GLENN SEABORG: VENTURING BEYOND URANIUM

Chapter 1 – The Germans Split the Uranium Atom (2:28)

In January 1939, scientists around the world are stunned to learn that German scientists have split the uranium atom by bombarding it with neutrons. One of those shocked by the news is a young Berkeley chemistry instructor named Glenn Seaborg, who will play a key role in harnessing the tremendous power of the atom.

Chapter 2 – A Nobel Prize-Winning Mistake (3:39)

Most scientists had believed nuclear fission was impossible, because the neutron is so much smaller than the uranium nucleus it was being fired at. It is so unthinkable that Italian physicist Enrico Fermi mistakenly identifies fission fragments as new elements heavier than uranium – and wins the Nobel Prize for it.

Chapter 3 – The Berkeley Cyclotron (1:39)

While most thoughts turn to the possibility of an atomic bomb, Seaborg seizes on another implication of fission: With Fermi's "transuranic" elements now discredited, the first element beyond uranium is once again a prize waiting to be claimed. And Berkeley, with its atom-smashing cyclotron, is the perfect place to pursue it.

Chapter 4 – The First Transuranic Element: Neptunium (3:27)

Just weeks after the news of fission breaks, physicist Ed McMillan uses the Berkeley cyclotron to study the new phenomenon. He finds some puzzling fragments among his reaction products and, with the help of former Berkeley grad student Phil Abelson, shows they can only be element 93, the first true transuranic: neptunium.

Chapter 5 – War Intervenes (1:47)

McMillan immediately sets out to make element 94 but is called away to work on the development of radar at MIT. Seaborg picks up the work, conducting his research with one eye on a changing world. Britain and France are now at war with Germany and Italy, and there are fears that Hitler hopes to create an atomic bomb.

Chapter 6 – Plutonium (3:20)

Only about one percent of uranium is easy to split. But Seaborg realizes that if he can turn the "useless" 99 percent of uranium into a fissionable new element, that will vastly increase the amount of bomb material. Working with grad student Arthur Wahl, Seaborg isolates element 94 – plutonium – in February 1941.

Chapter 7 – Could it be Used in a Bomb? (3:21)

Still to be answered is the critical question: Can plutonium be split? Seaborg and physicist Emilio Segrè carry out a series of tests, shielding themselves from radiation with crude lead-lined containers, goggles and rubber gloves. In a final experiment at the cyclotron, they hear the unmistakable sound of the "kicks" of fission.

Chapter 8 – The Atomic Bomb (4:49)

After the Japanese attack on Pearl Harbor, Seaborg spends four years working on the Manhattan Project. His team of chemists develops a method for generating the plutonium used in the first test of an atomic bomb in July 1945. One month later, a plutonium bomb dropped on the city of Nagasaki brings World War II to an end.

Chapter 9 – The Search for More Elements (1:56)

McMillan and Seaborg win the Nobel Prize in chemistry, but by this time Seaborg has already gone on to create more new elements and rearrange the Periodic Table, adding a bottom row called the "actinides." Today's table includes more than 25 "transuranic" elements ... including one named for Seaborg himself.

Chapter 10 – The Search Continues (2:12)

Around the world today, scientists continue to try to create new elements, using techniques like those Seaborg pioneered. We owe what we know about the elements to a long series of people who've investigated the question: What is the world made of? But we've only begun to solve the mystery of matter.