3 of 17 DOCUMENTS

The **Washington Post**

August 06, 1995, Sunday, Final Edition

The Ultimate Weapon

Marcia **Bartusiak**

SECTION: BOOK WORLD; Pg. X01

LENGTH: 1525 words

DARK SUN

The Making of the Hydrogen Bomb

By Richard Rhodes

Simon & Schuster. 731 pp. $ 32.50

WITH THE TOPPLING of the Berlin Wall and the demise of the Soviet Union, the world has released a collective sigh of relief. The hands on the Doomsday clock have been pushed back from midnight, diminishing our fears (at least for a while) of an approaching Armageddon.

Dark Sun insightfully demonstrates why the sigh is thoroughly justified. In this authoritative and riveting sequel to his Pulitzer Prize-winning saga, The Making of the Atomic Bomb, Richard Rhodes offers a view of the nuclear arms race -- the centerpiece of the Cold War -- as being more ominous and unnerving than generally acknowledged. We see Soviet and American physicists competing in a game of bomb-upsmanship and U.S. military commanders contemplating first strikes as "preventive wars."

Dark Sun is a chilling and brilliant addition to the extensive literature that is now being published to commemorate the 50th anniversary of the first atomic bomb. A century ago, dynamite-maker Alfred Nobel anticipated that his invention would make war too terrible to fight. In the era of nuclear weaponry, Nobel's curious logic has swiftly escalated: from atomic bombs with a power equal to tens of thousands of tons of dynamite to hydrogen bombs hundreds of times more powerful than that. Such bombs were too fearsome to use (although Rhodes tells us how perilously close we came during the Korean War and the Cuban missile crisis) yet too terrifying to back off from lest one's enemy gain an advantage.

The book opens as the flip side to The Making of the Atomic Bomb. Relying on documents newly released by the KGB, as well as interviews with key Russian scientists and officials, Rhodes takes an in-depth look at the Soviet Union's effort to build its first nuclear weapon. Although the United States and the Soviet Union were allies during World War II, the chill of the approaching Cold War could already be felt in the 1940s. The two countries were obviously gearing up for future combat. "They were opposite experiments in the large organization of people and natural wealth," writes Rhodes, "the one through liberty and competition, the other through terror and centralized control . . . and each was convinced that the other side's intentions were malevolent." The United States bombed a German uranium factory at war's end mostly to keep it out of Soviet hands, and Stalin authorized work on an atomic bomb only when he was certain that the

Americans had a project under way.

It is eerily fascinating to see how the Soviet scientists, many of them Nobel Prize-caliber physicists, managed to construct their device under Third-World conditions. Using gulag labor, they built their bomb out of what seemed like the modern-day equivalents of string and sealing wax. Under constant surveillance by Stalin's henchmen, they also knew that failure could mean imprisonment, even death. Rhodes makes a strong case that espionage gave the Soviet Union a decided boost; the secrets stolen from the Americans enabled the Soviet physicists to jump-start their operation and avoid many dead ends. The Soviets probably felt justified. "At least 25 million Soviet civilians and combatants died before the eventful Allied victory," Rhodes points out. "Anything the Soviets could grab, legally or illegally, must still have seemed less than a fair exchange."

Rhodes's detailed account of the Soviet Union's infiltration of America's Manhattan Project is every bit as exciting as a fictional spy novel, complete with Jell-O box-top IDs, secret code names and ingenious cryptographic work. More intriguing is how many secrets the Soviets were able to obtain, not by money but through simple appeals to the communist cause. It was devotion to a socialist ideal that spurred the taciturn Manhattan Project physicist Klaus Fuchs and his fantasy-ridden go-between Harry Gold to betray the West. And as for convicted spies Julius and Ethel Rosenberg, Rhodes unequivocally dismisses claims of their innocence.

The Soviets became members of the atomic club on August 29, 1949, with a test dubbed "First Lightning." Even after witnessing the enormous mushroom cloud rising from the ground, the paranoid commander of Stalin's security force, in a darkly comic moment, still questioned the blast's authenticity, frantic because he thought that the scientists were putting one over on him. U.S. officials were convinced once they spotted the test's airborne fallout from afar. Within five months, Truman announced that the United States would be building the next horrific weapon, the hydrogen bomb, whose destructive power was going to be measured in megatons, millions of tons of TNT. The arms race was taking off with a vengeance.

ATOMIC BOMBS derive their phenomenal energies from splitting heavy atoms. A hydrogen bomb, on the other hand, obtains its power by fusing light atoms of hydrogen into helium, just as stars do. As early as 1944, even as he was stationed in Los Alamos, N.M., to help get the first fission bomb working, Hungarian physicist Edward Teller made the H-bomb the focus of his professional life, producing a design he called the Super. Teller had "a smoldering passion for achievement," according to one colleague, and he chose the H-bomb as his ticket to success. Along the way, says Rhodes, Teller became the "Richard Nixon of American science -- dark, brooding, indefatigable," eventually alienating many of his cohort in his efforts to undermine J. Robert Oppenheimer.

For nearly seven years, the hydrogen bomb remained a back-burner project, to Teller's frustration. Rhodes claims he could have created it sooner if he hadn't insisted on delivering at least a megaton of destructive power. Only a theoretical breakthrough in 1951 by both Teller and Polish mathematician Stanislaw Ulam, a member of the original Los Alamos team, convinced the physics and military communities that an H-bomb could be constructed as Teller was selling it. Within a year, the 10-megaton bomb, called Mike, was designed, built and then exploded on a Pacific atoll.

The first hydrogen bomb was a technical tour de force that Rhodes describes in absorbing (even awestruck) detail. Bomb detonators, shock waves, and uranium tampers can be dry subjects, but in Rhodes's skillful hands the reader comes to understand how physicists got caught up in the creative challenge of making a bomb, despite the horrifying implications of the work. "Steel, lead, waxy polyethylene, purple-black uranium, gold leaf, copper, stainless steel, plutonium, a breath of tritium, silvery deuterium effervescent as sea-wake: Mike was a temple, tragically Solomonic, evoking the powers that fire the sun." Less than a year later, the Soviets followed suit with their own, less powerful version.

It was panic that the Soviets were catching up too quickly that fueled the anti-communist hysteria then intensifying in the Western hemisphere. By 1957 the Atomic Energy Commission was consuming nearly seven percent of all U.S. electrical power; by 1962 we had stockpiled 27,000 weapons. Concurring with an evaluation by Mikhail Gorbachev,

Rhodes bluntly points a finger at the United States for initiating the arms race, although he concedes that the Soviet Union's "opacity as a closed society made a realistic assessment of its intentions difficult."

Mutual deterrence arose as the preferred method of controlling nuclear weaponry, but other philosophies deeply smoldered in the United States. In 1954, a study group of the Joint Chiefs of Staff actually recommended a first strike against the Soviet Union as a preventive measure, an idea fortunately nixed by Eisenhower. Gen. Curtis LeMay, who built up the Strategic Air Command, was the ultimate loose cannon. He found the stalemate between the two superpowers intolerable. According to Rhodes, LeMay covertly and extralegally authorized reconnaissance flights over the Soviet Union during the 1950s, leading to the loss of 100 to 200 airmen. Rhodes suggests that it was LeMay's intent all along to provoke World War III.

Rhodes addresses a well-blended mix of issues -- arms-race politics, technological advances, superpower confrontations and undercover intrigue -- that push the narrative forward compellingly. But a word of caution: the lengthy cast of characters and the physics of A-bombs and H-bombs are placed in better context by first reading The Making of the Atomic Bomb.

Dark Sun is a dark tale told with gripping intensity. And its lessons are grim: "There never was any 'secret' of how to make an atomic bomb," writes Rhodes, "and in fact every nation that has attempted to build an atomic weapon in the half-century since the discovery of nuclear fission has succeeded on the first try." As we face the new world order, a volatile mix of wary nation-states, such conclusions linger in the mind long after we read his last page.

Marcia Bartusiak, a contributing editor of Discover magazine, regularly writes on physics and astronomy. She is the author of "Thursday's Universe" and "Through a Universe Darkly."

LOAD-DATE: August 06, 1995

LANGUAGE: ENGLISH

GRAPHIC: Illustration, christopher bing for The Washington Post; Photo, upi; Photo, wally mcnamee, GEN. CURTIS LEMAY EDWARD TELLER (1968)