a public health risk into a document which can pass scientific review. I think the same thing may have happened with EPA's risk assessment guidelines. Regulatory agencies are part of the political process as well as part of the scientific process and there are always conflicts among the people at the agencies, who look to advance their agencies and their policies, and among their advisors, some of whom may be closer to considering the science on its merits.

***O'Keefe*:** Before I go to the next question, I am going to give two examples from my personal experience. One was participating in the Administration's workshop on their Climate Change Strategic Plan. When they put that together and invited 1,300 people to come for two days, they began by saying they had put out everything that was available from all the agencies and it was intended to provoke discussion. Jim Mahoney said, "I am going to be very disappointed if this isn't changed as we go through this process of converting all these suggestions into a strategic plan, and we are going to seek input and reaction from the National Academy." They sent that draft and the comments from the workshop to the National Academy, and not surprisingly, the National Academy was highly critical that it really wasn't a plan. They gave suggestions which were then used to formulate a final plan. A number of advocacy groups and people in the media slammed the Administration for not having a strategic plan. Well, they weren't supposed to have it; they were getting comments.

The second involves the Clean Air Act and reformulated gasoline, because there is a big debate going on now about opting out of the RFG program, banning MTBE and shifting to ethanol. In 1989,

the oil and auto industries engaged in a $40 million research program to test various fuel combinations and advanced fuel management systems. The goal was to find the right combination that could produce different levels of emission reductions. The two industries went to Congress and said, "We've got this program. You set the objective and let us figure out the right vehicle fuel combinations" and Henry Waxman and some of his colleagues said, "That's fine. We are going to tell you how to make it." The Clean Air Act has a formula for reformulated gasoline that was really designed to promote ethanol. The petroleum industry, looking for the most cost-effective way to meet the oxygenate requirement, went to MTBE and now we have the problem of unintended consequences. So there are a lot of examples that support the point that Bob Walker and the other panelists have made and it is something that the media ought to look at very carefully and make sure they understand the process that's going on, the politics, the incentives and the dynamics of how decisions are made.

***Question*:** I wonder if any of the panelists would care to comment on the lead problem in Washington, D.C. If you read the newspapers, it's total chaos.

***Gough*:** I will just say one thing: it does seem to be a mess to me. I scanned through the articles looking for numbers and there are no numbers. The word "high" was used, but higher than what? This is not a health issue, but I live in Montgomery County where we are plagued with pinhole leaks in copper water pipes. No one can explain that either, but the plumbers like it.

***Hayward*:** I have noted with a bit of amusement that it's happening here in the federal government's backyard, not some far off place where they can't look after themselves without the federal government's help! One thing I haven't seen, only because I haven't been following this as intensely as I might have, is whether there has been any blood or tissue tests to see if there's elevated blood lead levels in anyone drinking the water. That may have happened, but I haven't seen it reported and I would be skeptical if there are.

***Question*:** I wonder if any of the panelists would comment on the current issue of mercury in fish. In the last couple of weeks, the US, I think, New Zealand, and Australia have all come out with advisories for pregnant women and young children about eating certain big oceanic fish that bio-accumulate mercury. I haven't had a chance to check it but wasn't there, about twenty years ago, another similar scare on mercury in fish with advisories suggesting it was something from recent modern industrialization? And somebody somewhere actually went back to fish collections around the country in museums and pulled out preserved specimens of swordfish, billfish, tuna from a hundred years ago and also found surprisingly high accumulations, so this may be happening in nature too. I don't know whether I have that story correct, but does anybody have any comments on that?

***Hayward*:** I forgot about all this. I have been wanting to go back and look into some of the episodes in Japan where twenty or thirty years ago they actually did have some, as I understand it, some very serious contaminated fish and health problems from high levels of mercury, essentially, I gather, from industrial dumping. There is some talk and some scientific literature about natural sources of mercury in the ocean, not just deposition from the air, getting into some fish. One of the things that interests me about the FDA language from a day or two ago is a classic example of a trade-off. Nutritionists have been telling us for the last several years, "Eat more fish! It's good for your heart; it's good for all kinds of things." Now they are telling us we have to balance it in our own minds against the risk of potential high levels of mercury. So what are you supposed to do if you are a poor consumer now? I am supposed to eat fish, I am not supposed to eat fish. I don't know. It is interesting to watch the dilemmas that arise now.

My own personal footnote, and I had forgotten about this too until this came up: when I was a kid, I used to go to the Army Surplus store near where I lived, where they had these old mercury switches with huge gobs of it in little glass things, left over from World War II. I would buy these things by the dozen, smash them up, collect mercury and play with it in my hands and carry around jars of it. I managed to finish school, though.

***Question*:** Just to follow up on what Bob Walker was saying, that so many scientists today are so dependent on federal funding that they are willing to compromise, in my view, their scientific integrity just to maintain their funding. I am a member of the American Chemical Society and in their publication, *Chemical and Engineering News*, you read stories all the time how they absolutely support regulation, because most of their membership are academics. I was also interested to hear Dr. Sallie Baliunas say, and she confirmed this with the Office of Management and Budget, that over the last decade, $45 billion has been used to fund global climate research. Now for that kind of money you can get people to say almost anything you want them to say.

***Walker*:** To some extent the situation is even worse than it looks on the surface, because the fact is that Congress doesn't have a very long-term view of things. Congress has a one-year horizon for appropriation bills, a two-year horizon to reelection and most authorization cycles don't go more than three years. So that is the extent of the Congressional horizon. When you're talking about a lot of basic science work and about really investigating some of these things, you are talking about programs that go five and ten years. Congress rapidly runs out of enthusiasm for the program along about three or four years into them and are onto new things. The latest thing that they have read in the newspaper is what they want to fund, so in order to keep the funding streams going, people have to come in and make it a very rosy picture about just what you're getting, how this is modern. That was my reference to the fact that very often, what you get then from the scientists is not a very accurate picture of what can be expected from the research, and yet that is exactly what the Congress wants; Congress wants to be able to go back home and say to their constituents, "This is what you got out of me spending that money." The translation of those two messages is really undermining some of the ability to do quality research at this point.

Question: We have heard an awful lot, particularly early in the discussion, about risk assessment and how that is different from science. Science is understood as the pursuit of objectivity. At the end of the

scientific process, you are left with a set of objective facts but before you get there, the results that you find are often surrounded by uncertainty, confidence intervals in particular. In risk assessment, it is very clear that there is uncertainty involved it; that's why you're assessing different kinds of risk. Mr. Walker, I wonder if you could comment, as a person who received this kind of information, how do decision makers understand the uncertainties that are in the scientific process, and how do you begin to reconcile some of those conflicts that may exist in the scientific record, and then maybe Mike can add any comment on this notion of science versus risk assessment.

***Walker*:** Well, it is one of the most difficult things that you face in public policy because where there are uncertainties and where there are differing kinds of conclusions, it really is difficult to decide where a funding stream should go, particularly if you are going to begin the process of making the risk assessment into some sort of a mandate or regulation. It really is the difficult decision. The only way that you can do it is to figure out what the base of good science is. And that also is a difficult thing, but you should at least start from the basis of the best available science, bring in both the proponents and the critics, and get them to respond. But in our modern society, some of this also comes down to public pressure. Ultimately Congress will respond to those things that the populace begins to define as necessary corrections in the system and that is sometimes driven by less than good science. I tell people that I read *USA Today* first in the morning before I read the *Washington Post*. The reason I do that is that *USA Today* is a cultural newspaper, rather than a political newspaper. It is the place where you are most likely to find the front-page headline that says, "Apples may kill you," or something like that, and cites a study. But I know that what shows up there is going to drive a large base of public opinion across the country, because they will react much more emotionally to cultural issues than to what they perceive as political or even economic issues. The dilemma for the politicians is to figure out just what the culture will sustain and then try to find inside of good science an ability to meet public demand.

***Gough*:** The conclusion from a scientific study or test is generally published in one form or another. If the science is of any interest to anybody, other scientists try to replicate it. If they replicate it, fine, it becomes accepted that that's the way the world works. If they can't replicate it, there are controversies and people make efforts to reconcile the differences, or show that one set of experiments is right and one set is wrong. Risk assessments, on the other hand, produce something that is almost an assertion. The assertion is that above a certain level of exposure, more people are going to get sick and below that level of exposure, fewer people are going to get sick, and that we should set a regulatory standard to protect people at that level. Once a result is an assertion, then you have people divided up on both sides. That's different from science, where I think there is not that much antagonism about results as there can be in risk assessments. The second difference is that it is impossible to test the results from a risk assessment. I don't know of a single case where an environmental exposure has been tested for causing a health effect in which the results substantiate that harm has occurred. The numbers are just too small. There are real differences between science and its results and risk assessment and its projections and yet, I think risk assessment is absolutely essential to run a society.

***Walker*:** Let me give you one example of something that I run into all the time in what I do, and that is regarding the NASA programs. In NASA, on one hand, you have an agency that we have told, "Take a lot of risk and go out and do space exploration." On the other hand, you have an agency that now says almost every day, "Safety is our number one concern." It's become almost a schizophrenic agency as a result. How do you decide how much risk that you are willing to take in pursuit of a public policy good of exploration? Weighing those questions has been one of the principal problems that NASA administrators face and that the people on the Hill face. We were certainly willing to take vastly more risk under the Apollo program than we have been willing to take in the present program. And it goes to vehicle design, it goes to how much money it costs. You can go to Mars for a lot less money if you are willing to take Apollo-level risks in order to do it. The question is, as a society, whether or not we are willing to accept that level of risk.

***Question*:** This is more of a select comment. As a science editor, we deal with reporting risk assessment all the time and it is always very tricky. For example, recently there was a warning about farm-raised salmon and the elevated risks that were associated with that. Well, as it turns out the elevated risks were in comparison with wild salmon, where the difference between one chance in a thousand of developing cancer versus four chances in a thousand of developing cancer. That was the essence of risk and yet many of the stories that were reported made it seem like a certainty of developing cancer or other diseases from eating farm-raised salmon. My favorite story along these lines was a couple of years ago when, as you might recall, there were quite a few shark attacks worldwide. There was an awful lot of publicity about sharks and being a big fan of the movie Jaws, I remember that that movie years ago started what essentially turned out to be a Holocaust for the world shark population. For every human eaten by a shark, there were probably a million sharks eaten or killed by humans. But the funny thing about the shark attacks in the past couple of years, if you look at the figures, is that you are fifteen times more likely to die from being hit by a coconut than you are from being eaten by a shark, and yet I have never read a story warning about the dangers of coconuts. So risk assessment is indeed a difficult subject.

***Question*:** Continuing on the risk assessment theme: the Office of Management and Budget has proposed draft guidelines. One of the goals is to reduce the conflicts that underlie the science that underlies regulations. Some people say however "It ain't gonna happen, if you disagree with the outcome, you are going to criticize it no matter what." What are your thoughts?

***O'Keefe*:** I'd like to answer that because one of the ways you can reduce the disagreement is through transparency. And that is, when an agency has a study, a risk assessment, and has it reviewed, the first thing it ought to do is the comments. It shouldn't push for consensus, because that masquerades serious differences. Include the comments, where there are disagreements and agreements. Secondly, make the data available and the models available so that other

interested people can go and see if they get the same results and what assumptions may make a big difference. Steve mentioned the Harvard study on ozone. That data has never been made available and the EPA uses a proprietary model so no one can go in and see how the model was constructed. So greater transparency and openness would certainly be a step in the right direction.

***Question*:** I have no brief for the Union of Concerned Scientists report; I haven't actually read it. It seemed like a rehash of the previous news reports and Congressman Waxman's report as well, which preceded it and which I think was in some ways better. But the idea of refuting it seems very difficult to me. I don't know how Dr. Marburger is going to do it, for the following reasons: because these are news reports, you essentially had "he said, she said" accounts from one scientist who is angry and someone from the Administration saying they misunderstood. The thing with the President's Council on Bioethics is the same way. Leon Kass says that "We are not playing politics with science" and Elizabeth Blackburn is calling every newspaper that called her saying, "This is an outrage." How are you going to refute "he said, she said" accounts where scientists are angry? I mean, more significant is the fact that there are so many of these disputes, I would suggest.

***Walker*:** Well, I would just tell you from the standpoint of a politician, the reason why you go out and do it is so that you do get some "he said, she said" kind of debate going. Otherwise these matters are allowed to rest as though they are fact, and no opposing viewpoint is provided for people who may question the facts which are being presented to them. We are seeing some of that with Richard Clarke in the White House right now. Both sides are going to have their share of proponents, but at least both sides have the arguing points and it seems to me that that's the reason why the Administration in this particular case. This is basically a direct attack upon them, and the Administration wants to put the facts on the table so that people can fairly evaluate the two different points of view.

Hayward: I'd like to add a thought to that. Actually I do have a degree, Congressman, but it's in political science, which ordinarily I tell

people is one of those squishy social sciences that's not very scientific, as we usually think about science. But it may be the most honest one, in some ways, in that at least we label it "political science." To pick up a thread that was mentioned earlier, you are never going to get politics out of science as long as the government is so deeply involved, not just in making decisions on science, which are going to be subject to political pressures, because politics is in everything now, right? But as long as the government is such a major funding source, there will always be politics in it. I don't necessarily say that the Union of Concerned Scientists is wrong for the approach that they have taken. It is a perfectly valid issue to say that an Administration is allowing politics to affect their decisions. I do tend to take the old fashioned view that when you win elections, you get to hire the people you want to work for you, and so the suggestion that the Administration shouldn't be able to hire the people they want to hire and not hire the people that the Union of Concerned Scientists want them to hire smacks of a kind of a political naiveté that, let's admit it, they don't really have. I mean, they know what the score is. So let's rest with that. We are not going to get politics out of science as long as politics is involved in promoting science. If we all understand that, then these things will go a little bit better.

***O'Keefe*:** I want to thank you for coming and I want to thank Adam, Mike, Bob and Steve for their participation and interesting views and for those of you who are interested, in a very interesting treatment of the process that leads to the kind of publicity that this report got, the late historian Daniel Boorstin wrote *The Image: An Introduction to Pseudo-Events in America* in 1962. It's very easy to read, you can buy it online and it's very insightful about this process of grabbing attention with agenda-provoking ideologies. I recommend it to you. I don't get any royalties, but it is a very good book. Thank you.