Introduction:

Chernobyl 1:23:40 the incredible true story of the world’s worst nuclear disaster, by Andrew Leatherbarrow is a very interesting account of the events at Chenobyl’s unit 4 reactor in 1986. It goes into detail about the causes, immediate and lasting results, and the cover-up conducted by the communist party. The event happened in April of 1986 and the effects are, while far less, still present today. Chernobyl is located in northern Ukraine, almost bordering Belarus. The event was caused primarily by a design flaw in the RBMK reactor that led to an uncontrollable reaction in the core that led to overheating and a steam explosion that exposed the radiation and the radioactive material to continue to degrade without the possibility of intervention. The effects of the event were most pronounced in the following year of the explosion, many thousands died in the weeks and months after, while many thousands more acquired lasting ill effects from the massive amounts of radiation poisoning. This book interested me because of my interest in nuclear energy. I have always been amazed by our ability to harness some of the most dangerous materials we could find and devise a way to produce power from it. It is a given that anyone who is interested in nuclear energy is aware of Chernobyl, however, the understanding of it is far less common. This book seemed like a good way to break down the complex event into understandable chunks while maintaining intellectual rigor.

Body:

Faulty design/ safety issues: There were many issues with the design of a RBMK reactor, one of which being the graphite tips to the control rods. Graphite is a common moderator for a fission reaction, it is even used in the walls of the reactor to slow down the neutrons to increase the chances that they will contact the radioactive material and continue the reaction. Knowing this, it makes no sense that the tips of the control rods would be constructed with a moderator. Also, the control rods were supposed to be replaced after other issues had been discovered, but they remained in their place. Another issue regarding the control rods is the time it takes them to descend into the core, the rods in a RBMK reactor takes 18-21 seconds to extend. Western counterparts can descend into the core in as little as 1 second. And the primary cause of the explosion was due to the fact that the reaction created more pressure in the core than the reactor would realistically handle, this is not a design flaw, but the possibility of an unexpected rise in pressure should have been accounted for in the design. Another large issue present in this type of reactor is the water system, typically a reactor will use a heat exchanger that heats pure water producing steam from it. The RBMK reactor produces steam from water that is in direct contact with the uranium, this leads to the radiating of the entire water system. While this is not an issue that is relevant to the explosion, it is a tell of the lack of care taken in the design. The safety precautions were another major cause of the explosion. The communist system led to massive amounts of substitution of materials and less attention paid to ensuring safety features are met. An example of this such substitution can be found in the roof of the reactor housing building. It was supposed to be made of a non-combustible material for obvious reasons, but due to a shortage, they used a highly flammable material that was banned from industrial use. This and many other examples are the kind of shortcuts that made the reactor not safe and led directly to the accident.

The Cover-up: As most governments would, the governing body of Soviet Russia wanted to hide this massive mistake from the world. The difference between Russia and most western countries is that Russia actually did hide the accident as well as they could. They even went so far as to stop anyone from coming or going to the town nearest to Chernobyl for more than a day after the event. It is arguable that they did this to prevent the spread of radiation through irradiated individuals, but it is plausible that the government hoped the incident was not as bad as it seemed and hoped they would not have to tell anyone. However, they soon realized that the radiation was simply too much to hide, so Pripayat was evacuated and countries were notified of the event when sensors were giving irregular readings in Finland and Norway. Even the court set up to investigate the problems at the Chernobyl reactor was set in a location far enough into the radiated area that only those with high enough clearance could enter. Yet another way the issue was hidden from the public. The transcript to this trial is still classified to this day. The communist party could not allow for a design flaw to be thought to be the cause of the explosion, so they pinned all of the blame on the operators of the reactor. This led to much of the pressure being taken off of the government, until the real reasons were released later, but it did its job for the short term.

The effects: The short term effects (days/weeks) of this horrible incident range from 18,000 hospitalized people in a few weeks, to a forest turning red from exposure to radiation. The latter is a very interesting example, this forest was so polluted that the idea of burning it was completely off the table because it would spread more radiation into the air, so the entire forest was simply buried to contain the problem. The initial explosion expelled 50 tons of vaporized nuclear fuel into the air and 700 tons of radiated debris over a few square miles. The total volume of radioactive particles released during the explosion is equivalent to 10 Hiroshima bombs. Once the area was finally allowed to evacuate, the zone was 10km in diameter, then it was extended to 30 km, causing more evacuations, and it was finally extended to 60km for pregnant women and children. The efforts to clean the radiated zone were conducted by some 240,000 men and women working in the 30km zone known as liquidators. The job of the liquidators was quite strenuous and dangerous, in the end 25,000 liquidators died and 200,000 more were harmed some other way. All in all, 300,000m3 of soil was buried under clean soil to prevent wind from moving the radiated particles around. The contamination of the area was even caused partially by rain, any time it rained radioactive particles were grounded and caused new contaminated zones to pop up all over the place. The short term effects are what is mostly covered in the book, but the lasting effects are still felt today in the region surrounding the Chernobyl site.

Reviews:

The book was overall decently accepted by readers, a few had issues with the random insertion of a description of his trip to the Chernobyl site. In all honesty, I had a bit of an issue with this as well and skimmed most of those parts. It was also mentioned that the author's thoughts were not well organized throughout the book. It jumped from one topic to the next, sometimes revisiting an already covered topic. Despite these issues, the book was well accepted as a general synopsis of the event in a way that is digestible and informative. My primary issue with the book is that some of the facts given my Leatherbarrow seem very wrong. For example, at one point he says that the annual recommended maximum dose of radiation for a person is .1 roentgens and goes on to say that a chest x-ray introduces .8 roentgens into your system. These small but very important facts are a major point of fallacy in the book, but the majority of them seem logically founded.