

# The Peiyang Arsenal and the Evolution of Warlord Logistics 1895-1911

THOMAS L. KENNEDY

*Washington State University*

## Introduction 1867-1895

The establishment of the Tientsin Arsenal, the forerunner of the Peiyang Arsenal, in 1867 augured well for the development of modern military industrial capacity in North China. Founded at the initiative of Commissioner of Northern Ports Chung-hou, the arsenal included two facilities. A plant designed primarily for powder production (Huo-yao chü) was situated at Chia-chia-ku Tao about six miles east of Tientsin and known as the East Arsenal. An installation for the production of machinery for the powder works, ordnance parts and steamship accessories was located south of the city at Hai-kuang Szu. This became known as the West Arsenal. Most of the initial cost of establishing these facilities was realized by the liquidation of the ill-fated Lay-Osborn Flotilla<sup>(1)</sup>.

During 1867, the need for strengthened military potential in North China was demonstrated by developments in the Nien Rebellion. Despite the shipments of arms and ammunition from the newly opened arsenals in the Yangtze Valley, imperial forces under the command of Li Hung-chang suffered severe setbacks. Against this background, the court approved Chung-hou's request, supported by Li Hung-chang, for 40 percent of the Tientsin and the Chefoo customs revenues annually to support the operations of the Tientsin Arsenal. Technicians and equipment for powder production began arriving from abroad and from the arsenals in the Yangtze Valley. The powder works at the East

---

(1) Thomas L. Kennedy, *The Arms of Kiangnan: Modernization in the Chinese Ordnance Industry, 1860-1895*, (Boulder, Colorado, 1978) 50-52. Wang Erh-min, *Ch'ing-chi ping-kung-yeh te hsing-ch'i* (The rise of military industry in the late Ch'ing dynasty), (Taipei 1963) 85-92, contains a succinct and accurate account of the development of the Tientsin Arsenal.

Arsenal, however, were not complete until 1870. Meanwhile the West Arsenal began production of small ordnance pieces and steamship equipment in 1868. <sup>(2)</sup>

Late in 1870, in the wake of the Tientsin Massacre, Li Hung-chang was installed as Governor General of Chihli and Commissioner of Northern Ports and charged with the supervision of the Tientsin Arsenal. From that time until he was relieved of these official posts early in 1895, Li supervised the operations of the Tientsin Arsenal and molded its development to fit his vision of China's strategic needs. He moved promptly to rid the arsenal of the foreign management that had been engaged during the establishment phase, retaining only those foreign technical personnel essential to production. In the early 1870's, the arsenal's annual income from the customs proceeds grew to nearly 300,000 taels. Li employed this to establish a facility primarily for the production of powder and secondarily for cartridges and percussion caps. By the mid 1870's, monthly output of powder reached 47,000 pounds and cartridges, 96,000 rounds. Shot, shell and percussion caps were all produced in significant quantities. Munitions from the Tientsin Arsenal were distributed to the defense forces of North China, the Huai and the Lien Armies. <sup>(3)</sup>

In the national reassessment of defense policies following the 1874 crisis with Japan, Li argued cogently for priority development of ammunition production and to delay heavy ordnance production until China's own iron and steel industries and modern coal mines had been established. He had already urged the court to back off from the production of steamships which he regarded as premature for the stage of industrial development in which China then found itself. In the next several decades, Li guided arsenal operations at Tientsin in accordance with these priorities<sup>(4)</sup>.

After 1875 the Tientsin Arsenal entered a period of stable production. Operation of the recently completed plant for powder and ammunition was supported

---

(2) Kennedy, *Arms of Kiangnan*, 55-57.

(3) Kennedy, *Arms of Kiangnan*, 70-76.

(4) Kennedy, *Arms of of Kingan*, 78-98.

by an average annual income of just under a quarter of a million taels derived principally from customs revenues supplemented by maritime defense appropriations. Annual output reached nearly 1,500,000 cartridges, more than 600,000 pounds of powder, 36,000,000 percussion caps and other firing devices for breech loaders, 70,000 rounds of gun ammunition and small quantities of small arms and mines. Capital expenditures declined sharply after the completion of the plant. Costs associated with foreign personnel also fell though there was a compensating increase in domestic personnel costs. The products of the arsenal continued to supply the defense forces of North China and Manchuria, particularly the Huai Army which Li commanded.

From 1880 on, Li undertook to increase the income of the Tientsin Arsenal and to improve the facilities in an effort to expand and upgrade production. Though detailed data on production for these years are lacking, it is certain that the arsenal continued to concentrate financial resources on the production of powder and ammunition to meet the needs of defense forces widely dispersed throughout North China. <sup>(5)</sup>

Efforts to gain new income to diversify and modernize production were stepped up during the decade between the Sino-French and Sino-Japanese Wars. In 1887, the arsenal began retooling to produce the most modern types of naval ammunition to supply the vessels of China's Peiyang Fleet and northern maritime defense installations. A plant to produce slow burning cocoa brown prismatic powder for naval shells was installed in 1887. It was not until five years later in 1893, however, that difficulties associated with the establishment of a steel works for production of the new style shells could be overcome. This new production of naval ammunition was contingent upon Li's capacity to secure additional operating capital of 100,000 taels or more annually. Financial shortfalls and uncertainties occasioned delays in production and stockpiling which adversely effected the arsenal's distribution of naval ammunition to the Peiyang Fleet before and during the Sino-Japanese War.

---

(5) Kennedy, *Arms of Kiangnan*, 115-119.

In the late 1880's, in addition to the new naval ammunition, production of powder, cartridges, gun ammunition, a few small arms, cannon and specialty items continued at the East Arsenal where eleven-hundred workers were employed. This facility was described in the foreign press as one of the largest powder works in the world. The West Arsenal employed about three-hundred workers in the production of various ordnance items, machinery, cartridges and shells.

The Tientsin Arsenal served as a supply depot for the Chinese forces during the Sino-Japanese War. At the outbreak of hostilities, Li reported the following munitions produced at Tientsin on hand and available for distribution: 10,000,000 rounds of Mauser, Hotchkiss and Winchester cartridges and various caliber gun ammunition; 600,000 pounds of rifle powder; 600,000 pounds of gun powder, and 300,000 pounds of cocoa brown prismatic powder. Only 250 naval gun shells were ready for resupply. He calculated that 1,300 would be needed after the first engagement. Recognizing the inadequacy of the Tientsin Arsenal as a supply depot for the Chinese forces, Li made covert arrangements for the purchase of arms and ammunition from neutral nations.

The poor quality and short supply of naval ammunition was reported to have restricted the fire power of the Chinese fleet at the battle of the Yalu on September 17, 1894, the first major engagement of the war and a crushing defeat for China. The arsenal hired extra personnel and worked around the clock but, on November 16, Li reported that Tientsin could not fill demands for gun ammunition for naval and ground forces. Supplies of Mauser and Hotchkiss ammunition were nearly expended by mid November. Stores of rifles and guns held by Peiyang depots were used up by the end of 1894 and, by the end of the war, the Tientsin Arsenal had begun the production of the premodern gingal, probably a desperation move from a plant unequipped for modern ordnance production.

The Tientsin Arsenal proved unable to provide ammunition resupply for the Chinese forces in the Sino-Japanese War. Li's strategy of concentrating resources on ammunition production had been undermined by his inability to secure stable

new sources of operating capital to support the expansion and development of production. Tientsin's relatively small annual income keyed to the fluctuating customs revenues limited attempts to modernize production of naval ammunition and restricted output of powder and cartridges even under wartime pressures. <sup>(6)</sup>

### The Peiyang Arsenal at Tientsin: Final Phase, 1895-1900

At the close of the Sino-Japanese War the supervision of the Tientsin Arsenal changed hands resulting in significant changes in operations. In February 1895, Wang Wen-shao was appointed Acting Commissioner of Northern Ports and Governor General of Chihli replacing Li Hung-chang who was dispatched to Japan to make peace. In the same year, Tientsin was officially renamed the Peiyang Arsenal. Wang, an elderly official, had been associated with the planning of military industry in Hunan in the 1870's. Under his supervision, Peiyang continued the anachronistic practice, begun during the war, of producing gingals. In 1896, Wang directed the arsenal to produce fifteen-hundred muzzle loading gingals for supply of troops stationed at the capital. Funds to support production were diverted from an annual allocation of 40,000 taels from Peiyang maritime defense for the production of gun ammunition. This outmoded production was still going on 1899 employing funds earmarked for gun ammunition. <sup>(7)</sup>

Personnel abuses also seem to have been a problem at the arsenal during Wang's tenure. In 1896 the director of the East Arsenal was dismissed by edict after an investigation prompted by censors' accusations uncovered extensive evidence of nepotism and official peculation. Further indications of management problems were disclosed in a report on China's arsenals prepared by Lord Beresford in 1898. Beresford rated the facilities and equipment at Tientsin highly but charged

---

(6) Kennedy, *Arms of Kiangnan*, 142-147.

(7) Kuo T'ing-yee ed. *Chin-tai chung-kuo shih-shih jih-chih* (Day by day history of modern China), 2 tse (Taipei, 1963), Vol. 2, 903. Kennedy, *Arms of Kiangnan* 176. Wang, *Ch'ing-ch'i ping-kung-yeh*, 85, 114. Ch'ing-shih pien-tsuan wei-yüan hui (Ch'ing history editorial committee) in cooperation with *Chung-kuo wen-hua yen-chiu-so* (The institute of Chinese culture), eds. *Ch'ing-shih* (History of the Ch'ing dynasty) 8 tse (Taipei, 1961) Vol. 3, 1921. Liu Chin-tso, ed. *Ch'ing-ch'ao-hsu wen-hsien t'ung-k'ao* (The Ch'ing dynasty continuation of the geral study of literary remains), (Taipei, 1965). 9839.

the Chinese management with gross incompetence that severely restricted output. <sup>(8)</sup>

There were several attempts to improve facilities and upgrade production during Wang's tenure as Commissioner of Northern Ports. <sup>(9)</sup> None, however, seem to have had any significant consequences. An ill-advised resumption, in 1896, of a minting operation, which had begun in 1887 and was quickly terminated, probably served to fragment the arsenal's resources and make more difficult the task of revamping and improving production. <sup>(10)</sup> It was not until several years later when the impulse for reform swept through the imperial government that there was a genuine effort to modernize the production of the Peiyang Arsenal.

In 1898, the Imperial Government initiated a move to modernize and standardize production throughout China's arsenals. An edict directed the provinces to confer and work out a plan for each arsenal to produce certain types of munitions. Yu Lu, the new Commissioner of Northern Ports, reported that despite the considerable production capacity at the Tientsin Arsenal, in recent years, limited financial resources had forced the East Arsenal to focus production on cartridges abandoning steel shells and cocoa brown prismatic powder. The West Arsenal had given up the production of gun ammunition in favor of ginals. After coordinating with other provincial officials, Yu Lu determined that the Tientsin arsenal would purchase equipment for the production of 3.7 cm and 5.7 cm quick-firing guns, Mannlicher cartridges and the smokeless powder used to make them. Peiyang would, for the time being, look to the arsenals in the Yangtze Valley for the supply of magazine rifles. The acquisition of machinery for production of larger caliber quick-firing guns was to be delayed. <sup>(11)</sup>

Though the concentration on powder and cartridge production was a logical step in view of Tientsin's long record of accomplishment in these areas, the

---

(8) *North China Herald and Supreme Court and Consular Gazeteer* (Shanghai weekly) (August 28, 1896) 361. Charles Beresford, *The Breakup of China* (New York and London, 1899), 292-294.

(9) *North China Herald*, (June 12, 1896), 929; (January 22, 1897).

(10) Kennedy, *Arms of Kiangnan*, 144 *North China Herald*, (October 16, 1896) 663-664; (April 23, 1897) 724.

(11) *Wen-hsien t'ung-k'ao*, 9839. *Ch'ing-shih* Vol. 3, 1725.

decision to produce Mannlicher cartridges was based on the presumption that China would continue to depend on external sources for the supply of small caliber ordnance. The modified Mannlicher rifle produced at the Kiangnan Arsenal in Shanghai was the only domestically produced weapon of that type. Discontinuation of the production at Kiangnan was already under discussion when the purchase of Mannlicher cartridge machinery for Tientsin was proposed. Production was halted after 1900. (12) The new cartridge machinery which arrived and was installed in 1899 would be used chiefly to produce ammunition for Mannlichers purchased from abroad.

The move to produce quick-firing gun production was based upon an unrealistic assessment of the arsenal's financial capacity. The cost of regular production at the Tientsin Arsenal in 1899 was approximately 250,000 taels, the same as it had been two decades previous, but the output had undergone gradual changes. Powder production had dropped from over 600,000 pounds annually in the late 1870's to less than 500,000 pounds in 1899 due to the diversion of funds from cocoa brown prismatic powder to the production of cartridges. Gun ammunition production capacity though rated at 77,760 rounds annually, compared to an output of about 70,000 rounds in the 1870's, stood far below the rated figure due to the shifting of funds for Hotchkiss gun ammunition to the production of gingals and the redirection of funds for steel shells to support cartridge production. Cartridge production rated capacity in 1899 was more than 7,300,000 rounds of various types annually; the output in the late 1870's was about 1,500,000 rounds. Actual production was probably up markedly also in 1899 because of the increased use of cartridges resulting from the widespread employment of breech loading small arms. Similarly, the rated capacity for production of percussion caps, 15,000,000 per year, was less than half of the approximately 36,000,000 produced annually in the late 1870's, a natural consequence of the decline in use of muzzle loading small arms. In the previous twenty years the arsenal had moved to concentrate its relatively unchanging annual income of about 250,000 taels on the production

---

(12) Thomas L. Kennedy "The Kiangnan Arsenal in the Era of Reform, 1895-1911" in *Chung-yang yen-chiu-yuan chin-tai-shih yen-chiu-so'chi-k'an* (Bulletin of the Institute of Modern History Academia Sinica) No. 3 part 1, 297-300. Kennedy, *Arms of Kiangnan*, 133.

of cartridges for modern small arms.<sup>(13)</sup> As Li Hung-chang had discovered before the war, significant increases in production or modernization of products such as that proposed by Yu Lu required new allocations of operating capital.

Nevertheless, new equipment was purchased from abroad and in 1900 facilities for the modernized production of cartridges, smokeless powder and quick firing guns were installed. Whereupon, additional operating capital of 150,000 taels annually was requested from the imperial government.<sup>(14)</sup> The same limitation of resources that had restricted product diversification and made specialization on ammunition the most practical course in the pre-war period loomed as an obstacle to the diversification at Tientsin at the turn of the century.

The concentration on production of small arms ammunition dictated by financial constraints was reinforced by new supply missions after the war. The new Peiyang armies established in 1895 under the command of Yuan Shih-k'ai dominated North China after the departure of Li Hung-chang. Li's Huai Army and the Peiyang Navy had been decimated in the Sino-Japanese War. The new armies fully equipped with modern rifles were the supply responsibility of the Peiyang Arsenal. Rifle ammunition production grew in importance. The quick firing guns which Peiyang planned to produce were also for employment by the new North China armies.<sup>(15)</sup>

Before these plans for upgrading and expanding the arsenal's production could be tested, the rapid course of international events in East Asia overtook Tientsin. The vulnerability to foreign attack of China's coastal arsenals had long been a source of worry to Li Hung-chang. After French forces destroyed the Foochow Dockyard in 1884, Li counseled the court to establish new plants at secure inland sites. Threats to the Kiangnan Arsenal during the Sino-Japanese War underscored the vulnerability of arsenals situated in open coastal ports, but nothing was done.

---

(13) *Wen-hsien t'ung-k'ao* 9839.

(14) *Ch'ing-shih kao* (Draft history of the Ch'ing dyanasty), 2 tse (1942), Vol. 1, ,556-557.

(15) Jerome Chen *Yuan Shih-k'ai* Second edition (Stanford, 1972), 29-43. *Ch'ing-shih Kao* Vol. 2, 556-557. *Wen-hsien t'ung-k'ao* 9839. John K. Fairbank and Kwang-Ching Liu eds., *The Cambridge History of China*, Vol. XI Late Ch'ing 1800-1911 Part 2 (Cambridge University Press 1980) 269-273.



In the summer of 1900, the Peiyang Arsenal stood squarely in the path of the eight-nation allied army sent to rescue foreign diplomats and missionaries trapped in Peking by the Boxer Uprising. On June 25, foreign bombardment of the West Arsenal destroyed fifty percent of the buildings and virtually all of the machinery. Chinese forces harried by a contingent of eleven-hundred Japanese withdrew to the West Arsenal in early July. By July 18, Japanese and Russian troops had taken the arsenal; over four-hundred Chinese lives were lost in its defense. The allied forces attacked the East Arsenal on June 27 and 30 but it was not until July 1, when a shell burst in the guncotton stores, that an allied force of two thousand overran the arsenal causing a loss of three-hundred Chinese lives. The rapid destruction of the arsenals in Tientsin by the allied forces demonstrated with brutal clarity the vulnerability of coastal arsenals to attack by foreign forces. From this time on strategic vulnerability became a matter of the utmost importance in arsenal planning<sup>(16)</sup>.

### **The Peiyang Arsenal at Te-chou 1900-1911**

In 1901, in the wake of China's humiliation by the allied armies during the Boxer Uprising, the new Commissioner of Northern Ports and Governor General of Chihli Yuan Shih-k'ai proposed the establishment of an arsenal at Te-chou Fu in Shantung to replace the ruined facilities at Tientsin. The following year imperial approval was granted and a site was selected for the Peiyang Arsenal at Hua Yuan in southwest Te-chou Fu outside the prefectural city on the banks of the Grand Canal. Construction commenced early in 1903 on a plot of between five and six-hundred acres purchased at a cost of over eight-thousand taels<sup>(17)</sup>.

---

(16) Kennedy, Arms of Kiangnan, 123-124. *North China Herald* (July 11, 1900) 82, 144; (July 25, 1900). Li Hung-chang *Li Wen-chung kung ch'uan-chi* (The complete works of Li Hung-chang), tien-kao (telegrams) Chuan 24:1. British Public Record Office, *Correspondence Respecting the Disturbances in China*, Presented to the Houses of Parliament by the command of His Majesty, Feb. 1901 (London: Printed for Her Majesty's Stationery Office By Harrison and Sons, St. Martins Lane), No. 257 Page 114. Kennedy, "The Kiangnan Arsenal in the Era of Reform, 1895-1911" *Chung-yang yen-chiu-yuan chin-tai-shih yen-chi-k'an* No. 3. part 1. 300-320.

(17) *Wen-hsien T'ung-k'ao*, 9848. *North China Herald* (Aug. 7, 1903), 285.

The straitened financial situation in North China in the post-Boxer years severely limited the establishment of production facilities. Funds were provided from customs revenues, probably those allocated for the Tientsin Arsenal that had not been forwarded for the several years since its destruction. Constrained by international restrictions on the import of munitions making machinery for two years after the signing of the Boxer Protocol in 1901, the authorities at Te-chou repurchased badly damaged machinery from the West Arsenal at Tientsin. This had been sold at auction by the allied provisional government in Tientsin to a foreign contractor who resold it to a Chinese firm which, in turn, sold it to the authorities at Te-chou for about 30,000 taels. Additional machinery was acquired from the government works near Chefoo and eventually one set of rifle ammunition machinery was secured from the foreign firm, Arnhold Karberg and Company. By 1908 production facilities included two rifle ammunition plants and installations for the production of machinery, cartridges, smokeless powder, guncotton, acid, nitrates, boilers, patterns, cast iron and wrought iron. A complete new set of cartridge machinery from Ludwig Loewe and Co. of Berlin and powder making and guncotton equipment from Krupp were installed prior to 1911. <sup>(18)</sup>

Establishment was complete and test production began in mid 1904. The source of the Peiyang Arsenal's operating capital is not certain but it is likely that it continued to come from the same allocation of customs revenues that had supported Tientsin. Though the original goals which Yuan had in mind for the arsenal included ordnance and ammunition production to supply the military forces that he commanded in North China, initial production was devoted chiefly to small arms ammunition for Mannlichers, 7.9 mm Mauser magazine rifles manufactured at the Hupeh Arsenal and the Japanese 6.5 mm caliber rifle.

---

(18) Li Hung-chang, *Li Wen-chung-kung ch'uan-chi*, tien-kao 36: 12. *Wen-hsien t'ung-k'ao*, 9848. *North China Herald*, (April 17, 1901) 754, (March 19, 1903) 542-543, (June 26, 1903) 1295, (Aug. 7, 1903) 285. House of Representatives, 57th Congress, 1st Session, Document No. 1, *Papers relating to the Foreign Relations of the United States with the Annual Message of the President*, (Washington D. C. 1902), Appendix, Affairs in China, 314. Mitchell Library Sydney Australia, Dr. G. E. Morrison Papers, uncatalogued manuscript 312, item 158.

Output rose from 3,000,000 rounds per year the first year after entering production to more than 10,000,000 rounds in 1908. <sup>(19)</sup>

During the establishment phase and first few years of operations, Te-chou was plagued with personnel and technical problems affecting the quality of ammunition production. In August 1905 it was publicly disclosed that Northern Commissioner Yuan Shih-k'ai had reprimanded Arsenal Director Lei Chen-ch'un because poor quality brass employed in Mauser ammunition had resulted in rounds which did not fit the chamber. Lei revealed other problems that originated during the establishment years; he charged that the official in charge of establishment had been responsible for the erection of unsound buildings and the acquisition of cut-rate machinery that resulted in diminishing the capacity for production of small arms ammunition by more than fifty percent. It was also disclosed that arsenal resources had been depleted by corrupt practices of officials who purchased and received materials<sup>(20)</sup>.

Subsequently, the director reported sweeping reform measures in three areas of operations. Modifications were made in the composition of brass and the process employed in smelting in order to achieve a uniform hardness in cartridge casings. New powder testing equipment was purchased and installed. With this, the speed of combustion and explosive force of smokeless powder could be determined prior to loading in cartridges and the incidence of firing defects due to faulty powder, reduced. Finally, new better qualified personnel were placed in charge of small arms ammunition production. Nevertheless, in 1908 there were reports in the foreign press that Peiyang cartridges were exploding at the rear end and killing or wounding whoever fired them. Reports from the arsenal at about the same time seemed to confirm that there were still serious technical problems associated with the production process. The low strength

---

(19) *Wen-hsien t'ung-k'ao* 9848. Shen Tsu-hsien ed. *Yang Shou-yuan tsou-i chi-yao* Selected memorials of Yuan Shih-k'ai) Taipei, no date, 31-37. Kan Hou-tzu ed. *Pei-yang kung-tu lei-tsuan* (Collected official papers of Northern Commissioner Yuan Shih-k'ai), (Taipei, no date) 1008-1010. Kan Hou-tzu ed. *Pei-yang Kung-tu lei-tsuan hsu-pien* (Additional collected official papers of Northern Commissioner Yuan Shih-k'ai) (Taipei, no date) 1656-1662.

(20) Ch'en Chen ed., *Chung-kuo chin-tai kung-yeh-shih tzu-liao* (Materials on China's modern industrial history) third series, 2 Vols. (Peking 1961), Vol. 1, 203-206.

brass smelted at Peiyang, when made into cartridge casings, could not withstand standard loads of high strength powder. Reduced loads had to be used in Mauser ammunition with the result that the effective range of the 7.9 mm Mauser was shortened significantly when Peiyang ammunition was used. By modifying the phosphorous content of the brass, the arsenal was eventually able to remedy this situation and produce cartridges that had the strength to hold a load of powder equivalent to that used in Western ammunition<sup>(21)</sup>.

The Peiyang Arsenal drew some of its raw materials from nearby areas. Saltpeter from Shantung, Honan and Chihli was used in production. Cotton suitable for guncotton production was grown in the adjacent district. Ammunition from the arsenal supplied the second and fourth divisions (and probably other units as well) of the Peiyang Army. In 1910, in an experiment to reduce the high costs of operating as a single product plant, trial production of 7.5 cm shrapnel shells was initiated but proved unsuccessful. The arsenal remained essentially a cartridge plant<sup>(22)</sup>.

### Conclusion

Like its predecessor, the Tientsin Arsenal, the Peiyang Arsenal tended to specialize in the production of small arms ammunition. This was in accord with the contemporary military development of North China where there was a rapid growth of ground forces equipped with modern weapons.<sup>(23)</sup> Specialization at Te-chou was complete; all reliable evidence points to the fact that prior to 1912 no products, other than small arms ammunition, were produced. Supply of ordnance to North China was from the Hupeh Arsenal and abroad. Gun ammunition came from Japan<sup>(24)</sup>.

---

(21) *North China Herald* (August 15, 1908) 403. *Pei-yang kung-tu lei-tsuan hsu-pien*, 1625-1627. *Chung-kuo chin-tai kung yeh-shih tzu-liao*, third series, Vol. 1 203-206.

(22) *Pei yang kung-tu lei-tsuan hsu-pien*, 1623-25, 1625-1627, 1656-1662. *Pei-yang kung-tu lei-tsuan* 1008-1010. Morrison Papers, uncatalogued manuscript 312, item 158.

(23) Ch'en Yuan Shih-k'ai 29-43, 55-62.

(24) British Public Record Office, Confidential Print, Part XLIV, *Further correspondence respecting the affairs of China*, April-June 1911, page 42, no. 78. *Pei-yang kung-tu lei-tsuan hsu-pien* 1623-1625.

The specialization on small arms ammunition at the Peiyang Arsenal was the result of an historical trend of several decades. Tientsin had been established primarily as a powder and cartridge plant. Attempts at other types of production had been hampered by difficulties in securing new sources of operating capital beyond the annual customs allotment. Tientsin's logistical importance, therefore, was linked to the supply of ordnance from abroad or from other Chinese arsenals. Its production had to be supplemented by supplies of large caliber ammunition. By the time of the Sino-Japanese War, China's arsenals had not developed the capacity for self-sufficient production of large quantities of ordnance and large caliber ammunition. Consequently, foreign supply was essential<sup>(25)</sup>.

In the post-war years, especially after the establishment at Te-chou, this trend of specialization on small arms ammunition and dependence on other sources of supply for ordnance and large caliber ammunition in North China was reinforced by new financial limitations and international restrictions. Scarce financial resources in North China in the Post-Boxer years limited the establishment of arsenal production. Even had funds been available, international restrictions on the import of munitions-making machinery precluded the initial establishment of ordnance production at Te-chou.

The specialized production at Te-chou, however, resulted in the largest annual output of small arms ammunition of any plant in China.<sup>(26)</sup> Although the quantities were great, the performance of Peiyang ammunition was below that of comparable foreign ammunition due to the poor quality of production equipment and the lack of technical know how. Because of the arsenal's highly specialized mission, its operations were regarded as uneconomical.

The Peiyang Arsenal was established at a time when the bitter experience of the destruction of the Tientsin Arsenal was fresh in the minds of the officials

(25) Kennedey, *The Arms of Kiangnan*, 138, 150-151. Wang Erh-min, *Ch'ing-chi ping-kung-yeh te hsing-ch'i*, 133.

(26) Thomas L. Kennedy "Mausers and the Opium Trade: The Hupeh Arsenal, 1895-1911" in Joshua A. Fogel and William T. Rowe eds. *Perspectives on a Changing China Essays in Honor of Professor C. Martin Wilbur on the Occasion of His Retirement*, (Boulder, Colorado 1979) 113-135. Kennedy "The Kiangnan Arsenal in the Era of Reform," *Chung-yang yen-chiu-yuan chin-tai-shih yen-chiu-so chi-k'an*, No. 3, part 1. 331-352.

of North China. In 1899 Yuan Shih-kai had recommended establishment at an inland site where the arsenal would be near to a source of coal and convenient to transport facilities.<sup>(27)</sup> The site at Te-Chou was apparently selected with these criteria in mind. But before the construction of the arsenal was even complete, the Inland Navigation Regulations signed with the United States, Britain and Japan in 1902 and 1903 opened the section of the Grand Canal that flowed past the arsenal to foreign steamships. The agreement for the construction of the Tientsin-Pukow Railroad, signed in May 1899, permitted the passage of a foreign controlled railroad through Te-chou<sup>(28)</sup>.

The Inland Navigation Regulations opened all Chinese waterways to navigation by foreign steamships. This meant that there was virtually no place that would provide convenient water transport for an arsenal which would not also be open to the regular surveillance of foreign navigators and, in time of war, to the threat of foreign gunboats. Te-chou was potentially as vulnerable to foreign attack as Tientsin had been.

The post-war advance of the foreign powers in access to and control of China's internal transportation had eliminated the possibility of an inland arsenal site secure from foreign attack. This was undoubtedly clear to Yuan Shih-k'ai when he selected the Te-Chou site. But something else must have been clear to Yuan by this time also, something that could have rationalized his decision to establish an arsenal at Te-Chou. The Tientsin Arsenal had proven inadequate to supply Chinese forces in a conflict with a modernized foreign power despite Li Hung-chang's herculean efforts to prepare it for that mission. The ammunition from the arsenal, however, when employed with foreign weapons was enough to assure military supremacy among domestic forces. Domination of North China in the prewar years by military forces supplied with ammunition from Tientsin had demonstrated this. Yuan Shih-k'ai with this experience to guide him and realizing the

---

(27) *Yang Shou-yuan tsou-i chi-yao*, 31-37.

(28) *North China Herald* (September 17, 1902) 569, (April 2, 1903) 634. Hosea B. Morse, *The International Relations of the Chinese Empire* 3 Vols. (London 1910, 1918) Vol. 3. 89-90. John V. A. MacMurray ed. *Treaties and Agreements with and concerning China* 1894-1919, (New York, 1921) 355-356, 415-417, 429-430.

impossibility of securing an arsenal against foreign threats, must have rationalized the establishment of the arsenal at Te-chou primarily in terms of its potential significance in domestic power struggles. Financial limitations, international restrictions and earlier experience at Tientsin undoubtedly contributed to Yuan's decision not to produce weapons at Te-chou. But his willingness to rely on foreign purchase or the Hupeh Arsenal, from whence foreign powers could readily interdict supply, for rifles also signified that he hoped to minimize the possibility of military conflict with foreigners in North China.

It is clear then that Yuan had set his goals realistically. He had in mind an ammunition arsenal which could support his own Peiyang Army equipped with guns secured from foreigners or shipped in from Hupeh. For this purpose Te-chou was an economically viable and strategically sound site. But the arsenal was plagued by technical problems which lowered the quality of its ammunition when compared to foreign products and, it was lacking in anti-imperialist potential. It was an arsenal for a new era in which the military authorities of North China were girding themselves for battles primarily with domestic foes.