

Hungnam, North Korea: Delving into Pyongyang's Long Nuclear Past

by Bill Streifer

“Since V-J Day wisps of information have drifted into the hands of U.S. Army Intelligence of the existence of a gigantic and mystery-shrouded industrial project operated during the closing months of [WWII] in a mountain vastness near the Northern Korean coastal city of Konan [Hungnam]. It was near here that Japan's uranium supply was said to exist.”

David Snell, journalist

North Korea recently conducted their third underground nuclear test. Experts agree that the nuclear fuel used in the first two was plutonium, made from natural uranium in a Soviet-designed breeder reactor. More than a month after their most recent test in February of this year, however, despite the use of sophisticated collection means, the U.S. was unable to determine if the nuclear fuel was in fact plutonium or rather Highly Enriched Uranium (HEU), which if true, experts say, would represent a significantly enhanced capability.

Back in 2000, a former nuclear researcher at North Korea's 304th Research Center, “[an] important laboratory in the Bungang area, and...the main research center for nuclear weapons development as well as for chemical arms development” at the Yongbyon Nuclear Research Center, defected, first to China and then to an unidentified third country. During a June 2002 interview, Ms. Dong Chun-ok¹ was asked thirteen questions. Her answers, and a hand-drawn map of the facility, were then published on the website of RENK (“Rescue North Korea”), a Japanese-based organization in support of North Korean refugees.

Some believe that Ms. Dong's revelations led Kim Jong-il to admit in October 2002 — during high-level talks in Pyongyang between U.S. Assistant Secretary of State James A. Kelly and North Korean officials — what the United States, Japan, and South Korea had long feared: North Korea was pursuing a nuclear weapons program. At the White House, reporters were told that the Chinese were stunned upon learning of North Korea's confession since Pyongyang had managed to keep their nuclear weapons program a secret for decades.

First, Ms. Dong was asked about her family and to describe how she became involved in Pyongyang's nuclear weapons program. She said she was born in Pungseo-gun (county), Ryanggang Province in North Korea on August 2, 1955. After her father died in 1957, Ms. Dong said her mother was secretly summoned by the Central Party. So she, her mother and her two elder sisters were then transferred to a special base of the Atomic Science Committee. After graduating from Pyongyang Physics College in the summer of 1974, Ms. Dong began work at Office 25 of the 304th Research Office of Atomic Energy Science until her dismissal on February 21, 1999. She defected the following year.

When Ms. Dong was asked how the North Koreans were able to trick IAEA inspectors, she offering the following explanation. The underground facilities, Ms. Dong said, were constructed by the 66th Industry, deep beneath Yak Mountain (Yaksan), “at a huge human cost.” Many workers died in various accidents during construction, Ms. Dong said, which began in 1965 and was completed five years later. Several female researchers who were inadvertently exposed to large doses of radiation gave birth to deformed children.

The complex is extremely large and well illuminated, Ms. Dong said, with underground caves branching out into various interconnecting tunnels. Concrete walls block the entrance, which is “large enough for trucks to enter,” and clever camouflage hide it from outsiders. The caves are used to hide lab equipment and other evidence of a nuclear weapons program in case of

inspections. During the IAEA inspection, for example, tell-tale equipment and materials were secretly moved into the Yaksan cave, and laboratory staff members wore military uniforms to hide their true roles.

According to Dr. Kang Ho-je, a South Korean authority on North Korean science technology, the weaponization of nuclear technology in North Korea began in the late-1960's or early-1970's, apparently as the result of a "confluence of change in the international situation, North Korean domestic politics, and the state of North Korean science." According to a 1988 CIA report, the Yongbyon Nuclear Research Center was established with Soviet assistance in the 1960's, and was the "focal point" of a North Korean nuclear effort. Until the 1980's, the CIA report said, the center consisted of an operations area with a 4-MW (megawatt) research reactor, supplied by the Soviets under IAEA safeguards, and a large support area. Since North Korea's expansion program, which began in 1980, the CIA said, Pyongyang constructed additional support buildings and a 10-30 MW graphite-moderated gas-cooled reactor which was fueled with natural uranium, mined in the Hamhung and Ch'olsan areas of North Korea. Although the new reactor had been in operation since October 1987, a CIA report the following year concluded, "We have no evidence that North Korea is pursuing a nuclear weapon option, but we cannot rule out that possibility."

When Ms. Dong was asked to discuss the origin of Pyongyang's nuclear weapons program, she said it began in the 1950's during the Korean War when Kim Il-sung, Kim Jong-il's father, ordered Lee Hak-mun, a two-time national hero medal winner, to develop nuclear weapons. Lee Hak-mun then recruited prominent South Korean scientists such as Dr. Do Sang-rok, Dr. Han In-suk and Dr. Lee Sung-gi to carry out nuclear research. Do Sang-rok, a quantum field theorist who conducted North Korea's first experiments in nuclear reactions, defected to Soviet-occupied North Korea in May 1946, only nine months after World War II had ended. By September of that year, Dr. Do became the head of the physics and mathematic departments and chief of research at what would later become Kim Il-sung University. Dr. Do also built North Korea's first particle accelerator and carried out the North's first nuclear experiments. He later enthusiastically helped establish North Korea's main nuclear facility at Bungang, some fifty miles north of Pyongyang.

Other South Korean scientists were reluctant to aid North Korea's nuclear weapons program. According to Kim Dae-ho, who requested asylum at the South Korean embassy in Beijing in 1994, Lee Sung-ki — best known for his invention of the synthetic fiber Vinalon — was kidnapped at the outbreak of the Korean War. He was eventually persuaded to join the effort by Kim Il-sung who argued that "nuclear development is an essential project for the unification of the nation." After the war, Dr. Lee re-established a branch lab at Hamhung, a short distance from the industrial port city of Hungnam, where some 200 Soviet and foreign advisors worked. It is now clear, however, that nuclear activities in the Hamhung/Hungnam area of North Korea began decades earlier when Korea was a Japanese colony (1910-1945).

Following the Tohoku earthquake and tsunami on March 11, 2011, the Fukushima Number One Power Plant in Japan suffered a series of equipment failures, a partial meltdown, and the release of radioactive material. In an article by the former editor of the *Japan Times Weekly*, Yoichi Shimatsu described how Japan's next nuclear accident might become another Nagasaki, the city that was devastated during WWII by "Fat Man," a plutonium atomic bomb. Shimatsu then reminded his readers that Japan was no stranger to atomic energy:

During the Second World War, the Allies and the Axis competed for an exotic new energy source — uranium. While the Manhattan Project was secretly crafting the atomic bomb in New Mexico, Japan opened uranium mines in Konan, North Korea, which now are the source of Pyongyang's nuclear energy program.

During WWII, Konan — now Hungnam, North Korea — was the home of the largest fertilizer and chemical complex in the Far East. The electric power required to operate Konan's

electro-chemical and non-ferrous metal installations — about 400,000 kilowatt per day — was obtained primarily from two hydro-electric plants some forty miles north of the city. This region of North Korea, characterized by a mountain chain which rises abruptly from the Sea of Japan's coast, slopes gently westward to the Yalu River, the boundary between North Korea and the northeast region (Manchuria) of China. Dams on the northwest-flowing Fusen and Chosen branches of the Yalu River created large storage reservoirs of year-round generation of more than 500,000 kilowatts. Tunnels carried the water south from each reservoir through a mountain divide in the Josen River basin, emptying out into the Sea of Japan at Konan. The electrical power network in northern Korea during WWII — with a capacity of more than 1.5 million kilowatts — supplied Konan and the industrial districts in and around Pyongyang and Seoul.²

In addition to electric power, North Korea had enormous uranium reserves. According to a recent South Korean government report on Pyongyang's nuclear and strategic weapons, North Korea is "known to have about four million tons of uranium³ in recoverable deposits," although some have called that number exaggerated. Rather than uranium, the "four million tons" figure may refer to monazite, a mineral containing thorium and small amounts of uranium oxide. Australia, for example, exports 10,000 metric tons of monazite per year. According to a 1967 U.S. geological report, North Korean monazite contains 0.15% (or 6,000 tons) of uranium oxide.

In 1931, Kenjiro Kimura and Sakae Shinoda discovered monazite near P'yongwon in western Korea, just south of the Ch'olsan Mines where it was first discovered in 1919. Prior to 1940, however, monazite was mined, not for its thorium or uranium content, but rather for its unique ability to burn brightly when ignited without burning out. For that reason, it was widely used in incandescent gas mantles and mining lamps. But in 1943, during Japan's search for uranium for use by their nuclear weapons programs in Tokyo (*Ni-go*) and Kyoto (*F-go*), monazite was discovered in veins by Hideki Tsuda when large crystals were found on the Ch'olsan Peninsula. Surprisingly, in Tsuda's 1953 report entitled "The Monazite Deposits in Korea," he failed to mention monazite's thorium/uranium content.

Today, the Ch'olsan Mines provide North Korea with a wide array of rare earth elements (REE's) such as terbium, dysprosium, ytterbium, thulium, and lutetium. REE's, the most obscure elements in the periodic table, have hundreds of high-tech applications including critical military-based technologies such as precision-guided weapons and night-vision goggles. In 1988, North Korea formed the Korea International Chemical Joint Venture Company to produce REE's from monazite. The Hamhung plant can reportedly process 1,500 tons of monazite per year from which 400 tons of rare earth metals, as well as thorium and uranium oxide, can be extracted. According to the U.S. Geological Survey, the Hamhung plant was reportedly designed to use solvent extraction technology acquired from China's Yue Long Chemical Plant near Shanghai. Production began in 1991.

Nuclear Research at Konan

During WWII, General Leslie Groves, the director of the Manhattan Project, believed that Japan lacked the industrial capacity, scientific manpower and the "essential raw material" — uranium. "We did not make any appreciable effort during the war to secure information on atomic developments in Japan," Groves wrote in his 1962 memoir *Now It Can Be Told*. "First, and most important," Groves said, "there was not even the remotest possibility that Japan had enough uranium or uranium ore to produce the necessary materials for a nuclear weapon." "In other words," Deborah Shapley later wrote in the journal *Science*, "[Groves] had far less intelligence about Japan than he had about Germany."

Then in 1997, according to AP reporter Richard Benke in a *Los Angeles Times* article entitled "New Details Emerge About Japan's Wartime A-Bomb Program," journalist Robert K. Wilcox and researcher Charles W. Stone discovered U.S. Army documents that referred to "consistent rumors from the Hungnam (Konan) area" which dealt with the possibility of atomic research being conducted there. According to one report, the actual experiments on atomic

energy were conducted in Japan but the “practical application of atomic energy to a bomb or other military use” was carried out at Konan. “It is unclear,” Benke said, if President Truman was aware of a Japanese atomic program when he ordered the atomic bombing of Japan; unlikely, since several Manhattan Project scientists said in interviews they knew nothing of a Japanese atomic program until after the war.

Ironically, the full extent of nuclear activities in Japanese-occupied northern Korea first came to light in 1999 following the publication of a story in the Japanese newspaper *Tokyo Shimbun* entitled “Atom Bomb Experiment Undertaken by Former Japanese Armed Forces in Korean Peninsula Just Prior to the End of the War, According to Secret Investigation by GHQ.” According to *Tokyo Shimbun*, a secret, 300-page GHQ/SCAP report was discovered at a U.S. archive by the Washington D.C. Bureau of *JiJi Press*, the Japanese news agency. According to that GHQ (General Headquarters, U.S. Army) report, Japan tried to develop the atomic bomb at the Chosen Nitrogen Fertilizer Factory at Konan during the war. And on August 12, 1945, Japanese scientists at Konan conducted an explosive test at sea, shortly before Soviet forces occupied the city, which, according to eyewitnesses, was “like an A-bomb.” After the war, the report said, GHQ prohibited research on atomic energy by the Japanese and impounded uranium compounds hidden at various locations.

When a censored version of that 1947 GHQ/SCAP report appeared three months earlier in the *Atlanta Constitution* [with “names, dates, facts and figures” redacted], the author, David Snell, a young reporter from Minden, Louisiana, was universally condemned: Dr. Yoshio Nishina, the head of Japan’s atomic program in Tokyo (*Ni-go*), called him a liar; the Russians called him a provocateur; and the U.S. Secretary of War categorically denied the story. “There was no [atomic] experiments in Chosen [Korea],” Nishina told the press corps. “However, there was a fertilizer factory in Konan.”

Snell, an agent with the Criminal Investigation Detachment (CID) of the U.S. Army’s XXIV Corps (U.S. occupation forces in Korea), said he obtained his information during an interview in Seoul with the head of security and counter-intelligence at the Konan plant who was awaiting repatriation back to Japan. “He was advised, and understood thoroughly, that he was speaking for publication,” Snell said. Although Snell had previously been given permission to file stories to his “old paper,” he was specifically asked to avoid highly controversial stories. So when he showed his 8-page typewritten manuscript — concerning a Japanese atomic program at Konan — to the head of U.S. Army intelligence in Seoul, he was told, “We cannot possibly clear this... We know about the Konan project, of course.”

When Snell returned to the States, his article, “Japan Developed Atom Bomb; Russians Grabbed Scientists,” was published as a front-page, headline story in the *Atlanta Constitution*. According to Snell, Japanese scientists had developed and successfully tested an atomic bomb off the coast of Konan. “With the advance units of the Russian Army only hours away,” Snell wrote, “the final scene of this *gotterdammerung* began.” Japanese destroyed unfinished atomic bombs, secret papers and her atomic bomb plans, and “dynamite sealed the secrets of the cave,” Snell wrote. But the Russians arrived quickly before the Japanese scientists could manage to escape. Those Japanese scientists are now in Moscow, Snell said, “prisoners of the Russians, tortured by their captors seeking atomic ‘know-how’.” According to the 1947 GHQ/SCAP report, all secret Japanese units were impounded by Soviet forces after the occupation of Konan, followed by joint Soviet-Japanese research.

Verification of Snell’s story came four years after publication of his 1946 *Atlanta Constitution* article when U.S. Intelligence officers revealed the existence of a Soviet atomic research project at Hungnam, North Korea. According to declassified CIA and U.S. Air Force reports, B-29’s with the Far East Air Force (FEAF) out of Okinawa demolished an ore refinery adjacent to the fertilizer factory at Hungnam, a refinery which was said to produce materials of possible use in “nuclear fission projects.” According to the *Nippon Times*, an English-language Japanese newspaper, U.S. Naval Headquarters in Tokyo announced its participation in a campaign to destroy North Korean “industrial facilities with possible links to the Russian atomic

program.” Then in April 1951, General C.J. Bondley, Jr. (Air Force) awarded Capt. James R. Cole of Green Acres, Maryland with the Distinguished Flying Cross for “extraordinary achievement” as lead crew bombardier on the highly successful bombing attack on a “thorium production plant...at Konan, North Korea.”

Following the attack, Lt. Gen. George E. Stratemeyer, the FEAF Commander, made note of the *Nippon Times* article in his diary. Although the story was released through the International News Service, it was Stratemeyer’s impression that “this type of information was of the very highest classification.” Only later was it learned that North Korea had shipped enormous quantities of monazite, gold and silver to the Soviet Union in exchange for Soviet artillery, ammunition, engineering equipment, aircraft, and medical supplies in advance of their June 25, 1950 attack on South Korea.

Dr. Fritz J. Hansgirg, electro-chemist

“North Korea has a Soviet-era heavy water nuclear plant capable of producing plutonium, a radioactive element essential for making an atomic bomb. Under a 1994 accord, Pyongyang agreed to scrap the plant in exchange for light-water reactors built and paid for by the Korean Peninsula Energy Development Organization, a consortium comprising the United States, South Korea and Japan.” - Oct. 6, 1997

North Korea was blessed with the majority of the mineral resources on the Korean peninsula. The value of those mineral reserves are estimated to be about thirty times greater than South Korea’s. In addition to thorium and uranium (from monazite), North Korea possesses some 200 minerals of economic value including iron ore, graphite, lead, zinc, tungsten and magnesite, the ore of magnesium. North Korea’s magnesite reserves, for example, are the second largest in the world, second only to China.

According to Henry S. Lowenhaupt, a technical sergeant in the U.S. Army’s Counter Intelligence Corps (CIC), who was assigned to the Manhattan Project during WWII and later a CIA specialist on nuclear intelligence, the Russians were set to dismantle and ship the large magnesium plant at Bitterfeld, German to the Soviet “atomic people” in 1945. They were also “intensely interested” in the Hansgirg magnesium process plant at Konan when it fell to the Russians at the end of WWII. Another facet of the problem, “investigated thoroughly,” Lowenhaupt said, was that the Russians might eventually turn from calcium to magnesium, just as the Manhattan Project had done. Magnesium, like calcium, can be used to reduce uranium oxide to pure uranium metal for use in nuclear weapons.

The magnesium plant at Konan was designed and built in the 1930’s by a brilliant, Austrian-born chemical engineer by the name of Dr. Fritz J. Hansgirg. Born in Graz, Austria, Hansgirg helped develop a less-costly method of mass-producing magnesium of extremely high purity. After a pilot plant at Radentheim, Austria was up and running, Hansgirg’s senior partner, Emil Winter, the vice-president and director of Pittsburg Steel, felt he was too old to help build a new magnesium plant on his own, so he suggested that Hansgirg sell the patent rights to the highest bidder. So in the fall of 1934, Hansgirg sailed from Austria to Japanese-occupied Manchuria, and later to Konan, where he lived and worked for six years before the war.

At Konan, Hansgirg helped the Japanese design a magnesium plant, and “in my spare time,” Hansgirg said, an ingenious method of mass-producing heavy water. According to the 1999 *Tokyo Shimbun* article concerning nuclear research at Konan, the U.S. ordered a thorough investigation — following publication of David Snell’s article in the *Atlanta Constitution* — which concluded that the Chosen Nitrogen Fertilizer Plant at Konan “produced heavy water jointly with the Japanese Navy,” since “pre-war times.” While it is not known for certain if the Japanese at Konan later used Hansgirg’s magnesium process to extract uranium from monazite or his heavy water process to produce weapons-grade plutonium from uranium in an atomic pile, it is entirely possible.

When Hansgirg returned to Manchuria from overseas in February 1940, he found the Japanese to be completely pro-Axis and hostile to all foreigners, so he left Japan for good, arriving in the United States in May of that year. There, he struck a deal with Henry Kaiser to help design a magnesium plant in California. By the start of WWII, Hansgirg said, the first unit at Kaiser's Permanente carbothermic magnesium plant was producing about five tons of magnesium per day, or roughly one-half of the designed capacity. Shortly after Hansgirg arrived in the U.S., however, the FBI began receiving tips that Hansgirg had cavorted with a high-ranking Nazi official in Manchuria, that he had signed his letters "Heil Hitler!" and later expressed joy over Japanese victories and U.S. defeats. By December 1941, Hansgirg's FBI file was substantial.

Then on December 16, 1941, about ten days after the Japanese attack on Pearl Harbor, Hansgirg was arrested by the FBI on a Presidential Warrant, accused of being "potentially dangerous to the public peace and safety of the United States." At the time of his arrest, TIME magazine said that Hansgirg was "high on the FBI roundup list," employed at Henry Kaiser's magnesium plant in "confidential U.S. defense work." At once, rumors spread that the Permanente's magnesium-making plant might have to cease. "They were false," TIME said.

After his arrest, Hansgirg was held temporarily at Santa Clara County Jail, and later at enemy alien internment camps in San Antonio, Texas and Stringtown, Oklahoma. When Attorney General Biddle denied permission for Hansgirg's wife, Josephine Marie, to visit her husband at Stringtown, she wrote a lengthy, hand-written letter to Eleanor Roosevelt, "woman-to-woman," in which Mrs. Hansgirg explained that she refrained from criticizing Hitler for fear it would jeopardize her son. Although he is "a scientist, not a soldier," Mrs. Hansgirg explained, "he is compelled to wear the uniform of the Hitler army." The letter ended with an appeal:

If it is within your jurisdiction to aid in reinstating my husband to his rightful place of usefulness, that his loyalty and integrity may again be recognized in this country, you may know you will have the undying gratitude of his wife.

A copy of Mrs. Hansgirg's letter was forwarded to FBI Director J. Edgar Hoover who, in turn, forwarded a copy to the Director of the Alien Enemy Control Unit. Eventually, Hansgirg was paroled into the custody of the President of Black Mountain College, a small private college in North Carolina, where he taught physics and chemistry during the war years, and beyond. Then in July 1949, Hansgirg died "unexpectedly" at the age of 58. His cause of death is unknown. However, since Fritz Hansgirg had worked with magnesium for decades, he may have suffered from acute magnesium ingestion, resulting in Hypermagnesia, an electrolyte disturbance in which there is an abnormally elevated level of magnesium in the blood. Hypermagnesia may cause various ailments including CNS depression, a physiological depression of the central nervous system that can result in a decreased rate of breathing, decreased heart rate, and loss of consciousness which can lead to coma or death.

THE END

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¹ チュンオク in Japanese. An alternate English spelling was confirmed by the Korean Embassy in Tokyo.

² During WWII, all towns, cities, rivers and mountains were known by their Japanese names.

³ The figure "four million tons" may refer a 1964 report concerning an extensive nationwide survey of recoverable uranium reserves by North Korea with the assistance of China.