



Episode 702, Story 1: Manhattan Project Patent

Wes Cowan: Our first story unearths a little known project to hide America's atomic secrets in plain sight. Early morning, August 6th, 1945, a bright light flashes over Hiroshima. America has dropped the first atomic bomb. The blast, and a second three days later over Nagasaki, kill an estimated 220,000 people. The devastated Japanese Empire surrenders. On the other side of the world, the secret city of Oak Ridge, Tennessee erupts in cheers. Workers from the town's uranium processing plant finally understand their role in America's war effort. Now Michael Kudravetz from Gardner, Massachusetts wonders whether a patent with his father's name on it means his dad may have played a crucial role in America's top secret atomic program.

Michael: His whole life, my father would never talk about his work on the Manhattan Project.

Wes: Does Michael have a piece of atomic history? I'm on my way to find out. Michael? Wes Cowan. What do you have for me here?

Michael: Well I have a copy of the patent my father filed. During World War II, he took our family to Oak Ridge, Tennessee to work on the Manhattan Project. You can see his name is down here at the bottom. His name was also Michael Kudravetz.

Wes: Michael says his dad was an electrical engineer who worked at Oak Ridge from 1944 until 1947 on the Manhattan Project – America's covert effort to be the first to build an atomic weapon. The mementos he left behind after his death reflect the project's cloak and dagger secrecy.

Michael: Here's a booklet which was given to the residents when they moved into Oak Ridge.

Wes: Wow, look at that "restricted" right across the cover. Oh yeah, listen "as this is a vital war effort, everyone that enters or leaves the grounds of this area must be properly identified". So do you know exactly what your dad did at Oak Ridge?

Michael: He was the supervising engineer at Y-12. But, other than that, he didn't say much. He didn't talk about it.



Wes: And what is Y-12. Michael explains that Y-12 was the plant where they produced enriched uranium. This metal was the Holy Grail for the Manhattan Project and was the fuel for the “Little Boy” bomb dropped on Hiroshima. Michael says that long after his dad left Oak Ridge, he received this patent in the mail along with some curious correspondence.

Michael: When the patent was returned to my dad in 1958, there’s some letters that came along with it.

Wes: Oh yeah. Look at that, “the secrecy order’, dated august 21st, 1951 is hereby rescinded.” So, this was top secret?

Michael: Yes.

Wes: Do you know exactly what your dad’s patent was supposed to do?

Michael: I’m a physics teacher; so, I can figure out a little bit of it. The patent is for a device that separates the different isotopes of uranium. And the lighter isotope was the one that was needed to make the bomb.

Wes: Did he ever say anything else about this patent?

Michael: He didn’t like to talk about it. He said he and his co-inventor sold it to the government for a dollar. I don’t know if they ever saw that dollar or not.

Wes: What do you want me to find out about all this?

Michael: I’d like to know if this device was ever built and used. Was it used to make the first atomic bomb?

Wes: Let me pack it all up. I’ll go away do my homework and come back and tell you what I found.

Michael: Very good



Wes: You know two years ago I worked on an investigation about the Manhattan Project ... My investigation concerned a public petition by Manhattan Project scientists, after they learned how the atomic technology they created had been used. "We the members of the association feel a very special responsibility to the people of America because of the role we have had in developing the atomic bomb." Following the war the scientists demanded that atomic technology be controlled by civilians, and used for peaceful purposes. I have no idea how Michael's father felt about his involvement in the bomb program, or even how his invention worked. But a couple of things about these documents strike me as a little odd. The patent was filed October 11th, 1945. That's two months after the bomb was dropped on Japan. And was the technology for the atomic bomb really kept at the US patent office...a civilian run operation? It's got a detailed drawing. There are detailed instructions about how to build this. And another thing -- the patent is finally issued in September of 1958. 13 years later. That's like during the height of the cold war. You know there's another inventor listed on this patent, Harold B. Green. I turn up an obituary. This must be our guy. Oh yeah now here's something. Harold B. Green, 90, of Oak Ridge, passed away Tuesday, May 27th, 2008. Mr. Green worked at Y-12 until his retirement in 1982. That's where Michael said his father worked. I'm meeting with Oak Ridge historian Bill Wilcox. He worked here as a chemist starting in 1943. We're meeting at an overlook called Chestnut Ridge. Since parts of the Oak Ridge facility are still veiled in secrecy, I've been asked to give up my cell phone and personal vehicle. Bill?

Bill: Hi Wes. Come on over here, I want to show you something.

Wes: What are we looking at here?

Bill: Well this is the Y-12 plant in Oak Ridge. During the Manhattan Project days, its task was to produce the uranium U235 for the first atomic bomb. We are as close as we can go today, though it's still highly classified

Wes: Before 1942 this was just farmland, right?

Bill: Late '42 September, the army decided to buy this 59,000 acres for the Manhattan Project.



Wes: Bill explains how a thousand families were uprooted to erect a super secret "Atomic City". It was built for one purpose: to enrich uranium that would fuel the powerful weapon being designed at Los Alamos, New Mexico.

Bill: They started production in January of '44, and they completed their assignment just a year and a half later.

Wes: My story involves this patent that I told you about. Did you know the two guys that are on the patent? A guy named Harold Green and another guy named Michael Kudravetz?

Bill: No, I didn't there were thousands of people that worked here...22,400 was the peak.

Wes: Would they have known that they were working on an atomic bomb?

Bill: They probably knew that there were separating uranium isotopes, and they probably could put two and two together, but that was top secret information, we were told instead of using the name uranium; call it by a codename called "Tuballoy".

Wes: Bill offers to take a closer look at Michael's patent, and we head to the nearby American Museum of Science and Energy. How did this patent work? Bill says the drawings appear to have been intended for use in what were known as the calutrons – giant machines arranged in oval "race tracks" at Y-12. 1,152 of them ran day and night, and used enormous electromagnets to "separate" and collect the weapons-grade uranium isotopes. Bill explains that sometimes the separation process failed, contaminating the precious bomb-grade material.

Bill: And what Kudravetz came up with was the idea to add a mechanical shutter.

Wes: A device to trap these isotopes put Michael's father at the heart of an astonishing engineering feat that would change the course of history. Bill explains how the Army Corp of engineers had to take extreme war-time measures to acquire the materials they needed for the Y-12 "calutrons". These must have been enormous electromagnets, right?



Bill: Ah, the biggest ever even conceived of. Conventionally they're wrapped with copper. But during the war time copper was so rare, somebody said, "hey, you know silver is an even better conductor than copper, why don't we buy -- borrow some silver from the US treasury"? And they did do that. 14,000 tons of our us silver was turned into magnet windings.

Wes: Did it go back to the treasury?

Bill: After the war over 99.9% was returned to the US treasury so don't worry about your money supply.

Wes: Do you know if this patent was ever used and did it help make the atomic bomb?

Bill: I couldn't get into the calutron unit so I really can't answer that question. But I know just who to call.

Wes: While Bill makes those calls for us, I think I need to do a bit of research myself. The "Soup Kitchen" cafeteria is located in what was once part of the original "Atomic City". You know, I just don't get it. This whole place is surrounded by secrecy. And yet Michael's dad's patent is sitting around the patent office for 13 years. Like it's a light bulb or a refrigerator. I mean it just doesn't make sense. I spend some time digging on the internet, and find what may be an interesting lead -- looks like someone else has come across some patents for atomic technology. There's a young Harvard researcher, a guy named Alex Wellerstein who is asking the same sorts of questions. I think I'm going to give him a call.... This is Wes Cowan. I'm really fascinated with the research you're doing... Alex has agreed to meet me nearby at the Hodges Library at the University of Tennessee. So what are we looking at here?

Alex: These are some other patents for the atomic bomb which I've collected over time.

Wes: I mean this really looks like the cross section of a bomb. Tell me this is not the patent for the bomb!

Alex: No, this is a patent for the switch on the bomb that was dropped over Nagasaki that would tell it when exactly it should detonate. But there is a patent for the atomic bomb.



Wes: Alex explains how he had been doing research on the history of the atomic bomb – when he made a bizarre discovery. Buried in some once-top secret government files, now declassified, was a paper trail concerning atomic patents. The trail led all the way to the White House.

Alex: These are some of the files I used to learn about the secret patent program.

Wes: Bush-Conant file relating to the development of the atomic bomb. I mean who were these guys?

Alex: Bush is Vannever Bush. He was Roosevelt's scientific advisor during the war. And James Conant was the President of Harvard.

Wes: Among the thousands of pages in the collection are the personal correspondence between Bush and Conant.

Alex: Bush was afraid that the scientists would try to use their intellectual property as a way of dictating the terms on which the bomb was used¹.

Wes: That's exactly what my investigation of a few seasons ago had discovered. Many of the scientists wanted a greater say in how their technology was to be used. Alex says Bush had anticipated this.

Alex: And he decided that the government should own all of the patents related to the atomic bomb.

Wes: And Roosevelt went along with this?

Alex: Bush wrote to Roosevelt and told him of his plan to seize the patents. But let me show you what Roosevelt wrote back.²

¹ Bush to Roosevelt Memo "Report on Present Status and Future Program on Atomic Fission Bombs" 16 December 1942, in Correspondence (Top Secret) of the Manhattan Engineer District 1942-1946, microfilm publication M1109 (Washington DC: National Archives and Records Administration,



Alex: Oh, here we are. There we go.

Wes: "Memorandum from dr. Vannever Bush. 'I wholly approve your patent control policy. Fdr.'" That's it?

Alex: That's it. With this one line Bush then could go around to all the scientists, all the industrialists, all the universities, anybody gave him trouble about taking their patents and he could say to them, "I'm just doing the president's bidding." Congress didn't know about it and even Vice President Truman didn't know about it until after Roosevelt died.

Wes: So the government was really keeping secrets from itself?

Alex: Exactly.

Wes: Bush's patent control policy explains why Michael's father would have had to sell his patent to the government for a dollar. So my patent has a filing date of October the 11th, 1945, two months after the bomb was dropped. Does this mean that the patent that I have could not have been used on the atomic bomb?

Alex: Not at all.

Wes: Alex says a backlog of patent applications explains the late filing dates.

Alex: The trigger for the atomic bomb dropped over Nagasaki was not filed until November 1945!

Wes: I'm really sort of confused here. This patent was filed in 45 but it wasn't released until 1958. This is like in the height of the cold war. Why in the world would the government be releasing these nuclear secrets during this incredibly tense time?

² Franklin D. Roosevelt to Vannever Bush memo, 11 July 1942, Bush-Conant file, folder 9: "S-1 British Relations Prior to Interim Committee (folder n. 1, 1942)." Roll 2, Target 4. (Uploaded at <http://work.atomlandonmars.com/historydetectives/NARA/RooseveltGivestheOk.pdf>)



Alex: In the 1950's Eisenhower instituted a program called "Atoms for Peace" and the goal was to declassify as much as they could on atomic research as a political gesture and as a scientific gesture. These are the annual reports of the atomic energy commission from the 1950s, and you'll want to see this.

Wes: Wow! Look at that. Patent number 2,852,687, isotope separating apparatus, MK Kudravetz and HB Greene, Oak Ridge, Tennessee. This is just like one of I guess hundreds of patents that are listed here. So being in this list of patents, does that mean that Michael's father's patent was actually used on the bomb?

Alex: It was certainly developed during the bomb project. Whether it actually went into production and was used in the actual uranium that was developed. I don't know.

Wes: to find out, Bill Wilcox has arranged for me to meet with an engineer who worked on the calutrons at Y-12 for nearly 50 years. Back at Oak Ridge, I've joined Joe Tracey at the Old Graphite Reactor, the pilot plutonium plant during the war effort. Even though it's now a museum, we're not allowed to shoot its exterior we're told for reasons of national security. So Joe you know my investigation involves this patent. Do you recognize anything about this at all?

Joe: Harold Greene, the name. I worked with Harold Greene when I first came here in 1959. In fact I've got some pictures of him right here.

Wes: Joe tells me that after the war, Harold Greene and the calutrons were given a second career – this time for splitting isotopes for medical & scientific research. Did Harold Greene ever mention anything about this patent?

Joe: Not to me and I never heard him mention it to anyone else.

Wes: So you don't know if he got paid a dollar for it?

Joe: Well, he should have got a dollar for it! I had a patent. I got a dollar for it and I framed it and hung it on the wall for a while.



Wes: So could this patent have been used to make the bomb? What Joe tells me next helps me answer Michael's question... Michael, this was a great story; I mean they all are but this one was particularly great, and I found out some pretty interesting things... I tell him about Vannever Bush's control of the Manhattan Project's patents program that kept his father's invention in limbo for over a decade.

Michael: That's really something

Wes: His father's patent was released in 1958 as part of Eisenhower's Atoms for Peace program. It's got great company. Look its right below the patent for the Neutronic Reactor by Fermi!

Michael: Wow, that's really neat.

Wes: So you wanted to know...was your father's invention used? You know I spoke with someone who actually worked with Harold Greene and he told me something I think you're going to be really interested in... When you first started working here in '59 and started turning back on the calutrons that had been running during the war, did you notice that this patent was on any of the machines?

Joe: When we started it back up, it was not on any of the machines that we opened up.

Wes: So in other words, as far as you know, this was never used during the war?

Joe: That's correct. But there were hundreds and hundreds of patents that were made on the calutron and a very small percentage of them was ever used.

Michael: I've always wanted to know what happened here. And regardless of how it came out one way or the other. My wife, my children ...everybody's really interested in this and wanted to know what happened.

Wes: You know, after the war the same calutrons that your dad worked on had a new life. They were used for research on nuclear medicine, the treatment of cancer, osteoporosis, and even rickets.



Michael: I didn't realize that the calutrons were put back into use. Thank you very much.

Wes: My pleasure

Michael: I appreciate your work.

Wes: Thanks for bringing it to my attention.