

WILLIAM WINTER

# Comments

WEEKLY ANALYSIS AND OPINION  
OF WORLD EVENTS

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## SPECIAL SUPPLEMENT

# TUNGSTEN!

## PART II

*Part II of the tungsten story examines sources and economics. It is to be noted that there is tungsten in South Korea and in North Vietnam, while most of the world's supply is in southeastern China. There are cynics who suspect sinister motivations for U.S. interest in Korea, in North Vietnam — and in China — on the assumption that the United States is in a power struggle with China: whichever possesses these unfathomable riches will emerge as the world's mightiest power. Tungsten is essential to industrial progress; space capsules need it as heat-resistant material for re-entry into the earth's atmosphere; no modern war can be fought without it. Without tungsten there would be no modern nuclear power.*

*Can the drive to acquire tungsten from North Vietnam and China really be a major factor in U.S. policy-making? The thought is chilling. In any case the facts should be understood. COMMENTS devotes this Special Issue as the second installment of TUNGSTEN! In the service of public interest.*

*Appreciation is expressed to Mr. Terry Waters of Los Angeles, whose exhaustive and painstaking research made this special series possible. Mr. Waters and I have wanted to collaborate on a book on the subject. So far no publisher cares to touch it.*

W.W.

## HOW IT BEGAN

The modern tungsten story began in 1911, the same year that Dr. Sun Yat-sen began his revolution against the Manchus on October 10. A young mining engineer named Li Kuoching was commissioned to explore for tin in the southwestern part of China. Li explored and surveyed in many places, and particularly in the province of Hunan. There in the lofty mountain range of Wuling he found a hamlet, Ta-ling, perched some 6,000 feet high on the mountainside, and there an historic episode began. Mr. Li recalls the story in his authoritative book, *Tungsten*:

"One cold evening in the month of May, after a day's hard prospecting," he writes, "I stopped over at the Wayside Inn in Ta-Ling" . . . While the innkeeper's wife and daughter were cooking supper, I made myself useful in the kitchen, which also served as my bedroom, where my canvas cot was spread. I was asked by the innkeeper's daughter to watch the stove which stood prominently at a corner of the room. The stove burned fresh wood — the only fuel available — and it was my duty not only to fire the stove but to keep it burning. The ventilation being poor, I had to blow by the mouth in order to keep the fire in steady flame. When I became exhausted, I was relieved by the innkeeper's daughter, Hsiao-mei.

"In the course of my 'windy' efforts, I was intrigued by the characteristics of the stove. I asked Hsiao-mei, who was just

in her teens, how long the stove had been in use, and when and how it was built. Hsiao-mei, thinking I was trying to take an interest in her, blushed and stammered that she did not know. From her mother I learned that the stove was built the year she was married and that for the past twenty-five years it required no repairs.

"The next morning I asked the husband about the origin of the material which he used to construct his twenty-five year old stove. Leading me to his back garden situated on the slope of the hill, he pointed to a huge outcrop formation and complained that every so often huge chunks would unloosen themselves, roll down the hill, and ruin his crop. His remedy, he said, was to convert the offending stones into some practical utensil. He converted them into foundations for his cess-pool, into tools for his garden, into slabs for his sidewalk, and into many other useful articles that required the use of stone. The innkeeper was obviously proud of his accomplishments.

"I could not see the outcrop clearly because of fog and the mist which covered the mountain range. I climbed to the outcrop, and after a cursory examination I concluded that it was well mineralized though not with the tin-bearing mineral, cassiterite, for which I was commissioned to prospect. I was impressed by the size of the outcrop and especially by the weight of the mineral. Among the specimens I gathered was a lovely egg-shaped specimen, especially treasured by me, because it was handed to me by Hsiao-mei. For years I used and still use it as a paper weight.

"On my return to China in 1915, I hastened to Ta-Ling, sought out the innkeeper of the Wayside Inn, and informed him of the value of his property. He would not believe me. I inquired about Hsiao-mei: I was told she had married but on learning that I was arriving, she hurried home to see the 'returned student' from England."

## FIRST U.S. SHIPMENT

Li quickly organized the Yu Hou Tungsten Company, which bought up the property adjoining Wayside Inn, and by the end of that year, 1915, this mining company had made its first shipment of tungsten ore from China to the United States. It was assayed and found to contain the purest wolframite ever mined anywhere in the world. There were practically no impurities of any kind. The first shipment went to Bethlehem Steel, the second to United States Steel. Word got around quickly that this was the finest quality tungsten

### Special Tungsten Issue

Last week's four-page supplement and this week's continuation make up the Special Tungsten issue. For 25c, we will send you the complete eight-page issue for distribution. Or send us individual names and 25c for each complete issue and we will send them ourselves. Special bundle rates for the complete issue: 25 copies for \$4.00; 50 copies for \$7.00; 100 for \$10.00. Special rates for larger quantities.



available anywhere in the world, and the demand grew among steel companies. Every American firm with representatives already in China instructed them to ship all the tungsten ore they could buy. Even companies which had no interest in minerals, and none in steel, became merchants of tungsten — firms such as The American Express Company.

When China suddenly blossomed as the happy hunting ground for tungsten importers, attention turned to other parts of Asia where tungsten had been discovered — Siam, Korea, and French Indochina.

Important tungsten resources are found in South Korea, and important tungsten deposits are in North Vietnam. If the enormous tungsten riches of China itself are denied the United States, there is certainly the strong desire to control those of North Vietnam as well as South Korea.

Meanwhile, the United States established an ore concentration plant on Staten Island, New York. It was called the National Reconditioning Company and was capable of purifying any kind of off-grade ore from anywhere in the world, so that even the lower quality tungsten ores could be purified. And K. C. Li (who had learned to write his name in the western manner — first names first — because people had been calling him “Mr. Ching”) was commissioned by the United States Treasury Department to buy up for the United States all available production in Latin America. He went to Bolivia, Peru, Argentina, Brazil and Mexico.

## TUNGSTEN MONOPOLY

Tungsten became Big Business in the United States. One corporation achieved monopolistic control of all tungsten processing: Wah Chang Smelting and Refining Company of America, headquartered at 233 Broadway, Woolworth Building, New York City. Its Board Chairman was Mr. K. C. Li. It operated a beneficiation plant for wolframite on Staten Island and later at Glen Cove, Long Island, New York. Linked with a number of subsidiaries, Wah Chang became to tungsten what the Bell System is to telephones and Western Union to telegrams. Nobody else could survive in the tungsten business.

Subsidiaries included: Wah Chang Mining Corporation which controlled mining resources in California, Nevada, and Brazil; Wah Chang Trading Corporation; and Wah Chang Corporation. Associated with K. C. Li was Dr. Wang Chung-yu who was formerly Li's professor. The two men ran the company plant on Long Island, operating the mining business and the export department, and handling all dealings with the United States government and its overseas friends and allies.

Eight years after World War II the top brass of the United States Army, Navy and Air Force assembled with numerous industrial tycoons at the dedication of new all-automated tungsten furnaces at the Wah Chang Corporation's Glen Cove, Long Island, plant. U.S. Secretary of the Army, Robert Stevens, presided. The proceedings were reported by *Business Week* (November 21, 1953):

“With a flock of Army, Navy, and industry brass standing by, Wah Chang Corp., Glen Cove, L.I., a major force in the tungsten processing picture, this month fired the first three of six radically new furnaces — first completely mechanized equipment of their type. With one man running all six, instead of the usual half-dozen crews, the furnaces will be far ahead of anything that's come along yet in production capacity and quality control.

“The significance of the development was summed up simply by Wah Ching's chief, Kuo Ching Li: ‘. . . This country shall no longer face any critical shortage of tungsten.’ Behind Li's statement were two things: tungsten's increasing — and vital — role in industry, and Wah Chang's unique place in tungsten processing.

“*Background* — Tungsten suddenly came into the strategic spotlight in World War I, when the Germans started putting the extremely hard and heat-resistant material into wide use for cutting tools.

“Ever since then, the problem has been to meet wartime needs.

“In peacetime, there was never much of a problem supplying enough tungsten. Scrap has always provided a sizable part of the supply. Some of the rest came from small, generally low grade tungsten mines in the U.S. and many other countries. The lion's share of the heavy, sandlike ore traditionally poured out of China's big, high-grade deposits.

“In the U.S. the ore heads for various channels. Most of heads to manufacturers of ferrotungsten . . . which pass their product — in the form of metal-gray chunks — along to steel companies. Steel men toss the ferrotungsten into their furnace to form alloy steels for cutting tools . . .

“In wartime these demands . . . multiply. That means headaches for the industry.”

And that is where Wah Chang comes in. It was K. C. Li who is credited with discovering tungsten in China, with first recognizing its value in industry and in war, in sensing the need for beating the Japanese and the Germans in the stock pile race, and in appreciating the enormous value of tungsten beneficiation plants, which he promptly proceeded to build.

One intriguing item in the *Business Week* report in 1953 was the information that Li needed only three of the six new high-speed automated furnaces in the company's new plant to handle all the tungsten business coming its way at that time, and planned to keep the other three in reserve for future use. And what was that “future use”? It appears that not three but only *one* of the six, was needed for peacetime purpose. Said *Business Week*: “Although only one of the huge new furnaces is needed for peacetime uses, Wah Chang have built six, with the others to be used in case of a shooting war or for total mobilization.” This accounts for the presence at the dedication of all the military brass. Five of the six purposes were for military use.

Li was quoted as saying that he expected that new uses for tungsten would be found, that the demand for more tungsten would grow, certainly if there were another war, but in any case that “peacetime uses of tungsten have hardly been opened up.” At one time Mr. Li wrote, “The tungsten industry is still in its infancy,” and with his former teacher, Dr. C. Wang, “author of the only treatise in English on Antimony” he published a book, *Tungsten*, in the hope, as he put it, that it “will stimulate the interest of those who share my own optimistic feeling toward the future of tungsten.”

## THE SENATOR FROM TEXAS

The following year at a news conference, President Eisenhower was asked by correspondent Sarah McClendon of the *Galveston News Tribune*:

“Mr. President, I believe you said you had under study the Texas City tin smelter's closing, and Senator Lyndon Johnson asked the Senate this week to adopt a resolution to keep the open for one more year in view of the situation in Indochina. He said if Indochina falls, the free world would be cut off from 65 percent of its tin from Indonesia (sic). Have you made up your mind what you are going to do about that?”

To which the President replied:

“That particular resolution of which you speak, or amendment, whatever it was, I haven't seen. Now, a congressman from Texas visited me yesterday and he said he thought the program involving that smelter was ‘on the rails,’ I believe was the word he used.”

Three years later the magazine *Fortune* carried a story about this Texas tin smelter, along with a photo of K. C. Li.

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The story was captioned: "Tungsten Tycoon Takes A Chance." It linked the Texas City tin smelter in which Senator Lyndon Johnson had taken such interest several years earlier with tungsten, Wah Chang, and Mr. Li. "The government sold its Longhorn tin smelter at Texas City, Texas," the *Fortune* article said, describing it as "the only large one in the Western Hemisphere - to Kuo Ching Li, 63, president and chairman of Wah Chang Corp., New York. Price: \$1,250,000 plus \$2 million if the smelter proves profitable. Li, a mining engineer educated in China and England, operates a tungsten refinery on Long Island. He will convert part of the Longhorn smelter, which has been an economic failure, to tungsten processing and tin alloy making . . ."

So Wah Chang acquired Longhorn and catered to the appetites of commercial industry and the military.

**U.S. IS IN SECOND PLACE**

Most of the world's tungsten, as we know, is in China. Today the United States has moved up to second place in world production. Normally this would suggest a self-sufficiency, but the difficulty is that while the United States has today become the world's second largest producer of tungsten, it is at the same time the world's largest consumer of tungsten and the consumption threatens a serious depletion of all the domestic reserves.

The government stockpile of the material is sufficient for peacetime uses but is not sufficient for long, drawn-out global warfare. The United States government, for reasons best known to itself, refuses information on current stockpiles, but there are occasional official assurances that there is no problem, there is enough tungsten on hand and available and nothing to be concerned about. But we have information from other sources, such as the book *Tungsten* by Colin J. Smithells, published in England, which conveys the information that "70% of the original tungsten deposits in the United States were already used up by 1946." Then there is the report by Alan M. Bateman, *America's Stake in World Mineral Resources*, that the "estimated commercial reserves of tungsten, as of 1944 in known deposits, compared with 1935-1944 annual rates of production and consumption, amount to 5 years in terms of years of production and to 2 years in terms of years of consumption."

**RUNNING OUT OF RESERVES**

Tungsten in some amount is found almost everywhere on earth. Although it makes up about one-10,000th of the earth's crust, it is found in practically every country. The fact, however, is that quantity production is feasible from only a few widely scattered places. The distribution of commercially valuable ore is uneven, and it happens that the United States, which consumes most of the world production, has already mined out most of its readily available reserves, and so the United States in point of tungsten supply must now be listed, oddly enough, as a "have-not" nation.

It has become necessary for the United States to buy tungsten where it can be produced. As these reservoirs are depleted the need naturally will accentuate and the pressures for gaining access to presently unreachable sources will intensify.

Pure tungsten is never found in nature. It is always found in combination with other elements, usually in the form of tungsten trioxide (WO<sub>3</sub>) combined with a variety of iron oxides, manganese, or calcium. To obtain unadulterated tungsten it becomes necessary to process the extraneous substance out of the tungsten ore.

When used in large quantities the cost of this processing is a critical factor, obviously, so there is constant search for the "purest" tungsten ore, the least adulterated. Such as that found in China. Ore produced in the United States is heavily adulterated and of unpredictable, uneven quality. In its search for tungsten to import, the United States, barred to China - and to North Vietnam - looks to where the tungsten is.

Some years ago an East European book, *Wolfram und Molybden*, by C. Agte and J. Vacek, published for Czechoslovakian and Polish industrial and military planning, summed it up thus: "The chief tungsten deposits are along or near the Pacific Seaboard; those in Asia being richer than those in the American hemisphere. After the First World War, 92% of the world output came from these Pacific deposits, including 61% from Asia and 31% from America."

In 1961, K. C. Li stated: "The world's most important tungsten deposits are found in China, the United States, Korea, Bolivia, Portugal, Burma, Australia, Siam, Spain, Argentina, Brazil, Russia, Peru, Belgian Congo, Rhodesia and Malaya in order of magnitude."

It is known that China produces more tungsten than any other country in the world - and it is the purest. Most of the Chinese tungsten is in the southeastern part of the country, about 95% from Kiangsi, Hunan and Kwangtung Provinces, and 70% from Kiangsi Province. The largest and richest deposits on earth are in a continuation of a range called the Indo-Malayan Mountains. These begin in Malaya and run up through Burma, Thailand, Indochina, China, Korea and Japan. The Chinese section of this range constitutes the Nanling Mountains and it is here that practically all Chinese tungsten deposits are found.

Outside of China just about the richest wolfram deposits are found in North Vietnam, on the flanks of the Pia-Quac Mountains, north of Haiphong, in the N'Guyen Bim district in the province of Cao Bang. *These are similar in characteristics to those in China.*

Burma has large tungsten deposits, but their quality does not compare with those found in China or in North Vietnam. Some of the deposits of Burma extend over into Malaysia and along with the tungsten there are rich tin deposits. In Thailand there is more tin than tungsten.

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South Korea has tungsten. In fact, the Sangdong deposit southeast of Seoul is recognized as one of the largest scheelite mines in the world. In addition to tungsten there is bismuth — “one of the world’s largest bismuth mines,” says Alan Bateman in his *Economic Mineral Deposits*, and also that the “accompanying minerals are bismuthinite, molybdenite, common sulphides, quartz, fluorite, apatite, and biotite. Ore reserves are listed as 3.2 million tons carrying 1.7% WO<sub>3</sub>.”

What this means in non-technical language is that South Korea is a prize the United States finds it well worth having access to, and it takes no great stretch of the imagination to appreciate the influence of these extensive mineral riches — particularly tungsten — upon the formulation of President Truman’s, and his successors’, Korean policies.

Japan has about forty tungsten-producing areas but only about eight of these are notable. If you care to go into the tungsten business in Japan, this is the way they are listed in order of importance: Akenobe, Otani, Kaneuchi, Takatori, Kivata, Ebisu, Nitta and Wachi. But tungsten is usually just a by-product in Japanese mines.

### TUNGSTEN IN OTHER AREAS

Let’s turn now to Latin America. Bolivia, Argentina, Brazil and Peru are the principle producers, and although there seems to be a large amount of ore present, most of it is of comparatively low grade. Bolivia is known for its tin, but while tungsten is usually found with tin, Bolivia seems an exception since such concurrence is only rare, although there are other ores found accompanying the tin deposits.

In Europe tungsten is produced in Portugal, Spain, and England. Portugal has the largest and richest deposits, mostly in the northeast part of the country north of the Tagus River. The largest of these Portuguese mines is the Panasqueira Wolfram Mine, operated by a British corporation, the Beralt Tin and Wolfram Corporation. It is in the highest mountain range in Portugal, near the town of Silvaes, in the Serra da Estrella. Wolframite is found with cassiterite (tin stone). For many years this mine supplied Britain with most of its tungsten. The mines in Spain are mainly not in the plains, but in Galicia, in the extreme northwest, the largest producer being the Silleda Mine in the Province of Pontevedra and operated by a Spanish company.

In England there are deposits in Cornwall, north and west of Plymouth, but production of tungsten has been small and intermittent. The ore, in the form of wolframite, is difficult to separate from the tin, copper and other accompanying minerals.

There are major deposits in Africa — in Rhodesia and in Katanga Province of the Congo (which may have been one of the important reasons why the mining operator, *Union Miniere du Haute Katanga*, fought so hard to keep Moise Tshombe in control as “Premier” of an “independent” Katanga “Republic” — to keep control of tungsten, as well as the rich copper and other minerals, out of the hands of the Central Congo government). And one can readily understand the reason for such intense interest in the Congo, while there seems less interest, relatively, in other African countries. But aside from these regions Africa has no other notable deposits of tungsten.

In addition, tungsten deposits have been found and worked extensively in eastern Australia and Tasmania, most of the output from Tasmania, the island state south of the Australian mainland. Wolframite and scheelite occur along with tin, copper, molybdenum, gold and antimony.

### SECRECY IN THE U.S.

What about the United States? There is tungsten in twenty-two states, the major deposits located between the Rocky Mountains and the Pacific coast. The most productive of these mines have been in California and Nevada. Scheelite is the most prominent mineral. The major areas in California are the Atolia district in San Bernardino County and the

### WHAT THREE PRESIDENTS SAID

I can conceive of no greater tragedy than for the United States to become involved in an all-out war in Indochina.

— President Dwight Eisenhower, 1954

In the final analysis, it is their war. They are the ones to win it or lose it. We can help them, we can give them equipment, we can send our men out there as advisers, but they have to win it — the people of Vietnam against the Communists.

— President John F. Kennedy, 1963

We don’t want to get tied down in a land war in Asia. We are not about to send American boys nine or ten thousand miles away to do what the Asian boys should have been doing.

— President Lyndon B. Johnson, 1964

Bishop district in Inyo County. The Pine Creek Mine in the Bishop district, operated by Union Carbide Nuclear Company, contains the largest known reserve of tungsten ore in the United States and is also a source of molybdenum, copper and gold. Most of these American mines are at high elevation with very deep workings, and the average grade of the ore has been about 0.45%.

These references are made in the past tense, because of the secrecy that has shrouded current sources of information. Reference books which listed “Tungsten” as a subject title in earlier editions, have deleted the category in later editions; textbooks and similar sources sometimes announce “information withheld.” Some reference works, such as the World Almanac for example, indicate that the total production has been declining. For example, the total U.S. tungsten ore output for 1964 was 9,244 tons, while the following year it dropped to 7,949 tons. And we have the informed comment of men like Smithells that our consumption exceeds production. The United States requires far more tungsten than its total production affords. And more than all of Latin America and Europe and Africa provide.

Significantly North Vietnam’s tungsten ore is comparable in quality to that in China itself. As for quantity, North Vietnam has almost as much production as the entire U.S.S.R., although there has not been full production in recent years, particularly since the French were ousted. During World War II production was sporadic and ceased completely in 1945, while Soviet production accelerated during the war and has been increasing enormously since 1945.

More important for the future is not how much tungsten has been produced, but how much is now available and what remains in reserve for the future. Since the first commercial mining of tungsten ore began in 1910 in Burma, many of the readily accessible and richer deposits on earth have been depleted. This is because of the accelerated demand for the mineral during the two wars and in the war preparation programs, plus industrialization needs.

Honest attempts to estimate ore reserves are necessarily based partly on guesswork, that is, an assessment of probabilities based on past experience. Estimates have been made by mine owners and operators, military and financial bodies, various government agencies and by the United Nations. But there are other factors which affect the accuracy, or at least the honesty, of these assessments: national interests, propaganda value, urge toward secrecy, chicanery, etc.

*The Wall Street Journal* has reported that U.S.-mined tungsten ore is undependable because its quality is uncertain and the cost of processing therefore becomes exorbitant. It would be so much easier to have the nice, pure ore from China . . .

Or, at least, from North Vietnam.