

After Hiroshima research interview

Interviewer: Sam Martin (SM)

Interviewee: Kennette Benedict (KB) director and publisher of *The Bulletin of the Atomic Scientists*

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(SM) So Kennette, would you mind just talking...about your role and who you work for [inaudible], and er, and what's your background, how you got into this kinda type of work?

(KB) Uh, sure. Um, I was the director and publisher of *The Bulletin of the Atomic Scientists* until, uh March 1st of 2015, um, and, um began there 10 years pre...previously in 2005, uh, and um, was uh, really wanting to make the Doomsday Clock more visible, more of a, uh a s...symbol that uh people around the world could look to and understand and...and to try and use that clock to bring to the attention of um, publics everywhere the dangers we face from nuclear weapons and then from other technologies uh that we've also, uh used to...harm ourselves, including uh, uh fossil-fuel burning technologies and th-the prospect of further climate change. But the um, as you, as you probably know *The Bulletin* was started, uh right after the...end of World War Two. Um, it was begun by the scientists who had developed the...the ato-...the first atomic bomb, and uh they were the ones who...saw the tests, saw what happened, and were...were very very interested in getting, uh in letting other people know just how powerful, and how unusual, and how terrible, this weapon was.

[1:58] Um, I got into the... *The Bulletin*...to some of this work, because I had been working, before I came to *The Bulletin*, at the um, John D. and Catherine T. MacArthur Foundation in Chicago, and there um, I worked with Ruth Adams, who had been editor of *The Bulletin* twice, uh in its history, and in fact had been...been, um a young graduate student in 1945 when *The Bulletin* got set up, and so she was involved in those early days with the atomic scientists. She had also been involved with the Pugwash Movement, which also came out of um...that scientists' movement. The Pugwash Movement was begun in 19...57 by Albert Einstein and Bertrand Russell, uh but for the 12 years or so before that, many scientists, uh in the United States, and in Britain, too, um had been working together to figure out how to tell the public and people, uh, about the...the horrors of this weapon.**[3:04]** So, I got to know...um I worked very closely with Ruth for a...about ten years, um, and met many of the people who had been involved, um, Victor Rabinowitch who uh, who was the son of the founding editor, uh, uh Eugene Rabinowitch, uh, was a good friend...[pause] and colleague as well at the MacArthur foundation. So I became immersed I would say, in the...the history, and in the, the um, uh and in the...the thinking of many of the scientists who were involved.

[3:42] *(SM) Uh, could you tell me a bit more about the Pugwash Movement, I haven't heard about that?*

(KB) Yeah, uh the Pugwash Movement was, um, started by, uh, it was for scientists and, and...and philosophers. Bertrand Russell, I guess...wasn't a scientist, but certainly people who thought deeply about the fate of the Earth, and the fate of humanity, um, and Albert Einstein, uh, uh, I'm not quite sure of all the specific origins, but, uh, he and Russell, uh, came up with a manifesto in...1957, which called upon scientists, and all interested cit-, uh, citizens to, uh learn more about the atomic bomb, and to bring about its, uh its, uh, bring about the end of the bomb. Um, they were funded by, um, Cyrus Eaton, who was a U.S., um, millionaire, um, I think involved in steel, uh making steel in the, in the Midwest, uh, and

he was taken by the movement and, the first meeting they had, was, um in Pugwash, Nova Scotia, in Canada, and it brought together scientists, uh, from all, uh...many many countries, most notably from the United States and the Soviet Union. The hostilities between our two countries were uh, really, be-...uh, very high, and um, and they wanted to...to get scientists who might be able to speak in the same language, who had respect for one another's, uuh, accomplishments as scientists, and who could, um, could then talk across this very uh, high, and dangerous political boundary. Um, so the Pugwash, uh Movement, as it's called, is still active, um, they've been around now since 1957, and they meet, um, at least annually, uh, and um, they along with Joe Rotblat won the Nobel Peace Prize, in I believe it was, oh, 19...1992 perhaps, um, for their work in bridging the...the divides between the countries, especially between the U.S. and the Soviet Union, but also between, with China, uh, India, uh Pakistan, and um, uh, uh, and Britain was part of that, clearly, in fact Joe...Joe Rotblat is, or was...was a British citizen. So yeah, so it's had a long...a long, um run, in its, yeah it probably isn't as well-known as it might be, but um, they have been behind a lot of the treaties, um that have, um, uh, like the uh Biological Weapons Convention, uh the Limited Test Ban Treaty...uh, drafts of those treaties were circulated among those scientists who came to um, came to meet every year to talk about these, uh, very, uh heady issues.

[7:02] (SM) *Hmm. And, so why was it called the Pugwash Movement?*

(KB) Uh, because the first meeting took place in Pugwash, Nova Scotia [laughs].

(SM) *Oh right, okay. Fair enough. [Kennette laughing in background]*

(KB) It's a small town, I actually was there. The Canadian Pugwash had a meeting there, um, uh in um, uh, let's see...it was the end of July, and I was asked to speak, so I was actually, uh...and I had been in Pugwash, uh, another time as well. [Laughing as starts this next sentence] It's a very tiny town of 300, uh, but it is, they've got a lodge there that was um, I think Cyrus Eaton's summer cottage or something, and they've turned it into what's called 'the thinker's lodge', it's a beautiful setting, uh, if you have a chance to get there, and um, but it's, yeah it's just the place that Cyrus Eaton, uh, you know, had. So they, so that's where they ended up.

(SM) *Okay good. And then, how did they communicate with, I mean Soviet scientists – was that difficult?*

(KB) Um, I think it was, uh, somewhat difficult, but, um, they, both the, uh the U.S. and the Soviet government, I think, saw this as...advantageous to have this kind of communication. Um, I think they cor-, I know they corresponded by letters, and, and um in those days it was, we didn't have, uh very good, you know, telephones and other things, but they did, uh commit to meet once a year, and at those meetings, um, that was where the work was done. They would meet for a week, um, or more sometimes. They would have cultural events, as well as, uh workshops and meetings, uh to talk, mostly then about, uh, nuclear weapons, about what kinds of weapons were being developed, and were there any ways they could convince their governments, um, to, uh, to reduce, or stop the arms race, which was at that point going full speed ahead. **[9:04]** So, um, yeah it was mostly face-to-face, um as I said, these were...scientists who, uh, you know, were involved in physics and chemistry, and biology, who, would um, meet on occasion at professional meetings, so that they had other ways as well to communicate. And um, uh, it was, you know, not always easy, um, it, uh,

actually a number of other people would come, uh, Henry Kissinger, apparently, made quite a career, uh, out of going to Pugwash meetings, because the scientists there and some of the government officials who came would talk about proposals, that in the, in the future would come to pass and so he had some inside information that he would, um be able to, uh tell people about, while he was, uh, in Washington, at Harvard, and then later in Washington. So it's a...it's kind of an insider's insider group, um that uh, you know, had enough influence, and was recognised as uh, contributing to peace through receiving their Nobel Peace Prize. But it was, um, yeah we, I think it was a pretty important...important bridge uh, between especially the U.S. and the Soviet Union for many years.

[10:25] (SM) *Hmm yeah that's fascinating, um, back onto, I mean onto The Bulletin, and the scientists that formed The Bulletin, um, um who were the kind of the major players, the kinda leaders of that movement?*

(KB) Um, the um, uh, well in Chicago, um, uh, the scientists who were involved in the first days of *The Bulletin*, and I would say in what's called the Scientists Movement of the time, um, were, um, uh, John Simpson, who was then Head of the Metallurgical Lab at the University of Chicago. Uh, that lab was the one that helped, and was really the key contributor to the early design of the first atomic bomb. Um, they...didn't go out, some of them, did not go out to Los Alamos, as others did from the University of Chicago, um but they did a lot of the...the earl-...the design, or rather the application of it, which is what happened at...at Los Alamos, but uh, but stayed behind here in Chicago, um, after they had put together most of the calculations and were able to um, hand that off, um, and um at the time, in 19..., in actually in June of 1945, um, James Franck, John Simpson, Eugene Rabinowitch, uh, and several others, uh issued something called what later became the Franck Report. Uh, and in that report, they had been asked by the government to um, uh...think about, and suggest, what might be the...the social, uh, consequences of using the atomic bomb. **[12:17]** There were other groups that had been asked to look at the military consequences, the technological consequences. None of the others apparently produced a report, but this...this one did. And in it, uh, they called for two things. One was the um, international control of nuclear weapons, and um, under the...the U.N., which was just forming in June of 1945. Um, and uh, and they uh, they also uh, called...called for um, the uh, really the reduct-...the, you know, doing away with the atomic bomb that they had just invented. They thought that the horror of it would be really dramatic and that...and that large...swathes of...of cities would be destroyed. They also, the second proposal they had was to um, test the bomb before using it on civilians in Japan. Um, this was something that was considered, by...a number of people, uh, but eventually was discarded. They felt that it wasn't practical, and um, so they went ahead and...and used the bomb, uh, uh, on, Hiroshima. Uh, they, uh, they also did...did test the...uh the plutonium bomb, uh...uh, in New Mexico, in...uh, July of 1945. Uh and that was the bomb that they then used on Nagasaki, uh, uh, two days after the Hiroshima bomb. So the scientists who were involved were, um, really, you know, some of the very top people, um, Oppenheimer wrote for *The Bulletin*, uh, he was also the Chair of the first board of sponsors, um, Albert Einstein wrote for *The Bulletin* also, um actually wrote, um, uh asking for funds for *The Bulletin*, so his name was...and he was, um, happy to...to put his name to that kind of, um, effort. Um, but really, um, uh, Edward Teller wrote for *The Bulletin*, um, Murray Gell-Mann, who...who was a student at the time, was involved...um, Ed Levi, who later became president of the University of Chicago, uh was also involved in the early days as a lawyer, uh, law professor,

looking at the implications of this...um anthropologists, um, really, all of the people at Chicago. Um, and many from other places...uh, Ernest Lawrence, in those early days, uh, who was at Berkeley, um, was also involved, um... So it was really, you know, just about...it was the, the group of scientists who all of them worked on the...on the first atomic bomb.[15:12]

(SM) Was that, I mean, the Franck Report came out, was that before Hiroshima? [laughs]

(KB) Yes, the Franck Report came out in June in 1945, um, the, uh, Trinity Test was in, uh, July, of 1945, so just a month after, and then, yes the bombs were dropped in August. So, yeah, it was a...things happened pretty quickly in those days [laughs]. It was war. And uh, yeah and they, they really...they'd been thinking about it for a while – there were discussions at Los Alamos, in fact, um, Robert, um, uh...Robert, uh...Wilson, who later became the director of the Fermilab, was a graduate student at the time, was really, he was pretty close to Oppenheimer, and was one of the few who kinda stood up and challenged Oppenheimer about dropping the bomb immediately on...especially on civilians... They really felt terrible. Um, and um, and uh, Wilson was um, a part of the University of Chicago group, who had gone out to Los Alamos, but he was involved in those early days, and at Los Alamos they had a huge meeting, um, uh, even before the Trinity Test, uh, to consider whether they should go forward. Um, remember that the reason many of them had joined the...the project was that they were wanting to get, um, a bomb before the Germans did. And the Germans surrendered in May, and after they surrendered it wasn't entirely...uh in 1945...it wasn't entirely clear to everybody that they should continue or why they should continue. Uh, so the initial rat-...the reason for doing all this was...was now over, gone, um, so it's at that point that some people began to ask well wait a minute, you know, why are we continuing to do this? Um, I think, uh, many of them expressed, uh, and it's...there's a wonderful film, called *The Day After Trinity*, which um, uh has interviews with many of those who were...who were involved in the Manhattan Project. And they're wonderful...um, oh...reflections on, um, you know, how...how tantalising this was for a physicist to be able to unleash this energy, even though it was in the form of a weapon, and um, you know, how many of them, uh, were really quite ambivalent, um, and torn, about the whole project. Um, so it was, yeah, it was a very heady time. And um, uh a time when people were...were questioning themselves and what they were doing, and you know, alternately, I think, uh, exhilarated by what they had accomplished and totally and utterly despairing, because of how the first, uh, bomb had been used.

[18:18] *(SM) Hm, [inaudible] so looking at th-, the potential consequences of the bomb, I mean, how good an idea did they have of what those were to be? And how did they know that, I mean...?*

(KB) Well they...um...[pause] ...uh, mostly because they were very good scientists, they could calculate things quite well, um, they uh, they knew how...they...or they had pretty good calculations of how much energy would be produced by the explosion. Um...this was the unleashing of large quantities of energy from uh, ur-uranium and plutonium, which are not, you know...plutonium is not found in nature, so... you know, they didn't have any other...ways of doing it except looking at their calculations. Um, Edward Teller, in fact, uh, was concerned that the test in, er at Trinity, in New Mexico, could actually ignite the atmosphere of the Earth. And, so there was a little bit of concern, as you might imagine, that this might happen. Um, the story goes that Hans Bethe, who...um, later went to Cornell, who

was then uh, uh I think a, probably a fellow, or postgraduate fellow, um, uh, at the University [coughs] of Chicago, uh, did some calculations and...and determined that no, it would not ignite the atmosphere, um [coughs] but he, along with Fermi...uh Fermi was also, um, at the University of Chicago, and of course was the...the scientist who, uh, created the first cell-sustaining chain reaction – controlled chain reaction – a...at the University of Chicago in 1942. Um, Fermi also did calculations and um, he, uh was able to predict what the, uh, the yield would be, what the explosive...how much energy would be released. And um, uh...while they weren't able to say exactly how much of the city of Hiroshima or any city would have been destroyed, they understood that um, this would be an, a huge...a huge huge weapon, and were able to calculate you know, how many, um, uh, what the equivalent would be in tonnes of...of TNT.

Um, so they understood there would be mass death... mass destruction of buildings... um, the, you know, the heat generated by the explosion would melt steel, would vaporise um, many materials, um, so just by their calculations of the explosion, they could, uh, say with some...some, you know, uh...certainty I guess, um, what this bomb would produce.

[21:23] (SM) *Hm, hmm. And um...so how did they, what was the scientists' reaction after Hiroshima then?*

(KB) I'm sorry say that again?

(SM) *So after Hiroshima, what was the...general scientists' reaction?*

(KB) Uh, well, it, er, hard to speak for all [SM: Hmm] of them of course. Um, uh, some of them...there was a big, uh, conference held actually, in, uh, November at the University of Chicago [SM: hmm] um, a-, and uh many of the scientists who had been involved were...had come back from Los Alamos, you know, they'd...they'd left, the...the University, and now were back and, um, Arthur Holly Compton, who uh was the Director of Research for um, the University of Chicago, and also had been instrumental in pulling together all these scientists. I mean Fermi had been...Enrico Fermi had actually been at Columbia, uh, when he first came from Italy, fleeing the Nazis there, er the Fascists there, um, and then Arthur Holly Compton convinced him to come to the University of Chicago and convince the government that they should provide [inaudible] to this...to the University here, rather than Columbia or, um, Berkeley. They, they gave money to all...to...to Berkeley as well and uh, Earnest Lawrence, who was out there, um working on...on purifying uranium, uh, but um, but, um the, many of the major design, uh...researchers were brought to the University of Chicago, so um... Fermi had never really been in-, that interested in the policy, I mean...frankly none of them...you know, these were physicists right [SM: Mmhm], I mean, none of them had really wanted to make the first use of nuclear energy be an...a horrible bomb. You know, they would uh, they would rather have um, developed it as nuclear power, as energy...for civilian use. To generate electricity. Um, or for...and for, um, medical purposes, which in fact they also were working on, at the time. So, uh, [pause] you know it varied, I mean, some of them were horrified that it had been used, um, especially, uh, Wilson, um, who went into a major depression, uh, for several months after...afterwards. Um, others, um, actually distract-....they...they went to, uh, Robert Serber, um, actually went to Hiroshima. He was one of I think two or so scientists who went right after, about two weeks after the bomb...went over to actually make calculations, take measurements, and find out exactly how the bomb had formed, uh, and uh, exactly...what the yield had been and so forth, but,

um, and it was terrible, but, uh, you know, work can be a distraction. For some of them then, that kind of work, um, helped them through that period. [24:37] Um, but the conference itself was a place where many could uh, argue, vent, you know...talk about...uh, some of them felt that they'd wanted more control over the use of nuclear, uh, energy, uh, and wanted the military to, uh, no longer be in charge of this nuclear energy, um...and voiced that opinion. Um, others like Edward Teller, um, uh, also were there, and, you know, felt that this needed to become under international control and Teller himself wrote an article in *The Bulletin* in 1940...47, um, saying the only way to deal with this was to have some kind of international control and he even used the words 'world government' [SM: mm]...to ensure that the...th- this power wouldn't be...get into the hands of n-, m-militaries...of national militaries. They had just come from World War Two, which had seen huge destruction, and millions upon millions of people...dead...dying, wounded, uh, countries ravaged. And no one really wanted to see that happen again. So, they were, you know, I would say on the whole, pretty distressed, and, but, and wanting to know what on earth they could do. Uh, they were civilians after all, at this point. They were no longer in charge of the...of the nuclear bomb, and they worked very hard to get the...the design and, uh, construction of those bombs into civilian hands. So, that was one answer, um, to all of this. Um, Glenn Seaborg, who became the first, uh, Head of the Atomic Energy Commission in the United States was one of those who had worked on the bomb project and who really wanted to move this into civilian hands and was instrumental in doing that. [26:40] So, in various ways they worked to, um, mitigate, I guess, is the best word, um, the...the um, you know the horror of what they had done, um, and you know, felt...some felt, because they hadn't been listened to about, um, testing the bomb, you know, on a pacific island without people around, they, you know, some of them felt betrayed, essentially, by, um, the political leaders...and by the military leaders...um, so...are you still there?

(SM) Yeah, yeah, sorry [laughs].

(KB) Okay, so their, so um, uh, so, you know, so their, you know, various ways of dealing with their guilt, but, many of them I think, felt a sense of guilt.

(SM) Ah, yeah. And, um...so say for example Wilson, you say went into sort of a depression, like...do you have any account of the rest of his life...what happened to...what he ended up doing?

(KB) Well he ended up, um, getting out of um, of any kind of military and weapons work, he just he...he couldn't do it anymore. [SM: Okay] And um, he...went on to have a wonderful career as, uh, you know, I think the first or maybe second Director of the...the Fermilab, here, out in, you know, out in the suburbs of Chicago. The Fermilab did...uh, lots of fundamental research. Um, uh, some of the research they did contributed to finding a whole range of small particles, including the cork, so it was, uh, you know, he really went into kinda basic research and fundamental research, continuing to do the physics that many of them had been doing before, you know, before the war, um, and before they were called in to work on this bomb project. Um, so, you know, and, and he, by all accounts, he was really quite a wonderful um, director, wonderful man and um, if you see some of the film clips of him, I mean, you get a sense of his...of his humanity, of his humility, uh, and um, and uh, and of...and of his talent, in leading uh, Fermilab, bringing in government money to do fundamental research um, about particle physics.

[29:01] (SM) *Hmm. And, and, I mean, do any of the scientists, or which of the scientists, were most active in... um... communicating with the public, about the nuclear weapons?*

(KB) Yeah well Eugene Rabinowitch was the first editor and, um, he had also been involved in the.. in the um... in the Manhattan Project. He was trained as a... zoologist as I recall, a biologist, and he was the real, I think, genius if you will behind The Bulletin until his death in 1973. He wrote beautifully; he... you know... when they first used the Doomsday Clock on the cover of The Bulletin to signal that the Soviet Union had tested its first Atomic bomb in 1949, he was the one who wrote a really marvellous essay, not blaming anyone but just saying this is a moment that we've all worried about. They knew the Soviets were probably going to be able to get a weapon – once you knew that it could happen, it wasn't hard to figure out how to do it apparently, so those scientists themselves had been kind of forecasting, and forecasting a nuclear arms race, and Eugene Rabinowitch wrote editorials in every issue and he was the one who I think called this 'the clock of doom' as he put it, and that later became, you know, popularised as the Doomsday Clock. So yes he was the person, I would say, who was most involved, but John Simpson continued to be involved throughout it's history. Hans Bado was on the board, you know, and I, those... there were rosters of them. If you haven't had a chance to look at The Bulletin on Google Books, it... it's really a treasure trove of material and quite accessible on Google for free so you can take a look. But you know, just lots and lots of scientists – Teller Lawrence – and then Leicester Groves wrote Oppenheimer. Just about all the scientists who worked on the project at one point were tapped to write for The Bulletin. Um... Joseph Routlette, I don't have a list in front of me but it kind of goes on and on, and, you know, and I could put together a more formal list or we can just look at the mast heads of The Bulletin – Google Books and you'll see, um, the range of people.

[32.17] (SM) *I'll definitely have a look at that. Yeah... all right... and, I mean, do you know anything about the audience of The Bulletin particularly in the early days? Readership?*

(KB) Yeah I think the audience... it was partly used as a way for the scientists themselves to sort out what they thought about their role in making the bomb, about their role as physicists, as scientists, in contributing to it, how their knowledge was used... They also, um... so a lot of it was actually talking to themselves, to other scientists, but also across disciplines, so physicists were talking to biologists and medical people. We really didn't know too much at the time about how radiation would effect humans, or any other living things, and so some of the articles in the '50s and into the '60s, you'll see discussions about what's a safe level of radiation for humans, and in fact it was through some of that discussion that changes were made to the standards so that in fact much lower radiation levels than had previously been thought were seemed to be dangerous. So it was medical people who read it but a lot of the audience was in the Soviet Union, and in Japan, even after the War, and Germany, France, and in Britain. So The Bulletin was read by certainly scientists and scientists – again scientists across these political borders – they were trying to figure out what the other was thinking about this new weapon. So it became... kind of a way for the Soviets to learn something at least about how the scientists were talking about it, they [inaudible - cough from SM] published correctional hearings, and lots of public statements. But I know that many others... the League of Woman voters had a whole session on the future of the Atomic Bomb in... I can't remember the exact year but it was in the 19... late 1940s; they were reading The Bulletin. People subscribed and, you know, I think it was mostly of course college, not of course, but college educated people, people who could, would have an

interest in this. But I think there's a pretty widespread public... You'll remember... you don't remember but you... 'scuse me, I don't remember either, I was born in 1948 so I don't remember at all, obviously, but John Hersey wrote his Hiroshima which was published in the *New Yorker* early on, I don't recall whether, what year, it might have been 1947. You know, *Life Magazine* was covering this, all these publications were really trying to shed light on what this fantastic, fantastical, invention was, and the role of Oppenheimer who was a kind of charismatic figure who was interviewed on television and films were made about him and his role. So it was on people's minds, and the Bulletin was one of the only places you could go to find articles written about it which were, you know, pretty accessible, there were no equations in them, there were very few numbers that turned up, and as I say Rabinowitch's essays were just beautiful. Even though English was his second language, Russian his first, he.. he really interpreted for the public. And so I think the audience, you know, I think it was university people, scientists, but I think people who, you know, might have read the *New Yorker*, or other magazines also were part of this. One of the people who joined the board in the '70s was actually a... Gerald Piel, who was the founder and publisher of *Scientific American*. So he came on the board of The Bulletin, recognised the.. both the influence and the authority of The Bulletin, and was very supportive of The Bulletin's work. The *Scientific American* was much more for scientists to talk to one another across their own disciplinary fields but he saw the bulletin as appealing to an even bigger audience than that, he was very supportive of it. He actually gave to the Bulletin the subscription list of *Scientific American* if you can believe it so that the Bulletin could send out mailings to get more subscribers. So yeah, a lot of people understood, I think, the significance and it's ability to reach a fairly sophisticated reader but still a non-scientific, lay audience.

[38.10] (SM) *Yeah, you mention the League of Woman's Conference – do you know anything more about that?*

(KB) I only know that the topic was, and I can probably... I can... I know I used that in a speech I gave one time, and I can try and... um... try and find the date for you. But I think the national, religious groups, the national, what's it called, The National Council of Churches held meetings to consider what the future should be with the Atomic bomb. It was an unusual time and there was enough known about the bomb that people really wanted to know more and learn more and understand what the implications were. But let me see if I can find it.

(SM) *Ok great, and, sorry, Life Magazine, again, do you know anything about that article or that coverage?*

(KB) Yeah... It would have been probably in the early 1950s I would say. It wasn't necessarily critical of the bomb, it was just laying out what this thing was. I think especially after the first hydrogen bomb tests in – let me see – that would be 1954, after the US and the Soviet Union each tested their large hydrogen bombs, you know, within about 6 months of each other, that was a big deal [laughing] and people kind of woke up, took notice, said oh, wait a minute we both have these things! So I think... I'm not going to be able to give you a citation, but I'm going to say it would be around that time around the 1954/'55 period probably.

(SM) *Mmm. Ok cool. And was there much opposition to the... scientists who set up The Bulletin in the early days?*

(KB) No... well... yes, it's a good question. Yeah, there was some opposition. The Bulletin... there was a time when the government wanted to prevent the Soviet Union and the Soviet scientists from gaining any information from our scientists and our engineers here in the United States, about anything, not just about the bomb, but any inventions, anything that we were doing. So they prevented scientific publications and technical publications from being mailed, sent, to the Soviet Union, so the Bulletin was among those that was being, I guess, embargoed from the Soviet Union. The Bulletin editors felt that there weren't really any national security secrets that were being divulged in the pages of The Bulletin so they fought that, they fought the State Department's embargo and won, actually, so they were, even though, I'm not sure they were targeted, but in any event they were part of a general feeling that we should... shouldn't be talking about these things much at all. But I guess, more than that, Oppenheimer was... his career was really killed... people were certainly out to get him. Robert Strauss, who was the head of the Atomic Energy Commission at the time. Edward Teller testified against him. Many of the scientists were thought to be communists, you know, a large number of them had come from Europe, a large number were German, actually, because they had had to leave Germany or they wouldn't have survived. So many of them were European, and somehow they were thought to be communist, especially because they were critical of the US Government. I mean they were critical of the Soviets too but they were critical of our own government. They were trailed by the FBI... so there was the subtle or not so subtle hand of government, I guess, that was kind of critical of the scientist, and you know in certain ways tried to squelch some of their writings and what they were doing.

[43.14] (SM) *And so, I mean, did it, did McCarthyism come into it? Was it a bad thing to be anti-nuclear in the '50s?*

(KB) Yeah... yeah it wasn't quite as bad as being a communist [laugh]... yeah you weren't always thought to be terribly patriotic I mean after all... it was such a strange position though, because these were the scientists who actually had created the bomb, right? So it's a little awkward, since they had done their duty, done their duty very well actually, and some actually thought the bombs ended the war in Japan, so I mean, what could be more patriotic than that? So I think there was a lot of confusion about who these scientists were, what they were doing, and the government wasn't every interested in having these citizen scientists pretending, or trying to effect policy, and I think that was where a lot of the distrust of the government... of the scientists by the government came in. On the other hand, it was the beginning of the greatest increases in funding for physics and sciences of all kinds in the US history, right? It was after World War II, that was when science became Big Science, you know, Big Labs, the Fermilab, which was a huge accelerator, and you know the accelerator we have now is Cern, but Fermi was a prototype for the beginning of all of that, and all those funded by the government. Argonne National Laboratory in the United States which was our civilian laboratory to develop atomic energy, that was all, you know, done by the scientists – the same scientists who brought us the nuclear bomb. So it was a very difficult time I think to figure out who was on what side. One of the things thought that several scientists objected to were the loyalty oaths that were being required by universities to continue to do their work at universities – they felt that in a way it smacked of the Nazism they had been fighting to have to pledge a loyalty oath to the United States of America which they'd never had to do before, and which is, you know, as University professors and scientists, they felt they should be able to take the arguments and the evidence where it led them. So they fought the loyalty oaths in

universities. There was a big, um... I don't know the details, but a very large protest at University of California Berkley about putting these loyalty oaths in place, and I think they were finally done away with but not without a lot of protest, and discussion in pages of The Bulletin.

[46.30] (SM) *Mmmm... During this period, this period of nuclear proliferation, what's the interplay between the sort of public opinion, or expert scientific opinion as well, and then government policy? I mean, was government reacting to the things, responding to the military situation as it saw it?*

(KB) Well yeah, I mean the nuclear arms race was in the '50s, and in the late '50s, which kind of peaked with the Cuban Missile Crisis in 1963, you know the US and Russia at complete and utter logger heads. Yeah that was all building during the '50s, and people were conscious of it, in fact, there were disarmament movements springing up, I mean, groups were protesting the bomb during that time. The thing though that I think got people most upset was the evidence that the nuclear testing that was going on in, um... Nevada, our own nuclear testing, was effecting people's health in the United States. Physicians... physicists and physicians were finding one of the isotopes strontium-90 in babies' teeth and also in mothers' breast milk, and these are radioactive especially to find them in our bodies, you know, far, far away from the tests in Nevada was really jarring. And so, there were protests in cities – New York, San Francisco, Chicago – you know, just street protests about this. Medical doctors getting involved, all very upset about what this was doing. And, you know, there were several people who said those protests did have an effect on our government, and in the end we came up with this partial Test Ban Treaty in 1963, I'm sorry Cuba was in 1962. In 1963 the US and the Soviet Union sign this kind of limited Test Ban Treaty that prohibited atmospheric tests of atomic weapons. We could still do them underground, but at least we still got rid of the atmospheric tests which were causing so much distress. So yeah, people.. um... there was discussion, you know, people knew about it, I'm not sure they felt they could do that much, but in fact they managed to get a treaty in place which is pretty good.

[49.26] (SM) *So do you think that was a consequence of public protest, of public opinion?*

(KB) In part, yeah, in part. Jerry Weisener, who I actually happened to know, he was on a McCarther board and he was a science adviser to John Kennedy in the early 1960s, and he, Jerry was involved as the science adviser, he was involved in some of the negotiations around the Test Ban Treaty and was in the room when they were talking to the Soviets about it and he, yeah, he said in their discussions, in the government, it wasn't... it probably wasn't sufficient, there were other reasons that the US and the Soviet wanted to, you know, reduce the ability to test, and it was kind of the beginning of the arms control movement by these government. But, he said there's absolutely no way it would have been done without that outside pressure, so I believe him, believed him, I think it takes, you know, what did Franklin Roosevelt say something like “well I agree with everything you said now go out and make me do it”? And I think that's what these protests were able to do was to, you know, push the government leaders to do something that perhaps they wanted to do but at least this also gave them some...

(SM) *Hello? Hello?*

(KB) Yes?

(SM) Hello, sorry I lost you there.

(KB) Oh, sorry.

(SM) It's alright. Um... it's just on those protests, do you know anything more about sort of the character of them and how big they were? And who went on them?

(KB) Yeah you know I'm not the... I wish I had all that information for you at my fingertips. Um... But I don't.

(SM) Ok.

(KB) There's a three volume... um... study, and actually you might want to talk to Laurence Wittmer. I don't know where... I think I've actually forgotten... I think he used to be at Syracuse University in the States, but I don't recall now where he is. He wrote a three volume history of the Nuclear Disarmament Movement so he's the go to person for this, and he also has written about the Disarmament Movement in the UK as well, and there are wonderful people to talk to about all that.

(SM) Cool, ok, that's really good.

(KB) So, and I'm sure you're probably reaching some of those in your other interviews, but Wittmer will know, you know, kind of chapter and verse of all of that.

[52.33] (SM) Ok. Cool. Thank you. On the subject of the Doomsday Clock, I wondered if you could shed any light on the process by which the, or by which you decide how many minutes it is until midnight and so on?

(KB) Yeah, um... The board gets together... well it meets twice a year, and it... and it talks about the clock at both meetings. At one of those meeting – it's usually November – they hold a symposium where they also bring in some outside experts, outside people, who were not on the board to give briefings and to talk... add to the briefings of the scientists on the board, and talk about, you know, what they see as the trends. Nuclear weapons and climate change, most directly, and they consider both the kind of technological innovations, as well as the general political and diplomatic scene, and really just spend a half a day or three quarters of a day talking. Then they, in consultation with these outside folk, after they've held the symposium, then they go into kind of a closed room and that's where they really talk very earnestly about whether or not the hand of the clock should be moved. And out of that they then issue a statement from the whole board which gives the reasons behind their decision to either move the hand of the clock, not to move the hand of the clock, and if they move it towards the clock why, and away from the... I mean towards midnight or away from midnight, and why. So, you know, it's on their minds most of the time, they will correspond even between meetings, you know, saying something happened, you know, I think we should really consider how this will effect the clock. So it's a very intense process, people talk it very seriously.... and it's a... and because there are a number of factors it's not a kind of mathematical formula, it has to do not only with the technologies but also with the politics and the economics, politics within countries as well as the international diplomacy or international trends that they see. So it's a pretty open, very earnest and very deliberative process.

[55.33] (SM) *Mmm. And what do you think the prospects are for bringing a concern about these issues to a bigger audience, and making people more concerned in the near future?*

(KB) Yeah... Well whenever we make an announcement,, for instance when we made an announcement last... um... January and moved it to three minutes to midnight, the media uptake was pretty extraordinary, I mean, every major media outlet – from FOX News to CNN to writers to AP to Al Jazeera – all of the media outlets – Alsace France Press, the Guardian often has articles, the BBC – you know kind of... we pretty much saturate the airwaves with, and the electrons I guess now, with stories, with the announcement and so forth. For that... for those few days around the time that we make the announcement it's pretty amazing to us that this small group of people can actually make news with this clock, and to warn people about the trends that we see. So, I guess I would need to... I'd have to look up the numbers or direct you to people at the Bulletin now that would have them at their fingertips. But in terms of audience we certainly... we reach millions of people when we do that, the question is how we keep up that discussion and where can it take place in addition to the media – can we get it taking place in parliaments, legislatures, high schools, universities, many places on an ongoing basis. And I think that's the challenge. It's very hard... we've... many people have found, to get people to focus on – especially Nuclear Weapons which are so fundamentally difficult to comprehend – it's a very fearful, anxiety provoking topic, and until we find another way to get people to understand that this is something they have a right to be concerned about and a right to do something about, until we get to that I think it is difficult, it's a difficult challenge.

[58.17] (SM) *Do you feel optimistic about that... challenge?*

(KB) You know what, I think... well I have to [laughs] or else.. it's an occupational hazard – optimism is. I, you know what, I do see, I did see in this discussion at least in the United States, about the Iran Agreement. I, you know, you may not have liked the tenor of the argument, it wasn't perfect, but the fact that there was a discussion at all in our Congress, in the public media, in newspapers, hearings, whatever – that was a... I think that was a first. I think that was the first time that there had been such public debate, both for and against, an agreement on Nuclear weapons, activity. You know, we had in this country, and I think you did too in the UK, had discussions about the Iraq War, the Afghanistan War, and you have discussions I think still, and we do too certainly, about, you know, what's happening in the Middle East, and Syria, and so forth. I think this might be... I may be... I'm not sure I'm right, I need to figure this out, but I think it was the first time we had such a vigorous debate about a nuclear... essentially a nuclear agreement. We've had debates in the Congress about Start 1, but they've been pretty limited to the Congress, not so many what I'd call civil society groups were involved. But here in the States we've had, you know, Iranian groups, disarmament groups, other Middle East... people who are concerned about what's happening in the Middle East more broadly, all of them were involved, and that I think was unusual. So to the extent that we can figure out how that happened, I think we might be able to try and apply that and move it to this question of what about our nuclear weapons, which of course is the big question.

(SM) *Quite. Have you... do you notice any kind of fluctuation in the engagement of scientists in this big debate?*

(KB) That's a good question, yeah. I think it's... I think we've seen now more... well especially in... let me step back for a minute. In the... the... scientists involved in the disarmament movement have often thought that they had more influence on the inside, right, kind of as advisers, as people who are talking to the Chinese or the Soviets or and now the Russians or whatever, and they felt that that was more... in some ways a better role for them. They're not terrifically, in the end, very politically orientated, I mean we try and get them to write for the Bulletin, and they do, but getting in there and mixing it up is another thing all together, and I think the climate change debate has shown how difficult it is sometimes for scientists to get involved in those debates, and is also, you see, why they're so wary of it... I mean they get trashed! Totally! [laughs] And they're not used to that, and they don't like it – nobody would. But there are people of pretty high integrity, who know what they're doing and I think they find it really kind of... not at all fun. So it takes a special kind of scientist I would say, someone who, you know, doesn't mind... Laurence Krauss who was the chair of our board of sponsors, is someone who is... not shy about talking to the press, about talking to audiences, he's a cosmologist, but he's someone who is also interested in the fate of the world and so he's eager to do this. I think it, you know, really does depend on a whole range of things, but I do think that if they can speak with authority based on the knowledge they have, and that can be interpreted, then that can have a role, and they enjoy playing that role, and many on Bulletin's board right now are of that kind, they're really tremendous people. So, yeah, not all of them – I wish there were more – but given the politics of the United States now, you can understand why they might be less willing to speak up than in other times.

[1.03.28] (SM) *Yeah. Ok, well I've taken up an hour of your time. Have you got any closing comments? Anything you might want to add that you've thought of on this?*

(KB) Um... I guess the closing thought has to do with some of what we've been talking about. How can we free ourselves from the tyranny of nuclear weapons? What are the perspectives and the framework that might be useful in engaging a broader public? And I think the... one of the problems with the bomb is that it produces fear, and that often leads to denial and paralysis. So one of the ideas to start maybe working on is that this is a matter of injustice, it's a matter of unequal participation in the decisions that are really about our very existence. And the unfairness of it – the unfairness of having leaders who can essentially wipe out major portions of the population, without any real consultation with the rest of us. That... that makes you angry – at least it makes me angry. I think, you know, we need to find some ways to have both the promise of... being free from this overhanging dread, and a sense of equal participation in decisions which are really fundamental to our existence on earth. And unless... or until or unless we can get to that point where we are angry at the inequality and the inequity of it, and yearning from the freedom from nuclear weapons, I think it's still going to be a pretty difficult... pretty difficult to get people engaged. So, that – the fear is there, fear can be a motivator, but not when it's of such a huge proportion, and without a feeling that we can do anything about it. And that's, I think, that's were the next challenge will be.

[1.05.57] (SM) *Ah, that was a really great way to end there. I'll just stop the recording.*