

# The Soviet Atomic Bomb

## Russian Revolution, 1917

- Russia joins WW1 in 1914
- Huge losses: 5 million dead or POW by 1915
- **Tsar Nicholas II** takes over military affairs personally and leaves domestic issues to his wife
  - Lots of corruption and suspicion
- Duma (congress) tells Nicholas to create a constitutional government in 1916, he rejects this. There are food shortages, high casualties, etc.
- Feb 1917: **February Revolution**: Moscow, general strikes, soldiers join protestors and Nicholas II abdicates and creates provisional government
- Nov 1917: **October Revolution**. Vladimir Lenin returns from exile and the provisional government fails. Soviet Union was created and Bolsheviks took over with Lenin at head. Russia pulls out of WW1.
- **Russian Civil War**: 1918-1922 (Reds versus White Russians).
  - War communism
- **1922: Union of Soviet Socialist Republics was declared**; was 6 republics by 1940 expanded to 15.

## Stalinism

- Lenin dies in 1924 and **Joseph Stalin** wrestles for power, achieves it by exiling and killing rivals like Trotsky. WTF story - Stalin not satisfied with Trotsky being exiled and has an assassin go to Mexico and kill him with an ice pick.
- Bank robber. Efficient wielder of power.
- **1930s: Stalin's Great Terror**: forced deportations, purges, collectivization, famines, tens of thousands executed, millions otherwise dead
  - Engineers get prosecuted here because they identify as engineers and then soviets.
- **GULAG** prison labor system expanded across the USSR. Forced prison labor. Goal is to exploit labor, not to exterminate.
  - Political prisoners rather than criminals. Let the criminals run the GULAG. Political prisoners need their class changed, many abuses.

## Soviet Union and World War II

- Nazis explicitly anti-Bolshevik in their ideology and sentiment
- But Hitler and Stalin agree to Non-Aggression Pact in 1939 both seize Poland
- Hitler ends pact in 1941, attacks USSR, almost defeats it with *Blitzkrieg*
- Soviet industry and military relocates

## Enormoz: the Soviet bomb project

- Detecting ENORMOZ - figured out that the Americans were working on this without the spies
- Soviet scientists have been interested in fission research since 1939, but no resources during war for serious work.
- **Georgii Flerov** co-discovered spontaneous fissioning of uranium-238, submitting an article to *Physical Review* in 1940.

- Flerov applied for **the Stalin Prize**: good benefits, including not being on the frontline.
  - Denied prize because prize committee finds that Western scientists do not cite paper
- Flerov puzzled - why is his work being ignored? Finds out that nobody is publishing on fission at all. Fermi, Szilard, Oppenheimer, Bohr have dropped off the map.
  - Nobody was publishing on fission.
- Writes to the state committee then went to Stalin directly. In April 1942: silence showed vigorous work that is going on now abroad.

### Beginnings of the Soviet Project

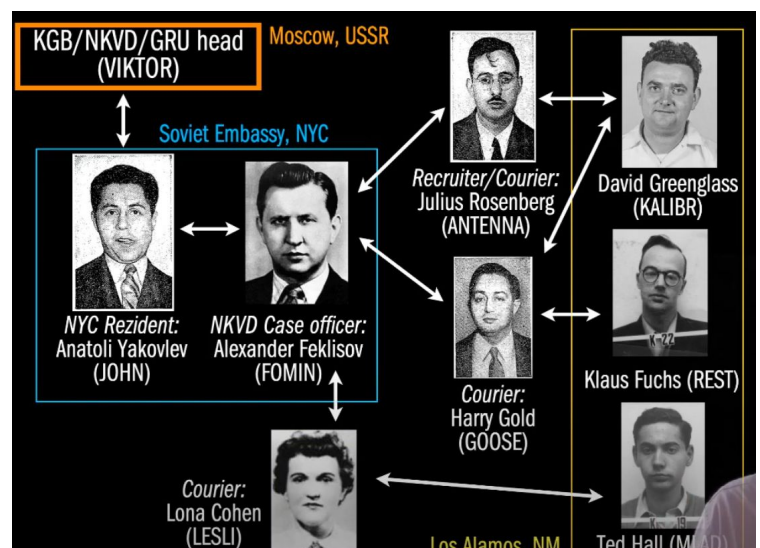
- USSR could not afford a major bomb effort
- Physicist **Igor Kurchatov** put in charge of coordinating a meager research program and interpreting espionage information. Had a sick ass beard.
- Slowly acquiring information on nuclear physics. Also acquire German resources including scientists in the late stage of war, parallel to the US "ALSOS" project.
  - Told Nazis that if they did work and worked at a secret site, they could go home or they could go where they want and the Soviets would set them up well (which they followed through and did).
- Allies do not take German scientists.

### Soviet Atomic Espionage

- Most important atomic spy: **Klaus Fuchs**. German communist physicist, fled to the UK, put on fission work. Mathematical physicist
- Volunteers information to the USSR, wants to help their war effort against Nazis.
- **MICE** - spy for **money, ideology, coercion, ego**
- Part of the UK delegation to Los Alamos.
- Quiet, unassuming, worked on explosive lenses, neutron initiators, gaseous diffusion, hydrogen bomb. He would be the babysitter when there were wild scientist parties.
- Attended all of Los Alamos colloquia. Fuchs went to all of these meetings.
  - Does not know anything about Hanford or reactors because of compartmentalization
  - He has a photographic memory, perfect spy
- Fuchs was more of a mole as opposed to a spy. Describes it as a schizophrenia.
  - Not trying to sabotage the project, he just wants the Soviets to succeed.

### Other Major Spies

- **Theodore Hall**: physicist, volunteer, harvard grad, youngest scientist at Los Alamos
  - Walked in the Soviet embassy in NYC and gave out information to them willingly
  - Wiz kid, youngest guy, ego answer



- **David Greenglass:** machinist at Los Alamos, member of the Army.
  - Engineer grunts that you can order around.
  - Recruited by brother-in-law: Julius Rosenberg
- **George Koval:** trained as Soviet intelligence officer, becomes health physics officer at Oak Ridge. Lived in the Jewish Autonomous region. He was recruited by Soviets and became trained and smuggled in the United States. Presented as a former American.

### **Soviet Atomic Espionage**

- Greenglass gave the Soviets a cross section of the atomic bomb. He is not educated on the details. He figured out the lenses because somebody gave him a number.
- Fuchs knew everything. Greenglass's value is not the information he gave, his information shows that Fuchs' information is correct. If you have spies corroborating other information that in it of itself is useful.

### **The Project begins in earnest**

- After Hiroshima, Stalin orders full speed invasion of Japan and full speed on bomb project
- **Lavrenty Beria** in charge of the overall project.
- Beria is NKVD spy chief, architect of the 1930s Terror purges, serial rapist, torturer.
- NKVD (KGB) runs prison system, it is like the FBI, CIA, they have the power to do whatever they want

### **Beria's Conundrum**

- Who does Beria trust?
  - Not the Americans, not the German/Austrian scientists, not the Soviet scientists, not the Soviet spies,
- What's a paranoid spymaster with nearly unlimited resources to do?
- **"The Beria School of Management" (joke):**
  - For every technical problem, assign two isolated groups of scientists to work on it and confront them whenever they differ on conclusions
  - Don't tell almost any of the scientists about the espionage information and present it to them as data from another Soviet lab, use it both as a guide and check on research
  - Every major scientist is assigned a security officer with a gun to keep the secrets and guarantee hard work and an understudy -> This is the plot to breaking bad haha

### **Smyth Report as overall plan**

- No technical details but a great template for what kinds of plants to build, what methods worked, etc.
- Soviets immediately translate it into Russian

### **Making the Soviet Atomic Bomb**

- Biggest problem is not enough uranium in USSR; learn to use low grade ores - uranium set the time table, not information
- The ores they have in the USSR were low grade ore.
- They have unlimited slave labor so they do intense uranium mining.
- Replicating ENORMOZ: make equivalents of Los Alamos, Hanford, Oak Ridge, secret cities
- Around 600k people used; even tighter security than Manhattan project

- Soviet bomb project worked to replicate American facilities, experiments, and bomb design... but almost no scientists on project realize they are copying
- Soviets had to re-confirm every single fact that led to the development of the bomb and its materials
- Lots of bomb work is not about written down secrets but in tacit knowledge: experience and judgment

### **First Lightning, August 1949**

- Ready to test first plutonium bomb in August 1949
- Functionally identical to the trinity and nagasaki bomb
- More organized than Trinity
- Scientists elated: rewards commensurate with what punishments would have been
- **How much time did espionage save them?** A year at most, maybe less

### **“Joe-1”**

- **Pre 1949 US estimates-How long until a Soviet bomb?** General Groves (1945): if they did it in secrecy 15-20 years
  - Estimates require many assumptions about Soviet resources, capabilities, and will - as well as when they started
  - Universal factor that nobody updates the estimate
  - USA has almost zero foreign intelligence on Soviet atomic work until 1950 - estimates based on Manhattan project
- **Groves Methodology:** Just asked Read and just made crude national stereotypes. Not a rigorous methodology
  - **Murray Hill Area:** Geographical exploration looking for uranium and Groves knew that Russia did not have that much uranium. Get contracts with the countries with known uranium reserves
- **Joe-1: September 1949:** American planes began searching for radioactivity in the air off of Soviet boundaries in early 1949
  - Looking for radioactive activity
  - In September 1949: they detect fission products and looking at the wind patterns, determine origins are USSR -- likely a bomb
- Debate in the Capitol: should the US announce detection? Truman initially thinks no - but decides to in the end, to show US is in control
- Truman did not think it was an atomic bomb, he believed it may have been a nuclear explosion.
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