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中国的地下长城

Strategic Implications of

CHINA'S UNDERGROUND GREAT WALL

Dr. Phillip A. Karber

26 September 2011

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GEORGETOWN UNIVERSITY
ASIAN ARMS CONTROL PROJECT

中国的地下长城

STRATEGIC IMPLICATIONS
OF
CHINA'S UNDERGROUND GREAT WALL

Dr. Phillip A. Karber

**with assistance from Tim Brown, Wes Cross, J.M LaGray and the students of seminars:
Arms Control & Multipolarity and #457 Asian Arms Control Prospects #569**

11 SEPTEMBER 2011

Forward

In 2008 the Director of the Defense Threat Reduction Agency asked the Threat Reduction Advisory Committee Science & Technology Panel to join with the DTRA Nuclear Deterrence Panel to address improvements needed in detection, monitoring and verification related to future arms control.

Following the May 2008 Sichuan earthquake, the Chinese media became more open about the PLA's decades long effort to protect their nuclear missile forces through tunneling. I commissioned S&T panel member Dr. Phillip A. Karber to conduct an "open source" study of what the PRC called their "Underground Great Wall."

Dr. Karber was the right person for this assignment given his four decades experience: with the Congressional Joint Committee on Atomic Energy; as director of the National Security Council net assessment project 186; strategy advisor to Secretary of Defense Weinberger; and bipartisan reputation in advising the Congress on security/arms control issues. He served on the Four Power Asian Security Committee (appointed by Secretary Carlucci), had aviation experience in China, as well as heads Georgetown University's Asian Arms Control Project with a pool of trained student researchers willing to comb through thousands of pages of military writings and hundreds of hours of Chinese television coverage.

In the middle of the Karber project – on 11 December 2009 -- the People's Liberation Army officially announced their "Underground Great Wall" project and publicly claimed that it involved 3,000 miles of tunnels for the concealment of nuclear weapons. The Georgetown team has assembled hundreds of pages of documentation and a 45 minute video compendium of tunnel coverage shown on Chinese television. Their evidence suggests a massive and modern effort that includes mobile ICBMs in new complexes. This report summarizes the implications of the PLA missile underground.

The surprising scope of the effort combined with the asymmetrical nature of the approach underscores the importance of the Karber effort in looking at the questions of strategic culture behind it: Why did the Chinese make this kind of effort? How would it function operationally? What are the implications for our own forward deployed force survivability, allied security guarantees and arms control strategy?

The DTRA TRAC panels have since been superseded by other on-going efforts, but the Karber Report shows that we need to give China's evolving nuclear posture more attention, that they have not only have taken an approach to nuclear force survivability that is quite different than our own experience, but that further stabilization and reduction of major nuclear power inventories will not succeed without bringing the PRC into a posture of negotiated constraint.

Dr. Joseph V. Braddock
Chair, DTRA S&T Committee
(2005-2009)

China's Underground Great Wall

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 Phase II: 1996-2010 – Solid Fuel SRBM/IRBM “enhanced mobility”
 Phase III: 2011-?? – Tunnel Based Road/Rail Mobile MIRVed ICBM
- Appendix 6** *Operational Concept: Hide, Surge, Strike, Move, Hide*
- Appendix 7** *Breakout & Instability*
 Uncertainties and the Problems of Monitoring & Verification
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熵

IMPLICATIONS OF AMERICAN ENTROPY: CHINA'S STRATEGIC ROCKET FORCE *“UNDERGROUND GREAT WALL”*

- Lessons Unlearned – during the Cold War we missed 50% of the Soviet stockpile, i.e. 20,000 warheads were not accounted for and presumed not to exist;
- Missed Significance -- while the US has tracked PRC tunnel construction for years, the scope, magnitude and strategic rationale behind the “Underground Great Wall” has been under appreciated;
- Missed Trends – the Chinese buildup of their Theater-Strategic Rocket Force has not been the focus of a comprehensive all source analysis that includes technology, deployment, operational concepts, readiness, logistics, training as well as protective deception, dispersal and underground deployment;
- Missing Warheads – public estimates of Chinese nuclear warheads range from 300 to 400, PRC data in 1995 gave the figure at 2350, and if the doubling of tunneling since then is reflected in the size of the protected force, our public numbers could be easily off by a factor of 10.
- Missing Assessment – we have not thought through what all this means for US forces deployed in the region, let alone the impact of a “surprise” roll-out in the middle of a regional crisis of a much larger ICBM force than estimated.



广东工业大学国防生 -> 军事天地

★ 阅读新闻

背景: □□□□□□□□

西方专家称中国地下战略导弹库可承受核弹攻击

[日期: 2009-12-18]

来源: 中国国防报 作者:

[字体: 大 中 小]



二炮导弹地理: 掩体、阵地遍布全国山川
SECOND ARTILLERY MISSILE GEOGRAPHY
Bunkers, Mountains and Rivers All Over the Country Positions



09

“Underground Tunnels”



“长城”
THE GREAT WALL
连续击
NUCLEAR STRIKES
与美国大仗
WAR WITH THE UNITED STATE

The Challenge

Historically the PRC has been EXTREMELY tight lipped about their nuclear forces.

A Radical Shift in State Behavior that is NOT associated with apparent external or internal stimuli raises three serious questions:

- **Is it Real?**
- **Why did they do it?**
- **What does it Portend for Future behavior?**

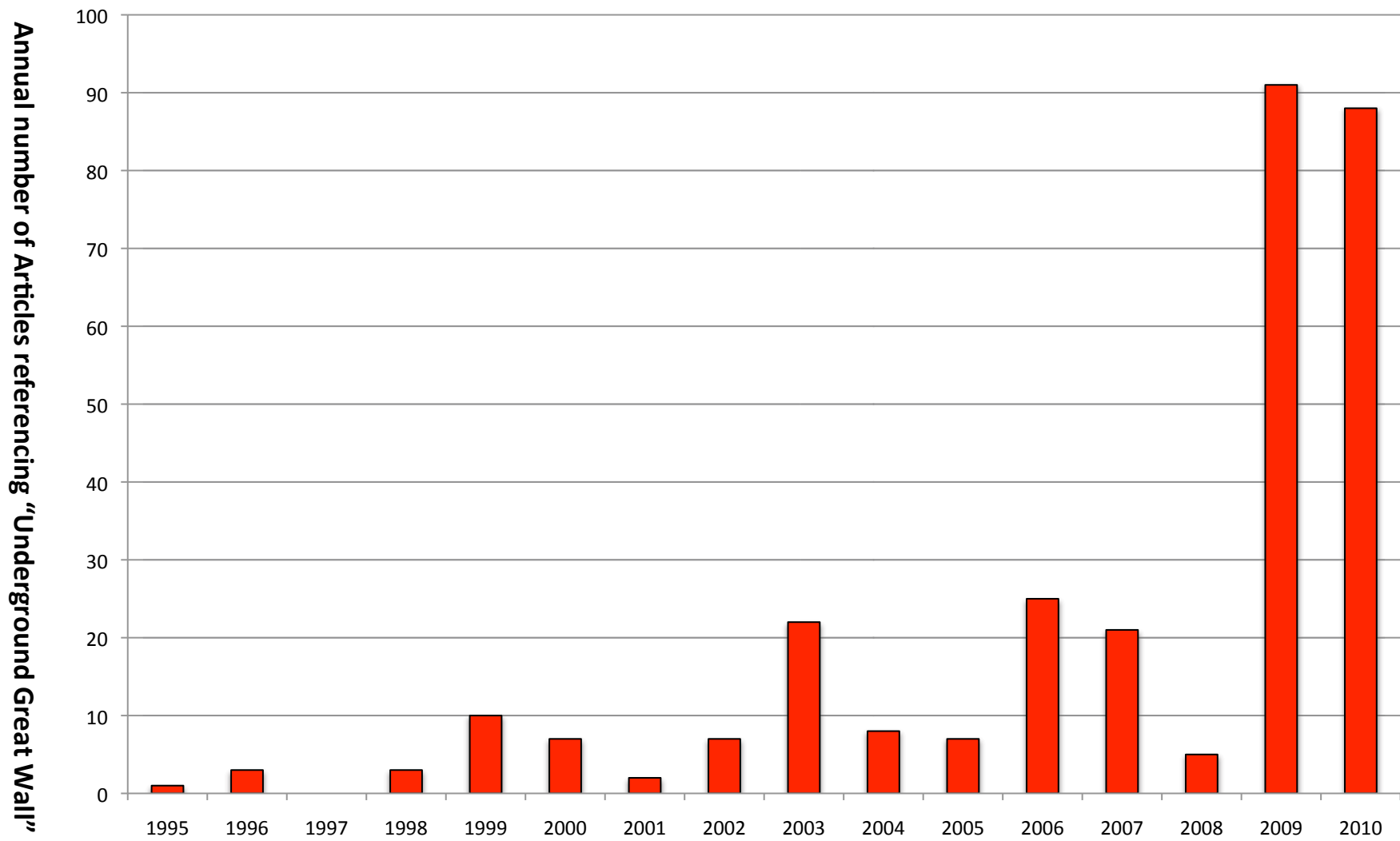
The Opportunity

Over the last eight years there has been an exponential increase in Chinese discussion of *Second Artillery*:

- **Major Books – *Science of 2nd Arty Campaigns, Glorious Era of 2nd Arty***
- **Journal Articles – actually say something about:**
 - Problems in training, logistics, maintenance, leadership initiative, Party meddling;
 - Emerging capabilities in mobility, space based RSI, accuracy and lethality;
 - Experimenting with innovative Joint Command and Theater Campaign Concepts.
- **TV coverage – Prime Time Series, weekly news coverage**
- **An explosion of Internet based information and **military blogging.****

This offers the potential of looking for insight in non-traditional sources.

2nd Artillery Underground Great Wall Referenced in Chinese Military Literature



Internet Flows both Ways: IP-1011

Administrators and censors have trouble keep up with explosion in traffic;

Backdoors are left open – particularly in less sophisticated regional sites –

String character searches particularly useful

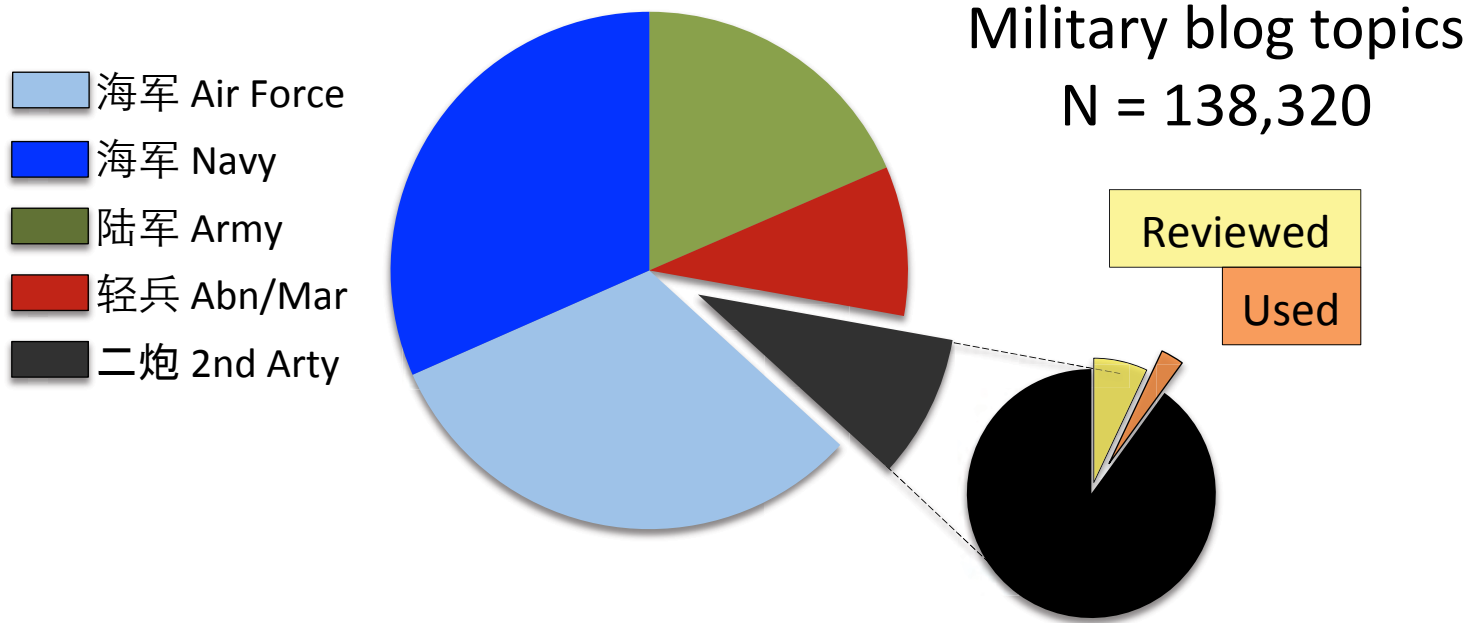
False sense of security about lack of Western access to the language --

Second Artillery created the digital code that makes Chinese machine readable

Military bloggers like to share “cool” stuff and exchange critical comments on it;

Unique trove but massive overload of treasure and trash --

Need focus and anvil to test it against.



Project IP-1011: Chinese OCR Experiment



Hard Copy or Internet
in Mandarin



Digitized Scanning
up to 100 pp per hour



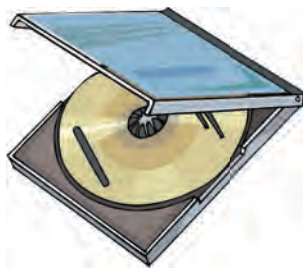
Output PDF file



Chinese OCR
Reading Software



MDGB Machine
Translation & Editing



Searchable, Distributable,
Storable Electronic Media

An Experiment

A Radical Shift in Behavior from Minimizing to Highlighting?

-- Is it Real? Why did they do it? What does it Portend?

History: A Deep Culture of Strategic Concealment

- I. Scope: Current Phase (1995-2009) as Shown to Domestic Audiences**
- II. Implications: Operational Warfighting**
- III. Implications: Force Design**
- IV. Implications: Strategic Deterrence & Theater Dissuasion**
- V. Uncertainties: What should be expected in the Next Phase?**

警告!!! WARNING!!!

This is NOT an Intelligence Product:

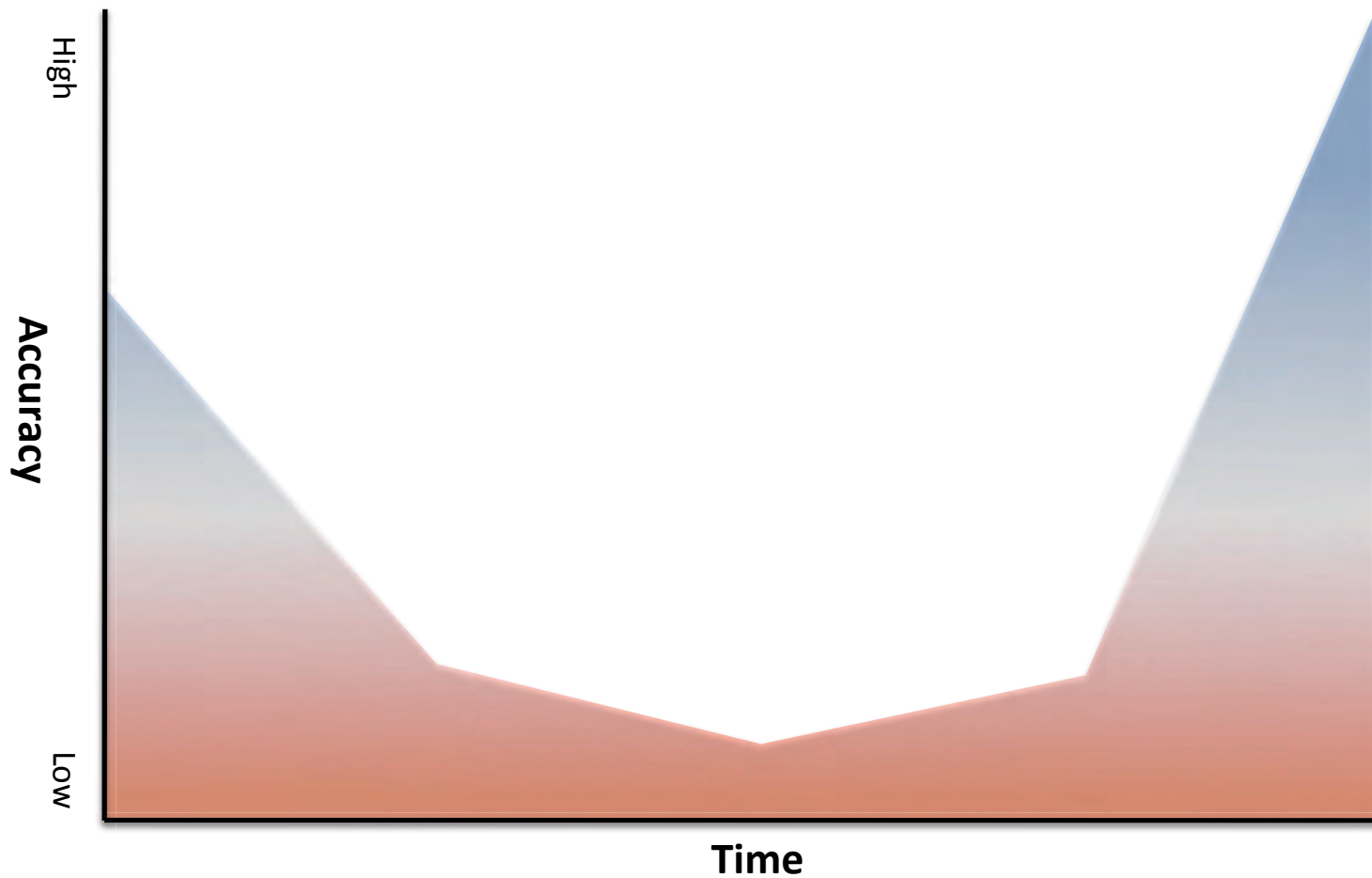
- NO classified material on this topic consulted;
- NO correlation or correction by others;
- NO claim of accuracy or truth.

This is a Georgetown University study of Chinese Strategic Culture & American Arms Control Entropy:

- DTRA S&T panel tasking but no-government funding;
- utilizing original and only open source material;
- generating heuristic hypotheses to be tested.

“Bathtub of Ignorance”*

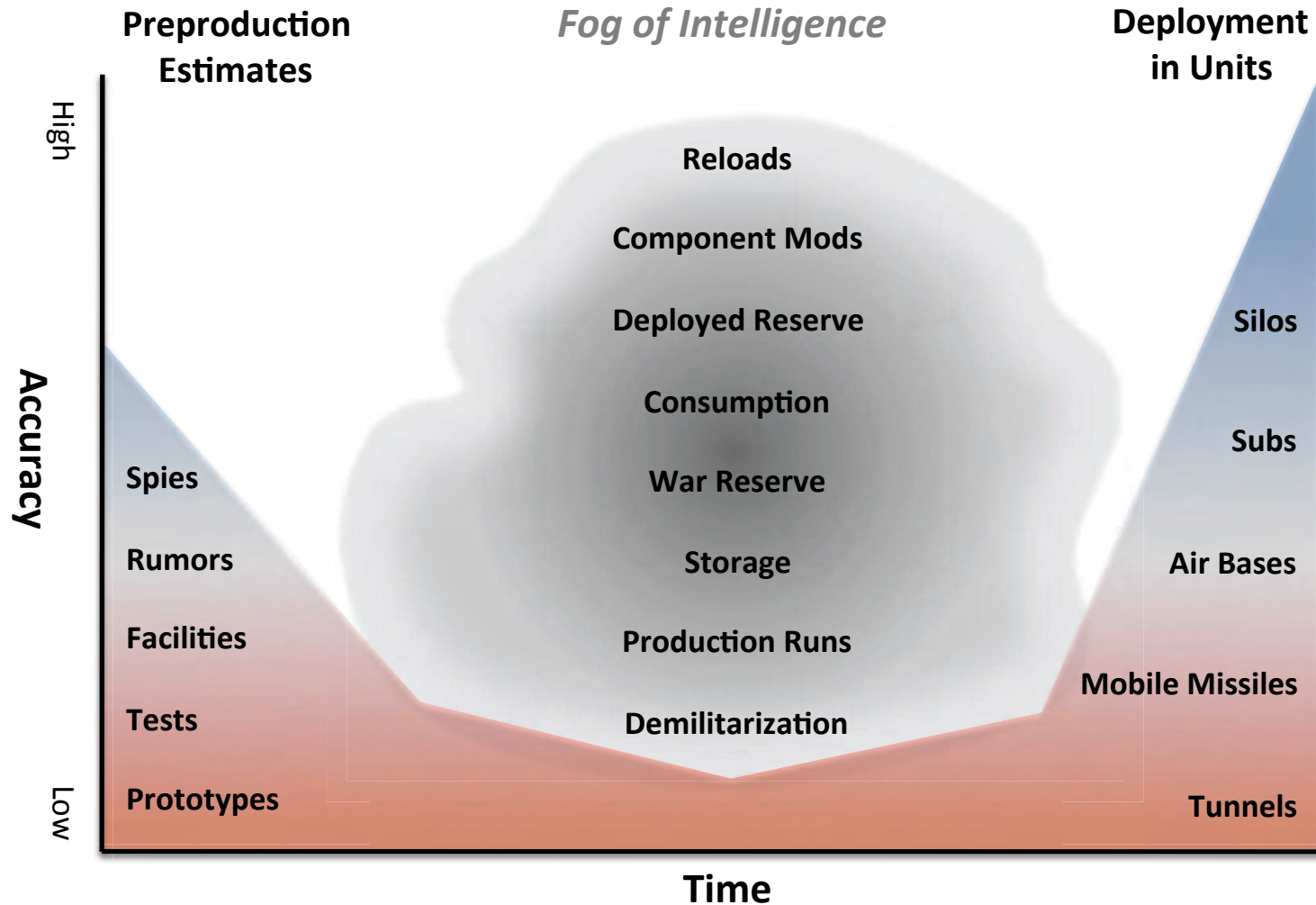
"This is not an indictment of our intelligence system.... The flaw, instead, is in our decision-making process. Our system reacts positively only when confronted with hard evidence -- a photograph of fielded equipment -- and negatively to an intelligence community 'bathtub' projection. No one in Washington is willing to make a decision until shown a picture of a fielded system incorporating new technology; then there will be all sorts of doomsday and 'how could this have happened' reactions."



Gen. Donn A. Starry, "A Comment," *Los Alamos Science*, (Summer 1989): pp. 54-56; and *Press On! Selected Works of General Donn A. Starry*, Vol. I, edited by Lewis Sorley, (Fort Leavenworth, KS: US Army Combined Arms Center, Combat Studies Institute Press, 2009): pp. 128-129.

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STUDY #1

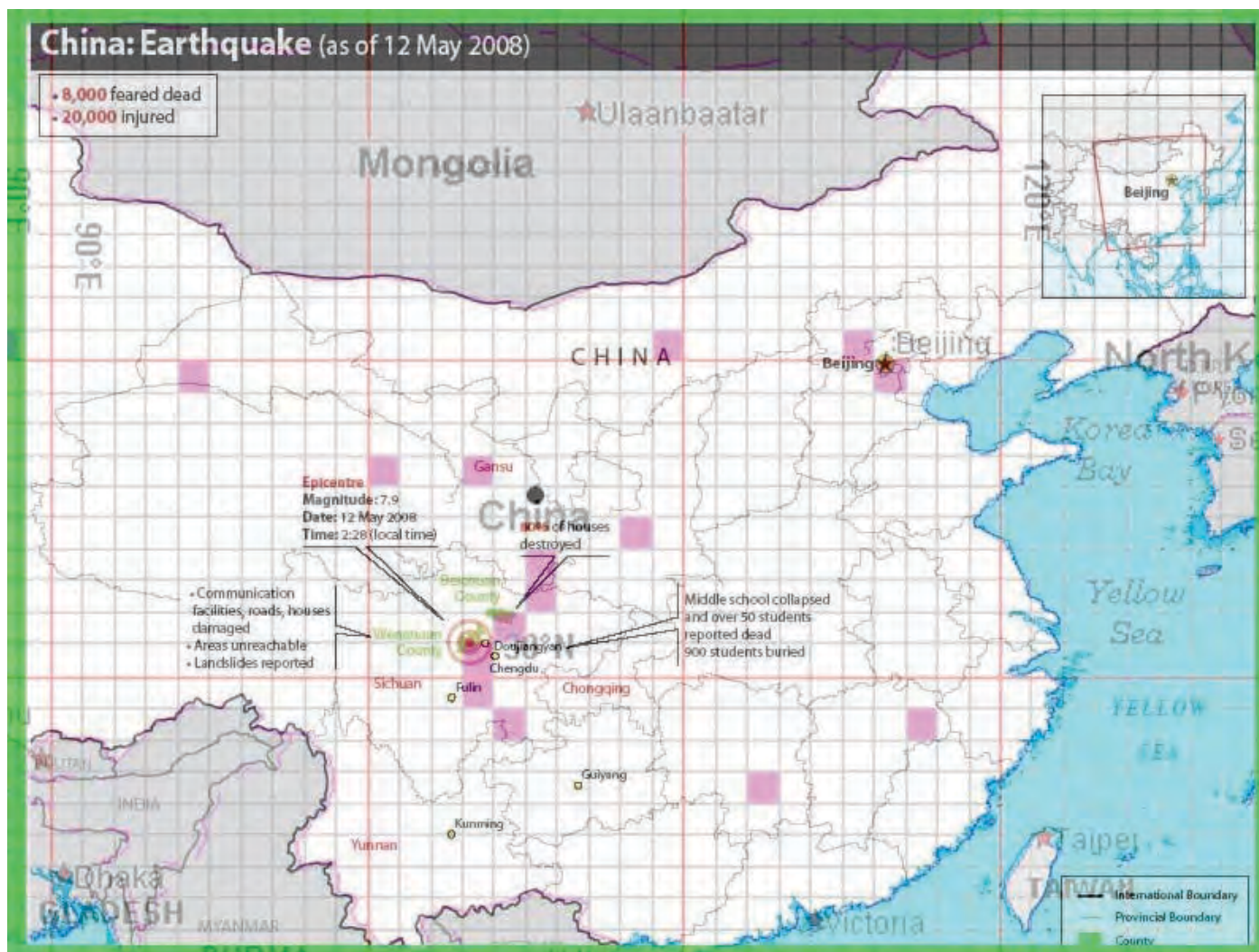
Sichuan earthquake Tunnel exposure

2008 Sichuan Earthquake exposes Tunnels

- Co-location of 2008 earthquake epicenter and underground nuclear “armory;”¹
- Earthquake “volcano” split mountain spewing manmade concrete blocs;²
- Reports that PLA’s largest underground nuclear weapons cache collapsed;³
- Government concern over “radiation” leakage;⁴
- Large scale military reaction with 137,000 troops dispatched to quake area – including 2nd Artillery engineer division⁵ and 2,700 radiation technicians;⁶
- Post –quake scientific controversy whether event was “triggered” by human action;⁷
- Closure of epicenter to reporters and press suppression.⁸

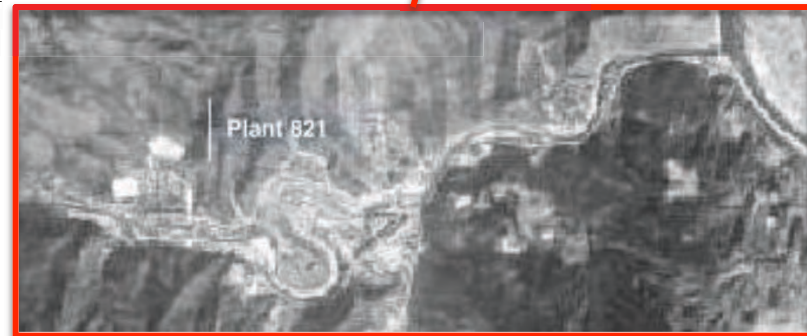
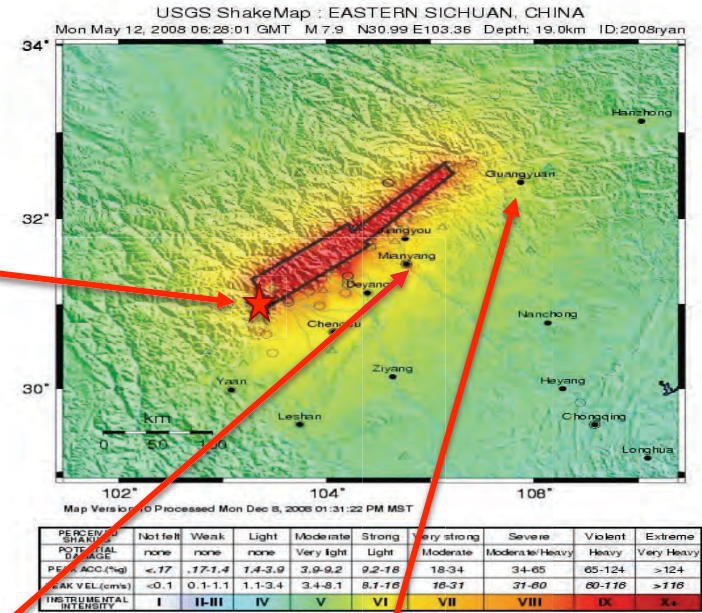
- 1 William J. Broad, “Western Experts Monitor China’s Nuclear Sites for Signs of Earthquake Damage,” *New York Times*, (2008.05.16), < <http://www.nytimes.com/2008/05/16/world/asia/16nuke.html> > [accessed 30 Jan. 2011].
- 2 “大地震销毁中国军队最大兵库 [Earthquake Destroyed the Chinese Army’s Largest Armory],” 大纪元 [*Epoch Times*, Taiwan], (2008.07.04) at < <http://www.epochtimes.com/gb/8/7/4/n2178701.htm> > [accessed 31 Jan. 2011; translated by IP-1011].
- 3 Catherine Hennessy, “China’s Nuclear Base Exploded in Quake;” “Eastern Sichuan, China: 12 May 2008 06:28:01 GMT, M-7.9, Depth 19.0-km,” *Earthquake Hazards Program*, (2009.10.28), at < <http://earthquake.usgs.gov/earthquakes/shakemap/global/shake/2008ryan/> > [accessed 21 Jan. 2011].
- 4 Jake Hooker, “Unearthed in Quake: Flaws in Chinese Military Capability,” *New York Times*, (2008.07.01), at < <http://www.nytimes.com/2008/07/01/world/asia/01iht-china.3.14139474.html> > [accessed 29 Jan. 2011].
- 5 PRC announcement of 27 June 2008 quoted in: “媒體爆料大地震造成北川地下核爆 [Broke the News: A Large Underground Nuclear Explosion Caused by Earthquake in Beichuan],” 大纪元 [*Epoch Times*, Taiwan], (2009.05.07) at < <http://tw.epochtimes.com/9/5/7/111780g.htm> > [accessed 31 Jan. 2011; translated by IP-1011].
- 6 “15 Million People Threatened by Nuclear Contamination,” *AsiaNews*, (2008.05.31), at < <http://www.asianews.it/news-en/15-million-displaced-people-threatened-by-nuclear-contamination-12395.html> > [accessed 29 Jan. 2011].
- 7 “A Human Trigger for the Great Quake of Sichuan?” *Science Magazine*, (2009.01.16): pp. 322; Malcom Moore, “Chinese Earthquake may have been Man-made, say Scientists,” *Telegraph*, (2009.02.03), < <http://www.telegraph.co.uk/news/worldnews/asia/china/4434400/Chinese-earthquake-may-have-been-man-made-say-scientists.html> > [accessed 29 Jan. 2011]; and “Was China’s earthquake triggered by a nuclear accident? Episode 2: Perhaps,” *BookofJoe* blog, (2008.06.04), at < <http://www.bookofjoe.com/2008/06/was-chinas-eart.html> > [accessed 30 Jan. 2011].
- 8 John J. Tkacik, Jr., “Seismic Suppression: Chinese Censorship after the Sichuan Earthquake,” Heritage Foundation *WebMemo*, no. 1971, (2008.06.26), at < www.heritage.org/research/asiaandthepacific/wm1971.cfm > [31 Jan. 2011]; Peter Kwong & Ming Xia, “China’s Unnatural Disaster: The Tears of Sichuan Province,” (HBO documentary; New York, NY: CUNY, Asian/American Asian Research Institute, 15 May 2009) at < http://wn.com/Sichuan_Province > [accessed 31 Jan. 2011].

Chinese Nuclear Facilities in Proximity to 2008 Earthquake

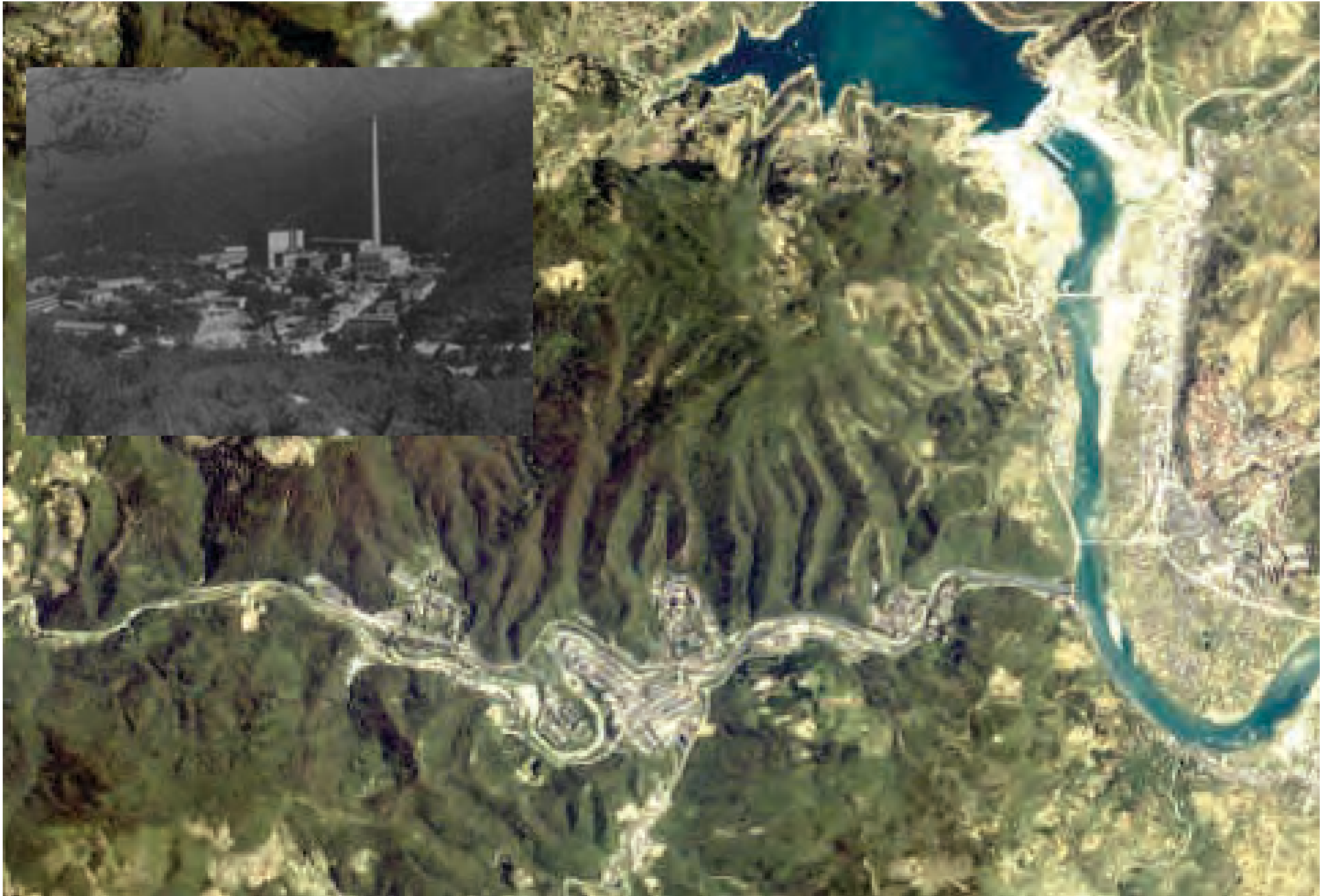


“China: Quake-damaged Nuke sites are Safe: Authorities Release New info Saying 32 Radiation Sources were Damaged in Disaster,” *CBS News*, (2008.05.20), at < http://www.cbsnews.com/stories/2008/05/20/tech/main4110775.shtml?source=RSSattr=SciTech_4110775 > [accessed 30 Jan. 2011].

Major Nuclear Facilities in Quake Zone



“大地震销毁中国军队最大兵库 [Earthquake Destroyed the Chinese Army's Largest Armory],” 大纪元, iop cit.



“Guangyuan

Plant 821: 32 26’N 105 52’EColor map from < http://archive.spaceimaging.com/ikonos/2/kpms/2000/07/browse.42944.crss_sat.0.0.jpg > [accessed 17 Oct. 2010].

Sichuan 2008 Aftershock

Earthquake close to major PLA nuclear tunnel complex

Nuclear experts said that closer to the epicenter of the earthquake, in rugged hills a two-hour drive west of Mianyang, China runs a highly secretive center that houses a prompt-burst reactor. It mimics the rush of speeding subatomic particles that an exploding atom bomb spews out in its first microseconds. North in an even more rugged and inaccessible region, nuclear experts said, China maintains a hidden complex of large tunnels in the side of a mountain where it stores nuclear arms. "It's very close to the epicenter," said one specialist, who spoke on the condition of anonymity because, to the best of his knowledge, the exact location of the secret complex had never been publicly disclosed.¹

Larger Crater near Epicenter associated with Underground Explosion

According to a CNS report on May 31, titled "Suspicious Epicenter of the Epicenter Was Found," on May 23, a medical team, consisting of paramedics from the People's Liberation Army (PLA) hospitals and psychologists from Beijing, found onsite a one-kilometer (0.62 mile) wide and two kilometers (1.24 mile) long valley on a hill close to the epicenter. The long ravine was found to have been covered with concrete debris 10-20 inches thick at its bottom as if large cement blocks were tossed about randomly surrounding the immediate area.

A team member said, "Where did those concrete blocks come from?" Since there were no large buildings nearby, everybody was curiously talking about it but could not find an answer. A local resident... saw a huge hole form at the top of the mountain. Many things were pushed out of this hole like toothpaste being squeezed out. "Was it magma?" somebody asked. "No, those were concrete blocks," said He. "The eruption lasted about three minutes," he added.

Earthquakes may sometimes result in a volcanic eruption, but no concrete eruption has ever been recorded, said an expert. Based on the CNS report, several experts have suggested the eruption could have been caused by a huge explosion beneath the mountain, which shattered the concrete cover of the underground facilities and pushed them to the surface. The thickness of the concrete blocks pushed to the surface seemed to match the cover layer used in China's underground military bases.²

1 Broad, "Western Experts Monitor China's Nuclear Sites for Signs of Earthquake Damage," *New York Times*, op cit.

2 "大地震销毁中国军队最大兵库 [Earthquake Destroyed the Chinese Army's Largest Armory]," 大纪元, iop cit.

Claims of “Volcanic like eruption” near Yingxiu



四川山区有很多军工厂、武器库及核设施基地，军方知情人士透露，这次地震引发武器弹药库爆炸，给军队带来灾难性的重创。图为地震山区爆炸后的情形。当地村民说：大山好像被切开了肚子——这能量太大了。

“大地震销毁中国军队最大兵库 [Earthquake destroyed the Chinese army's largest Arsenal],” op cit. Caption: “Mountains in Sichuan, many military factories, arsenals and nuclear facilities, bases, military informed sources, the earthquake triggered weapons and ammunition depot explosion, a devastating hit to the military. The picture shows the situation after the explosion earthquake mountain. Local villagers said: the mountain seems to its stomach cut open with the greatest energy.”

Sichuan 2008 Aftershock

Suppression of Reports of Damage to Nuclear Facilities

May 18, 2008, acting chairman of China Democracy Party Guo Quan released the "China Democracy Party as soon as possible to urge the Chinese government issued the security of nuclear facilities in Sichuan, the report." He cited in this report a series of Sichuan Province experimental research facilities and nuclear power projects after the earthquake casualties of these units, and asked the CPC and the immediate surrounding areas throughout Sichuan, all nuclear facilities in Sichuan, radiation detection and early release of nuclear facility safety reports. However, the third day after the publication of the report, Guo Quan was arrested. Police said no charges Guo Quan, but must be detained for 10 days, 10 days do processing.¹

Major Loss to China's Nuclear Arsenal?

July 4, 2008.... according to high-level Chinese military source secretly disclosed that in the earthquake the Chinese Army's largest arsenal of weapons was completely destroyed, for the Chinese army this was a catastrophic hit. Sources said that the earthquake triggered weapons and ammunition mountain chain explosion, a large supply of nuclear weapons which the PRC had stored for decades was completely destroyed; in addition some new nuclear warheads, weapons test site and nuclear facilities, have been destroyed. This event, the highest military secret, set off vibrations at Zhongnanhai [Communist headquarter in Beijing].²

Radiological Leakage into Underground Water Supply

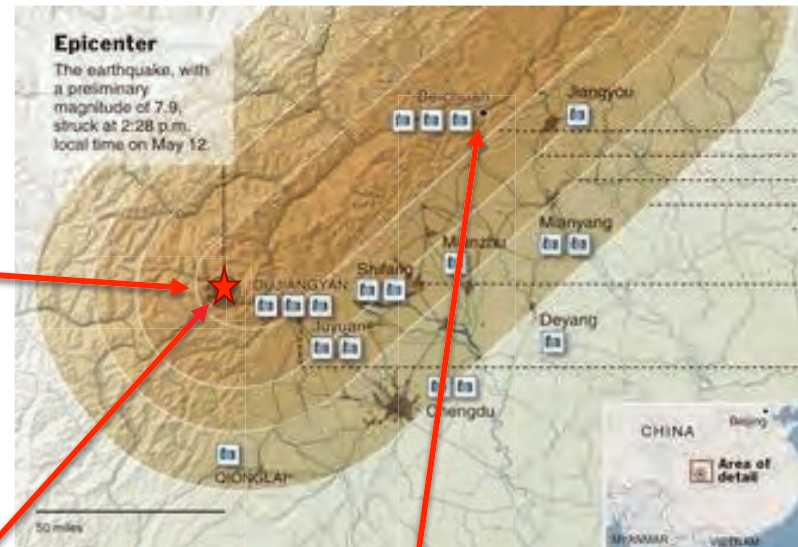
"North River below the original nuclear storage places ... Result of underground nuclear leaks, now has a serious threat to groundwater and Sichuan, Chongqing, hundreds of millions of people safe."³

- 1 Zhang Shan, “大地震銷毀中國軍隊最大兵庫 [News Media breaks story: A Large Underground Nuclear Explosion caused by the Earthquake in Beichuan],” 大紀元, (2009.05.07), at < <http://tw.epochtimes.com/9/5/7/111780.htm> > [accessed 31 Jan. 2011].
- 2 2008年5月18日，中國新民主黨代主席郭泉發表了「中國新民主黨敦促中共政府盡快發布四川核設施的安全報告」。他在該報告中列舉了四川境內的一系列核動力工程實驗研究設施及地震後這些單位的人員傷亡情況，並要求中共立即對四川全境及周邊地區所有核設施進行輻射檢測及盡快發布四川核設施的安全報告。但在該報告發表後的第三天，郭泉被拘捕。警方稱，郭泉沒有罪名，但必須拘留10天，10天後再處理。Ibid.
- 3 2008年7月4日，據中共軍方高層知情人士祕密透露，在汶川地震中中國軍隊最大的武器庫被完全銷毀，給中共軍隊帶來災難性的重創。消息稱，地震引發山區武器彈藥庫連鎖爆炸，中共幾十年經營的最大的兵器補給庫被完全銷毀，還包括新武器試驗基地及部分核設施、核彈頭都遭到摧毀。此事件作為最高軍事祕密，震動中南海。 Ibid.
- 4 2009年3月16日署名內幕人士本著良心、道德向博訊網「驚天大爆料」：「北川下方是原來的核彈貯藏地 ... 造成地下核洩露，現已經嚴重威脅到川渝地下水和億萬人民的安全。」 Ibid.

2008 Earthquake Military Containment



Medical team of specialists enter crater area near Yingziu



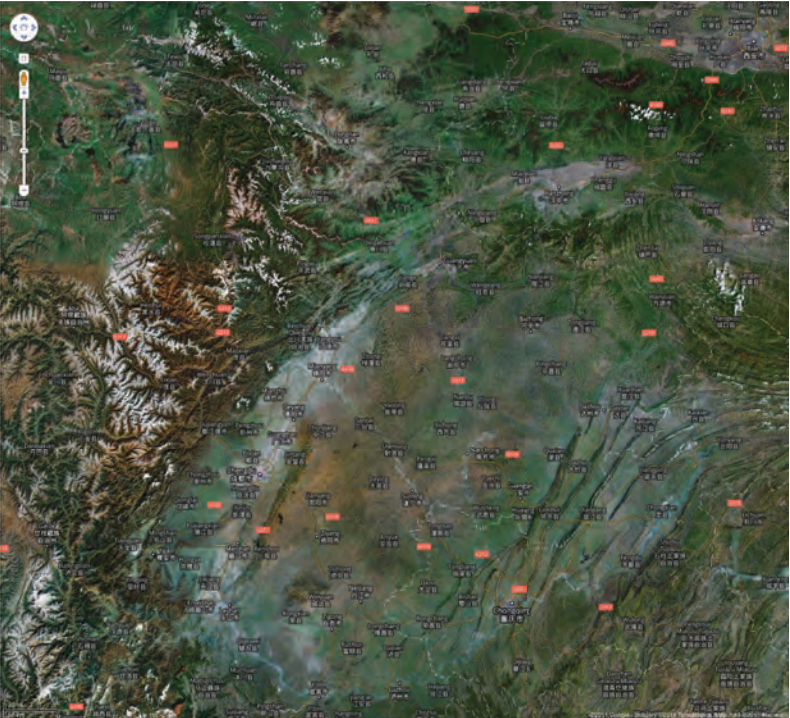
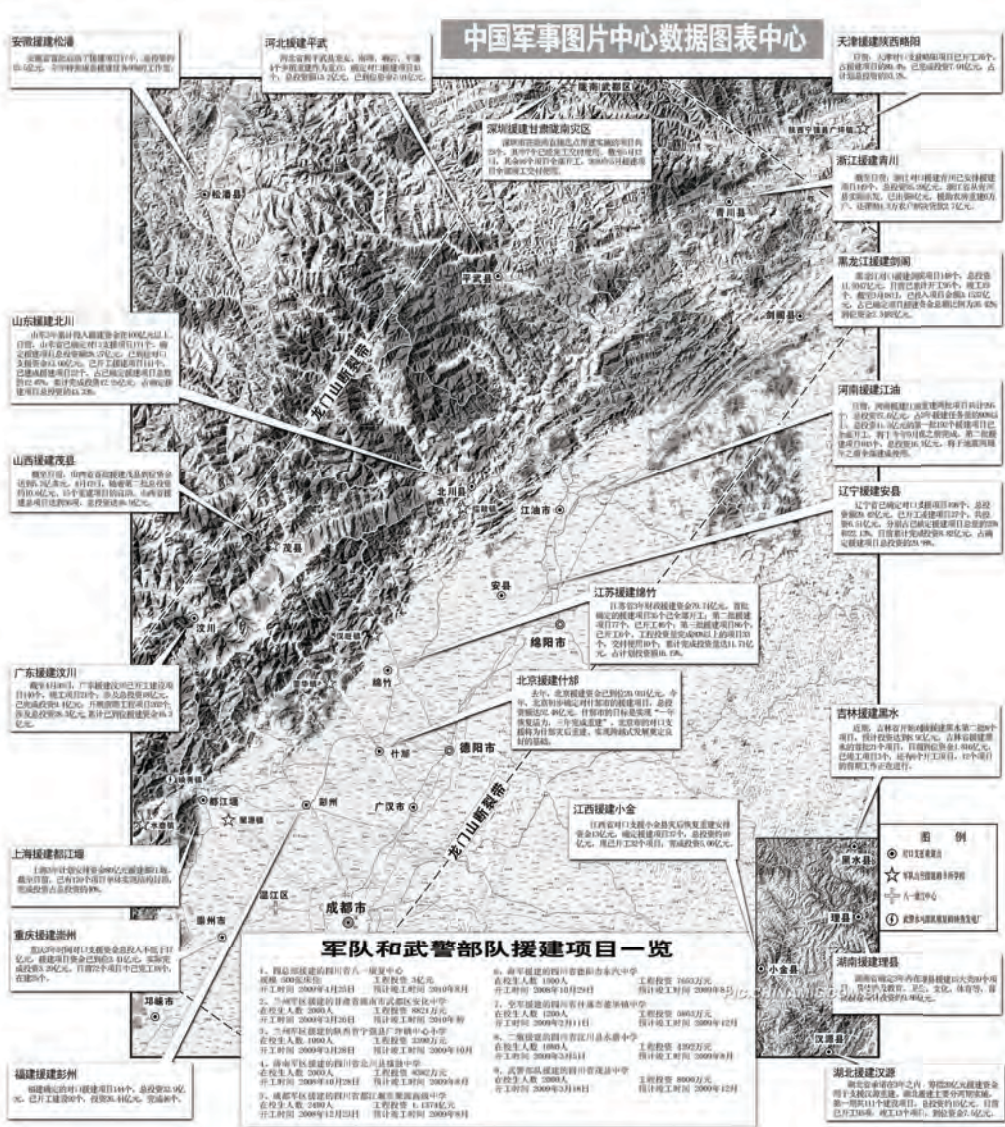
100 paratroopers jump into mountain epicenter for "security"



Chemical defense troop of the Chinese Army deployed to Chenjiaba, Beichuan County, area of reported ground water radiological contamination

Wen Cheng, "Local Residents Concerned with Safety of Sichuan Nuclear Facilities," *Epoch Times*, (2008.05.27), at < <http://en.epochtimes.com/news/8-5-27/71080.html> > [accessed 31 Jan. 2011]; "The Riddle of the Chinese Paratroopers: China parachutes 100 paratroopers to "cut-off" quake area," *Fire Earth*, (2008.05.16), at < <http://feww.wordpress.com/2008/05/16/chinese-paratroopers-rescuing-survivors-or-eliminating-plague/> > [accessed 31 Jan. 2011]; and Shan, "大地震销毁中国军队最大兵库 [News Media breaks story: A Large Underground Nuclear Explosion caused by the Earthquake in Beichuan]," op cit. Epicenter map from: "Earthquake in Sichuan Province: Interactive map showing the extent of the most damaged areas from the 7.9 magnitude earthquake in Western China," *New York Times*, (2008.05.12), < http://www.nytimes.com/interactive/2008/05/12/world/05132008_CHINA_MAP.html?ref=sichuanprovincechina > [accessed 30 Jan. 2011];

Location of Earthquake & Reconstruction Projects



“地震灾区援建项目地图 [Map of Earthquake Reconstruction Projects],” Chinamil, (2009.05.12), at < http://pic.chinamil.com.cn/chat/2009-05/12/content_1759798.htm > [accessed 18 Sep. 2008; translated by IP-1011].

Military Deployments to Earthquake Zone

2nd Artillery Rocket Forces



2008 May 18: Vice Minister of the General Staff for Operations Ma Jian news conference showed the deployment of military relief force to the earthquake area.



“中国首度公布救灾部队兵力部署示意图 [China first announced deployment of relief troop strength diagram],” Wangchao, (2008.05.18), at < http://www.wangchao.net.cn/junshi/detail_32812.html > [accessed 15 Feb. 2011; translated by UP-1011].

Accidents Happen

and can be revealing

Given Second Artillery's high degree of reliance on the nation's rail and highway system for its nuclear deterrent, a failure in the transport network is cause for concern. One example of a rail failure that potentially affected warhead logistics occurred during the May 12, 2008 Sichuan earthquake. A train hauling hazardous materials derailed and ignited inside a tunnel in Qinling Mountains in the vicinity of a primary 22 Base warhead rail transfer point. Rail operations on the Baoji-Chengdu line were shut down for 12 days. The Hongling Command Cell commander responded and arrived on the scene in just over two hours.¹

Baoji-Chengdu Rail Accident 2008²



“12 tankers, part of a 40-car freight train trapped in the No 109 tunnel by landslides following last week's earthquake...” Xin Dingding, “Final Gas Tankers Cleared from Tunnel,” *China.com*, (2008.05.21) at < http://english.china.com/zh_cn/news/china/11020307/20080521/14858076.html > accessed 5 May 2010]. “Li Chunhong, **a military officer assigned to the Baoji-Chengdu clearance operation**, said there is a slim chance the tunnel could reopen at the end of next week if weather permits. Previously, poisonous gas emitted from the fire and the dangers posed by the gasoline had prevented firefighters from entering the tunnel, he said to the 21st Century Business Herald. **When the army team arrived** the day after the earthquake, the temperature at both of the tunnel's exits had reached 160 C, he said. Fearing an explosion, local officials helped evacuate more than 900 farmers living in two nearby towns to a safer place 6 km away.”

Earthquake buried train on the Baoji-Chengdu Railway



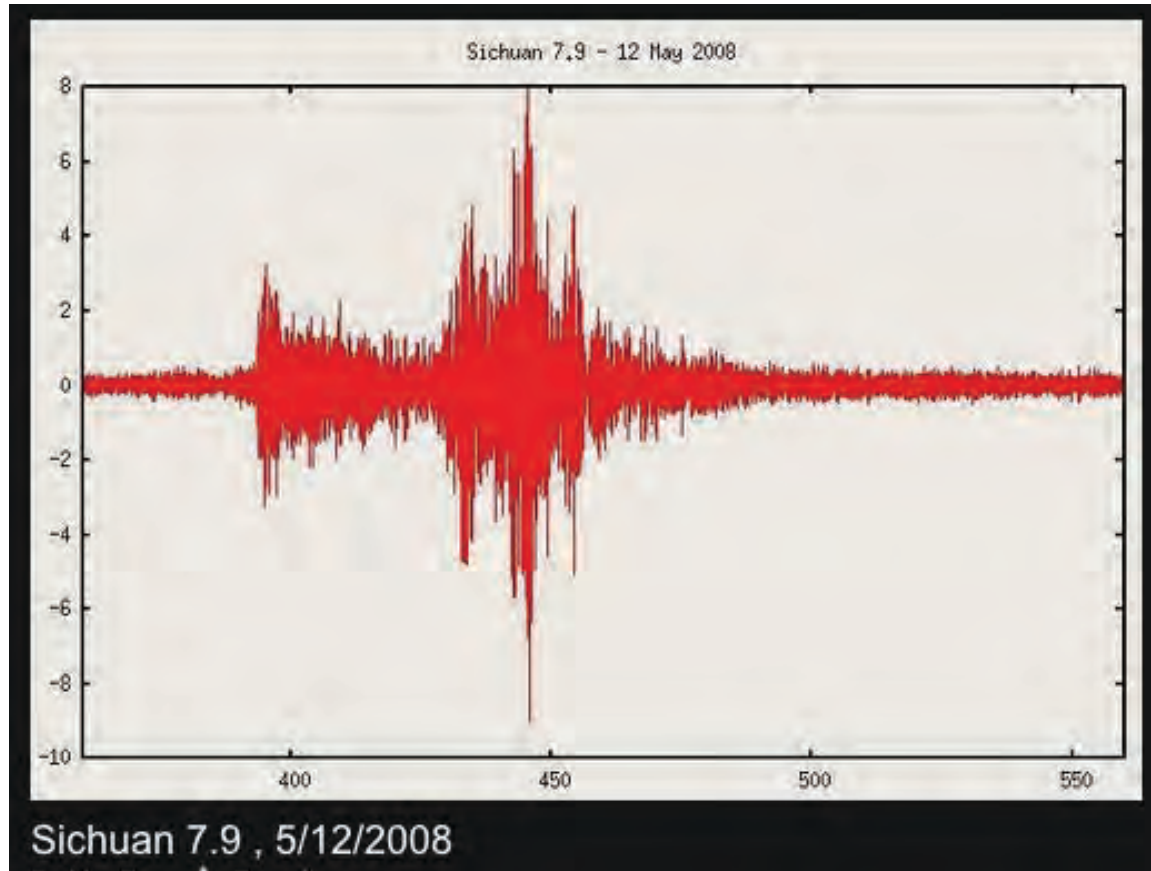
UPPER LEFT: The locomotive was successfully buried out of the tunnel;

UPPER RIGHT: Fire brigade uninterrupted cooling water to the southern end of the tunnel;

LEFT: Fatigue and sleep in the battle space of the fire brigade.

“公安民警全力抢修宝成铁路109隧道 [Public Safety Personnel regent rescue on the Baoji-Chengdu Railway Tunnel 109],” 腾讯, (2008.05.17), at < <http://news.qq.com/a/20080517/003451.htm> > [accessed 27 Aug. 2008; translated by IP-1011].

**Sichuan Seismic Record 12 May 2008, Richter scale = 7.9 shows
No Nuclear Detonation before, during or after Earthquake**



"Seismic signal of Massive Earthquake in Sichuan, China." "China's Earthquake After Shock," *Carnegie Council*, (2008.05.15), at < <http://www.policyinnovations.org/ideas/briefings/data/000052> > [accessed 10 Sep. 2010].

STUDY #2

2,500 Years of Cave Defense

STUDY 1: *Twenty-five Hundred Years of Cave Defense*

- China's military culture has long valued defensive tunneling and underground fortification – such as the “cliff roads” of the late Warring States period (c.259-210BC) and the “Terracotta Warriors” of Qin Shi Huang's tomb (c.259-210BC);
- Seven times in the history of China the phrase “Underground Great Wall” has been used in the context of military defense:
- The most recent application of the term -- “mysterious underground Great Wall” -- was secretly applied to the effort to build secure basing for the strategic nuclear rocket force in the 1980s; first ambiguously referenced in print in the mid-90s, and officially enshrined as a “national project” involving 3,000 miles of tunnels on 11 Dec. 2009.

Earliest Middle Kingdom Tunneling

“Cliff Roads” of the late Warring State Period (circa 475-221BC)

Chinese contribution was the provision of roads in precipitous regions by the use of cliff-face gallery roads. The four most famous were in Shaanxi Province, and work on the most notorious of these – the Shaanxi to Sichuan cliff road – began in the Warring States period in 475-221BC.



Modern example (circa 1972): 1,200m Guoliang Tunnel, Taihang Mountains, Huixian County

M.G. Lay and James E. Vance, *Ways of the World: A History of the World's Roads and of the Vehicles that Used Them*, (Piscataway, NJ: Rutgers University Press, 1999): p. 257; photos from: “Guilang Tunnel,” *Wayfaring*, (2009/08.03) at <<http://www.wayfaring.info/2009/08/03/guoliang-tunnel/>> accessed 23 May 2010]. And “世界奇蹟-地下長城? [World wonders - the Great Wall Underground?],” *Global Commons/Xuite 日誌*, (2007.02.19), at <<http://blog.xuite.net/frank.hgs/GE/10250251>> [accessed 29 Aug. 2010].

Underground Guardians of the Emperor

Qin Shi Huang's 兵马俑 Terracotta Tunnel Warriors (circa 259-210BC)



700,000 workers spent 36 years constructing the necropolis with nearly 1,000 meters of tunnels and over 8,000 figures.

Jane Portal, [Terra Cotta Warriors: Guardians of China's First Emperor](#), (Washington, DC: National Geographic, 2008); Sima Qian, [Records of the Grand Historian](#), vol. Han Dynasty I, translated by Burton Watson, (New York, NY: Columbia University, 1993).

地下长城 – “Underground Great Wall”

is an Established Defensive Concept in Chinese History

Six times in the history of China the phrase “Underground Great Wall” has been used in the context of military defense:

- **安徽地下长城**, 天下无二 -- Bozhou underground military defensive tunnel system built by Cao Cao – politician, general and literati -- (circa 155-220AD):
- **宋地下长城** – Song Dynasty “underground Great Wall” linear defensive positions (circa 960-1279);
- **广西地下长城** -- Ping Kong Ling underground Great Wall was built in 1889, under Adm. Su Yuanchun supervision by the Guangxi Border Guards Service (circa late 1800s);
- **朝鲜战争地下长城** -- Korean War tunnel complex built north of the 42nd parallel (circa 1952-53);
- **河北地下长城** -- Hebei Great Wall Underground civil defense complex in Beijing and other northern cities fearing Soviet attack (1969-1975);
- **神秘的“地下长城”** – “Mysterious ‘Underground Great Wall’” for protection of 2nd Artillery missile units:
 - Phase 1 – 1985-1995
 - Phase 2 – 1998-2009
 - Phase 3 -- 2010-??

Underground Great Wall -- 安徽地下长城，天下无二 (circa 155-220)

Lying in the old city of Bozhou, it is an **underground military defensive tunnel built by Cao Cao** (155-220), a famous politician, militarist and literati, in his hometown. It underwent repeated expansion in the Song and Yuan dynasties. About 3-8 meters below the surface of the downtown area, **the tunnel extends some 10 km**, it is a military tunnel with the longest history, most complicated structure, largest scale and complete facilities ever discovered in China. Therefore, it is renowned as the Underground Great Wall.

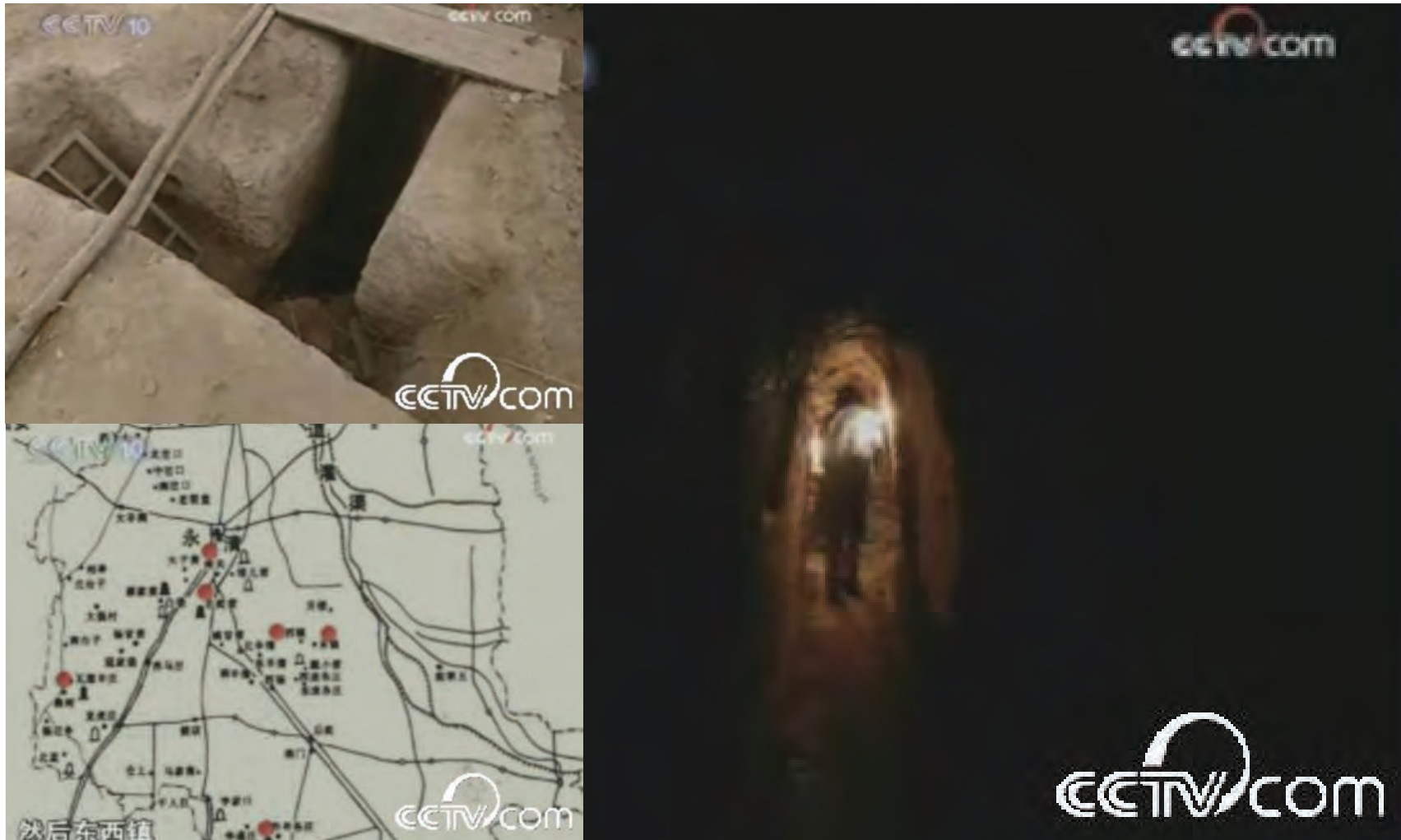
The whole tunnel is crisscrossed with complicated and subtle arrangements, with multilevel distribution and complex construction. The tunnel takes the shape of a "T" when it turns. The two parallel lanes are spaced 2-3.5 meters apart, and there are square holes for passing on a message on the wall between them.

Along the deep and zigzagging tunnel, some military and supporting facilities were built, including foxholes, obstacle walls, stumbling boards, traps, vent holes, holes for passing on a message and niches for torches. The cultural relics of the Han, Tang and Song dynasties unearthed in the tunnel include pills, soldier's swords, lamps, copper mirrors, pottery, porcelain and ink-stones left behind from several dynasties. These are all of great importance for researching China's ancient **military buildings and tactics and the military thought of Cao Cao**.



"Cao Cao Underground Tunnel for Transporting Troops," *Travel in Anhui*, (2010) at < http://chinadaily.chinadaily.com.cn/m/anhui/travel/2010-05/23/content_9776705.htm > [accessed 5 May 2010].

Tunnel Warfare from the Northern Song Dynasty



"A Large Area of Authentic Relics of Tunnel Warfare Discovered from Beginning of the Northern Song Dynasty." 中国网 *china.com.cn*, (9 December 2008) at < http://www.china.com.cn/v/2008-12/09/content_16921624.htm > [accessed 17 Mar. 2010].

Song Dynasty Military Tunnel Discovery



During the Song Dynasty (916-1125), in the years between 960 and 1127, this area was a battlefield between the states Song and Liao. Liao occupied part of the Song state, and the Song built a military defense line, which was expanded during a 200 year long period of war. The ancient structure was completely forgotten until 1948. A great flood happening in Yongqing village, Hebei province, was about to destroy the whole village, when it was stopped with a thunderous noise. The course of the flood was changed, the water level sank, as the water was flowing into an underground passage. In 1951 an underground cave some 150m² in size was discovered, after a house 2.5km from Yongqing had caved in. Dozens of small doors in this cavern were opening to a passageway each. Ancient war passages were found, spreading throughout Yongqing County, covering an area of some 300 square kilometers. The underground bulwark is of enormous size, 90km of tunnels which cover an area 65km from east to west, and 25km from north to south, which is an area of 1,600m². Most of it is a long tunnel along the border, similar to the Great Wall, that is why it is called Underground Great Wall. It consists of a wide range of military facilities, camouflaged exits, covers, and locking gates. A frontier pass between the rivaling states was fortified by an underground fortress. But it also has living necessities, with ventilation holes, and lamp stands integrated into the walls. There were brick beds, with some basic comfort, as they could be heated during winter.

"Underground Great Wall," Hubie website [PRC], (2009.08.30) at < <http://www.showcaves.com/english/cn/misc/GreatWall.html> > [accessed 30 May 2010].

Underground Great Wall -- 宋地下长城 -- as Defense Position

In ancient Chinese history it is recorded that The Northern Song Dynasty (960-1127 AD) battled for 200 years with the Liao and Jin Dynasties, which at the time were ruled by minority races from China's Northern Territories, the Khitan and Jurchens respectively. The Northern China Plain was an endless flat ground, with no mountains or rivers that could be used to help defend against the northerners.

Upon further investigation, experts found that ancient war passages were spread throughout Yongqing County in an area covering approximately 300 square kilometers. Who Built the Ancient War Passages and When? Experts discovered that the Yongqing ancient war passages were widespread. They were in fact a large-scale construction used to house troops during times of war. The structures of the caves were complicated and complete, possessing military facilities such as camouflaged exits, covers, and locking gates.



“地下长城 [Great Wall Underground],” (Public Photo Show; Chongzuo, PRC: Tourism Bureau, 2005) at < http://chongzuo.gxta.gov.cn/Public/Photo/ShowPhoto.asp?Image_ID=14767 > [accessed 5 May 2010].

Underground Great Wall -- 宋地下长城 -- as National Redoubt

The creation and maintenance of such a massive underground network required a great number of these bricks. It is believed that these ancient war passages were constructed as part of a large nation-wide project created and overseen at a national level by the governing authorities of the time. The Passages Spread Over 1,600 Square Kilometers.



Experts have dug out similar war passages in Yongqing, Xiong county, and Bazhou. The ancient war passages are about 65 kilometers from east to west, 25 kilometers from north to south, which extend through 1,600 square kilometers. When the border between the Song Dynasty and the Liao Dynasty went as far west as Rongcheng county and Xushui county, it is thought that many ancient war passages existed in that area. How far the ancient war passages extended eastwards from Yongqing is still unknown.

Hiding Soldiers in the Ancient War Passages to Defend the Country: Amidst many legends about the underground network, one states that the ancient war passages were built by General Yang and his family; a family that produced three great generals over three generations. Another legend suggests that General Yang Liulang used the underground passageways to defend the border. At the time (960-1127 AD), soldiers of the Liao Dynasty strictly guarded the lands north of Yongqing County. It is said that Yang Liulang built the passages to hide his soldiers underground so they could quickly defend against attacks launched by the Liao soldiers. Experts point out that the underground passages may have been used as base for launching attacks during wars fought in ancient China. As a means of defense throughout the years, people have built great walls in mountainous areas and water fields near rivers and lakes to block cavalries. However, in the open plains, where it is difficult to use the terrain as a means of defense, the tunnels would have allowed soldiers to travel unseen below the earth. The ancient war passages have become famous for the advantages they provide whether the troops are attacking or defending, and they have been named the "underground Great Wall."

“地下长城沈睡千年 古战道疑团待解 [Hidden For A Thousand Years - China's "Underground Great Wall]," *The Epoch Times*, (2006.02.17) at < <http://www.epochtimes.com/gb/6/2/8/n1215958.htm> > [accessed 30 May 2010, translated by IP-1011].

广西地下长城 – “Underground Great Wall of Guangxi”

Ping Kong Ling “underground Great Wal”l was built in 1889 by the late Admiral Su Yuanchun supervision of the Guangxi Guangxi Border Guards Service built during the military defense system, it is based on the cross-border river - flat terrain and the river environment, the construction of a north-south peace Kong cobbles two batteries, each country Krupp cannons An Youde each one, the number of small cannon door.

In 1921 artillery from Taiwan was moved to Nanning, by Guangxi warlord Lu Rongting to create the “Zhenning Battery).” Between north and south the grand battery was connected by an underground passage, and crossed the river through the length of more than 1000 meters – became known as the “underground Great Wall.”

February 1950, the PLA Army 45th division in the Ping Gang area cut off the Kuomintang 19th and 197th divisions, with 6715 troops. After two days and nights fighting in the Guangxi fortress, the PLA wiped out the remnants of the KMT forces. This is the war of liberation in southern Guangxi, the last battle known to history Ping'erguan The campaign battle.

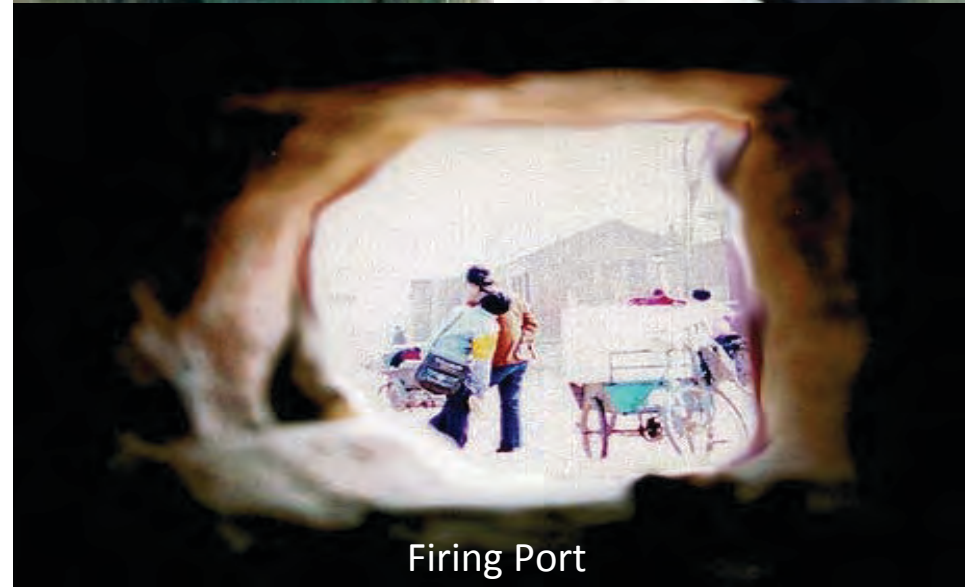


“地下长城 [Underground Great Wall],” op cit.

Beijing Tunnels from the War of Japanese Aggression



Monument to Tunnel Warriors



Firing Port

"War Tunnels Fortification in the Shunyi County of Beijing," at "China In Peaceful Times Honors Chinese Fighters At War Tunnels." blog, (no date) at < <http://chinadan.com/index.html> > [accessed 7 Mar. 2010].

Famous Art Depicting Defense of the Tunnels



“重温地道战：“地下长城”是如何搭建起来的 [Review the tunnel warfare: "Underground Great Wall" is how to build up],” *Xinhuanet*, (2010.07.30), at < http://news.xinhuanet.com/mil/2010-07/30/content_13938201.htm > [accessed 1 Dec. 2010].

Tunnels from the War of Japanese Aggression



Mao's original tunnel

"in the tunnel connecting Chairman Mao's childhood home to the rest of Shaoshan village.," blog (no date), at < <http://chinadan.com/index.html> > [accessed 7 Mar. 2010].

电视剧“地道战” TV drama “Tunnel Warfare”

“Film “Tunnel Warfare” has been hailed as a red classic films, as a commemoration of the 65th anniversary of the victory of the Chinese People's Anti-Japanese War as a tribute to the “Tunnel Warfare” tunnel warfare site in Hebei Province....”

“TV version of the “Tunnel Warfare” film uses the “three-stage” structure. The original single-port, dual port hiding hole, the development of interlinked to every household, every village connected, the tunnel dug under the devils strongholds and fortified towers....”

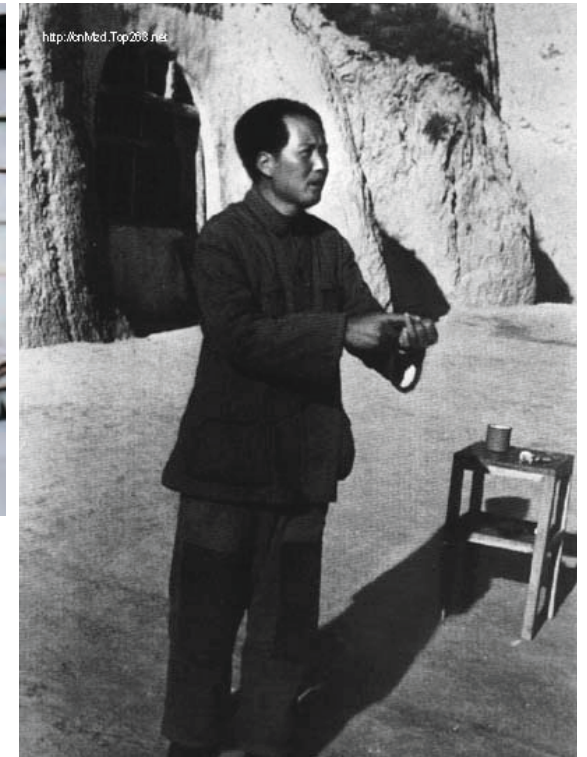
“...the TV drama ‘Tunnel Warfare’ will be limited to the original high-Jinjiazhuang of tunnel warfare and the neighboring villages, rivers and lakes, reed marshes, urban guerrilla warfare within the enemy's positions - mine warfare, mahjong warfare, ambush warfare, sabotage, war, siege warfare tactics....”

TV drama “Tunnel Warfare,” *ShowChina.org*, (no date), at < <http://www.showchina.org/zcr/yjdt/201001/t512229.htm> > [accessed 14 Mar. 2010].



Mao's Utilization of Caves during the Revolution

Yan'an, in northwestern China's Shaanxi Province, was the headquarters of the Communist Party of China from 1935-1948, serving as the endpoint of the Long March and as a military base against the Japanese.



LEFT: CCP Headquarters complex and Mao's command center;
ABOVE: Mao working in his cave office;
RIGHT: making a speech to cadres during his 13 years dwelling in Yan'an's caves.

Korea War “地下长城” “Underground Great Wall”

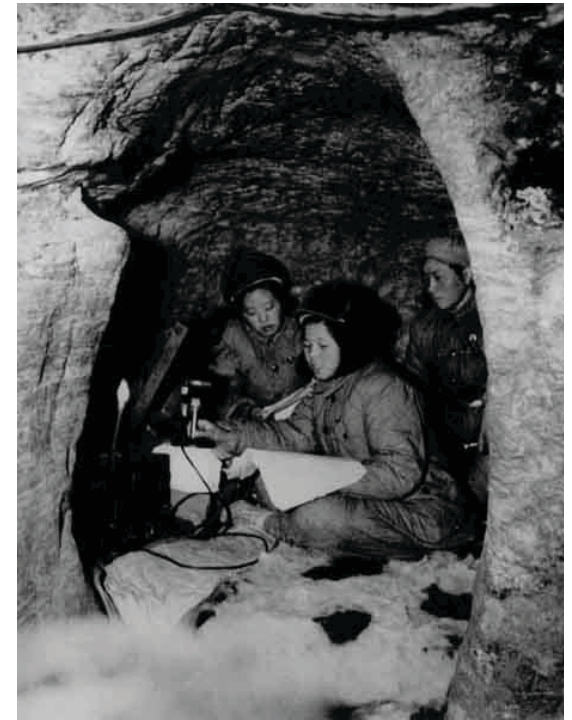


Volunteers Logistics depot carry forward the revolutionary spirit of hard struggle, mountains building a database, storage material.



志愿军战士不畏艰苦，一定要筑成“地下长城”

Volunteer soldiers despite the difficulties, we must build into the “**underground Great Wall.**”



Volunteers making radio broadcasts to enemy troops.

Korea War Stalemate: “Underground Great Wall”



Volunteer soldiers in the trenches in the cupola on the self-constructed self-built tools for tunnel.



Linking up through the tunnel, the soldiers “join forces.”

Ibid.



Night attack out of the position.



June 13, 1952 Palace Dai Lixi Hill battle, relying on volunteers Jun 12 trenches and fight the enemy repeatedly, kill and wound the enemy more than 2,000 people, smash the enemy's attack

Korea War: Underground Great Wall



Volunteer soldiers in the trenches enjoy bath.



Ma Liang Shan volunteer unit fighting in the infantry, artillery, armored joint command post.



Squad attack.



Tunnel briefing & oath before battle.



To carry out training activities in the tunnel.

Ibid.

Korean War era Tunneling

"In view of the Battle of the Korean War a Major lessons learned In the 20th century, China's national defense project began 60 years of underground fortress building."



Illustration from: "防护工程建设的中外比较和战略思考 [Protection Project at Home and Abroad and Strategic Thinking]," *ShowChina*, (2009.03.06), at < <http://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm> > [accessed 10 Dec. 2010; translated by IP-1011].

Korean War era Tunneling

“During the Korean War, the Chinese People's Volunteers and the Korean People's Army Air Force created an Air Force joint operations command structure. Under the Sino-Korean Combined Forces Command, the headquarters was set up by the Chinese People's Volunteers and the dual leadership of the PLA Air Force.”



Command Tunnel for the Joint Command, December 1950

“中朝空军联合司令部 [Korean Air Force Joint Command],” 空史纵横, (2010.04.20), at < <http://www.plaaf.net/> > [accessed 20 Feb. 2011; translated by Google Chrome].

Underground Culture

“An estimated 40 million people in northern China still live in cave homes known as yaodongs.”



“People's Republic of China,” *Wikipedia*, (2011.09.18), at < http://en.wikipedia.org/wiki/People's_Republic_of_China > [accessed 2 June 2011].

STUDY #3

Cold War Civil Defense Tunneling

- **3rd Line Construction -- Relocation & Hardening of Industry: 1964-1979**
- **Beijing Civil Defense Shelter Complex**
- **Project 131: CMC National Command Bunker**
- **Project 816: Reserve Weapons Production Complex**
- **Project 7381 at Harbin: Urban Defense for Nuclear War**
- **Modern Shanghai's Underground**
- **Military Rail & Road Tunneling**
- **Related Issues**

PRC Civil Defense

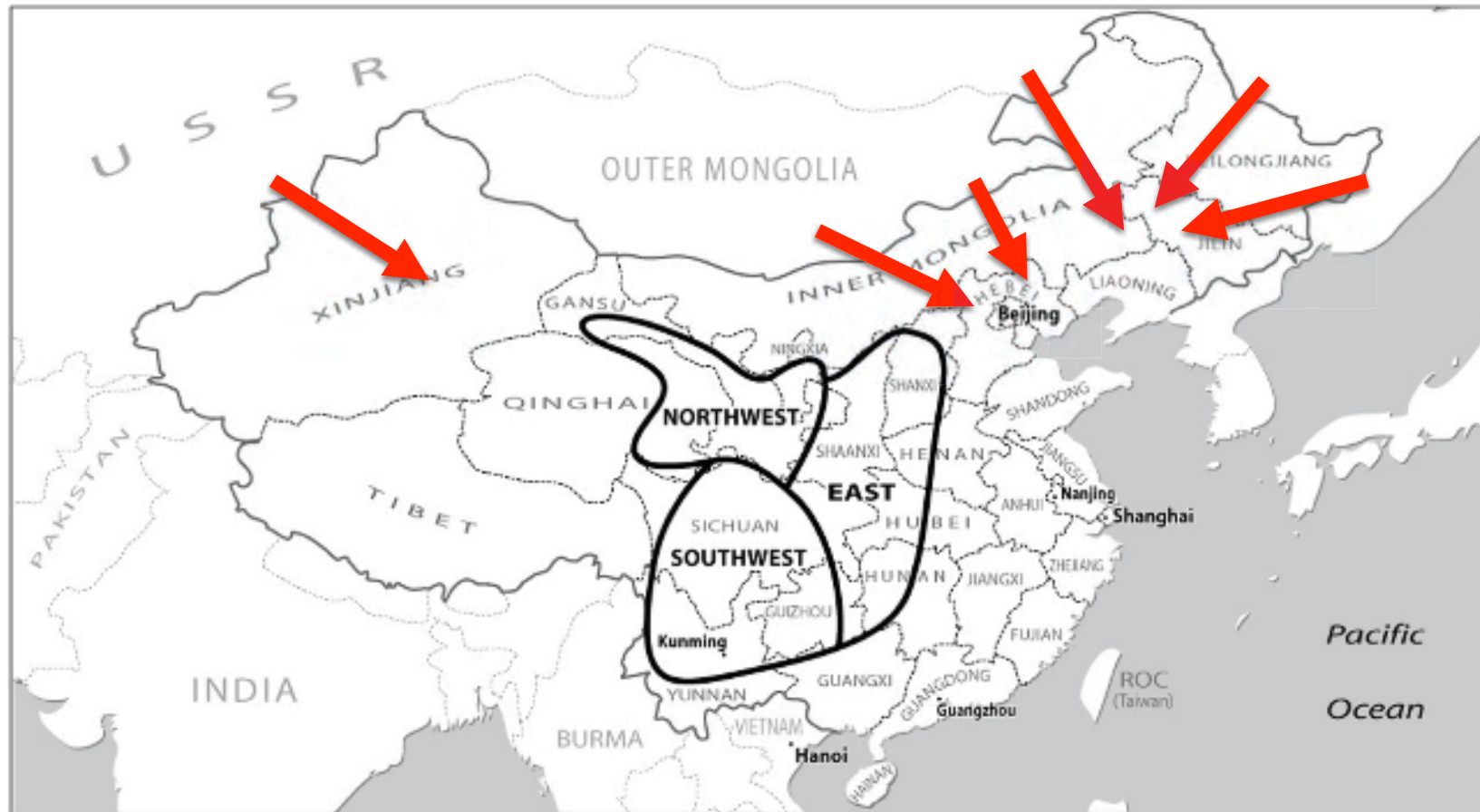
The Chinese have taken some initial steps to provide protection against the immediate effects of a large-scale nuclear attack. They apparently feel that their civil defense has enhanced civilian morale as well as their ability to survive an air or missile attack.

In contrast to the West's, China's civil defense measures have taken on a new and larger strategic dimension. The extensive construction of shelters and underground tunneling serves two purposes. They are seen as offering some protection of personnel during bombing and as providing locations from which to fight an invader in the ground defense of a city.

China's shelter and tunnel program is one of the most extensive in the world, though its effectiveness remains untested. Since 1969, the massive effort to build more and better protection has resulted in the construction of a maze of shelters and tunnels under most, if not all, large and medium-sized cities.... [T]he nature and quality of these underground installations vary from city to city....

“Third-Line Defense”

Relocation & Hardening of Industry: 1964-1979



Map from: Lorenz Luthi, “The Vietnam War and China’s Third-Line Defense Planning before the Cultural Revolution, 1964-1966,” *Journal of Cold War Studies*, vol. 10, no. 1, (Winter 2008): pp. 26-51; and Barry J. Naughton, “The Third Front: Defense Industrialization in the Chinese Interior,” *China Quarterly*, No.115 (September 1988), pp. 351–386.

3rd Line Construction in the 1960s

Millions of Peasant Man-hours of Labor



•“毛泽东在1964年的一个重大决策：建设大三线 [Mao Zedong in 1964, A Major decision: Third Front Construction],” 爱丽白领女性网, (2010.12.23), at <<http://www.aioliol.com/news/80112.shtml>> [accessed 22 Mar. 2011].

Massive Impact of “TLD” Relocation of Industry: 1964-1979

- From 1965 to 1979, 125 large-scale enterprises (producing cars, light and heavy machinery, mechanical equipment, rolling mills, etc.) were completed;
- From 1969 it included Underground location of Nuclear Reactors, Warhead Storage, Command Center, Urban population civil defense (northern cities) and bunkers for DF-1 and DF-2 missile storage but cost of the latter NOT included in TLD budget;
- 8,000 km of railroad tracks and 250,000 km of roads were constructed to support TLD projects.
- TLD seen as source of enormous economic drain and was cancelled in the post-Mao development policy.

<i>Year/Period</i>	<i>Overall budget for capital investment in billion yuan RMB</i>	<i>Budget for TLD in billion yuan RMB</i>	<i>TLD share in % of overall capital investment</i>
1965	17.000	7.813	45.96
1966–1970 (3rd FYP)	97.603	48.243	49.43
1971–1975 (4th FYP)	176.395	59.200	33.56
1976–1980 (5th FYP)	246.786	69.100	28.00
<i>1965–1980 (Total)</i>	<i>537.784</i>	<i>184.356</i>	<i>34.28</i>

Source: Li Cunshe, “Woguo sanxian shengchan buju de jibe texheng” [“The Basic Features of the Overall Arrangement of Production for Our Country’s Three-line Defense”]. *Zhongguo gongye jingji yanjiu* 1992/1993, p. 48. See also Zhonggong zhongyang wenxian yanjiushi bian [CCP, Central Documents Research Office], *Zhou Enlai nianpu, 1949–1976* [A Chronicle of Zhou Enlai’s Life: 1949–1976], 2 vols. (Beijing: Zhongyang, 1997), Vol. 2, 725.

3rd Line Defense Production Underground



Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Distribution of Dispersed and Tunneled Facilities

011 Base: Anshun. Fighter and trainer aircraft production base.

012 Base: Hanzhong. Into a fighter production base is expected in 1975, the central decision developed by Xi'an Aircraft Design shipped eight aircraft from the 012 bases continue to develop the base into a transport aircraft manufacturing base. Tong Hui Machinery Factory in 1979, Jinsong Machinery Plant and the 012 aircraft design by the separation of the establishment of a separate Shaanxi Aircraft Manufacturing Company, 012 Aviation parts production base into base. In 1980, eight transport aircraft in production.

013 bases (Hunan aviation): Zhangjiajie - Changsha. Jurisdiction of several aviation parts plant (mainly Xiang Ling Machinery Factory Factory 3028) and Zhangjiajie Vocational and Technical College aviation industry, aviation and the third and Design Institute.

014 Base (Missile Institute of China): Luoyang. 158 South Peak plant moved to the company from Hanzhong, specializes in manufacturing air to air missiles.



“大三线建设：——宏伟深远的超级战略工程 [Third Front Construction: Super Grand Far-reaching Strategic Project],” *Sina*, (2008.08.24), at < http://blog.sina.com.cn/s/blog_5a53af350100araj.html > [accessed 24 Mar. 2011; translated by IP-1011].

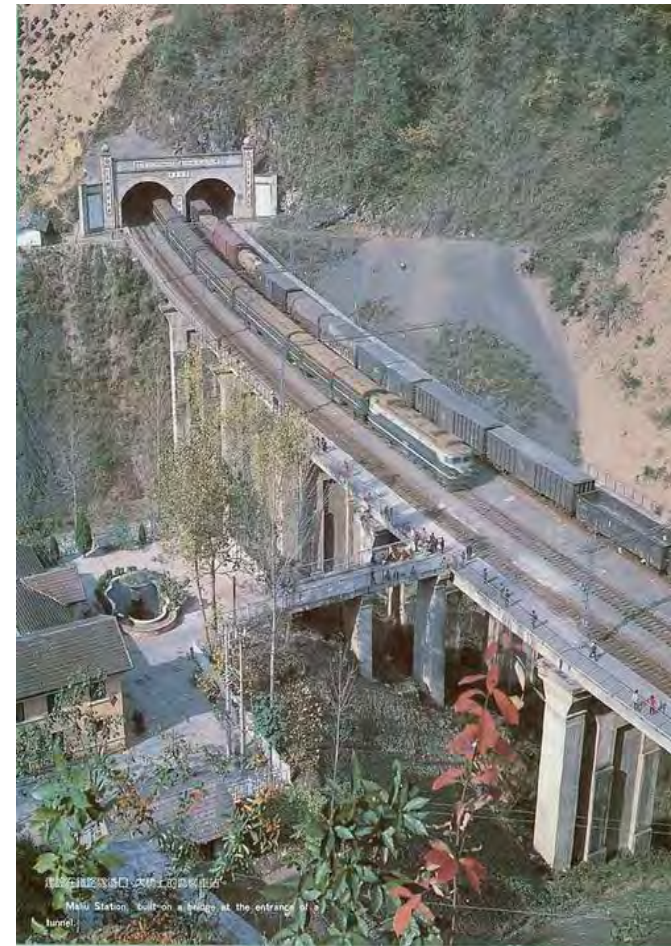
Chongqing Rail Line

3rd Line Tunnel Construction

Impact of Civilian Tunneling:

- Built between 1970-1978;
- Line length of 897 km;
- Total of 716 bridges;
- 405 tunnels;
- Sixty “student” construction companies with 18,500 high school and 25,800 junior high school students to participating
- Within a three year period 141 students killed in construction accidents.

Bridge and tunnel length equaled 45% of total line length over the Chengdu-Kunming line.



“襄渝铁路往事：121名三线学兵在建设中牺牲 [Xiangyu past: 121 three-line, students and soldiers lost their lives in the building],” *Tencent Zhuanqu*, (2009.08.28), at < <http://news.qq.com/a/20090828/002653.htm> > [accessed 20 Mar. 2011; translated by IP-1011].

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Distribution of Dispersed and Tunneled Facilities (cont.)

- 061 Base (South space) Zunyi. Anti-aircraft missile base, sub-two homes built aircraft.
- 062 Base (Aerospace VII Hospital) million Source - Chengdu. Rocket / missile production base. Construction of a hospital sub-navigation.
- 063 Base (Aerospace four homes): Xi'an.
- 064 bases (into 062 base): Florida.
- 066 Base (Sanjiang Space): Yuan'an - Xiaogan. Cruise Missile base (red bird). Construction of Hospitals minutes flight.
- 067 Base (Aerospace six homes): Fengxian - Xi'an. Liquid rocket engine production base. Construction of a hospital sub-navigation.
- 068 bases (Hunan Aerospace): Shaoyang City 4 County 1 - Changsha. Sub navigation built two homes. Founded in 1970, 1978, stop the construction in 1994, moved to Changsha.
- 081 Base (Kawakita E): Guangyuan. The original 0821 headquarters, built in 1965, the production base for the fire control radar.
- 082 Base: eastern suburbs of Chengdu, the electronics industry base.
- 083 Base (Zhenhua Electronics): Duyun.
- 541 Factory: Tank manufacturing base, authorities Wenxi Township, the plant located in Xinjiang County, Yicheng and Yuanqu.



“大三线建设：——宏伟深远的超级战略工程，” op cit.

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Third Front Construction of Major Achievements

- China steam (Shiyan City, Hubei Province)
- China's second-largest automotive group
- Oilfield (Qianjiang City, Hubei Province)
- Changqing Oilfield (Shaanxi Province) China's third-largest oil field
- Jiuquan Iron and Steel Group (Gansu Jiuquan)
- Northwest aluminum plants (Lanzhou)
- Panzhuhua Iron and Steel Group (Sichuan Panzhihua)
- China's fifth largest Steel Group
- Coal base in the Helan Mountains (Shizuishan City)
- Jiuquan Space Launch Center (Gansu Jiuquan) China's largest space launch site
- Xichang Space Launch Center (Sichuan Xichang)
- Jinchuan Nonferrous Metals Company (Jinchang)
- Jialing Motorcycle Group (Chongqing) the world's largest motorcycle maker
- Liupanshui coal industry base (Liupanshui)



“大三线建设：——宏伟深远的超级战略工程,” op cit.; and photos from: “我们的大三线 [Our Third Line],” *Wilderness Wolf*, (2010.04.30), at < <http://ckkkkk-007.blog.163.com/blog/static/32649606201033033020813/> > [translated by IP-1011; accessed 21 Mar. 2011].

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Third Front Construction of Major Achievements (cont.)

Deyang Second Heavy Machinery Plant (Sichuan Deyang) Large machinery manufacturer

Luoyang Glass Factory (Luoyang, Henan Province)

Dongfang Steam Turbine Works,

Dongfang Electrical Machinery Factory

Dongfang Boiler Works

Chengdu-Kunming Railway (Chengdu - Kunming) Total length of 1091 km

Hunan-Guizhou railway 772 km (Zhuzhou - you may be) Total length of 905 km

Xiangyu Railway (Xiangfan - Chongqing) Total length of 1,411 km

Qinghai-Tibet Railway a (Xining - Nanshan mouth) full 814 kilometers

Liujiaxia Hydropower Station The total installed capacity of 1,225,000 kilowatts, generating capacity of 5.7 billion degrees of Danjiangkou Hydropower

Asia's largest artificial freshwater lake Hydroelectric (Hubei Yichang city) The total installed capacity of 2,715,000 kilowatts, generating capacity of 16.1 billion degrees in Southwest China

Research Institute of China

Nuclear Power Institute of Physics



“大三线建设：——宏伟深远的超级战略工程，” op cit.

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling



“大三线建设：——宏伟深远的超级战略工程，” op cit.

DEFENSE RELATED EXAMPLE 1: Beijing Underground City

“The Secret Tunnels of the Capital”

Mao Tse Tung (1969)

A relic from the Cold War Era and the 1960s tensions between China and the Soviet Union. Once a secret air-raid shelter network expected to protect 40% of the Beijing Public inside underground Tunnels from a devastating nuclear attack, it fell into disuse after the late 1970s.

During the Days of the Cultural Revolution 400,000 Beijing Chinese were mobilized to dig these underground tunnels that run for miles and miles under Beijing.

After the Cultural Revolution and with the advent of modernity in China, it was soon forgotten by most Beijingers and remained a site virtually unknown to the City’s Citizens until at least the year 2000AD. Since it has become a modest tourist attraction.... Beijing Underground city can be found in the Chongwen District.¹



One of 90 original entrances.



Staircase descending 8-18 meters.



Internal florescent site map.

1 "Beijing Underground City The Secret Tunnels of the Capital," *China Report*, (11 September 2009), at < http://www.drben.net/ChinaReport/Beijing/Landmarks-Hotspots/ChongWen/Underground_City-Beijing_Air_Raid_Shelters/Beijing_DixiaCheng-Beijing_Underground_City.html > [accessed 7 Mar. 2010].

Beijing's Underground City

30 km in length

*"Beneath the ancient city of Beijing, an underground city of definite proportions has already begun to emerge. There are factories, stores, guesthouses, restaurants, hospitals, schools, theaters, reading-rooms, a roller skating rink, a grain and oil warehouse, and a mushroom cultivation farm. These underground production and service facilities cover a total area of **850,000 square meters and makes use of more than 1,000 anti-air raid structures.**"¹*

Current Activity:

- Entertainment: 4 main public restaurants, 2 underground theaters, and a roller skating rink.
- Hotels: *"In the last few years, the number of underground hotels has climbed to 100, with a total of more than 10,000 beds. This number is roughly equivalent to the half of the total offered at guest houses in the Beijing Municipality."*
- Retail and leased storage: *"The stores underneath the Xidan shopping area north of Chang'an Hotel take up an area of over 5,000 square meters. Of this, some 4,000 square meters are used for storage, the rest for business. **Ventilation equipment maintains a constant 27 °C environment, with relative humidity never above 78 percent.**"*

Public Access:

- Public tours operated between 2000-2009:
"There are roughly 90 entrances to the complex, all of which are hidden in shops along Qianmen's main streets. A fluorescent wall map reveals the routing of the entire tunnel system. You can visit a section of the tunnels and ... you'll pass chambers labeled their original function (cinema, hospital, arsenal etc) as well as flood-proof gates. You can also make out signposts to major landmarks accessed by the tunnels (Tiananmen Sq, the Forbidden City), but these routes are inaccessible."
- Since June 2009, however, other than commercial locations listed above, all tour entrances currently closed.²

Dark Side:

- Much of the complex not maintained – flooded, filled with trash, and boarded up.

¹ "The Underground City," *Beijing: A Guide to China's Capital City*, (2009?) at < <http://www.china.org.cn/english/features/beijing/30836.htm> > [accessed 15 Jan. 2010].

² "Beijing Underground City," *Lonely Planet Review*, (20 April 2010) at < <http://www.lonelyplanet.com/china/beijing/sights/368621> > [accessed 5 May 2010]: Stephan Curran, (posted: 11 June 2009) "Current Access to Underground City -- I tried to access the Underground City on June 10 2009 and could find no way in.... The city is still there, hiding...." Andy Degraeve, (posted: 20 April 2010) "I have been to the underground city entrance at 62 West Damochang Street in Qianmen. That entrance is advertised to be closed permanently."

“The Secret Tunnels of the Capital” under construction



Mao personally reviewing plans for Underground City



400,000 civilians participated in construction



400,000 civilians participated in construction



Part of interior lined with the old city walls of Beijing

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].

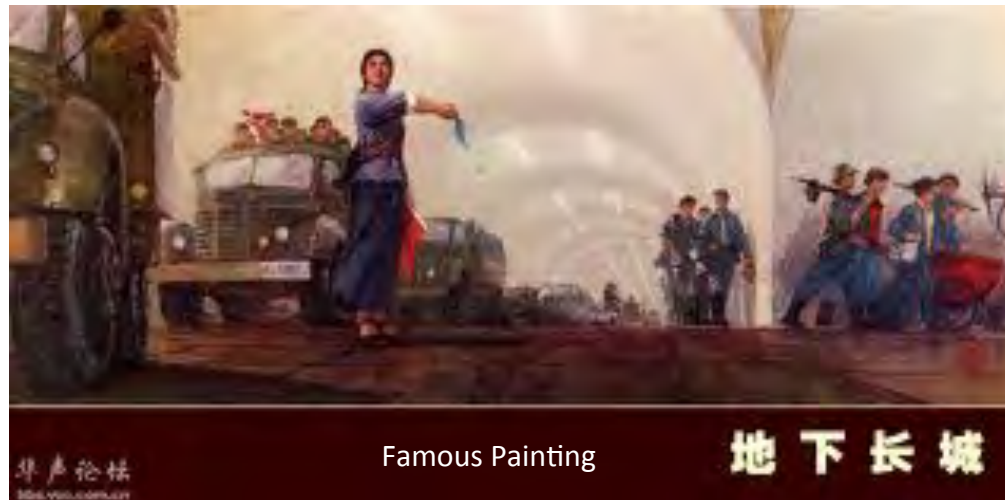
“The Secret Tunnels of the Capital” as a cultural achievement



Plaque from Underground City



Stamp Commemorating Effort



Famous Painting

“Underground City,” *China Internet Information Center -- Travel*, (15 April 2005), at < http://www.drben.net/ChinaReport/Beijing/Landmarks-Hotspots/ChongWen/Underground_City-Beijing_Air_Raid_Shelters/Beijing_DixiaCheng-Beijing_Underground_City.html> [accessed 7 Mar. 2010].

“The Secret Tunnels of the Capital” upon completion



Active hospital in underground city



Storage compartments & narrow-gauge rail transport



Heavy blast/anti-radiation doors on underground hospital



VIP drive-thru galleries

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].

Beijing Underground City

Decline thru Lack of Use



Beijing Underground City



"Beijing Underground City The Secret Tunnels of the Capital.," *China Report*, (11 September 2009), at < http://www.drben.net/ChinaReport/Beijing/Landmarks-Hotspots/ChongWen/Underground_City-Beijing_Air_Raid_Shelters/Beijing_DixiaCheng-Beijing_Underground_City.html> [accessed 7 Mar. 2010].



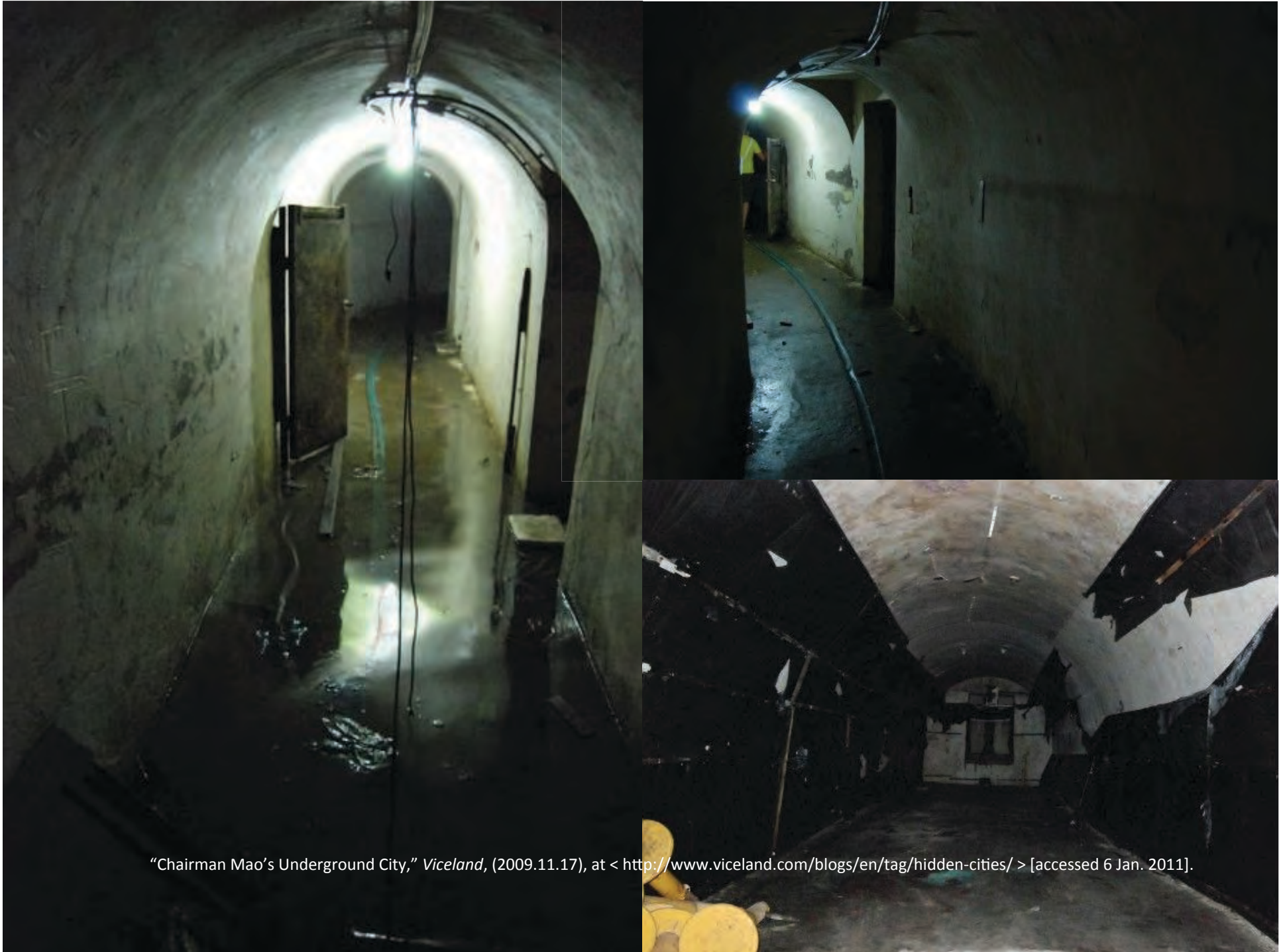
Beijing Underground City The Dark Side

"Beijing Underground City The Secret Tunnels of the Capital.," *China Report*, (11 September 2009), at < http://www.drben.net/ChinaReport/Beijing/Landmarks-Hotspots/ChongWen/Underground_City-Beijing_Air_Raid_Shelters/Beijing_DixiaCheng-Beijing_Underground_City.html> [accessed 7 Mar. 2010].



"China's Underground Cities , Prep for Nuke War," Defense Forum India, (2010.01.16), at < <http://defenceforumindia.com/china-pakistan-defence/8013-chinas-underground-cities-prep-nuke-war.html> > [accessed 6 Jan. 2011].





"Chairman Mao's Underground City," *Viceland*, (2009.11.17), at < <http://www.viceland.com/blogs/en/tag/hidden-cities/> > [accessed 6 Jan. 2011].





DEFENSE RELATED EXAMPLE 2: Central Committee Command Complex

Project 131

- CONTEXT: A deteriorating relationship with the USSR after the “Zhenbao Island military clash back in the 60s after the war when the Soviet Union deployed on the border 1 million troops eyeing China. Anticipating a War of Aggression against China, its top authorities recognized an urgent need to prepare for an it and decided to build an anti-nuclear war underground headquarters in the central hinterland.”
- Leadership orders the construction of a nuclear war command center constructed as a series of underground bunkers for the senior political elite and the PLA command and control organs;
- Under the direct command of General Huang Yongsheng, Central Political Bureau member and PLA Chief of Staff, who picked the location for leadership hideout near his home town of Gaoqiao Town, Xianning City, Hubei Province;
- Top Secret program started 1969 January 31
- 1-31, thus named 131; construction: 1969-1971
- Stopped before completed, investment = 1.3 billion.



For a very useful history, see: “Mystery 131 Works: 60 Years to Build the Anti-Nuclear Underground Headquarters,” [“神秘131工程:60年代修建的防核地下指挥部”], *China News*, (1 October 2007), at < <http://bbs.chinanews.com.cn/thread-15076-1-1.html> > [accessed 31 Jan. 2010, translated by PAK]; and Jiejunyun, “131 Top-Secret Project - Xianning Cheng Tunnel Underground Headquarters,” [“131绝密工程 ——湖北咸宁澄水洞地下指挥部”], *China Super Project [中国超级工程]* blog, (7 July 2009), at < > [accessed 6 Mar. 2010].

Project 131

Mao's Above Ground Villa

- Leadership orders the construction of a nuclear war command center constructed as a series of underground bunkers for the senior political elite and the PLA command and control organs;
- *“Surrounded by verdant mountains and forests, the location is hard to see, even from low-altitude reconnaissance aircraft, is indeed a good place for the construction of hard to find military facilities.”*



LEFT: Entrance to tunnel complexes



RIGHT: Mao's bedroom

For a very useful history, see: “Mystery 131 Works: 60 Years to Build the Anti-Nuclear Underground Headquarters,” [“神秘131工程:60年代修建的防核地下指挥部”], *China News*, (1 October 2007), at < <http://bbs.chinanews.com.cn/thread-15076-1-1.html> > [accessed 31 Jan. 2010, translated by IP-1011].

Project 131 Mao's Command Center

Mao: "Burrow deep, store grain, never seek hegemony."

Lin Biao: "If the North is lost, we must build an impregnable position in the south with an underground headquarters."



- *In addition to the extensive tunneling, the plans included "an airport, railway, highway, and other ancillary works."*
- *With the fall of Lin Piao, the "131' underground construction was not yet fully completed and came to a rash end." Visiting the complex which is now open to Chinese tourists (but not foreigners) a reporter noted the large scale of the operational headquarters and extensive facilities designed specifically for Chairman Mao, where once the war broke out, he "will be here, strategizing Chief of the three armed forces, commanding the war against aggression."*

Project 131 Underground Bunker



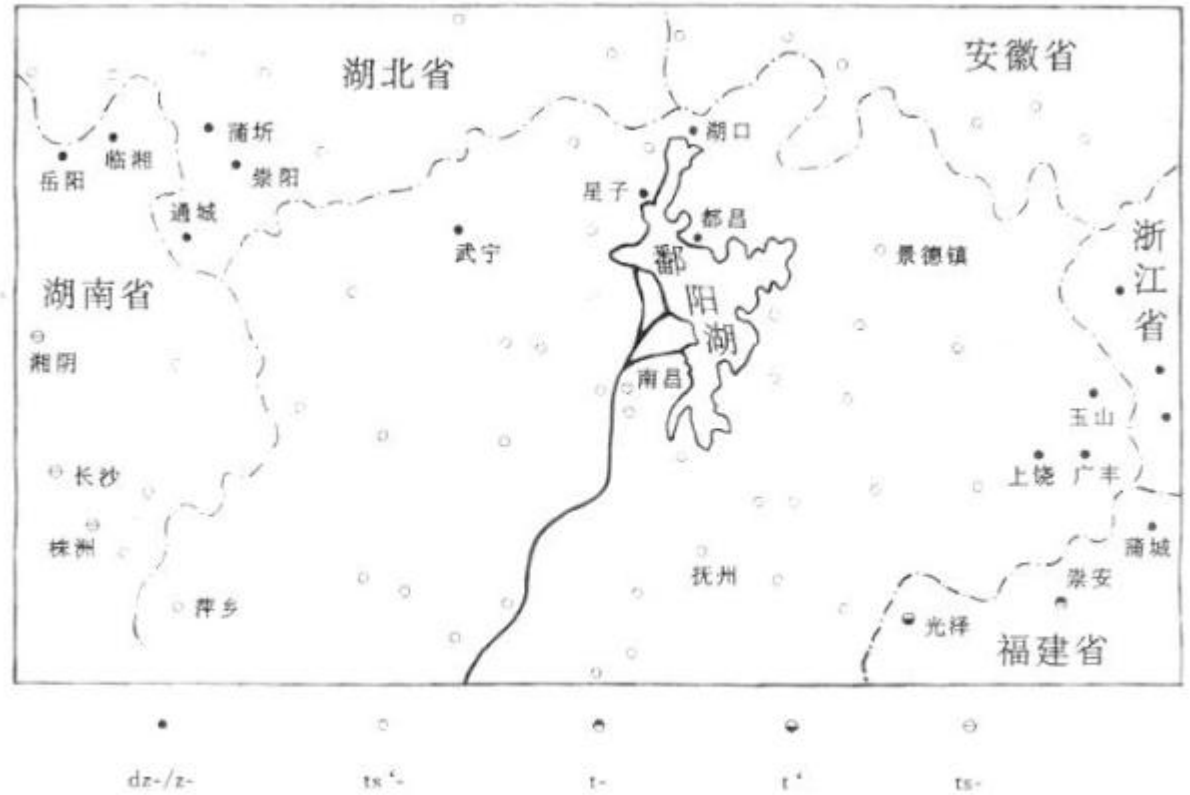
"探秘湖北"131"工程：毛泽东与江青卧室什么样 [Quest Hubei "131" project: What kind of Mao Zedong and Jiang Qing bedroom]," 晓慧的博客, (2011.08.03), at < <http://zhanghui552.blog.163.com/blog/static/807152162011730172285/> > [accessed 1 Sept. 2011; translated by IP-1011].

Project 131 Underground Bunker



ibid.

Project 131



图八 “茶”字声母读音特征图

"临湘地图_5724临湘地图_临湘地图 [Linxiang Map_5724_Linxiang Map Linxiang Map]," WOPUS, (2011.07.03), at < <http://www.groupons7.com/linxiangditu/20110703/775.html> > [accessed 1 Sept. 2011; translated by IP-1011].

Project 131 Underground Bunker



ibid.

DEFENSE RELATED EXAMPLE 3: Nuclear Reactor

Project 816: Reserve Weapons Production Complex

Known as "the world's largest artificial cave," the Chongqing Fuling 816 military cave for the first time to open as tourist attractions. The project started in 1967, to conduct pre-drilled holes by the Corps of Engineers, The Ins and Outs of human 60 000 people share the 1984 lockout, in April 2002 to decrypt.

816 military cave is located in the streets of Fuling District, Bai Tao. In 1966, Zhou Enlai, China approved the construction of a second nuclear material industrial base for Third-Line construction -- atomic reactors and chemical post-treatment works, that is, to provide nuclear bomb underground nuclear plant materials, are classified as top secret level military secrets.

816 military tunnel for body total construction area of 104,000 square meters, plant hole depth of 400 meters. Cave at the top of the best cover 200 meters thick, the core parts of plant cover layer thickness of 150 meters.

Entrances = 19, corridors = 21 km in total length.

April 24, the tourists visited the reactor hall. Nuclear reactors, also known as atomic reactors or reactor, is equipped to achieve large-scale nuclear fuel fission chain reaction can be controlled device. The hall and down a total of nine layers, up to 79.6 meters, the equivalent of 20 multi-storey building height, size of a standard football field is almost the same.

Nuclear reactors, "bottom" well preserved. According to reports, bottom diameter of 78 cm of the 2001 holes, for nuclear materials, nuclear energy exchange. As the production here has not stopped, there is no radiation.

9 floors in the main control room, are placed at the most advanced computer body, the computer console is on the four drops of a diameter of about 2m in the control panel, the holes were filled with hundreds of nuclear material rod is inserted into the these holes, but never really used in the production.

"816工程参观照片 [816 Project Photo Tour]," topic: 航天二炮及新概念武器 [Second Artillery Corps and the New Concept of Space Weapons] at 超级大本营论坛 [Higher Headquarters Forum], (2010.04.26) at < <http://bbs.cjdbj.net/thread-917792-1-3.html> > [accessed 20 May. 2010, translated IP-1011].

Project 816 Mountain



"Declassified Chinese Underground Nuclear Facility Open to Public," *Youtube*, (2010.04.22) at OSC.



Project 816 Entrance

Project 816 Underground Nuclear Reactor



"816工程参观照片," op cit.

Project 816 Underground Nuclear Reactor



Early construction



Control Room under repair



Press tour of facility

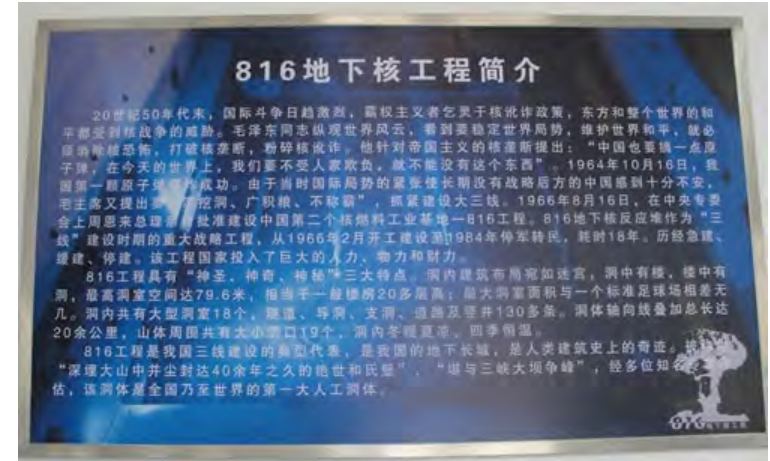
"816工程参观照片 ibid; and "深山"潜伏"36载 重庆核工程揭秘 [Mountains "latent" 36 Secret Nuclear Engineering Chongqing contained," Beijing News, (2010.05.19), at < <http://cq.gmw.cn/Item/40880.aspx> > [accessed 21 Mar. 2011; translated by IP-1011].

Project 816 Underground Nuclear Reactor



"816工程参观照片," op cit.

Project 816 Underground Reactor Core

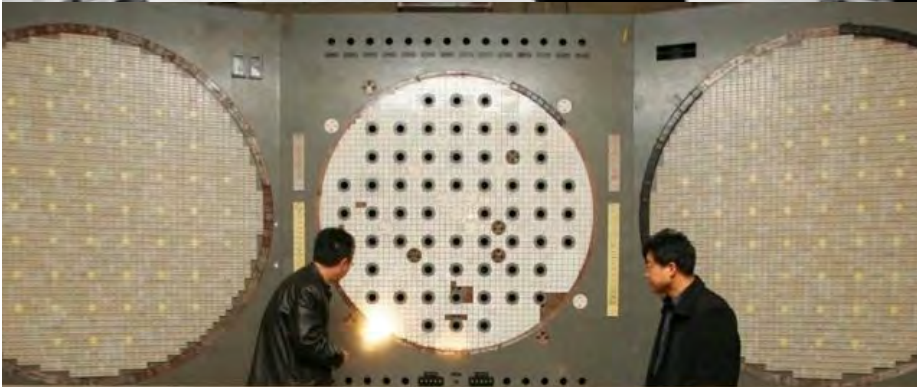


"816核工厂对市民开放洞里有什么？ [816 Nuclear Plants Open to the Public What Hole?]," *Chongqing Times (Xian)*, (2010.04.25) at < <http://news.163.com/10/0425/11/6544M9OD00014AEE.html> > [accessed 20 May, 2010, translated IP-1011].

Memorial plaque (upper right) from: "欧美震惊：中国“地下长城”核力量远超想象 [Europe shocked: China's "underground Great Wall" of nuclear power far beyond imagination]," LeiTing001, (2011.08.23), < <http://www.leiting001.com/news/201108/25044.html> > [accessed 15 Sept. 2011; translated by IP-1011] > [accessed 15 Sept. 2011; translated by IP-1011].



Project 816 Underground Reactor Control Panels

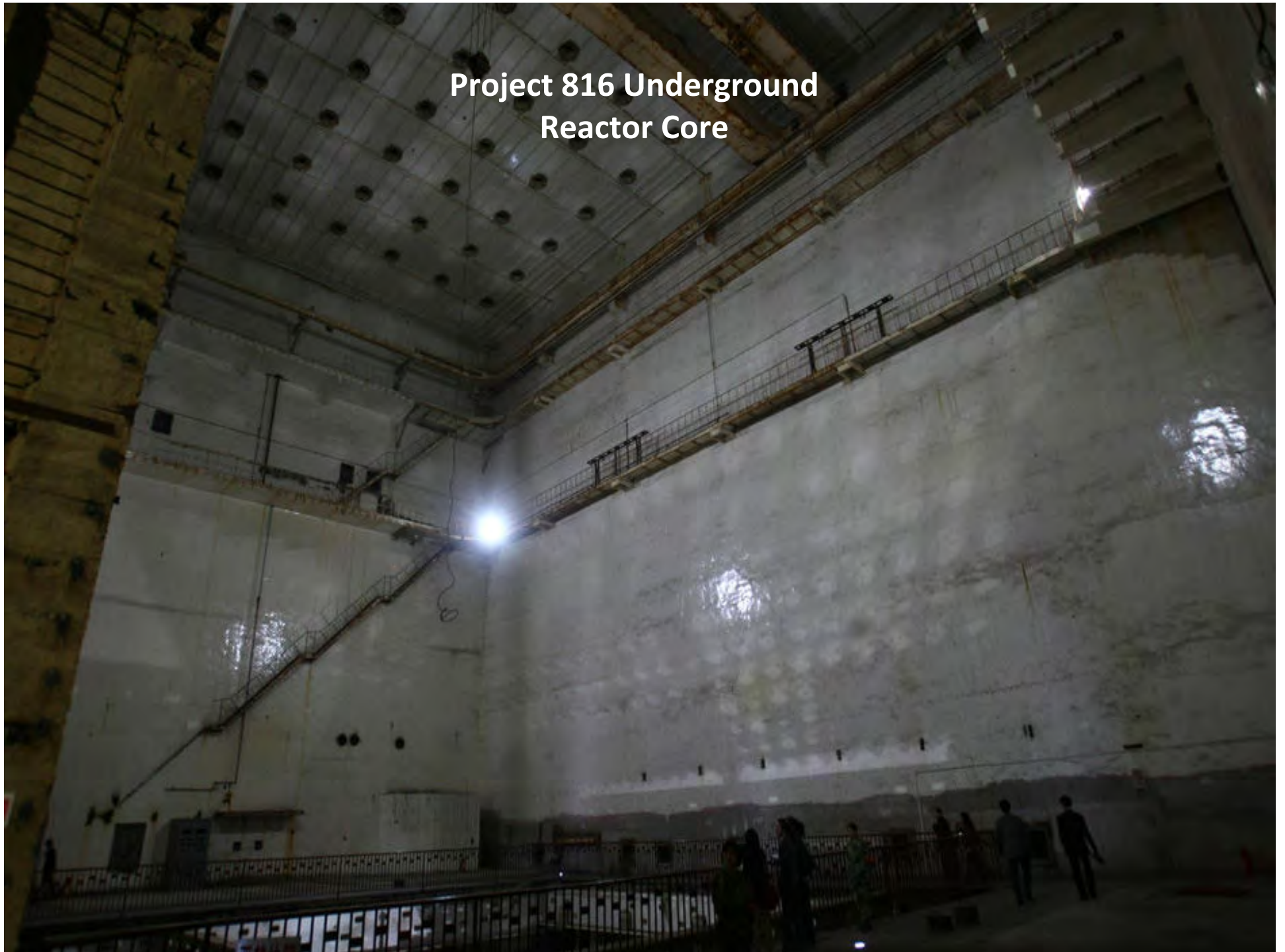


Project 816 Underground Reactor Core



816工程参观照片 ibid.

Project 816 Underground Reactor Core



Project 816 Schematic

(entrances = 19, corridors = 21 km)



DEFENSE RELATED EXAMPLE 4: Urban Defense for Nuclear War

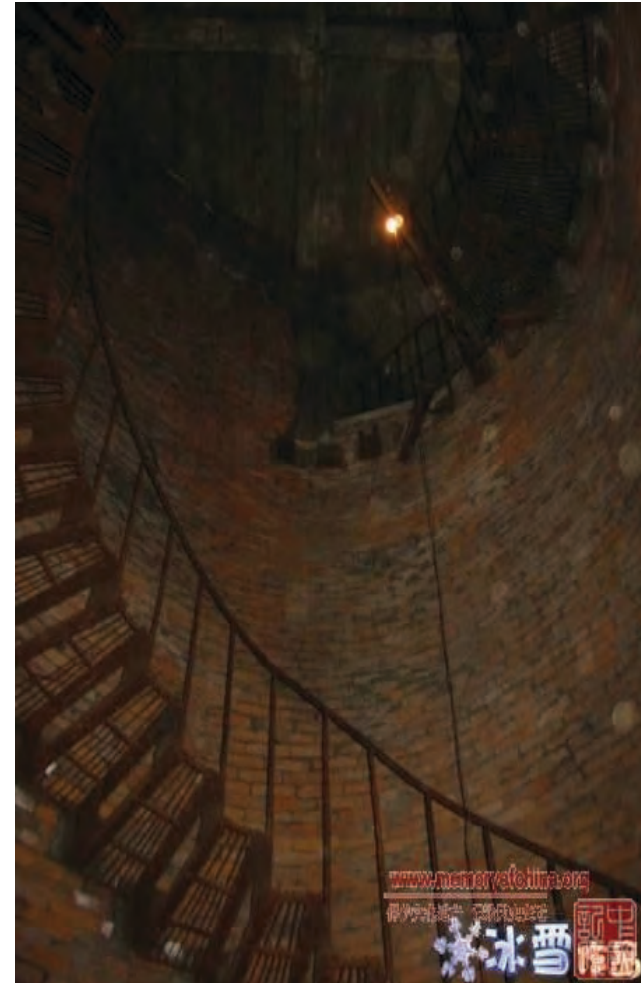
7381 Project at Harbin

- CONTEXT: “After the “Zhenbao Island incident, under the guidance of the people the entire Party concluded that Harbin air defense system, an important position ‘must be prepared to fight’ placed the city's.”
- “From 1970 to 1980, Harbin civil air defense construction mobilized the masses and concentrated on building a permanent masked fortifications, mobile evacuation roads and groups fortifications. This included ten new roads of 376,631 square meters ... and protection for thousands of families in the underground tunnel network.”
- “In 1973, taking into account Harbin as an important strategic position it was recognized that the original construction of the small trunk size tunneling was small, poor quality, and can not meet the evacuation of staff and operational mobility needs of the situation....”
- “...decided to build underground evacuation tunnels through the city, connecting mountains and the ‘5 can be’ large motorized roads project.”
- “...on August 1, 1973 (73-8-1) by the provincial approval, the name ‘7381’ project.”
- “After six years of continuous construction of the building to complete the project – depth of 21 meters by 6 meters wide and 7.3 m of reinforced concrete structures -- trunk engineering 111.8 thousand square meters, trunk length of 9.5 kilometers.”
- “‘7381’ project to participate in the construction of 68 units, the average daily number of people involved in the construction of the 1.5 million people, with a total investment volume of more than 720 million working man-days to build area of 11 thousand square meters.”

- 1 Project 7381 is extensively discussed in: “Harbin, ‘7381’, A Giant Underground Works -- Underground Great Wall, Super-Air-Raid Shelter,” *Love China blog*, (24 August 2008) at < http://blog.sina.com.cn/s/blog_5a53af350100ar7w.html > [accessed 1 Mar. 2010].
- 2 The “5 can be” projects were designated to be able to: [1] prevent [war],[2] fight, [3] be mobile, [4] able to live, and [5] can produce.”

7381 Project at Harbin (cont.)

- “After six years of continuous construction of the building to complete the project – depth of 21 meters by 6 meters wide and 7.3 m of reinforced concrete structures -- trunk engineering 111.8 thousand square meters, trunk length of 9.5 kilometers.”
- "7381" project entirely of reinforced concrete structure, the entire project consumed 12,501 tons steel, 20,549 cubic meters of wood, 100,000 tons of cement, sand and 247,000 cubic meters, all kinds of stone 400 thousand cubic meters, a total investment of 53.08 million yuan (not including labor costs and sporadic tool costs), the average cost of 404 yuan per square meter.



Ibid.

7381 Project at Harbin (cont.)



The “New” 7381 Project

Subway Reconstruction using 10km of original tunnels



Screen capture video from: “建設中的哈爾濱地鐵一號綫 Harbin subway line No.1 under construction],” (2008.08.30) at < <http://www.youtube.com/watch?v=CDhi1EcvviM&feature=related> > [accessed 7 June 2010].

DEFENSE RELATED EXAMPLE 5: Modernizing Civil Defense

Modern Shanghai's Underground

方孔栋 (Fang Kong Dong)¹

Shanghai Super Underground Bunker Built to Accommodate 200,000 in Emergency

Shanghai has constructed a massive underground bunker complex capable of sheltering 200,000 people from a nuclear attack, a local newspaper reported.

The million-square-foot complex connects to shopping centers, office buildings, apartment buildings and the subway system via miles of tunnels, the Shanghai Morning Post said in an exclusive report.

The newspaper said the complex has water, electricity, lighting, ventilation and protective doors, and can support life for as long as two weeks.²



Shanghai's Civil Defense Office announced completion of the city's largest subterranean bunker:

- 90,000 square meters;
- Accommodate 200,000 citizens;
- Protection from nuclear radiation, poisonous gas releases, or terrorist blasts.
- 15 tunnels, each 4,000 meters, link more than 10 trading centers, office buildings, and residential buildings throughout city.
- Complex equipped with its own power supply, ventilation, and power storage capability, which is able to ensure a daily underground supply for 1–2 weeks.
- Shelter is connected to railway and world's largest subway.³

¹ "When I was a kid in Shanghai, I used to play in those underground bunkers.... They are called Fang Kong Dong, or anti-air holes...Also, in my elementary school, we converted part of the underground bunker into a sports complex where my school's rifle team used to practice." European Bunkers blog, op cit.

² "Shanghai Constructs Underground Bunker Capable Of Sheltering 200,000 People," Associated Press, (2006.07.31) at < <http://www.freerepublic.com/focus/f-news/1675268/posts> > [accessed 15 April 2010].

³ "上海建成超级地下掩体紧急时可容纳20万人(图)," Shanghai Morning Post, (2006.08.08) at < http://news.xinhuanet.com/politics/2006-07/29/content_4890885.htm > [accessed 30 April 2010, translated by IP-2010].

Repairing & Reconstructing Civil Defense Tunnels



"地下人防设施防水堵漏 [Waterproof plugging underground civil air defense facilities]," 江苏盐城兴雷防水工程有限公司, (2011), at < <http://jsxlfs.com/About-33.html> > [accessed 4 Sept. 2011; translated by IP-1011].

PRC Subway Development

China's cost of subways = \$100 million per mile versus \$2.4 billion per mile in New York

12 Operating Subways

- Anshan
- Beijing
- Changchun
- Dalin
- Guangzhou
- Hong Kong
- Nanjing
- Shanghai
- Shenyang
- Shenzhen
- Tianjin
- Wuhan

15 Under Construction

- Chengdu
- Harbin
- Hangzhou
- Hefei
- Kunming
- Lanzhou
- Macao
- Nanchang
- Qingdao
- Suzhou
- Uruuqui
- Weihai
- Xi'an
- Zhengzhou
- Zibo

13 Planned Subways

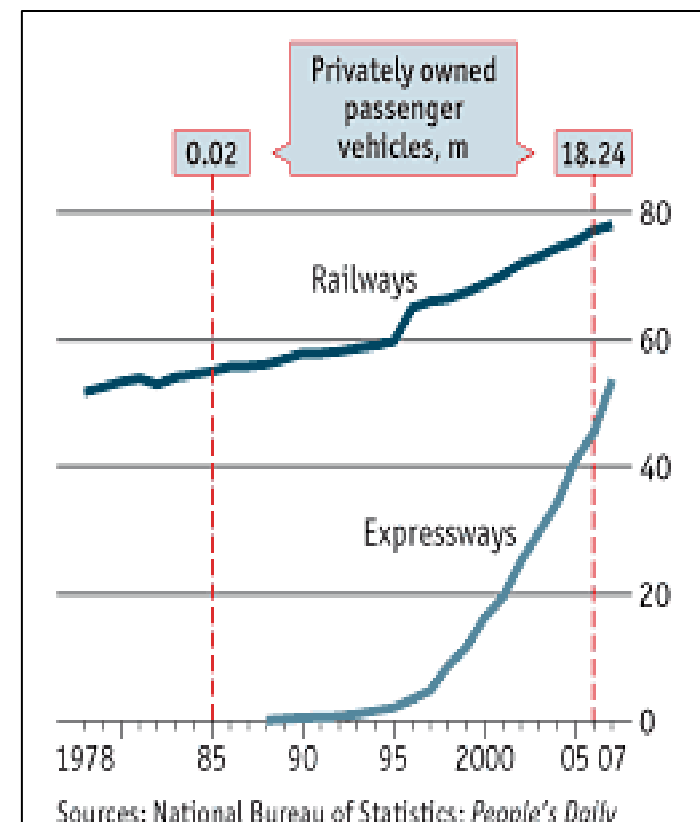
- Changzhou Metro
- Datong Metro
- Dongguan Metro
- Fuzhou Metro
- Guiyang Metro
- Jiaxing Metro
- Lanzhou Metro
- Nanning Metro
- Quanzhou Metro
- Shijiazhuang Metro
- Taiyuan Metro
- Xiamen Metro
- Xuzhou Metro

"Workers of the Revolution: Its Time to ride the People's Subway," *China.net*, (2010) at < <http://www.subways.net/china/index.htm> >; "Building A Subway Is 96 Percent Cheaper In China," *Infrastructureist*, (2009.03.27) at < <http://www.infrastructurist.com/2009/03/27/building-a-subway-is-96-percent-cheaper-in-china/> > see also: "Subway 地铁," *China.Page*, (2009) at < <http://www.chinapage.com/road/subway/subway.html> > [all accessed 8 June 2010].

Growth of PRC Rail & Roads and associated Tunnels

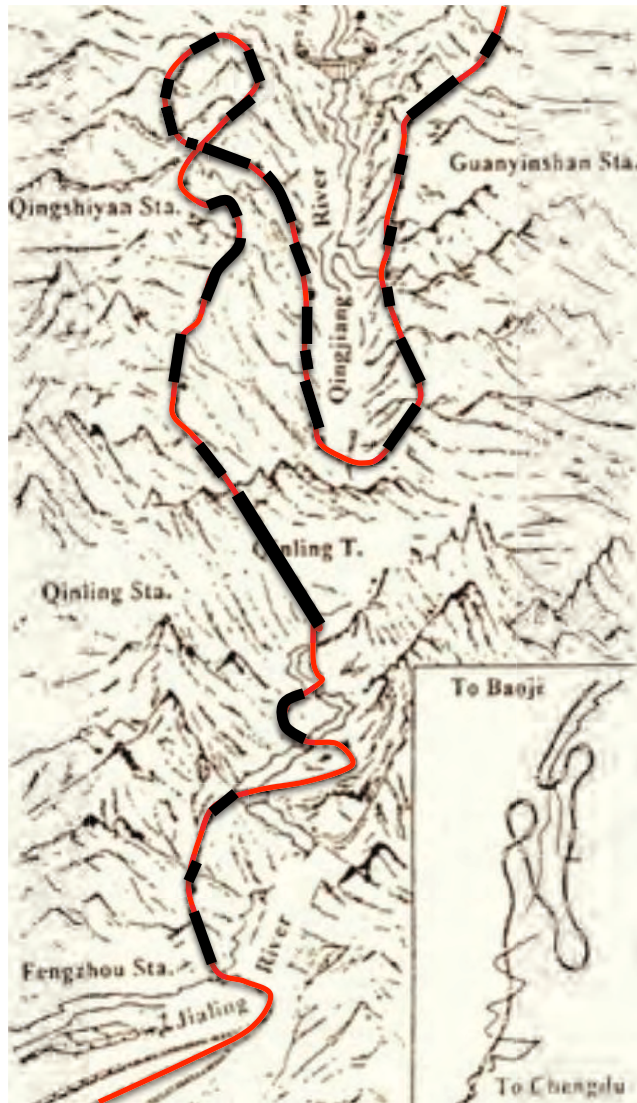


**Length of China's Transport Routes
(in 000s km)**



"China's Road, Rail and Air Infrastructure Rushes On," *Economist*, (2008.02.14).

Nuclear Storage & Rail Tunneling



Rail Line ——— Tunnel ———

Situated deep in the Qinling [秦岭] mountain range about 140 kilometers west of the historical city of Xian, an independent organization known as the 22 Base is responsible for storing and managing most of the Second Artillery's nuclear warhead stockpile....

Taibai Mountain is the highest peak in China, east of its three western-most provinces of Tibet, Qinghai, and Xinjiang. Taibai Mountain reaches 3767 meters (12,358 feet) in height and is formed of large granite rock. Perhaps to facilitate logistics, **the PLA Rail Corps initiated construction of a rail line connecting Baoji and Chengdu and nuclear production facilities near Mianyang in the 1960s.** The Baoji-Chengdu line was considered a major feat, not only because it was China's first electric rail, but due to tunnels that sliced through mountains south of Baoji. Of most significance was a 2.3 kilometer tunnel passing through Qinling Mountain and **a series of spiral tunnels just southwest of Baoji.**

Although the Taibai nuclear warhead facility has existed for 40 years, Second Artillery engineering units have been engaged in a national engineering project in the Qinling Mountain region between Taibai and western foothills adjacent to Tianshui city (Gansu Province) over the last 10 to 15 years....

China's tunneling technology since then has advanced significantly, with completion of an **18.5 kilometer tunnel cut** through the eastern edge of the Qinling Mountains south of Xian.

Quote from: Stokes, *China's Nuclear Warhead Storage and Handling System*, op cit: pp. 3, 8, 14-15; map from the International Tunnelling and Underground Space Association (ITA).

China Rail Tunneling

There are more than **5,300** railway tunnels with a total length of **2,500 km**.

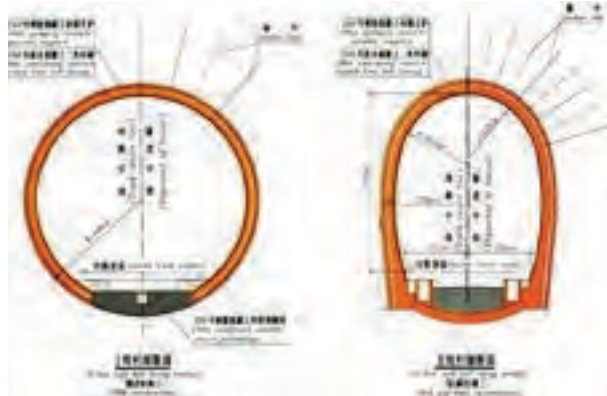
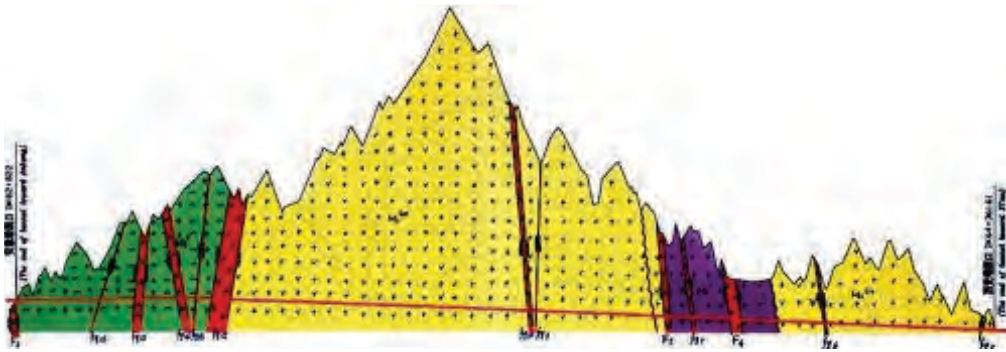
Railway tunnels, each longer than 5 km, as of 1999

Tunnel Name	Length	Railway Name	Completion Year
Qinling Tunnel	18,457 m	Xi'an - Ankang	1999
Dayaoshan Tunnel	14,294 m	Beijing - Guangzhou	1987
Changliangshan Tunnel	12,780 m	Suozhou - Huanghuagang	2000
Mihualing Tunnel	9,383 m	Nanning - Kunming	1996
Jundushan Tunnel	8,460 m	Datong - Qinhuangdao	1987
Yuntaishan Tunnel	8,145 m	Houma - Yueshan	1991
Fenshuiguan Tunnel	7,228 m	Hengnan	1997
Yimaling Tunnel	7,032 m	Beijing - Yuanping	1969
Sipujian Tunnel	6,407 m	Suozhou - Huanghuagang	Under construction
Shamalada Tunnel	6,383 m	Chengdu - Kunming	1966
Bapanling Tunnel	6,340 m	Xitian	1993
Pingxingguan Tunnel	6,188 m	Beijing - Yuanping	1971
Guancunba Tunnel	6,187 m	Chengdu - Kunming	1966
Kuixian Tunnel	6,152 m	Nanjiang	1978
Nanling Tunnel	6,061 m	Beijing - Guangzhou	1987
Hongqi Tunnel	5,848 m	Beijing - Tongliao	1975
Pengmoshan Tunnel	5,592 m	Jiaozuo - Liuzhou	1973
Dabashan Tunnel	5,334 m	Xiangfan - Chongqing	1973
Liupanshan Tunnel	5,240 m	Baoji - Zhongwei	1994
Wudangshan Tunnel	5,226 m	Xiangfan - Chongqing	1973
Pingguan Tunnel	5,140 m	Panxi	1970
Baijawan Tunnel	5,058 m	Datong - Qinhuangdao	1986

"Tunneling in China," International Tunneling and Underground Space Association, (1999) at < <http://www.ita-aites.org/cms/ita-aites-home/members-and-links/member-nations/related-member/datum/////focus-on-china.html> > [accessed 29 May 2010]; updates from: Jian Zhao, J. Nicholas Shirlaw, Rajan Krishnan, Tunnels and Underground Structures: Proceedings of the International, (Oxford, UK: Taylor & Francis, 2000).

Qingling Tunnel

Baoji-Chengdu Rail Line



TBM

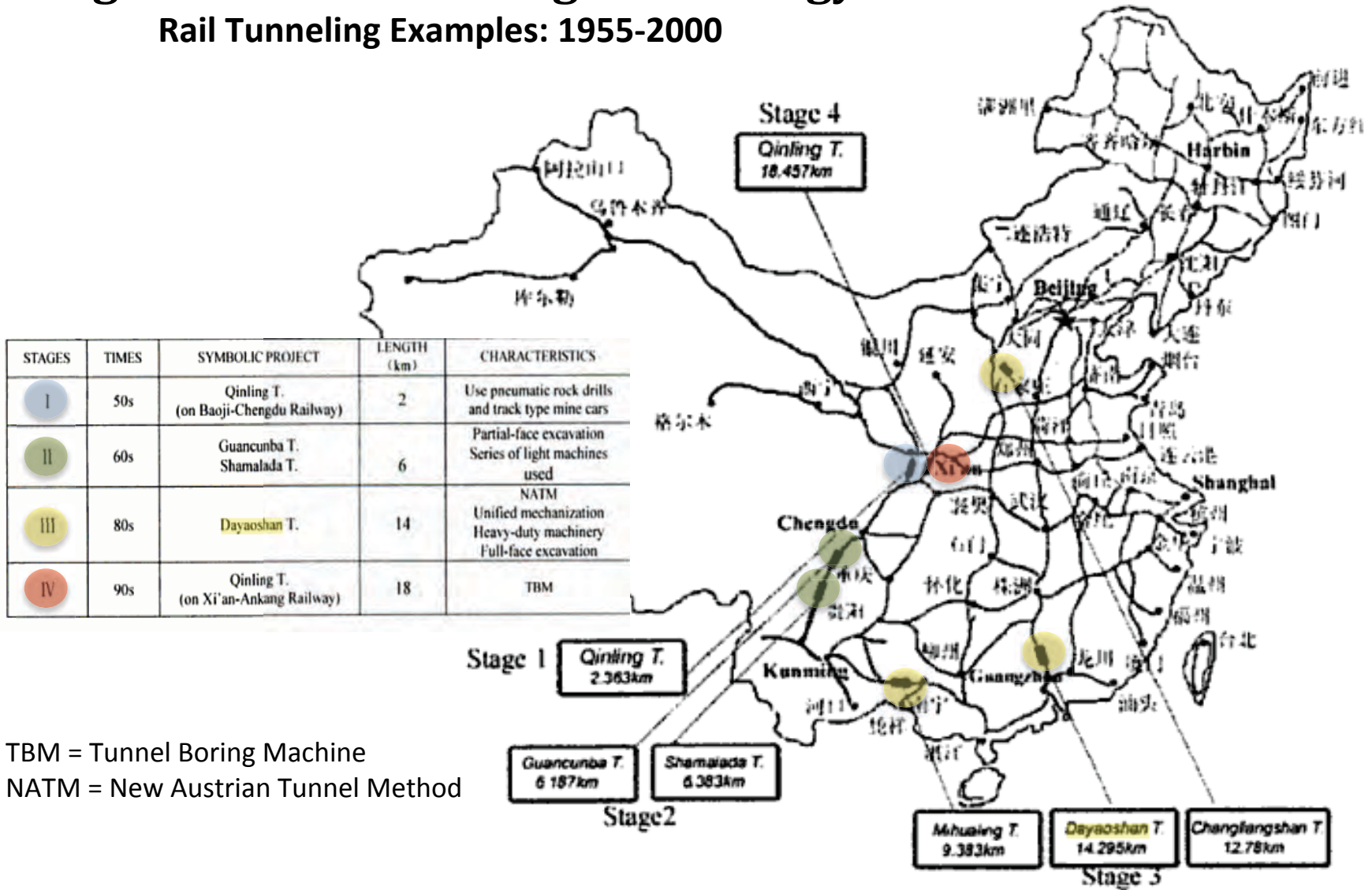
Blast & Bore



“Tunneling in China,” op cit; and J.W. Wang, “Tunneling and Technological Progress in Tunneling in China,” in Jian Zhao, Nicholas Shirlaw, and Rajan Krishnan (eds), *Tunnels and Underground Structures*, (Rotterdam: Balkema Publishing, 2000), p. 97.

Stages of PRC Tunneling Technology

Rail Tunneling Examples: 1955-2000



“National 863 Project”

Chinese Government investment “年国家 863项目” program acquires world class tunneling technology and supports domestic enterprise development of domestic underground expertise.



Shield Boring Machine



Shanghai Yangtze River Tunnel

“With a new round of subway construction in Chinese cities, and other tunnel construction boom the vigorous development of shield tunneling machines play a major task of the special machinery to become the focus of domestic construction equipment.”

“隧道股份——先进装备与一流工程的互动 [Tunnel shares - advanced equipment and first-class interactive projects], *Chinaequip*, (2008.06.16), at < http://chinaneast.xinhuanet.com/zhuanti/2008-06/16/content_13550687.htm > [accessed 24 Apr. 2010]; and “造中国中铁自己的盾构——我国首台自主研发复合式盾构下线侧记 [China Railway made its own shield - China's first self-developed composite shield off the assembly line Sidelights],” 中国中铁 [China Railway], (2008.05.19), at < http://www.ctg.ha.cn/ctg_dwgzw/readnews.asp?newsid=6901 > [accessed 24 Apr. 2010];

China Rail Tunneling Advances

Dayaoshan Rail Tunnel Complex introducing the New Austrian Tunneling Method (NATM)



Since the 1960s, NATM, a new tunneling concept or philosophy from Europe, has been accepted by Chinese tunneling engineers both in its spirit and for the term itself. NATM has become a popular topic in some symposiums or colloquiums on tunneling and underground works held in China. Quite a lot of tunnels under difficult geological conditions and in weak rock have been successfully constructed by NATM.

Qinghai-Tibet Railway Tunnel = total length of 65.3 kilometers



"Tunneling in China," op cit; "Qinghai-Tibet Railway Daily Drainage Volume Hits New Record," *TibetOnline*, (2009.12.30) at < <http://chinatibet.people.com.cn/6856041.html> > [accessed 12 June 2010]; and Wang J.Y., "Tunneling and Technological Progress in Tunneling in China," op cit.



中国军网

www.chinamil.com.cn

Modern PLA Tunnel Construction

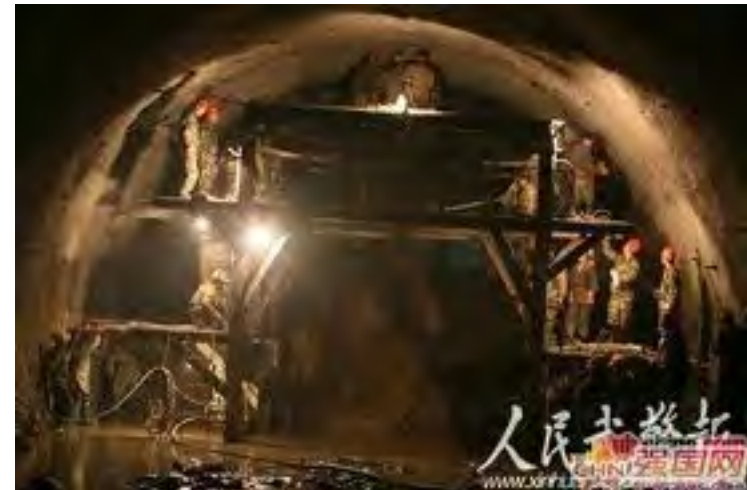
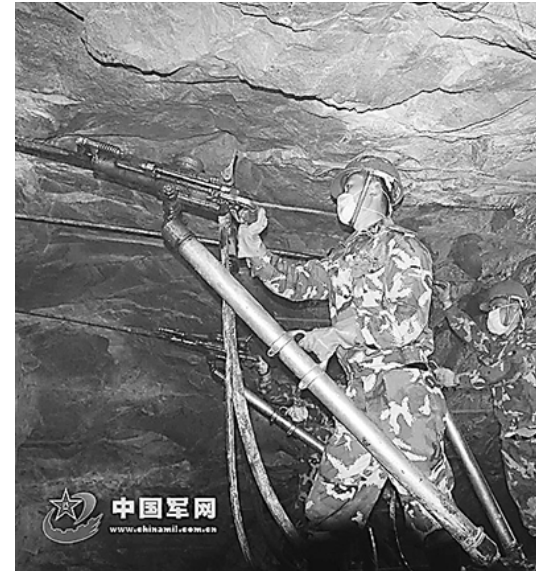
嘎隆拉隧道 Galong La tunnel

Medog highway, Tibet



"嘎隆拉隧道"洞口 ["Galong La tunnel" entrance]," Liberation Army Daily, (2009.12.15), at < http://tibet.cn/jiaotong_pd/xzlsnjtfz/ybczhh/201104/t20110422_1007532.html > [accessed 4 Sept. 2011; translated by IP-1011].

嘎隆拉隧道 Galong La tunnel, Medog highway, Tibet



Ibid; and "西藏墨脱公路控制性工程嘎隆拉隧道贯通 [Tibetan control projects Galong La Tibet Medog highway tunnel through], Huanqui, (2011), at < <http://bbs.puduw.org/thread-5764-1-1.html> > [accessed 5 Sept. 2011; translated by IP-1011].

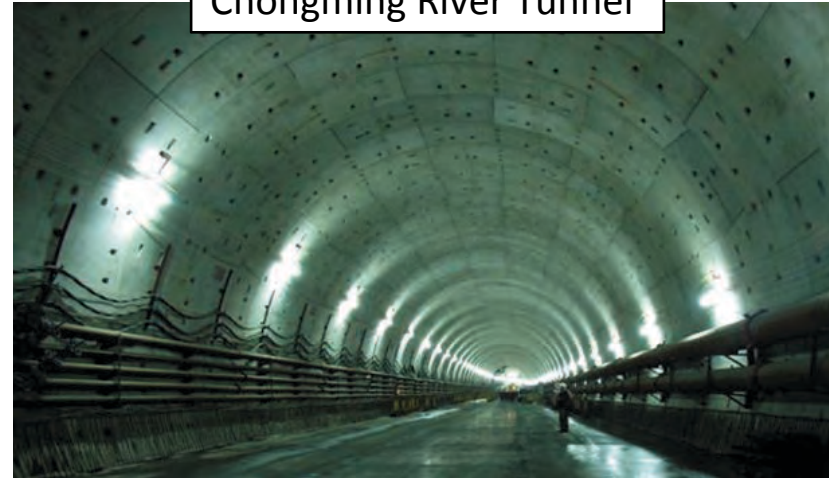
“Cutting Edge” Tunneling

Xiamen Undersea Tunnel



After more than four years' construction, Xiamen Xiang'an Undersea Tunnel, the **first undersea tunnel in Chinese mainland**, was dug through on Oct. 5, 2009, marking a milestone in China's tunnel construction technology between Xiamen Island and Xiamen in southeast China's Fujian province. The project, which adopted the undersea blasting and undermining methods traversing the eastern sea of Xiamen, has a total length of 8.695 km with the tunnel length amounting to 5.95 km and 70 meters below the sea level at its deepest section.

Chongming River Tunnel



The Chongming River Crossing comprises two 15.3 meters diameter TBM tunnels, making it the **largest tunnel in the world**, connected by eight cross passages. Each tunnel is approximately 7.5 kilometers long and linked to a 1.5 kilometers approach road. The tunnel will be a double-decked. The upper part will be a three lane road, while the lower part will house the utilities and a light railway. An innovative ground freezing technique will be used for cross passage construction. Cast iron lining segments will replace the 650 millimeters thick concrete at the junction between the bored tunnel and cross passage.

Related Tunneling Efforts

2007 Ning Xia Dafeng Coal Mine 5kt Blast



20 December 2007: “Ning Xia Dafeng Coal Mine Blasting Chamber.” Total investment: 50 million yuan+; Project period: 2006 – 2007. 5,500 tons of explosives equal small nuclear weapons, explosive power equivalent to 1 / 4 the Hiroshima atomic bomb, The world's largest blasting in 17 years = 14 million tons of coal brought to light the world's rare, **for the first time for the civil air defense engineering seismic data to provide blast resistant.**”

“世界最大爆破工程 [The World's Largest Blasting],” Zhenghun Network, (2009.04.24) at < <http://www.lnlt.cn/viewthread.php?tid=26484> > [accessed 7 March 2008, translated by IP-1011.

Carlyle Group's failed attempt to acquire Xuaona Heavy Equipment Manufacturer

"In 2008, Washington-based private-equity firm Carlyle Group L.P. abandoned a plan to acquire a controlling stake in Xugong Group because it failed to receive approval from the Chinese government. Carlyle had planned to buy a ... 85% stake in the firm."



China: A Revolt Against Foreign Takeovers
These bloggers and businessmen are putting pressure on Beijing to crack down



What ever the real reason for the failed deal, it is not irrelevant that the Xuaona Corporation produces most of the excavators used in the Underground Great Wall Project.

Civilian Underground Infrastructure & Technology Part of National Policy and Major Military Asset

- There is more civilian tunneling going on in China than everywhere else in the world combined.
- China is becoming the leading buyer and applier of tunneling technology.
- A “New Century” Strategy:
 - **From Emergency Response to Long Range: Construction of a New Underground "Great Wall;"**
 - **From "Single" to "Multi-Function": Integration of Protective Engineering;**
 - **From "Scattered" to "Networked": "Networking" of Command Systems;**
 - **From Closed to Open: Increased Benefits of Integrating Peacetime and Wartime Functions;**
 - **From "Rule of Man" to "Rule of Law": Regulation Becoming More Scientific;**
 - **From Underground to the Surface: Marriage of "Two Defenses" Builds a Protective Barrier;**
 - **Looking to Tomorrow from Today: "Digging Deep Tunnels" Never Out of Date.**
- Crossover between Civil Defense tunneling and Military underground technology development and force deployment.

"Civil Air Defense Striding Into the New Century," *Jiefangjun Bao Online* [Beijing, in Mandarin], (2000.01.08): p.9, at [OSC translation CPP20001108000041: "Jiefangjun Bao Article on China's Achievements in Civil Air Defense;" accessed 8 June 2010].

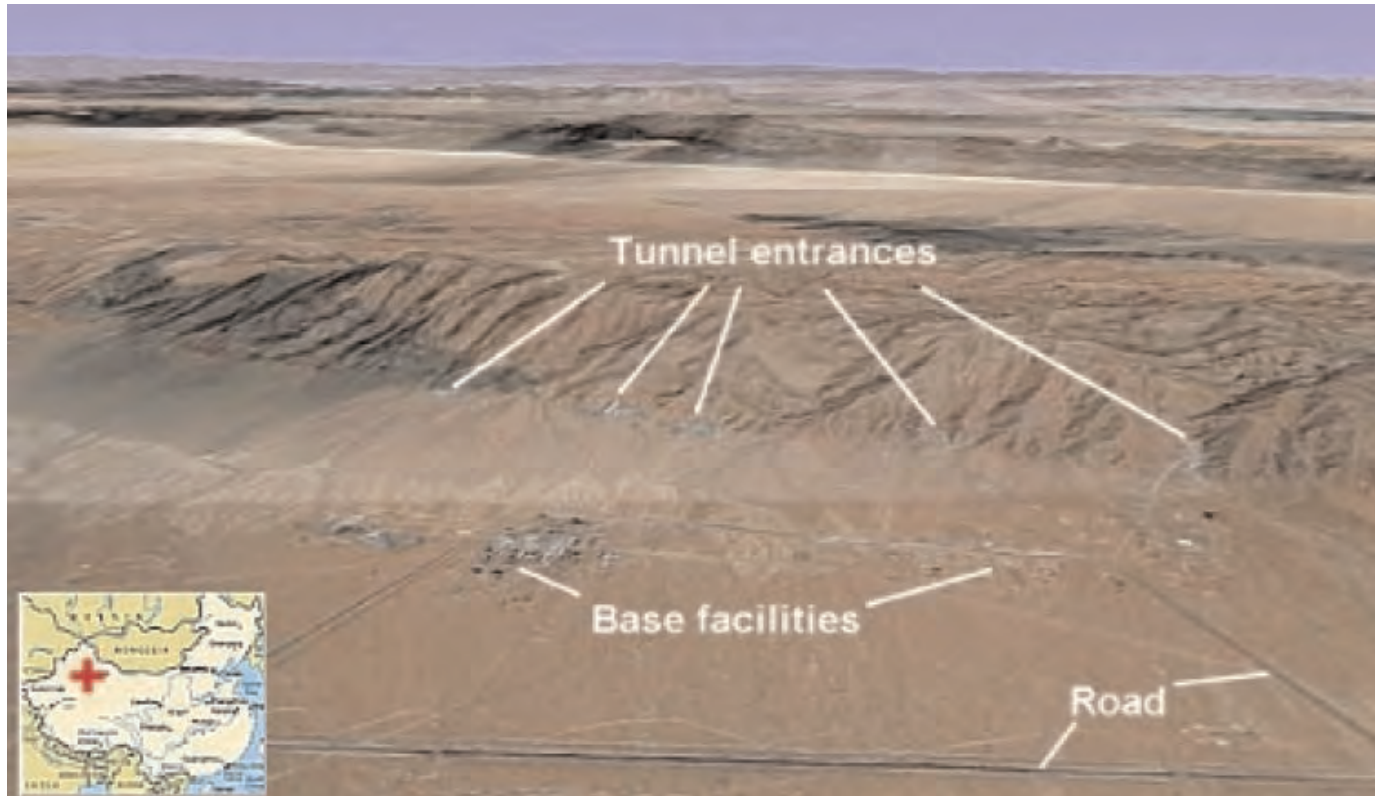
STUDY #4

Military Underground Deployment

- **Nuclear Facilities**
- **Army (PLA) Tunneling**
- **Naval (PLAN) Tunneling**
- **Air Force (PLAAF) Tunneling**

Lop Nur Nuclear Test Site and Tunnel Warhead Storage (circa 1962-current)

“The first storage tunnel reportedly was completed in 1964, the same year as China’s first nuclear test, and subordinated to the National Defense Science Commission in 1965. Declassified U.S. intelligence community reporting from 1971 indicates that a central storage facility for warheads was located ‘in a ridge about 12nm from the Koko Nor weapons fabrication complex’.”



Quote from: Mark Stokes, *China's Nuclear Warhead Storage and Handling System*, (monograph; Washington, DC: Project 2029 Institute, 12 March 2010): pp. 4, 14, cites source as: *Communist China's Weapons Program for Strategic Attack*, NIE 13-8-71 (declassified), October 28, 1971. It added that "some of this space is probably used for nuclear weapons inspection and retrofit." Photo from: Hans M. Kristensen, Robert S. Norris, and Matthew G. McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, (Washington, DC: FAS & NRDC, November 2006): pp. 123-125.

Current Lop Nur Nuclear Testing & Warhead Storage

Right: Close-ups of entrances to five horizontal tunnels at the Lop Nur test site in the Xinjiang province. Centered at 41°42'01"N, 88°21'58"E, the satellite image reveals various levels of activities at all five entrances. Trucks are visible at four of the five tunnel entrances, particularly the eastern ... and one entrance is covered with a roof.

Left: This satellite image taken in 2005 shows what appears to be the most active horizontal tunnel at the Lop Nur test site. Several 20-foot (6-meter) trucks are visible amongst the buildings. What appears to be the dumping area for rock



Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit.

Tunnel Complex at Nuclear Test Site



“中国原核试验基地：新疆马兰 [The former nuclear test site in China: Xinjiang Malan],” Sina, (2007.10.17), at < http://blog.sina.com.cn/s/blog_4cf6c3b601000b57.html > [accessed 15 Jan. 2011; translated by Google Chrome].

EXAMPLE 4: Early Missile Facility?

Lin Piao's Project 6501
“中国地下长城”

“‘Underground Great Wall of China’ internal layout of China's
Underground Nuclear Second Strike Capability Insurance”



“实拍“中国地下长城”内部景观 中国地下确保有二次核打击能力 [Real pictures of "Underground Great Wall of China" internal layout of China's Underground Nuclear Second Strike Capability Insurance],” CF8, (2011.08.25), at < <http://lc.cf8.com.cn/news/20110825/7739,2.shtml> > [accessed 18 Sept. 2011; translated by IP-1011].

Lin Piao's Project 6501

PLA's largest known man-made tunnel

- started by Lin Piao in 1965
- underground railroad link with four tracks
- 7 years under construction
- 17 kilometers of tunnels
- 3 layers
- main gallery = 12 x 12 meters
- 25 large rooms
- 18 large circular tanks (for liquid fuel storage?)
- 17 ventilation shafts
- abandoned in 1973



“中国最大人造军事洞穴：林彪签发6501秘密工程 [Military of China's largest man-made cave: Lin 6501 issue of secret project],” 酒泉频道, (2011.09.07), < <http://www.m937.com/html/photo/laozhaopian/2011/09/8594909035058.htm> > [accessed 17 Sept. 2011; translated by IP-1011].

Mysterious “Underground Great Wall of China”



“国内最大人造军事洞穴 林彪的6501工程 [The largest man-made cave Lin Biao's 6501 military construction],” 军事前沿, (2011.09.07), at < http://www.qianyan001.com/lishi/c/20110907/1315366779_11686300.html > [accessed 17 Sept. 2011; translated by IP-1011].

Lin Piao's Project 6501

外界誉为“中国地下长城”

“Hailed as the ‘underground Great Wall of China’.

From the information currently available, 6501 Project name comes from the Central Military Commission file No. 1965, is currently the largest known man-made military use of the cave . Cave complex. There are 25 rooms, with, 17 ventilation shaft, length of over 17,000 meters, a large hole designed to pass trains, hole for truck traffic. There are 18 circular cement floor, put the original 18 large tanks. 6501 project ... hailed as the "underground Great Wall of China."

You can walk through the train from four trucks to enter the parallel, the width of 12 meters, 12 meters high in the cave, but anti-Zhong Hunan Linxiang town "6501" main hole.

Since 1965 it has a very subtle state in the construction of 8 years. Early 1973, suddenly abandoned, still no one understood its function, role and reason are abandoned. Now, the local government has here and 3 km away Taolin Lead-Zinc "artificial desert" development as tourist spot.

Linxiang the northern gate of Hunan, is under the jurisdiction of Yueyang, from Wuhan, Changsha, respectively 154 km and 161 km, 107 State Road side shop in Linxiang City, Beijing-Zhuhai Expressway Linxiang mouth down, 5 minutes up urban area, one called "Chang" crossed the river in the city. 6501 Engineering Linxiang city about 15 kilometers away from.

Black hole gauze cover nearly half a hole, as the project has so far not fully decrypted. From the information currently available, 6501 works from the Central Military Commission in 1965 named the first document, is currently the largest known military use of man-made caves. It is the upper, middle and lower layers. The entire mountain has been hollowed out, connected up and down, hole connected to those early hole, such as break maze, large scale rarely seen in the outside world.

Huge granite structure was hollowed out mountain, made of reinforced concrete up and down three, cold and humid, the temperature about 18 degrees Celsius year round. Surprisingly, the 6501 project in addition to 17 kilometers of artificial caves, but also the distribution of the 25 rooms of various sizes hall, large room to hundreds of square meters, and 17 large high-wide missile-shaped cave.

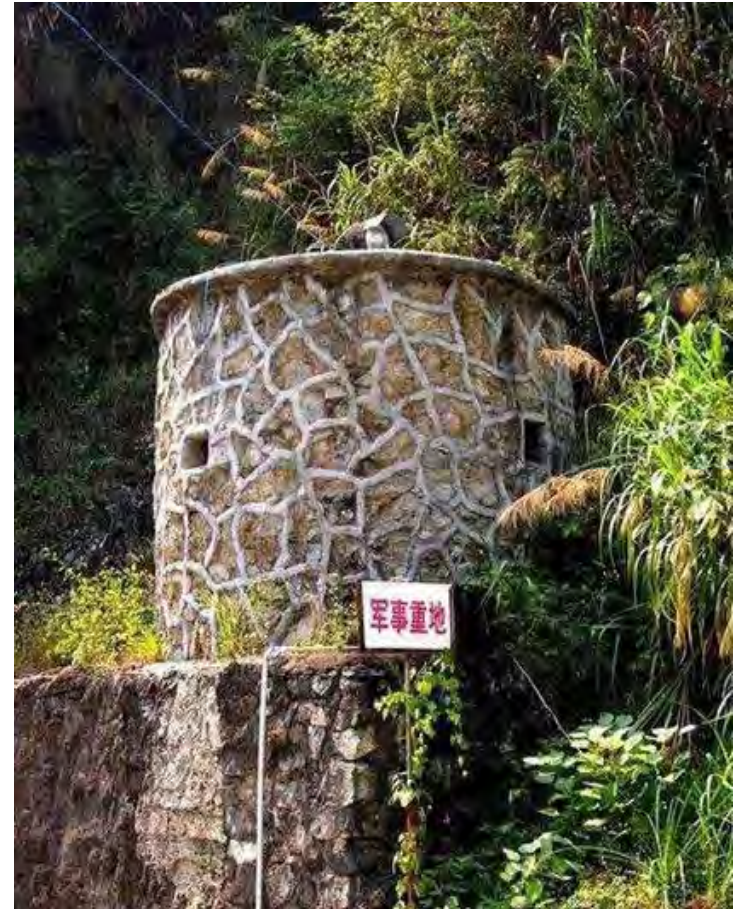
Project 6501



ABOVE: Secure entrance to the valley;
RIGHT: Tunnel guard tower; BELOW: Main road.



该图片由 caijojo 上传至 Tiexue.Net 图片版权归原创者所有



“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.

Project 6501

Total = 10 Entrances for Rail and Trucks.



RIGHT: Main entrance;

LEFT: Other exits.

“中国最大人造军事洞穴：林彪签发6501秘密工程 [Military of China's largest man-made cave: Lin Piao's 6501 issue of secret project],” *Net Ease (blog)*, (2011.09.06), at < <http://xqy88.blog.163.com/blog/static/6526399620118685533342/> > [accessed 17 Sept. 2011; translated by IP-1011]; and “神秘的6501工程：中国军事史上最大的烂尾工程 [Mysterious 6501 Project: China's biggest unfinished projects of military history!],” 华声论坛, (2008.06.18), at < <http://bbs.voc.com.cn/archiver/tid-1536007.html> > [accessed 1 Sept. 2011; translated by IP-1011].

Project 6501

Total = 10 Entrances for Rail and Trucks.



LEFT: Rail line from Linxiang City; RIGHT: Railroad Entrance (tracks removed).

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.; and for details on rail links, see: “代号‘6501’” [Code ‘6501’], Rednet, (2006.07.18), at < <http://hn.rednet.cn/c/2006/08/05/1013820.htm> > [accessed 1 Sept. 2011; translated by IP-1011].

Lin Piao's Secret Project 6501



“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.

Lin Piao's Secret Project 6501

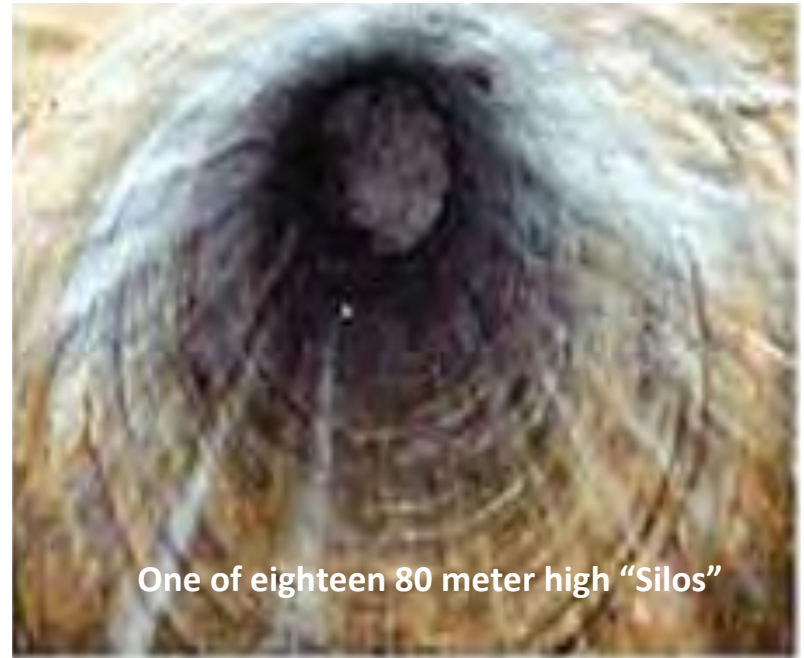


“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit. Upper left photo from: “[原创]值得一看的临湘市桃林大坝6501密洞 [Deserving to be looked after, Linxiang Taolin 6501 Secret Cave],” *Tiexue.net*, (2009.07.17), at < http://bbs.tiexue.net/post2_3713587_1.html > [accessed 18 Sept. 2011; translated by IP-1011].

Project 6501



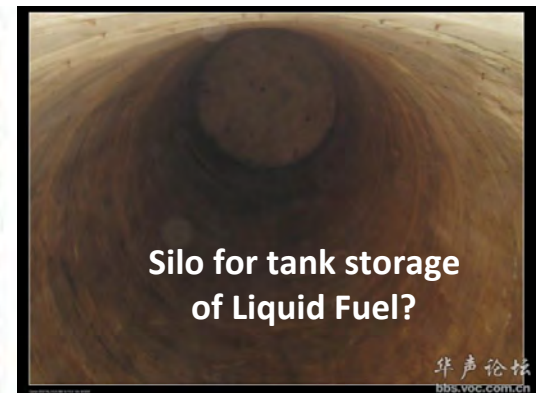
Described as Missile Bay



One of eighteen 80 meter high "Silos"



华声论坛
bbs.voc.com.cn



Silo for tank storage
of Liquid Fuel?

华声论坛
bbs.voc.com.cn

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.

Project 6501



“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.

Uncompleted parts of Project 6501



“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit; and “神秘的6501工程-中国最大军事烂尾工程 [Mysterious 6501 project - China's largest military unfinished projects],” Baidu, (2008.01.31), at < <http://hi.baidu.com/e5259/blog/item/a99541f3691f1ecf0b46e012.html> > [accessed 1 Sept. 2011; translated by IP-1011].

Uncompleted parts of Project 6501



“实拍‘中国地下长城’内部景观 中国地下确保有二次核打击能力 [Real pictures of "Underground Great Wall of China" internal landscape of China's Underground Nuclear Second Strike Capability Insurance],” *CF8*, (2011.08.25), at < <http://lc.cf8.com.cn/news/20110825/7739,2.shtml> > [accessed 18 Sept. 2011; translated by IP-1011].

Army Tunneling

PLA deployment of Army units in underground complex

Late 1960s/early 1970s



Unit equipment sets ready for rapid deployment



Tunnel based motor pool



Underground troops movement thru tunnel complex

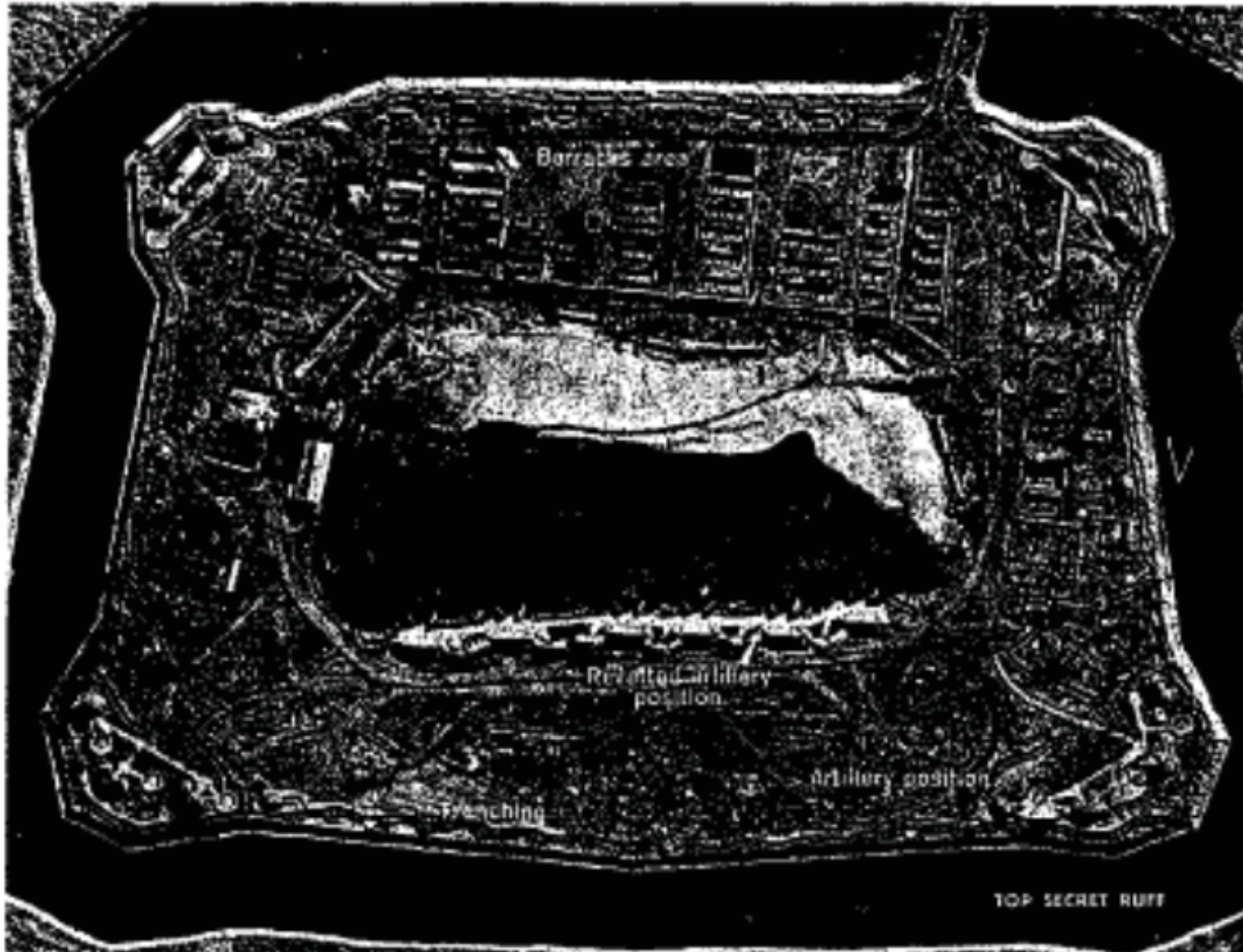


Protected ammunition and supply depots

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].

Late 1960s PLA Created Series of Large

Chinese Mounded Defensive Position



This is the most elaborately developed of the defensive positions located north of the missile range at Shuang-ch'eng-tzu. The mounds of the North China Plain have a similar design but are less heavily fortified.

PLA “Logistic storage tunnels” 后勤某屯装坑道

Built in reaction to threat of Soviet nuclear preemption



Illustration from: "防护工程建设的中外比较和战略思考 [Protection Project at Home and Abroad and Strategic Thinking]," *ShowChina*, (2009.03.06), at < <http://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm> > [accessed 10 Dec. 2010; translated by IP-1011].

PLA Coastal Defense Regiment

Modern retractable artillery bunker in island tunnel complex



"Operation Rapid Response" Staged on Yellow Sea Islands," CCTV-7 [Beijing in Mandarin], (2009.12.07), at [OSC FEA20100216001519: "DVD/Web Product: PRC Military Activities in Dec 09;" accessed 27 Nov. 2010].

Tunneling for Coastal Defense (circa 1955-1975) example of *White Island*

Fortification of Coastal positions began in the 1950s;

Dec. 1967 Zhou Enlai personally gave order for “nuclear hardening;”

10 years of construction, 5,000 workers;

High risk – “almost every meter excavation, the sacrifice of a soldier or civilian... 30 killed and hundreds injured...”

500 meter entrance hall, then opens up into underground naval base 27 meters high by 70 meters wide, exit tunnel;

10 lateral tunnels 500 meters long;

30,000 square meters inside;

Included “missile reserve bank” and “missile handling storage;”

Can hold and repair more than 20 boats up to 2,140 tons;

Sealed and self-contained storage for 1000 tons oil, 300 tons fresh water, and 140 blocks of barracks.



“珠海白沥岛(图) [Zhukai Whie Lek Island],” 51766.com, 2006.06.23) at < <http://www.51766.com/zhinan/11001/1100189782.html> > [accessed 7 June 2010, translated by IP-1011].

White Island Coastal Defense



“珠海白沥岛(图,” op cit.

Coastal Fortifications



"大旺海军基地 [The Great Wonder Naval Base]," *Hongdou.gxnews*, (2006.04.12) at < <http://hongdou.gxnews.com.cn/viewthread-4522405-1.html> > [accessed 5 July 2010, translated by IP-1011]; "76式の原型である66式130mm海岸炮 [Model 76 twin 130mm Coastal Defense Guns]," *日本周辺国の軍事兵器*, (2008.06.24) at < <http://wiki.livedoor.jp/namacha2/d/%B4%CF%BA%DC%CB%A4%A1%CA%C3%E6%B9%F1%A1%CB> > [accessed 3 July 2010].

广深珠港岛网

Coastal Fortifications



军事报道



海军某岸炮营实战背景练精确打击

007兄弟

<http://www.15630.com/haidao/zhhaidao/bl/200704/1741.html>

Coastal Fortifications



“大旺海军基地 [The Great Wonder Naval Base],” *Hongdou.gxnews*, (2006.04.12) at < <http://hongdou.gxnews.com.cn/viewthread-4522405-1.html> > [accessed 5 July 2010, translated by IP-1011]; “76式の原型である66式130mm海岸炮 [Model 76 twin 130mm Coastal Defense Guns],” 日本周辺国の軍事兵器, (2008.06.24) at < <http://wiki.livedoor.jp/namacha2/d/%B4%CF%BA%DC%CB%A4%A1%CA%C3%E6%B9%F1%A1%CB> > [accessed 3 July 2010].

White Island Coastal Defense



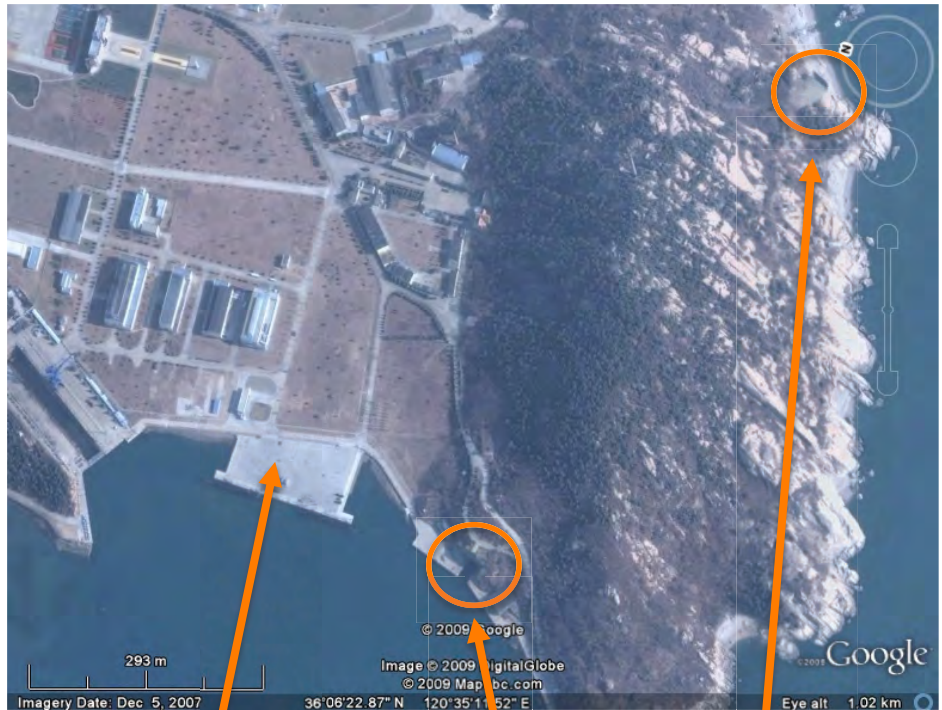
“游珠海白沥岛: 白沥岛上的军事设施 [Zhuhai White Lek Island Tour: Military Facilities],” *Sogou*, (2007.11.28) at < <http://bbs.sogou.com/109566/NSq5is5upXoFBAAAA.html> > [accessed 7 June 2010, translated by IP-1011].

Jianggezhuang Sub Base



Tim Brown, "Overhead & Underground," lecture, Technology & Security, Georgetown University, (30 Nov. 2005, updated 20 May 2010).

Jianggezhuang Sub Base 1970s to Present



Tailings used as fill
Coffer dam
Tunnel dig
Dock and base
Tunnel entrance
Residual drill, exit

Tim Brown, "Overhead & Underground," lecture, Technology & Security, Georgetown University, (30 Nov. 2005, updated 20 May 2010).

Underground Sub Base

(probably *Jianggezhuang* – home of all Han-class Type-091)



Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit.

Submarine Launched Ballistic Missiles

stored and maintained underground with reloads for Subs



JL-1



JL-2

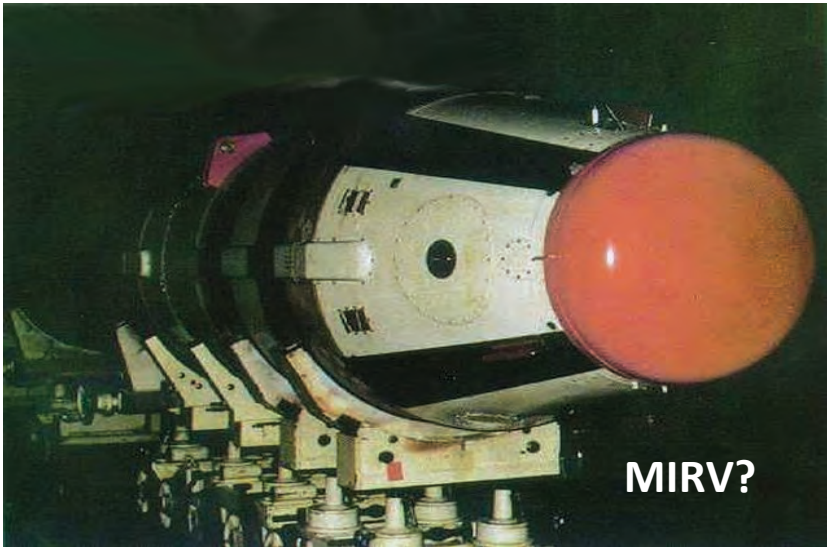


Photo from: "JL-2 (CSS-NX-4 SLBM Jin Class SSBN Nuclear Deterrent Missile System," *General Bouma blog*, (20

Yulin Underground Sub Base

Hainan Island

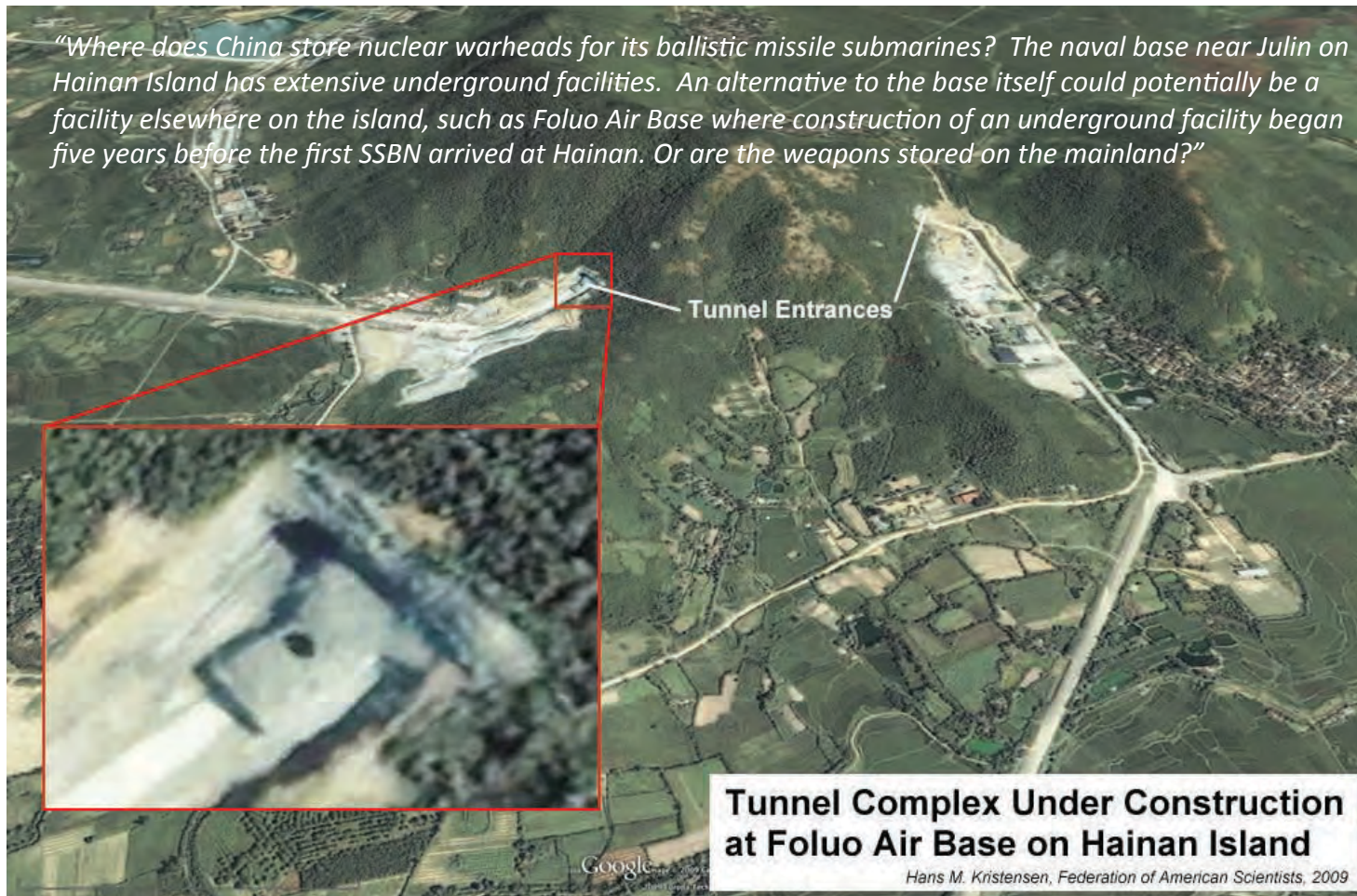


“The tunnel is one of 10 such submarine tunnels China has built to avoid detection and attack for its submarine forces.”

Originally discovered by Tim Brown, see: “Google Earth imagery reveals entrance to China sub tunnel,” *World Tribune*, (2006.08.07), at < <http://www.worldtribune.com/worldtribune/06/front2453955.079861111.html> > [accessed 7 Nov. 2009].

“Is there a Nuclear Weapons Storage Site on Hainan Island?”

“Where does China store nuclear warheads for its ballistic missile submarines? The naval base near Julin on Hainan Island has extensive underground facilities. An alternative to the base itself could potentially be a facility elsewhere on the island, such as Foluo Air Base where construction of an underground facility began five years before the first SSBN arrived at Hainan. Or are the weapons stored on the mainland?”



Quotes and images from: Hans Kristensen, “Estimated Nuclear Weapons Locations: 2009,” *FAS Strategic Security Blog*, (2009.11.27), at < <http://www.fas.org/blog/ssp/2009/11/locations.php> > [accessed 4 June 2011].

PLAAF Underground Hanger Construction

(circa 1960s)

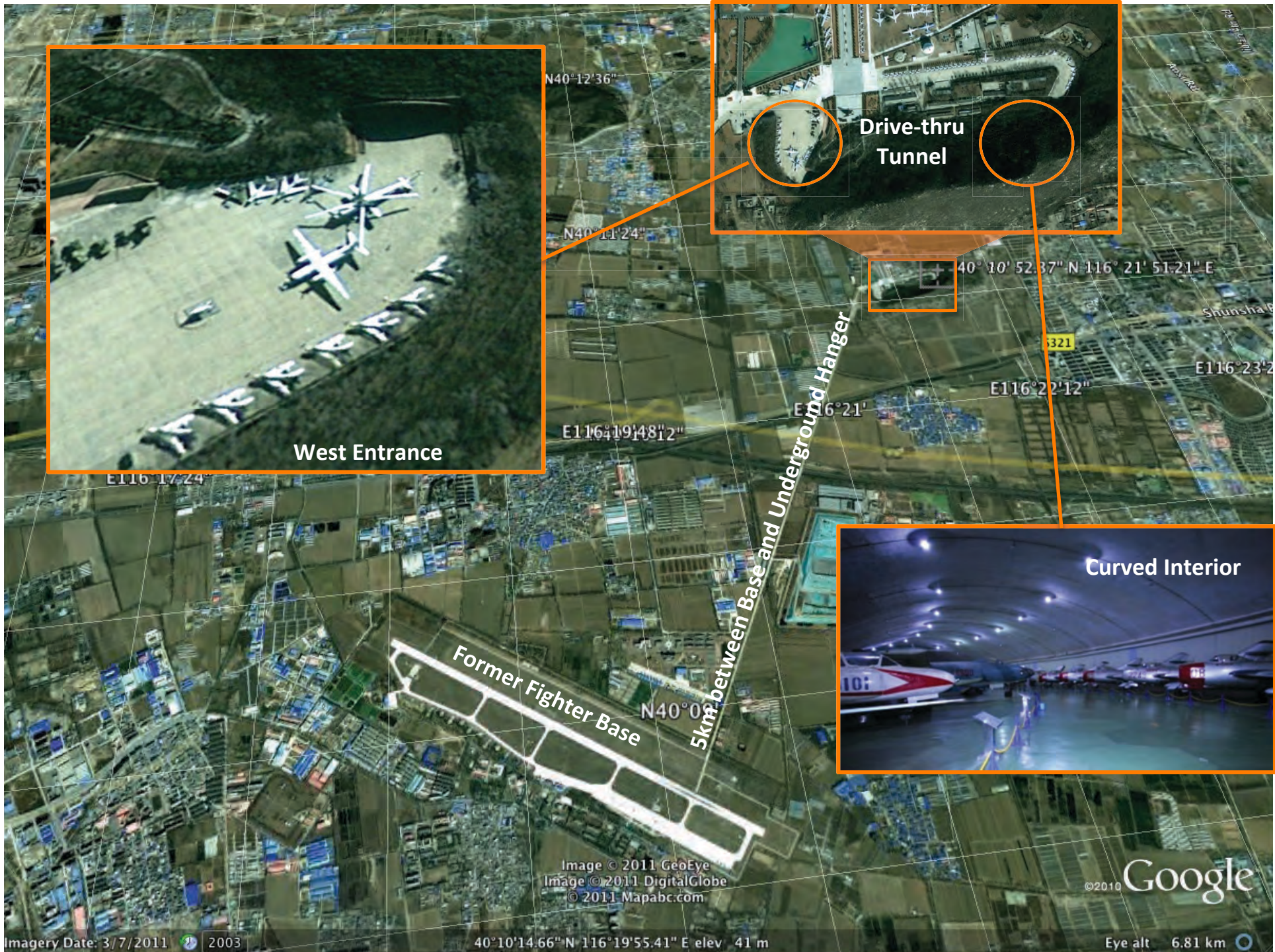


PLAAF Mountain Hanger

Former Shahe Airbase



Now a museum, east portal of mountain hanger for former Shahe Airbase fighters outside of Beijing. "China Aviation Museum - Hangar Entrance," *Panoramio*, (2009.01 21), at <http://static.panoramio.com/photos/original/18068057.jpg> > [accessed 31 Dec. 2010]. Blast protection doors replaced.



PLAAF “*Model of Air Force station*” 空军场站模型

Example of Tunnel Based Aircraft Shelter



Illustration from: "防护工程建设的中外比较和战略思考 [Protection Project at Home and Abroad and Strategic Thinking]," *ShowChina*, (2009.03.06), at < <http://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm> > [accessed 10 Dec. 2010; translated by IP-1011].

Chifeng Air Base

Inner Mongolia

China's first nuclear hardened underground aircraft hanger (1969)



Tunnel 1km from runway;
Two hardened entrances
facing opposite directions;
Linked by underground
pass-thru and hangers;
Length = 700 meters;
Reported aircraft storage
= 80 J-7s fighters.

Dual roads

Tunnel



“赤峰机场” cited as PLAAF’s “first excavated underground hanger” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia’s largest military airport, China’s “area 51”],” *Overview of China’s Super Projects*, (2008.10.,24) at < <http://www.ourairports.com/airports/CN-0187/> > [accessed 15 Jan. 2010, translated by P-1011].

Ljtao Air Base

(Gansu Province)

Standard airbase pattern but with hardened shelter or tunnel entrance backed into earth (entry way to underground complex?) at end of a **tree lined country road 1.2km from base.** Hard to find except for fighter parked outside.



“临洮” Ljtao Air Base cited with “underground hanger” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia's largest military airport, China's "area 51"],” *op cit*; map from: “Ljtao Air Base,” *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0125/> > [accessed 15 June 2010].

Zhangye Southeast Air Base

(Gansu Province)



“张掖” Zhangye Air Base cited with “underground hanger” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia's largest military airport, China's "area 51"],” *op cit*; map from: “Zhangye Southeast Air Base,” *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0143/> > [accessed 15 June 2010].

Qingshui Air Base

(Gansu Province)



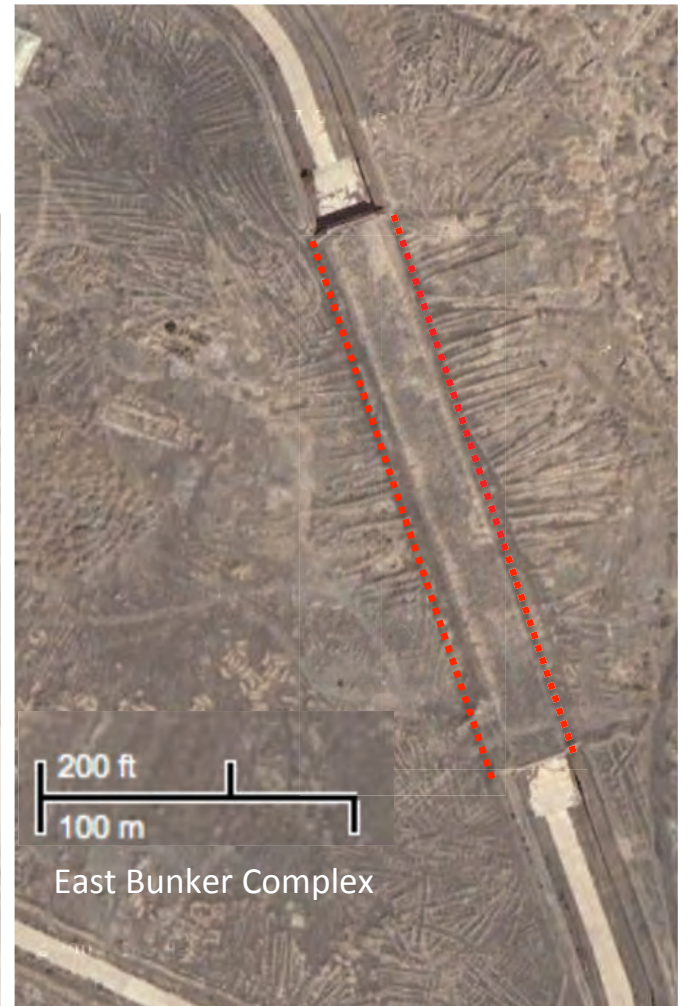
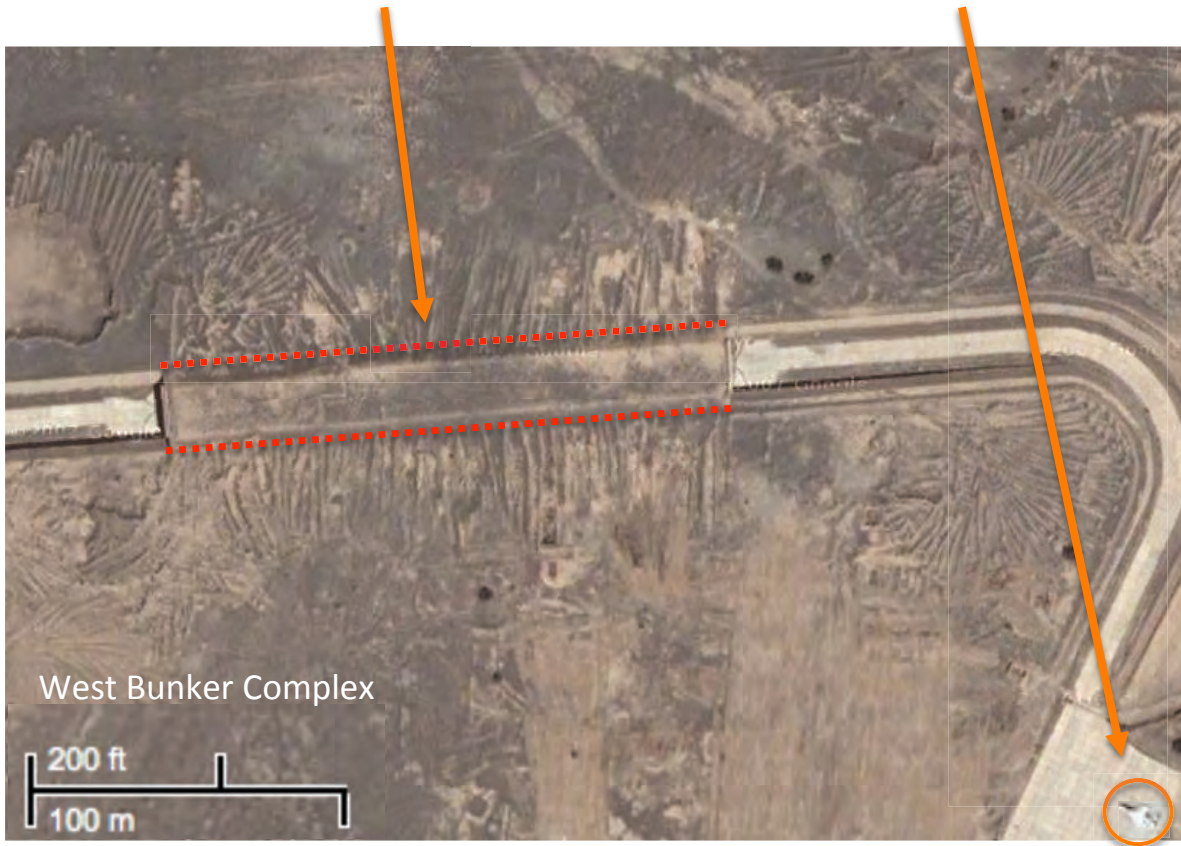
Recent air base construction with nearly identical dual Pass-thru shelters at West and East ends of Qingshui Air Base. Each shelter complex has nearby hardstand and loop access. **Note relative size of fighter.**



“清水” Qingshui Air Base,” *Our Airports*, (2010) at <<http://www.ourairports.com/airports/CN-0143/>> [accessed 15 June 2010]; and “39.554722,98.884167” Google Maps, (2010) at <<http://maps.google.com/maps?ll=39.554722,98.884167&spn=0.03,0.03&t=h&q=39.554722,98.884167>> [accessed 11 May 2010].

Qingshui Air Base (cont.)

Recently constructed two identical 600ft Pass-thru shelters at Qingshui Air Base with blast doors and overhead cover. Note **bulldozer tracks adding earth cover** and **relative size of fighter**.



Urumqi South Air Base (Xinjiang AR)

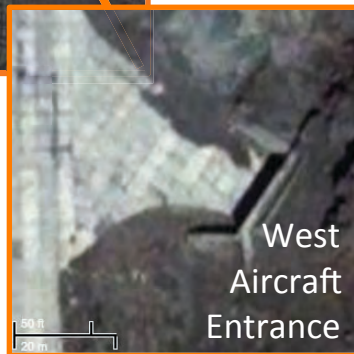
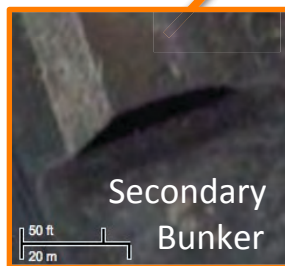


“乌鲁木齐” Urumqi South Air Base,” *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0132/> > [accessed 15 June 2010]; and “张掖” Zhangye Air Base cited with “caves built into hills” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia's largest military airport, China's "area 51"],” *op cit*; map from: “Zhangye Southeast Air Base,” *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0143/> > [accessed 15 June 2010].

Urumqi South Air Base (cont.)

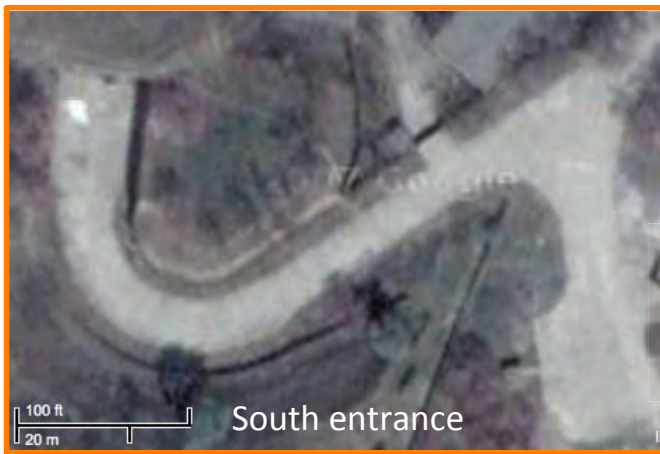


Unique combination of West entrance for aircraft and East entrance for test and maintenance facilities with paved "road to nowhere." Presumably the two facilities are linked by one of the longest airbase tunnels in the PLAAF at over 8,000ft in length.



Tianshui Air Base

(Gansu Province)



Pass-thru covered hardened shelter 500ft long, with blast doors; located in an industrial area, across major highway at end of a **tree lined street 1,000ft from runway.**

“天水” Tianshui Air Base cited with “underground hanger” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia's largest military airport, China's "area 51"],” *op cit*; map from: “Tianshui Air Base,” *Our Airports*, (2010) at <http://www.ourairports.com/airports/CN-0130/> > [accessed 15 June 2010].

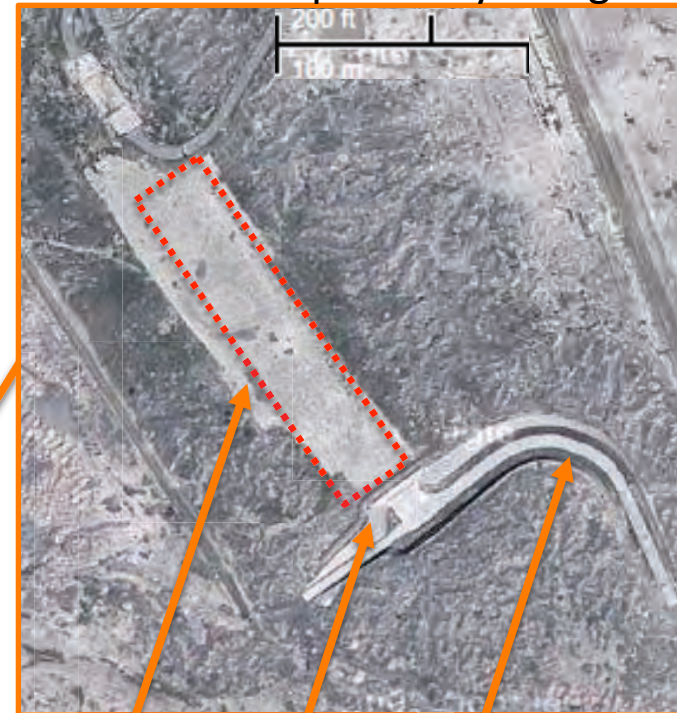
Wuwei Air Base follows Zhangye Model

(under construction, date unknown)

Dual Off-set Runways



“J-curve” Ramp & Entry Design



Aircraft ramp

Heavy blast doors

Underground aircraft or warhead storage?

“武威” Wuwei Air Base cited with “underground hanger” at “鼎新机场——亚洲最大军用机场，中国的“51”区 [New airport — Asia's largest military airport, China's "area 51"],” *op cit*; overhead imagery from: “Wuwei Air Base,” *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0136/> > [accessed 15 June 2010].

Yinchuan Air Base
Ningxia AR
(built circa 1980s)
**Variety of Tunnels &
Underground Complexes**

**Underground
Aircraft Hanger
Complex**

Facilities with Hillside Tunnels

Main Base

Warhead Storage Bunkers

"Yinchuan West Air Base Super-hardened Underground Bunkers," *Virtual Globetrotting*, (2011), at < <http://virtualglobetrotting.com/map/yinchuan-west-air-base-super-hardened-underground-bunkers/view/?service=0> > [accessed 10 Sept. 2011].

Yinchuan Air Base



Tim Brown, "Overhead & Underground," lecture, Technology & Security, Georgetown University, (30 Nov. 2005, updated 20 May 2010); "Yinchuan West Air Base super-hardened underground bunkers," *Virtual Globtrotting*, (2008.01.23) a < <http://virtualglobetrotting.com/map/yinchuan-west-air-base-super-hardened-underground-bunkers/> > [accessed 15 June 2010].

North Tunnels

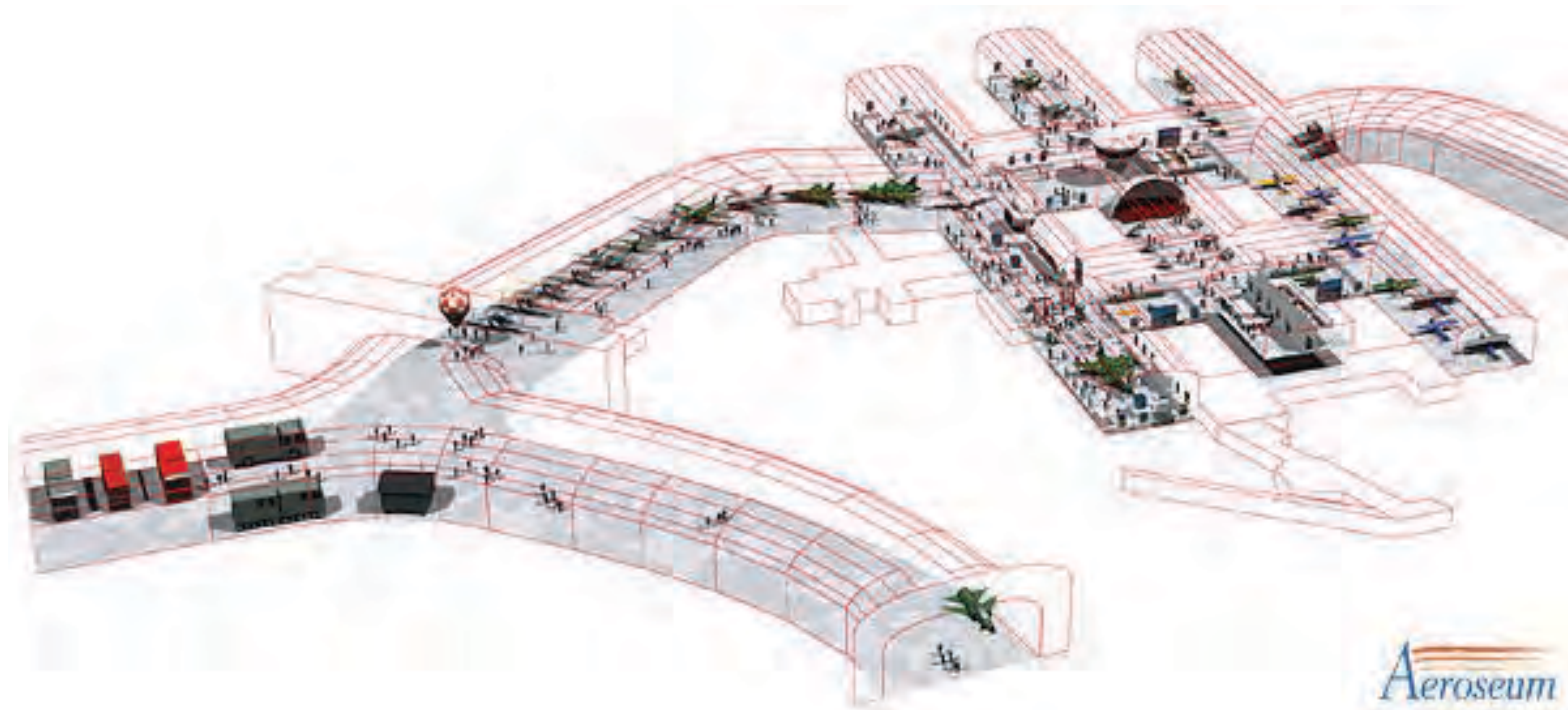
Yinchuan Air Base (cont.)



Photo of J-8Is entering tunnel from: Carlo Kopp, "PLAAF and PLAN Legacy Fighters," (Technical Report APA-TR-2007-0104; Canberra, AUS: Air Power Australia, Jan. 2007) at < <http://www.ausairpower.net/APA-PLA-Fighters.html> > [accessed 10 Jan. 2010].

Schematic of Chinese Designed Underground Airbase similar to *Yinchuan* Air Base

PAF Base near the Pakistan navy Base Gwadar: construction of this complex has begun in 1980 with the help of China and it is reported that it cannot be damaged during an earthquake.



“Underground Runways and Hangar Facility,” *Pakistan Defence Forum*, (2011.08.23), at < <http://imageshack.us/f/832/bunkern3stor.jpg/> > [accessed 15 Sept. 2011].

Yiwu Air Base
Jinan MR
Tunnel Complex Design
similar to *Yinchuan* model

North Entrances

Aircraft
Drive-thru

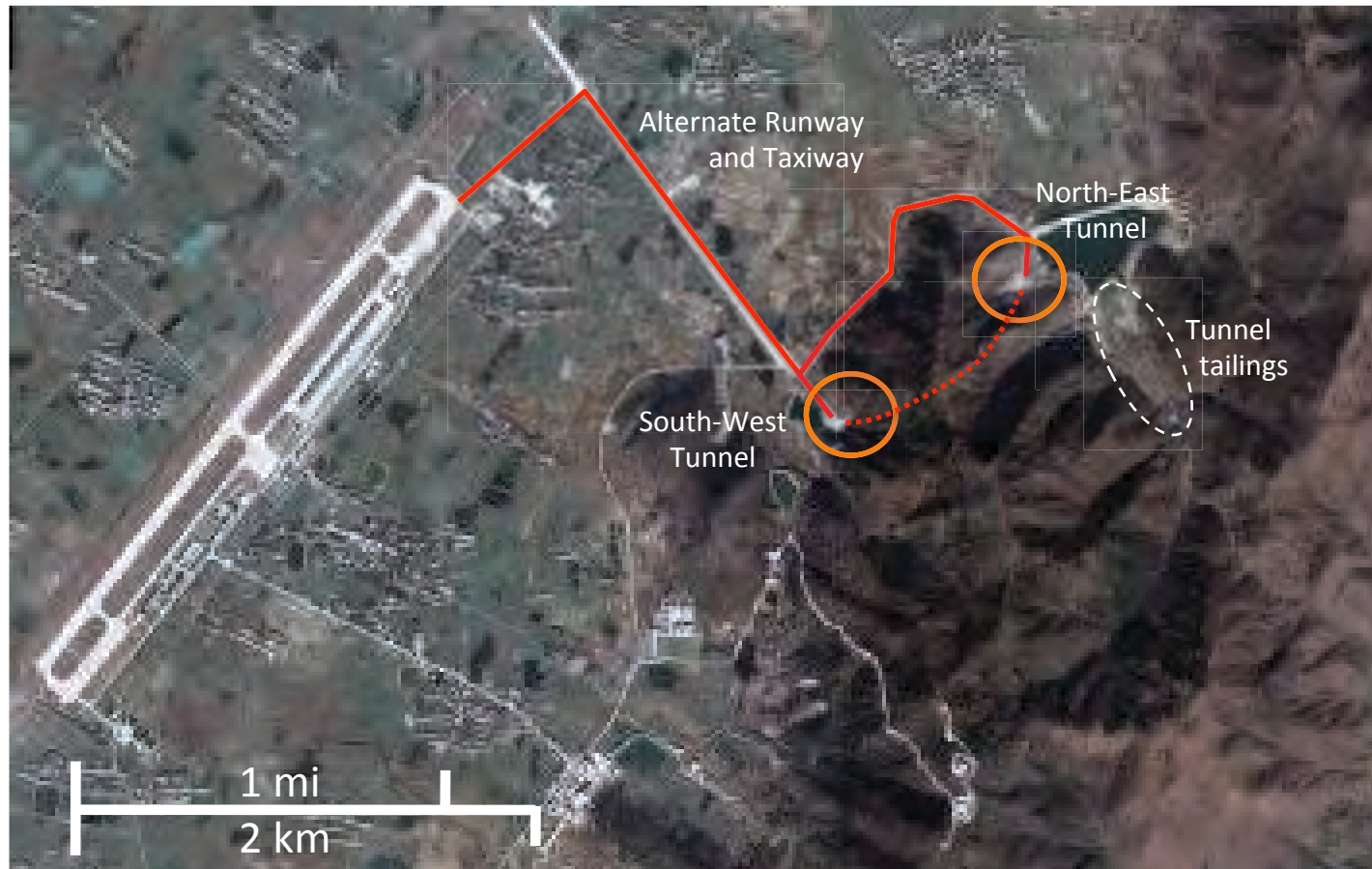
Personnel
Tunnel

South Entrances

1972 Corona imagery

"Underground Access," *Virtual Globetrotting*, (2011), at < <http://virtualglobetrotting.com/map/underground-access-1/> > [accessed 10 Sept. 2011]. Corona imagery from: "Yiwu Airbase 29°20'N 120°02'E," *Global Security*, (2011.07.11), < http://www.globalsecurity.org/military/world/china/ikonos_yiwu_2000329_underground.htm > [accessed 6 Sept. 2011].

Feidong Air Base (Abhui Province)



"肥东" Feidong Air Base," *Our Airports*, (2010) at < <http://www.ourairports.com/airports/CN-0147/> > [accessed 15 June 2010]; and Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit.

Feidong Air Base (Abhui Province)

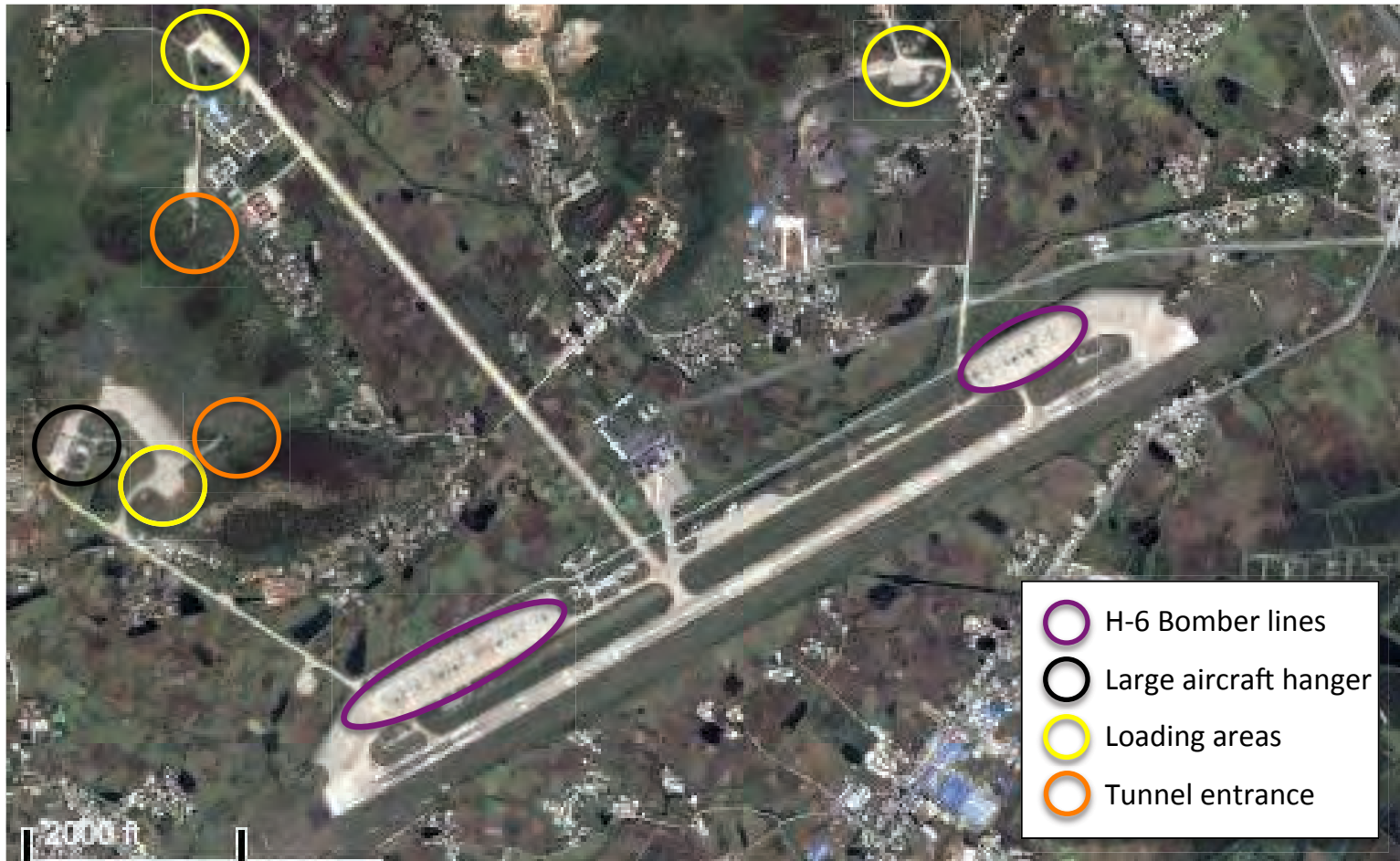


Ibid.

Anqing Air Base

(Anhui Province)

Main Base for H-6 Bombers



"安庆机场" Anqing Air Base," *Our Airports*, (2010) at < <http://www.ourairports.com/airports/ZSAQ/> > [accessed 15 June 2010]; and Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit.

Anqing Air Base (cont.)



Ibid.

Other Tunneling coverage for Anqing Air Base -- H-6 Bombers

30.35 N 117.02 E



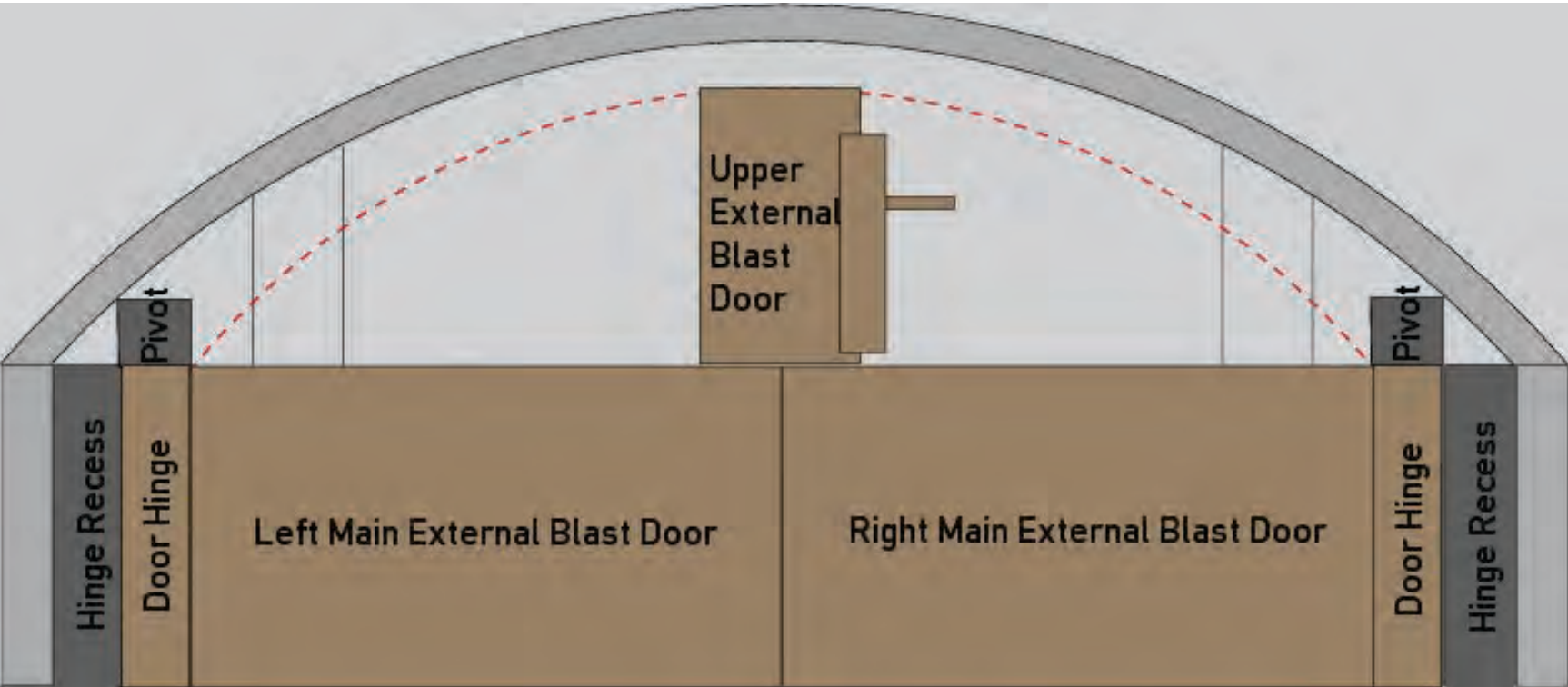
PHOTO: Rare illustration of tunnel deployed H-6 Bomber, from: LOWER LEFT: Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit; RIGHT: "PLAAF 2006," *SinoDefenseForum*, (2006.09.06), at < <http://www.sinodefenceforum.com/air-force/google-earth-plaaf-2006-a-1934.html> > [accessed 17 July 2010]. The latter also provides a listing of most Chinese Air Bases with Lat-Long coordinates.

“Fighter” sized Tunnels



Sean O'Connor and Carlo Kopp, "Assessing PLA Underground Air Basing Capability," (report 2011-01; Canberra, AUS: Air Power Australia Analysis, 16 February 2011), at < <http://www.ausairpower.net/support.html> > [accessed 28 Aug. 2011].

Blast Door Design



Ibid.

Examples of Large Underground Hangers



Ibid.

Underground Air Base Hanger Interior Design



Nuclear capable IL-28 in large hanger at *Guangzhou*



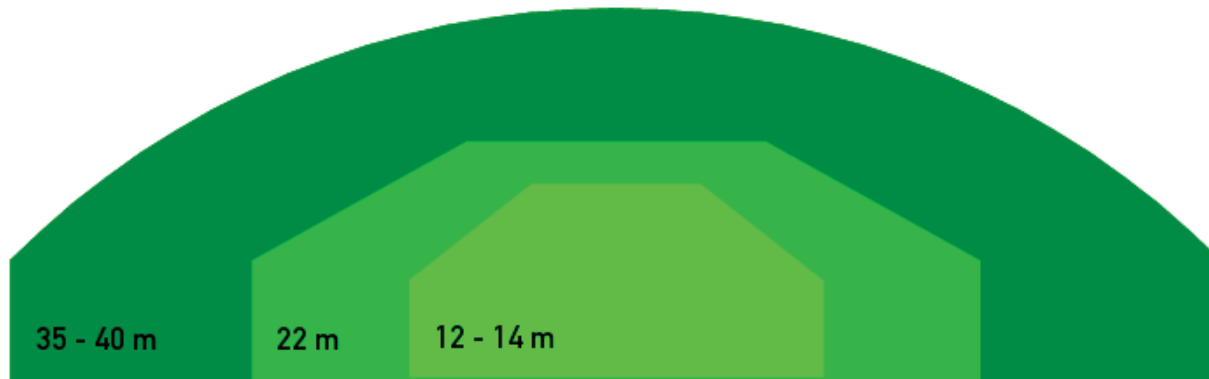
Jiang Zemin CMC inspection



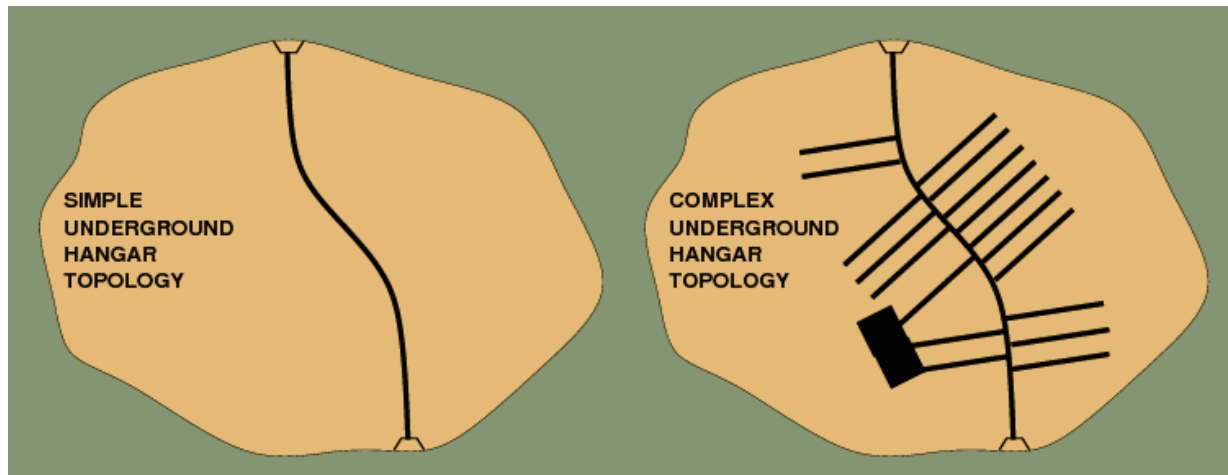
Guangzhou underground hanger

Kristensen, Norris, and McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning*, op cit.; and O'Connor and Kopp, "Assessing PLA Underground Air Basing Capability," op cit.

Underground Air Base Hangar Interior Design



Comparative entrance sizes for PLA underground hangars, scaled from imagery. Some fighter base entrances are as narrow as 12 metres, while some “Badger-sized” base entrances may be as wide as 40 metres. There are eight known 35 - 40 metre wide “Badger-sized” hangars, one of which is decommissioned, fourteen known ~22 metre wide “Beagle-sized” hangars, and seventeen known 12 to 14 metre wide “MiG-sized” hangars.



Significant increases in internal storage capacity and supporting capabilities such as materiel storage and personnel accommodation can be achieved by using complex rather than simple internal topologies.

New Emphasis on Hardened Individual Shelters? (circa 2010)



Prototype model of H-14 shown with latest aircraft shelter with blast doors.

STUDY #5

2nd Artillery Underground "Great Wall"

President Hu inspects the Second Artillery Force performance of “Song of Dong Feng” – *Eastward Wind*

Chinese President Hu Jintao inspected the headquarters of the Second Artillery Force of the Chinese People's Liberation Army (PLA) on Wednesday to mark the 40th anniversary of the founding of the country's strategic troops.

*In his speech, Hu pledged to step up military reforms, **intensify preparations for the military struggle, and strengthen the overall building of the Second Artillery Force....***

Noting that the Second Artillery Force shoulders a glorious mission and important duties in the new century and the new period, Hu said the Party Central Committee and the CMC have attached great importance to and pinned high hopes on the development of the Second Artillery Force.....

*Hu and other military leaders watched an art performance entitled "Song of Dong Feng (**Eastward Wind**)", which tells about the 40-year experience of the Second Artillery Force in an artistic way.*



During his stay, the president, who is also general secretary of the Communist Party of China (CPC) Central Committee and chairman of the Central Military Commission (CMC), had a meeting with senior officers of the Second Artillery Force, with the company of its commander Jing Zhiyuan and commissar Peng Xiaofeng.

“Dong Feng” -- Eastward Wind -- is the original nomenclature for PLA ballistic missiles = “DF.” “Hu Inspects the Second Artillery Force,” Xomjia, (13 Dec. 2009), at < http://www.chinadaily.com.cn/china/2006-06/29/content_628562.htm > [accessed 20 Feb. 2010]. Photos accompanied the website posting.

Second Artillery Underground 1964-2010

- From earliest deployment, use of caves and tunnels was a common theme;
- The name “Second Artillery” was a form of concealment and disinformation;
- PLA Strategic Nuclear focus from late 60s to early 90s was on the USSR;
- Survivability of STRATEGIC missiles – driven by nature of liquid fuel – deployed:
 - Few number of fixed hardened sites – not “active” with fuel/warhead loaded;
 - Hidden cave or tunnel “nests” for assembly and roll-out to pre-surveyed launch sites.
- Survivability of TACTICAL missiles by dispersal and redundancy:
 - Use of mobility and emphasis on multiple reload trailers per fire unit.
- 1st “Underground Great Wall” built in NE and on coast between 1985-1995;
- Introduction of solid fuel has led to major build-up in active launch units as well as multiple re-fires for “dual capability” with DF-11, DF-15 and DF-21;
- Introduce employment concept of “the surge” for deterrence and warfighting;
- 2nd “Underground Great Wall” supposed to be between 1995-2005 but delayed;
- Intense construction in NW, SE, Tibet for completion of 2nd UGW by 2009 for DF-21/DF-31;
- Hypothesis: starting of new 3rd phase “Underground Great Wall” – 2010 to 2020 – for cover and concealment of new generation of mobile ICBM DF-31+ and DF-5 replacement.

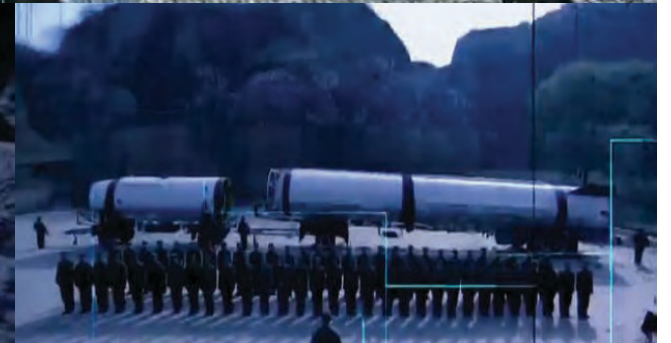
Tunnel Digging as National Strategic Culture

天啸 *Heaven's Roar*

- 2008 Joint Second Artillery Dept. of Television Arts Centre prime-time “epic” series
 - Brilliant reproduction of 40-year history of the Second Artillery to mark the 87 anniversary of the founding of the CPC. Second Artillery Corps, the full name "The PLA Second Artillery Force," approved by Chairman Mao, Premier Zhou named. Many people think it is just an ordinary force, in fact it is a secret form of China's strategic missile forces.*
- Shown nation wide on CCTV-3 with high ratings
- 24 programs @ 43min = 17.2 hours
- Extremely accurate dramatization of the non-fictional early history of the 2nd Artillery: *Tiān Xiào*
- 1st active DF-2 Surface-to-Surface Missile Regiment
- Deployment to Gobi Desert
- Storage location in deep ravines
- Engineer Battalion digging primitive horizontal tunnel construction with deadly cave-ins
 - Few years, they have no powerful modern construction machinery, but with blood and sweat – loss of life patriotism, strong military dreams, heroism, sacrifice, -- they hollowed out, and get through the tens of kilometers of the cave, as the well built missile nests.*
- Failure of initial missile tests
- Relives successful missile delivered nuclear detonation = 18kt
- Live testing incorporated into CMC CPX against the Soviets



“天啸 [Heavens Roar],” directed by missile brigade commander Gu Jin Yun, screen play by Chen, (Mandarin; Beijing, PRC: CCTV, 2008) at < <http://dianshiju.cntv.cn/revolution/tianxiao/vidoeage/index.shtml> > [accessed 11 Apr. 2010]; see also: TV series “Tian Xiao,” Development of the Second Artillery Reproduction,” *Liberation Army Daily*, (2006.05.01) at < <http://military.people.com.cn/GB/42968/57661/4346160.html> > [accessed 21 May 2010].



Early Trailer Deployment



Training for Tunnel Roll-out



"PLA Missile Threat," *Sino Defense Forum*, (2006.02.03), at < <http://www.sinodefenceforum.com/world-military-pictures/pla-missile-thread-pictures-6-832.html> > [accessed 31 Sep. 2011]

Early examples of towed “Rollout”



Screen shot from Ifeng TV [Hong Kong]: “PLA Missiles Aimed at India,” *Chinese Military* [blog], (2010.11.13), at < <http://www.chinese-army.com/?p=7> > [accessed 30 Nov. 2010].

Early Silo Deployment



“央视曝光解放军二炮部队地下战略核导弹发射井 [CCTV Exposure of the PLA Second Artillery Corps Ground Strategic Nuclear Missile Silo Underground],” 陆军论坛 Army Forum, at 铁血国际论坛 [Blood & Iron International Forum], (2010.04.10) at < http://bbs.tiexue.net/post_4196029_1.html > [accessed 2 June 2010].

1980s Silo Deployment



"一口井 [A Silo]," topic: 航天二炮及新概念武器 [Second Artillery Corps and the New Concept of Space Weapons] at 超级大本营论坛 [Higher Headquarters Forum], (2010.04.14) at < <http://bbs.cjdy.net/thread-907903-1-5.html> > [accessed 20 May, 2010, translated IP-1011]; and "DF5发射井内部照片 [DF5 silos within the photo]," China Picture, (2010.04.29), at < <http://www.picturechina.com.cn/bbs/viewthread.php?tid=55644&extra=page%3D1> > [accessed 20 Sept. 2011, translated IP-1011].



Handling & Diagnostic in Facilities



"French Media: China's Number of Nuclear Weapons...." 法媒:中国核武数量, (30 November 2009), at <http://mil.cnwest.com/content/2009-11/30/content_2610125.htm > [accessed 10 Mar. 2010].

Diagnostics & Mating Re-entry Vehicle on DF-31 ICBM



[Report by Peng Wei, Jiang Wu, Chen Shuangwei, and Li Jing]: "New Initiatives in Passing on Experience: 'Snowballing' Talent Cultivation -- Documentary Report of Certain Base of Secondary Artillery Promoting Contract-type' Mentoring," *Jiefangjun Huabao*, [Beijing, in Mandarin], (2009.02.09) at [translated by OSC CPP20090428682002: "Second Artillery Base Promotes Personnel Mentoring To Foster Talent;" accessed 1 June 2010].

Late 1980s Bunkers



Modernization of Bunker Command & Control



“央视曝光解放军二炮部队地下战略核导弹发射井,” op cit.

Inside Loading Rails



Manual Tunnel Roll Out

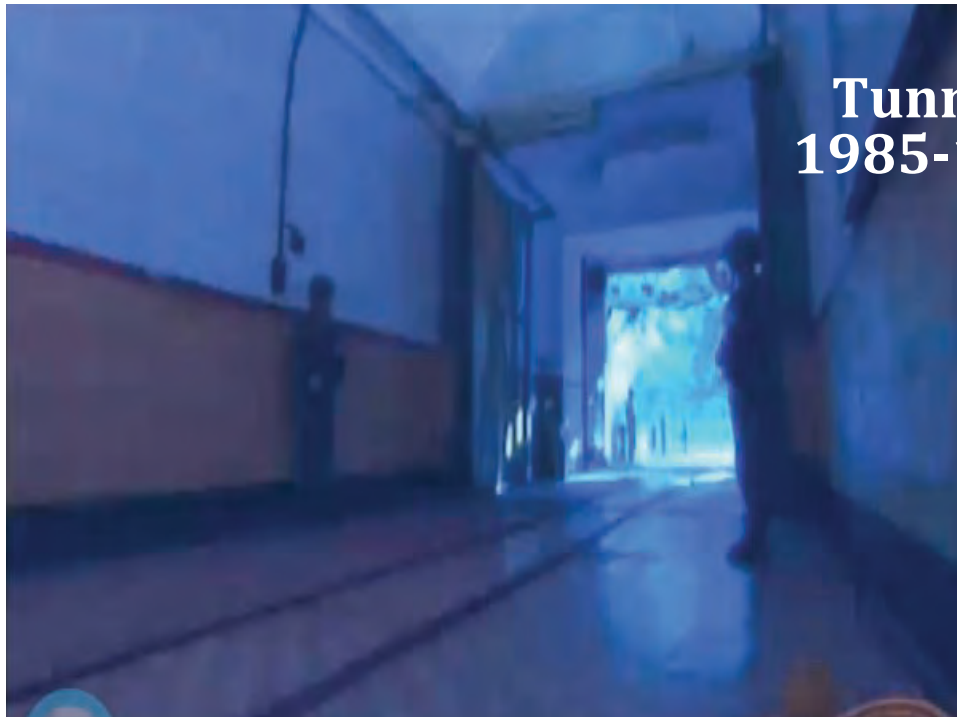


Missiles in Underground Storage



“二炮已装备国产新型延迟爆炸及智能战斗部 [Second Artillery Corps has equipment made of new and intelligent warhead explosion delay],” *Huanqiu*, (2008.04.08), at < <http://mil.huanqiu.com/china/2008-04/86451.html> > [accessed 30 Dec. 2010].

Tunnels 1985-1995



优酷



优酷

和桂营长搞的车载伪装系统



注视着 环球云

返回 歌曲

“Surge” from Underground as National Strategic Culture

导弹旅长 *Missile Brigade*

- 2002 Joint Second Artillery Dept. of Television Arts Centre prime-time “epic” series
- Shown nation wide on CCTV with high ratings
- 18 programs @ 45min = 13.5 hours
- Accurate dramatization of 2nd Artillery: *Tiān Xiào*
- Shows mixed Brigades with DF-2, DF-3, DF-4 and DF-5
- Deployment in “The East” (adjacent to Yangtze River)
- Storage location in sides of mountains with many winding narrow access roads
- Follows Missile Brigade Commander through system modernization
- Shows Military District underground command center as built up on a natural cave
- Shows 2nd and 3rd generation tunnels
- Relives 1995-1996 naval crisis over the Taiwan Straits
- Live testing incorporated into CMC CPX against US Fleet with DF-21s tracking American carriers.



“天啸 [Heavens Roar],” directed by missile brigade commander Gu Jin Yun, screen play by Zhang Rui, (Mandarin; Beijing, PRC: CCTV, 2002) at < http://v.youku.com/v_show/id_XMzlwMzlwMzY=.html > [accessed 11 Apr. 2010]; see also: TV series “Tian Xiao,” Development of the Second Artillery Reproduction,” *Liberation Army Daily*, (2006.05.01) at < <http://military.people.com.cn/GB/42968/57661/4346160.html> > [accessed 21 May 2010].

Command Cave

1分钟准备 1分钟准备



1990s Tunnels



Fathers of the Underground



M.Gen. Qiucheng Long



Lt.Gen. Zhang Xiang

[Report by Ding Haiming, Wei Cunren, and He Zhong]:“万里天疆绘就中国弹道 —— 追记我军战略导弹作战运用专家第二炮兵装备研究院原研究员邱成龙 [Miles-day Xinjiang draw on China's trajectory - In Memory of the Army's Strategic Missile experts in the use of equipment, the Second Artillery Institute of the original researcher Qiucheng Long];” *Jiefangjun Bao Online* [Beijing, in Mandarin], (2010.05.17): p. 1, at [OSC summary CPP20100525088001: “JFJB on Late PLA Missile Expert Qiu Chenglong (Part 1);” full translation by IP-1011]. “通讯：解放军战略导弹作战运用专家邱成龙 [Communication: the use of the PLA Strategic Missile Experts Qiucheng Long],” topic: 航天二炮及新概念武器 [Second Artillery Corps and the New Concept of Space Weapons] at 超级大本营论坛 [Higher Headquarters Forum], (2010.05.16) at < <http://bbs.cjdbby.net/thread-932746-1-2.html> > [accessed 19 May, 2010, translated IP-1011].

“張翔：兩岸應共同規劃中華民族未來 [Zhang Xiang: the two sides should jointly plan the future of the Chinese nation],” Ghongguo Pinglun Tongxun She, [Hong Kong-based Internet news agency (China Review News Agency, in Mandarin), (2010.06.03) at < <http://www.Chinareviewnews.Com> > [OSC summary CPP20100603707002: “Former PLA Commander Urges Cross-Strait Talks on Future of Chinese Nation;” translated in full by IP-1011].

2nd Artillery Tunneling 2005

18 separate national TV programs; 15 minutes of edited coverage.

- 04 Dec 2004 Emergency report -- “tunneling work ran into a group of ‘dragon [stalacite] caves’.”
- 05 Feb 2005 Large scale landslide at underground 2nd Arty construction site;
- 09 Feb Engr. Regt. tunneling in minus 30 degree Centigrade;
- 13 Feb Unit works near Longtan Power Plant;
- 13 Mar 2nd Arty representative complains to Beijing that troops in isolated “frontline construction.... described cultural and recreational activities in the unit as monotonous.
- 17 Mar Following a cave-in at a construction site of 2nd Arty engineering regiment under the Commander “immediately rushed to the site to organize contingency measures: *‘The first step is to remove hazards. Then spray concrete, set up props, section by section, and pour concrete. Then we strengthen steel support. Then we will pass muster’.*”
- 18 Mar “Four news” – methodology, technology, XXXXX, YYYYYY -- training course for 2nd Arty Engr unit; visit the Xiaolangdi and Three Gorges dams to learn construction techniques
- 28 Mar 2nd Arty Engr. Unit “has invested several tens of millions of yuan to set up five new mechanized operation lines” and “new-model rock-drilling machine ... can complete a three-meter-deep roof bolt in five minutes, compared to more than one hour in the past.

“Compilation DVD of PRC’s Second Artillery Corps Activities in 2005,” (CPP20060324017001; Washington, DC: Open Source Center, 29 Mar. 2006); and “PRC Second Artillery Corps Activities in 2005,” (OSC Report in Chinese 05 Feb 06 - 04 Dec 06: FEA20060324021211; Washington, DC: Open Source Center, 24 Mar. 2006).

2nd Artillery Tunneling: 2005 (cont.)

- 06 Apr Rock surface fragmented and collapsed at 2nd Arty underground construction site;
- 18 Apr Soldier afraid of tunnels but now “unfazed as he leads hazardous construction work;”
- 02 Jul Expensive drilling trolley spare parts produced by Regt. locally to save money;
- 03 Jul Award for “iron man” in tunneling projects to soldier working since 1981;
- 08 Jul Engr. Regt. has “accident free” national defense construction mission for past 17 years;
- 21 Aug Engr. Regt. assigned new defense construction mission in early April;
- 25 Aug Exhibition of technological accomplishments of 2nd Arty Corp Engr. units – all tunnel related;
- 13 Sep Mobile S&T service team comes to aid unit with cave-in due to “water percolation in rocks;
- 18 Sep 2nd Arty Engr. Regt. – “narrow, stuffy work sites with temp exceeding 50 degrees Celsius....”
- 2 Oct 2nd Arty Engr. Regt. – “cadres” front line troops for holiday rest.



2nd Artillery Tunneling 2006

16 separate national TV programs; 19 minutes of edited coverage.

- 02 Feb 2nd Arty Engineer Reg. working on tunneling thru holidays;
- 11 Feb Innovation in development of steel membrane tunnel coating machine;
- 21 Mar New approach to preventing “cave-ins” over two year period;



“Second Artillery Corps Tunneling Activities in 2006,” (FBS20070203829568; Washington, DC: Open Source Center, 3 Feb. 2007); “DVD Compilation of PRC’s Second Artillery Corps Tunneling Activities in 2006,” (CPP20070203035001; Washington, DC: Open Source Center, 3 Feb. 2007); “PRC’s Second Artillery Corps Tunneling in 2006,” (OSC Report in Chinese 05 Feb 06 - 04 Dec 06: FEA20070205087986; Washington, DC: Open Source Center, 5 Feb. 2007); and “Compilation of PLA’s Second Artillery Corps Tunneling Activities: 2006,” (Interactive Web Product; Washington, DC: Open Source Center, 2007).

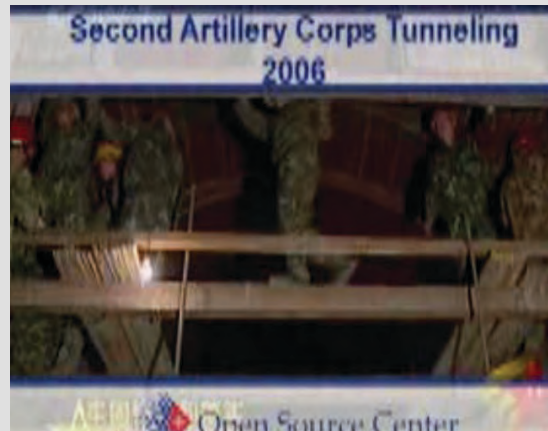
2nd Artillery Tunneling: 2006 (cont.)

- 07 Apr CMC award to 2nd Arty Cmd Academy Professor – linking program of **training + tunneling for 10 yrs**;
- 08 Apr CMC cited 2nd Arty Cmd Academy Professor who made major technical innovations -- visits tunnel site, inspects ventilation + air conditioning;
- 20 Apr Award for 2nd Arty Engr Reg Cmdr for 100% construction acceptance at completion of tunnel project;
- 26 Apr Explosives in tunneling – concern over enlisted troop morale -- psychological program initiated to address troop fears;



2nd Artillery Tunneling: 2006 (cont.)

- 07 May 2nd Arty Engr Reg. develops optimum drilling techniques for linear + curvilinear tunneling – 10 fold increase in efficiency;
- 29 Jun 2nd Arty Engr unit “known as ‘**nest builders**’ for missiles,” makes innovations in video monitored safety + earth moving;
- 02 Jul Communist Party Committee oath taking for troops of “**the Magic Swords of the Orient**” unit in high mountain location on 3,600m plateau;
- 12 Jul 2nd Arty Engr unit specialists in air duct work necessary for humidity control and air conditioning “at locations storing missiles;”



2nd Artillery Tunneling: 2006 (cont.)



2nd Artillery Tunneling: 2006 (cont.)

- 11 Sep “TSP advance geological forecasting technology” surveys material 100m ahead of drilling to prevent “cave-ins.”
- 06 Oct No fall holiday for 2nd Arty Engr construction project “**entering a crucial stage;**”
- 31 Oct Use of the phrase – “ascending/descending translational protective containment for **underground railway;**”
- 27 Nov Expert response team created to respond to tunneling problems at “**a dozen ... units in remote areas;**”
- 04 Dec 2nd Engr Bn working in “**small cave depot;**” also utilization of advanced “**New Austrian Tunneling system.**”



2nd Artillery Tunneling: 2007

01 Feb 3rd Bn, 2nd Arty Engineer Reg. “garrisoned in a cold northwestern region, recently received a ... ‘company-delivery’ [wu xia lian] contingent.... To help them solve practical problems, so as to elevate their self-building capability;”



“: May 2007Video of PRC Military Activities of Second Artillery Corps7,” (CPP20070626035008; Washington, DC: Open Source Center, 31 May. 2007); “Second Artillery Corps Tunneling Activities in 2006,” (FBS2008020127313; Washington, DC: Open Source Center, 1 Feb. 2008); “DVD Compilation of PRC’s Second Artillery Corps Tunneling Activities in 2007,” (OSC Summary in Chinese, Mandarin 01 Feb 07 - 03 Nov 07: CPP20080130017002; Washington, DC: Open Source Center, 30 Jan. 2008); “PRC’s Second Artillery Corps Tunneling in 2007,” Open Source Center (OSC Summary 01 Feb 07 - 03 Nov 07: FEA20080205524228; Washington, DC: Open Source Center, 5 Feb. 2008); and “Compilation of PLA’s Second Artillery Corps Tunneling Activities: 2006,” (Interactive Web Product; Washington, DC: Open Source Center, 2008).

2nd Artillery Tunneling: 2007 (cont.)

- 03 Feb An IT-based command center established within a Second Artillery unit, “that cost millions of yuan to build,; was put into operation in late January -- center will be used to **direct the construction work of national defense-related projects.**
- 04 Feb 2nd Arty Eng. Regt. “working on a plateau” continues underground construction thru winter; coping with problems of “pitting, water seepage, and cracking” in the **high-altitude frigid zone;**”
- 07 Feb Rotation of 2nd Arty Eng. Regt. technical personnel (relieved by Party cadres);
- 08 Feb 8th Co., 2nd Arty Eng. Regt. completes a **3 year project** in the “harsh” Gobi Desert;
- 09 Feb Projection movies shown to troops digging underground in Gobi Desert;”
- 21 Feb Underground 2nd Arty unit “in order to **race against the time** ... working overtime;”



2nd Artillery Tunneling: 2007 (cont.)

- 06 Mar Pt. 1: Plateau-based “poor rock quality in the tunnel is creating problems for blasting;” Regt. Cmdr. “on a plateau in the northwest” since 2004; Regt. “over the past few years.... responsible for “17 national defense projects;”
- 07 Mar Pt. 2: Cmdr is a specialist in digging through difficult terrain and has published 16 papers on “Smooth-Surface Blasting for Tunneling;”
- 13 Mar “The tunnel in which the 3d Battalion of the regiment works is a very tough environment.”
- 27 Mar Party committee mobile office (comprising committee members and technical experts) formed to help solve problems encountered by the grassroots servicemen and prevent the occurrence of construction-related accidents.



2nd Artillery Tunneling: 2007 (cont.)

- 01 May 2 construction records set in history of 2nd Arty Corps:
-- **Daily tunneling footage of 17.5 meters** by a single tunneler in a cave depot;
-- **Monthly ferroconcrete usage of over 10,000 cubic meters.**
- 09 May “Report on the safety assurance measures adopted by a Second Artillery regiment at its construction site;” concern with “**checking and redressing any lurking perils;**”
- 13 May “To actively change the work style of its command and staff cadres, the authorities of a Second Artillery regiment have, since the beginning of May, required the regiment's command and staff cadres to go to the construction sites of the key national defense projects it has undertaken.... One such project was entering the critical stage of concreting.”



2007: "Engineering Regiment Updates Second Artillery Project Methods"*

After the peak of the latest round of national defense construction, an unidentified engineering regiment famous for bravely going all out also underwent challenge. In mission after mission, with time limits repeatedly moved up and quality standards constantly raised, the regimental party committee adjusted thoughts and ideas to advance with the times, adjusted team building to satisfy the need for development, and sought the best avenue for improving the overall combat strength of the armed forces. After several years of exploration, the regiment has gotten into the fast lane of comprehensive development under the guidance of the scientific development concept.

Installing "Clock Hands" in the Brain

As the pattern of battalions fighting on their own, companies fighting on their own, and even squads fighting on their own has emerged, projects involving tunnels, revetments, and installation and repair have become bigger in scale. At the same time, inconsistencies, such as a lack of main battle equipment and pressing deadlines for handing over completed projects, were preventing projects from fully "blooming." But in deploying the work force organically, having more people was in fact leading to holdups in work....

The regiment received instructions to urgently dig out a shelter several hundred meters long. "Forward command" transferred experts in machinery operation, maintenance, and demolition to form a small digging fendui [squad to battalion-size unit], and it concentrated superior forces to roll out operations. For 76 days, 56 "mountain moving warriors" fought bravely to satisfactorily complete the mission, setting a Second Artillery speed record for an underground facility.

The "green light" was given all the way to bring the following to the troops: Manpower support comes from the construction company; responsibility for equipment support is handed over to the mechanized company; technical support is provided by the mapping platoon and the technical groups; logistics support allows for the management of the supply of materials at battalion headquarters.

The Party Is Not Behind the Times

*Presently, **the EYB automated command center**, which the regiment invested in and designed and built on its own, is undergoing extensive trials for the first time in the engineering corps' informatization building. After the automated command center is completed, the situations at the locations of the tunneling operations, the mechanized equipment site, and the detonator and explosives storehouses will conveniently appear on the screen....*

* Niu Xiaoqi, Liu Baolong, and staff reporter Wang Hongxu: "Advancing With the Times; Satisfying the Need for Development -- Experiences of Unidentified Engineering Regiment Using Scientific Development Concept To Guide Comprehensive Future Development of the Regiment, Part 1," Huojianbing Bao, [Party Journal of the 2nd Artillery], (23 Jun. 2007), Open Source Center translation: CPP20070802436007.

2nd Artillery Tunneling: 2007 (cont.)

- 08 Jul Operational underground “**EYB Automated Command Center**” -- application of IT has greatly enhanced the quality and efficiency of their construction work;”
- 10 Aug Concern of smoke and dust in tunnels; innovative “roller shutter” automated self-sealing “**Gate of Health**” development by 2nd Arty Eng. Regt.
- 24 Aug New “engineering vehicle designed by” Eng. Regt; “holders of dozens of Second Artillery records, including **monthly tunneling footage and daily revetment;**”
- 12 Sep Unit based cost savings initiatives for recycling of expensive drill bits;
- 17 Sep Profile of Cmdr, 3rd Co., 2nd Arty, participated in 5 “**key national defense construction projects**” over last three years, awarded the title of "Vanguard Company in National Defense Project Construction" after “most serious cave-in recently.”



2nd Artillery Tunneling: 2007 (cont.)

03 Nov 2nd Arty Engr. Regt. “setting a new record of tunneling footage in soft, weak, and precarious rock area.” Interview with Political Commissar, Lt. Col. Huang Jinpo: “We must, under the guidance of the 17th CPC National Congress spirit, adhere to the scientific development concept and accomplish our defense construction tasks to high standards, with a sense of urgency that time and tide waits for no man.”



2008: “Second Artillery Achieves Remarkable Results in Site Construction”*

From the Conference on Second Artillery Site [zhen di] Engineering Construction Work that concluded yesterday, the reporters learned the following:

...its achievements were spoken highly of by the [Central] Military Commission and [the PLA] Headquarters. Second Artillery Deputy Commander Zhang Yuting attended and addressed the conference and Deputy Chief of Staff Wang Zhimin summed up last year's work and outlined plans for this year. Liu Huanmin, deputy director of the Logistics Department of the Second Artillery Corps, presided over the conference.

The tasks involved in last year's site [zhen di] engineering construction were **unprecedentedly weighty**, the project **deadlines were unprecedentedly tight**, and the required standards were higher than ever.... At the project construction front, **the vast numbers of [Second Artillery] officers and men** tackled key problems, overcame difficulties.... while the **wartime project support** capability of its troops has been formed in an all-round way.

The achievement of success relies on the firm conviction of our **vast numbers of officers and men** who took part in the site [zhen di] engineering construction, their collective wisdom, and united efforts.

...they had ensured the satisfactory progress of their projects and broken many of the Second Artillery's records for underground construction.... They had successively introduced many pieces of capital construction equipment of the world's most advanced level and vigorously improved and innovated their construction technologies. In so doing, they had resolved several dozen challenging problems related to **long-distance ventilation and smoke discharge, cave-depot construction in areas with unfavorable geological conditions, and roughening of concrete surface**. As a result, the quality of a number of site [zhen di] construction processes, including **tunneling, covering, and installation, had reached the highest standard in the [Second Artillery's] history of site [zhen di] construction**.

Deputy Commander Zhang pointed out in his address: Units at all levels must... [w]ith a combat-ready posture and determination to meet the requirement to win wars, all units must get a good grasp of the demands of the situation, resolutely **uphold their actual-combat standards**, and push forward, in a down-to-earth manner, their site [zhen di] engineering construction and **preparations for wartime project support**.... They must focus their attention on the general prospect of our **overall national building and the long-term development of our Second Artillery Corps**, and vigorously create a favorable atmosphere charged with the desire to work hard, to economize, and to realize benefits, so that money can be put to the best use.

* Liu Baolong, Niu Xiaoqi, and reporter Ge Song: “Achieving Progress Through Scientific Planning, Enhancing Quality Through Scientific and Technological Innovations, Ensuring Safety Through Scientific Precautions -- the Second Artillery Corps Has Again Achieved Remarkable Results in Its Site Engineering Construction; Second Artillery Corps Deputy Commander Zhang Yuting Attends and Addresses Conference on Second Artillery Site Engineering Construction Work,” Huojianbing Bao, [Party Journal of the 2nd Artillery], (15 Jan. 2008), Open Source Center translation: CPP20080314478007.

2nd Artillery Tunneling: 2008

- 21 Mar Tunnel construction site with temperature below minus 10 Celsius “referred to by experts as the most dangerous and most ‘unnerving’ project in the history of the Second Artillery Corps’ underground works.”
- 23 Mar In temperatures below minus 20 degrees Celsius, the “officers and men are using a self-developed insulated mixing station to perform concrete coating.” Other inventions by this tunneling unit include mobile power switchboard and composite ventilation system.



“Second Artillery Corps Continues Tunneling Work,” (Video Report: CPM20081128017002; Washington, DC: Open Source Center, 8 Oct. 2008); “Second Artillery Corps Tunneling Activities in 2008,” (FBS20090206296385; Washington, DC: Open Source Center, 6 Feb. 2009); “DVD Compilation of PRC’s Second Artillery Corps Tunneling Activities in ‘08,” (OSC Summary in Chinese, Mandarin, 21 Mar 08 - 07 Dec 08: CPP20090203017001; Washington, DC: Open Source Center, 3 Jan. 2009); “PRC’s Second Artillery Corps Tunneling in 2007,” Open Source Center (OSC Summary 1130 GMT 21 Mar 08 - 07 Dec 08: FEA20090206814557; Washington, DC: Open Source Center, 7 Dec. 2008); and “Compilation of PLA’s Second Artillery Corps Tunneling Activities: 2008,” (Interactive Web Product; Washington, DC: Open Source Center, 2009).

2nd Artillery Tunneling: 2008 (cont.)

- 25 Mar “Iron 8th Company, 2nd Arty, in underground area where “landslides were very common,” used new technology and new processes to overcome the difficulties in the tunneling operation caused by poor geological conditions and the project was completed on time.”
- 4 Oct “Racing against time to ensure that their projects can be completed before winter sets in, the soldiers are working over 11 hours a day in the tunnels where temperature runs up to over 40 degrees Celsius.”
- 11 Oct “The tunnel in which the 3d Battalion of the regiment works is a very tough environment.”
- 7 Dec Party committee mobile office (comprising committee members and technical experts) formed to help solve problems encountered by the grassroots servicemen and prevent the occurrence of construction-related accidents.



Qinghai-Tibet Railway Tunnel

= total length of 65.3 kilometers



"Tunneling in China," op cit; "Qinghai-Tibet Railway Daily Drainage Volume Hits New Record," *TibetOnline*, (2009.12.30) at < <http://chinatibet.people.com.cn/6856041.html> > [accessed 12 June 2010]; and Wang J.Y., "Tunneling and Technological Progress in Tunneling in China," op cit.

Military Highway Construction in Tibet



“Highway tunnel to Tibet's Metok completed,” *Sina English*, (2010.12.15), at <<http://english.sina.com/china/p/2010/1215/352187.html> > [accessed 18 Jan. 2011].

Military Highway Construction in Tibet



嘎隆拉山隧道顺利贯通 官兵万分激动 Galong La Cairn Tunnel smoothly through extremely excited soldiers]," Chinamil, (2010.12.15), at < http://tp.chinamil.com.cn/zt/2010/2010-12/15/content_4353913.htm > [accessed 18 Jan. 2011].

2nd Artillery Tunneling: 2008 (cont.)

“Building the First Missile Site in Tibet”

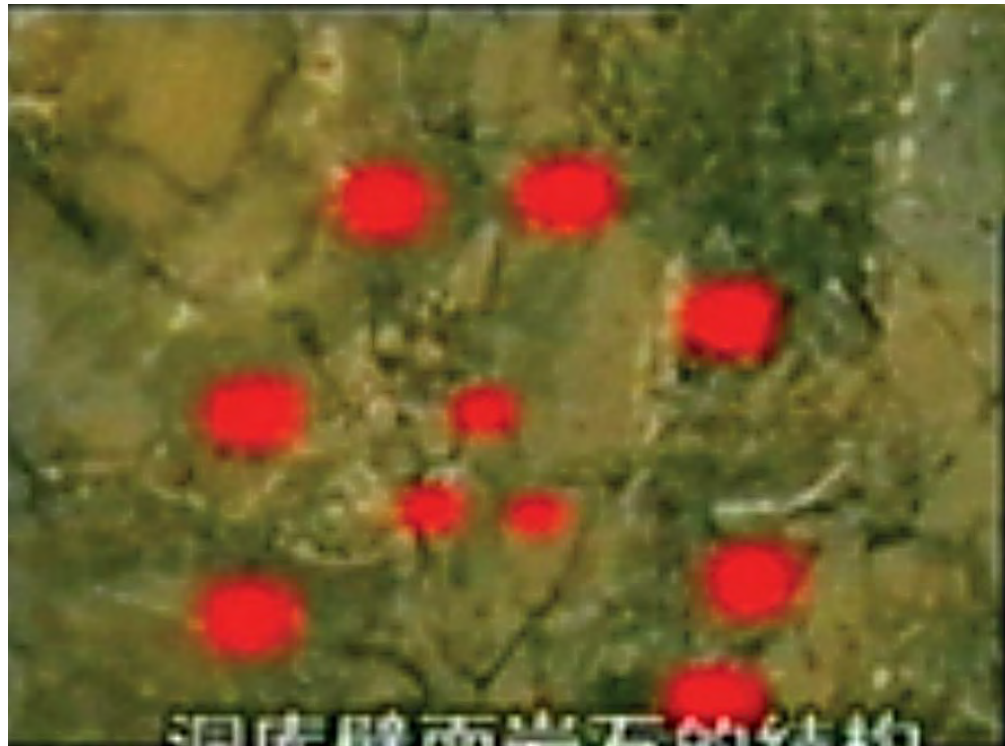
In 2007, Colonel Zheng's regiment was tasked to build the first strategic missile site in Tibet. Without providing much information about the new strategic missile site, the documentary mentions that the missile site is located in a mountainous area at an altitude of over 4,000 meters.

Tibet's harsh environment and scarcity of oxygen at a high altitude posed a major challenge to the missile site project. In light of the situation, Colonel Zheng first built a well-equipped work camp, an oxygen generation station and a water purification station. Oxygen was piped down to the project's work sites deep into a mountain.

In April 2007, the missile site project started and had continued for 200 days till it was completed. The planned missile site was carved out of a hill through layers of perennial frozen soils. The project utilized an array of modern tunnel boring machines. The smoothing blasting techniques were successfully applied, which eventually sped up the entire project.

The documentary indicates that upon the completion of the project, the engineering regiment quickly pulled out, thus allowing immediate missile deployment operations.

Played on PRC national CCTV, (25 Mar. 2008);
from OSC (3 Feb. 2009): CPP20090203017001.



PRC Television Reports of Missile Buildup Opposite India



Rail movement of Missile Units



Dual-capable DF-21 IRBM



Missile Deployment in Tibet



Dual-capable DF-11 IRBM

Screen shots from Ifeng TV [Hong Kong]: "PLA Missiles Aimed at India," *Chinese Military* [blog], (2010.11.13), at < <http://www.chinese-army.com/?p=7> > [accessed 30 Nov. 2010].

2nd Arty FTX vs. India



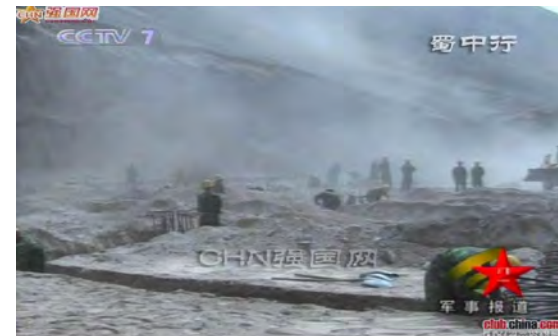
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“印度要疯了:中国二炮部队针对的印度演习曝光! [India to be Crazy: China's Second Artillery Corps in India for Exercise Sxposure],” *Army Forum*, (2009.07.02) at < http://bbs.tiexue.net/post2_3680288_1.html > [accessed 11 May 2010, translated by IP-1011].

Deployment of 2nd Artillery Missiles to Tibet



Photos of Tunnel Construction in Tibet



November 15, 2010, the Chinese official media have reported major Lanzhou Military Region Corps of Engineers is the roof of the world steel soldiers, the news suggested to China from the year 2004 a total of seven years in the western Qinghai-Tibet Plateau altitude of 4,500 meters above the plateau into absolute Ji defense projects.



“印度头上的利剑！中国建成重大国防工程 [Indian Head Sword! China into a Major Defense Project[],” Tuku-Military, (2010.11.16), at < http://tuku.military.china.com/military/html/2010-11-16/157822_1559899.htm > [accessed 31 Dec. 2010; translated by IP-1011].

PRC Map Shown with News Report



“印度头上的利剑！ 中国建成重大国防工程 [Indian Head Sword! China into a Major Defense Project],” *Tuku-Military*, (2010.11.16), at < http://tuku.military.china.com/military/html/2010-11-16/157822_1559899.htm > [accessed 31 Dec. 2010; translated by IP-1011].

Construction Troops in Front of what appears to be DF-31 type **slanted Tunnel Portal** as at Kunming



“印度头上的利剑！ 中国建成重大国防工程 [Indian Head Sword! China into a Major Defense Project[],” *Tuku-Military*, (2010.11.16), at < http://tuku.military.china.com/military/html/2010-11-16/157822_1559899.htm > [accessed 31 Dec. 2010; translated by IP-1011].

2nd Artillery Tunneling: 2009

- 24 Jan National defense project “is in critical stage” with 2nd Arty Engr. Regt. dealing with dangerous cave-ins.
Dep.Reg.Cmdr: “This working face is a clay intercalation. If it is not promptly buttressed, it may cave in at any moment. That is why we cannot afford to stop.”



“Video of PRC Military Activities of Second Artillery Corps: May 2007,” (CPP20070626035008; Washington, DC: Open Source Center, 31 May. 2007); “PRC’s Second Artillery Corps Tunneling Activities in 2009,” (FEA20100209001275; Washington, DC: Open Source Center, 9 Feb. 2010); “DVD Compilation of PRC’s Second Artillery Corps Tunneling Activities in 2009,” (“CPP20100209035001, OSC Summary in Chinese, Mandarin 01 Feb 07 - 03 Nov 07; Washington, DC: Open Source Center, 9 Feb. 2010); “PRC’s Second Artillery Corps Tunneling in 2007,” Open Source Center (OSC Summary 01 Feb 07 - 03 Nov 07: FEA20080205524228; Washington, DC: Open Source Center, 5 Feb. 2008); and “Compilation of PLA’s Second Artillery Corps Tunneling Activities: 2009,” (Interactive Web Product; Washington, DC: Open Source Center, 2010).

2nd Artillery Tunneling: 2009 (cont.)

26 Jan Wives bring “jiaozi” [dumplings] to tunnel for troops to celebrate New Years while working;



2nd Artillery Tunneling: 2009 (cont.)

- 30 Jan Engr. Regt. 2nd Arty – “some of the construction sites require that work be done in one stretch.... officers and men are staying in their respective posts during the festive season.”
Political Commissar of 2nd Arty Engr. Regt., Wang Baoguo (lower left, red hat), “has been working in tunnels for over three decades.”
- 22 Mar Tunnel troops using “a new type of portable oxygen respirator tailor-made for this unit's drill carriage operators, for the first time, to effectively protect themselves from dust pollution.”
- 25 Apr Underground “Engineering Installation Regiment” solves “bottleneck problems.” “Recently, a core sampler [lower right] that had been improved by the soldiers of this regiment was applied at the surveying points for multiple missile sites. This was the 28th innovation outcome of the regiment since the introduction of the "Golden Idea" award.



2nd Artillery Tunneling: 2009

22 May Profile of Commander of 2nd Arty “Engineering Installation Regiment” at completion of defense project -- with discussion of critical importance of “quality” construction and help of civilian rebuilding (in addition to military duties) in post-earthquake areas:

During the 100-day earthquake relief operations of last year, Zhang led his entire regiment to rebuild infrastructure and help solve the problems facing over 200,000 victims in their daily life at 18 temporary settlements.

Early this year, when a national defense project was completed, the amount of steel used was over four metric tons less than originally planned.

Shortly after the Spring Festival this year, the engineering regiment received an urgent assignment.... During a spot check, [the Engr. Regimental Commander] ... noticed a crack on an expansion screw. He immediately instructed the operators to double-check all the screws in the same batch one by one. Over 50 similar problems were exposed, whereupon ... [the Engr. Regimental Commander] ordered comprehensive reworking.

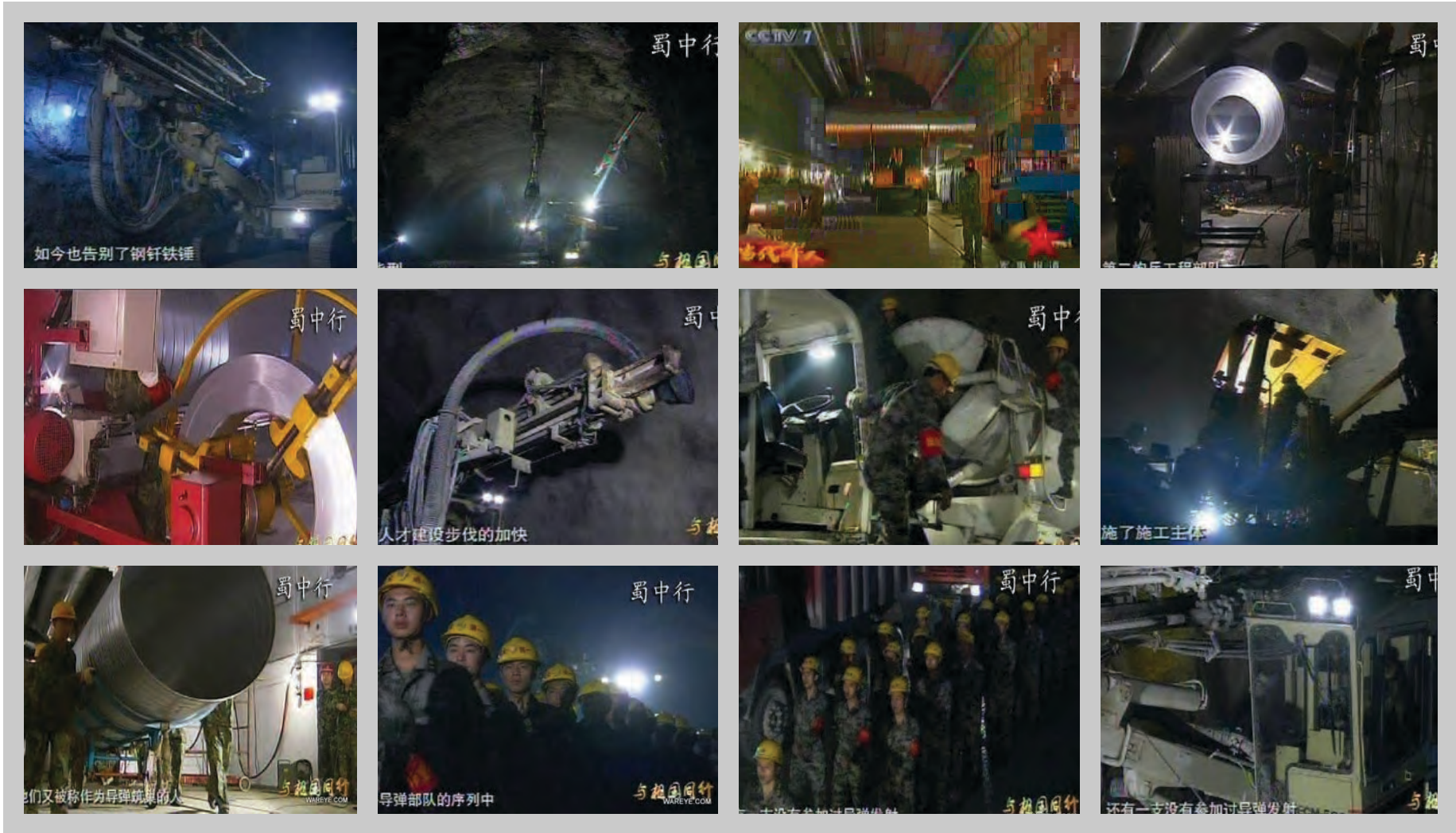
7 Nov “In the strategic missile force, there is another unit that has never taken part in the launch of any missile or even seen a missile. This is the engineering unit of the Second Artillery Corps, made up of an engineering headquarters and an engineering technology general unit. They are also known as nest builders for missiles. Their hard work and quiet dedication have created these modern "underground Great Walls" running through the bowels of tall mountains.”

2nd Artillery Tunneling: 2009 (cont.)

- 24 Jan National defense project “is in critical stage.” 2nd Arty Engr. Regt. Dealing with dangerous caves; Wang Baoguo, political commissar of 2nd Arty Engr. Regt. (lower right, red hat), “has been working in tunnels for over three decades.”
- 22 May Profile of Commander of 2nd Arty “Engineering Installation Regiment” at completion of defense project -- with discussion of critical importance of “quality” construction and help of civilian rebuilding (in addition to military duties) in post-earthquake areas:
- 7 Nov “In the strategic missile force, there is another unit that has never taken part in the launch of any missile or even seen a missile. This is the engineering unit of the Second Artillery Corps, made up of an engineering headquarters and an engineering technology general unit. They are also known as nest builders for missiles. Their hard work and quiet dedication have created these modern "underground Great Walls" running through the bowels of tall mountains.”



2nd Artillery Tunneling: 2009 (cont.)



All photos from "PLA's Second Artillery Corps to Create a Mysterious 'Underground Great Wall,'" of 13 Dec. 2009, op cit.



2nd Artillery Tunneling:
2009 (cont.)

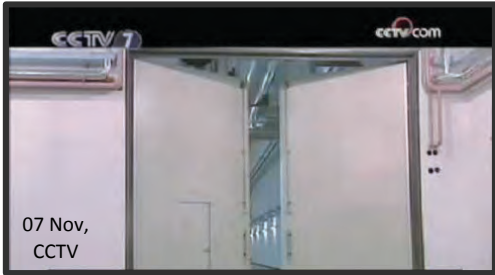
Above photo: Main Missile Bay with double track rails looking south from north entrance floor. Right photo: Same Main Missile Bay looking north from scaffold above south entrance. Film shown on 7 Nov. 2009, national CCTV-7. Screen shots from: "PLA's Second Artillery Corps to Create a Mysterious 'Underground Great Wall,'" of 13 Dec. 2009, op cit.



2nd Artillery Tunneling: 2009 (cont.)

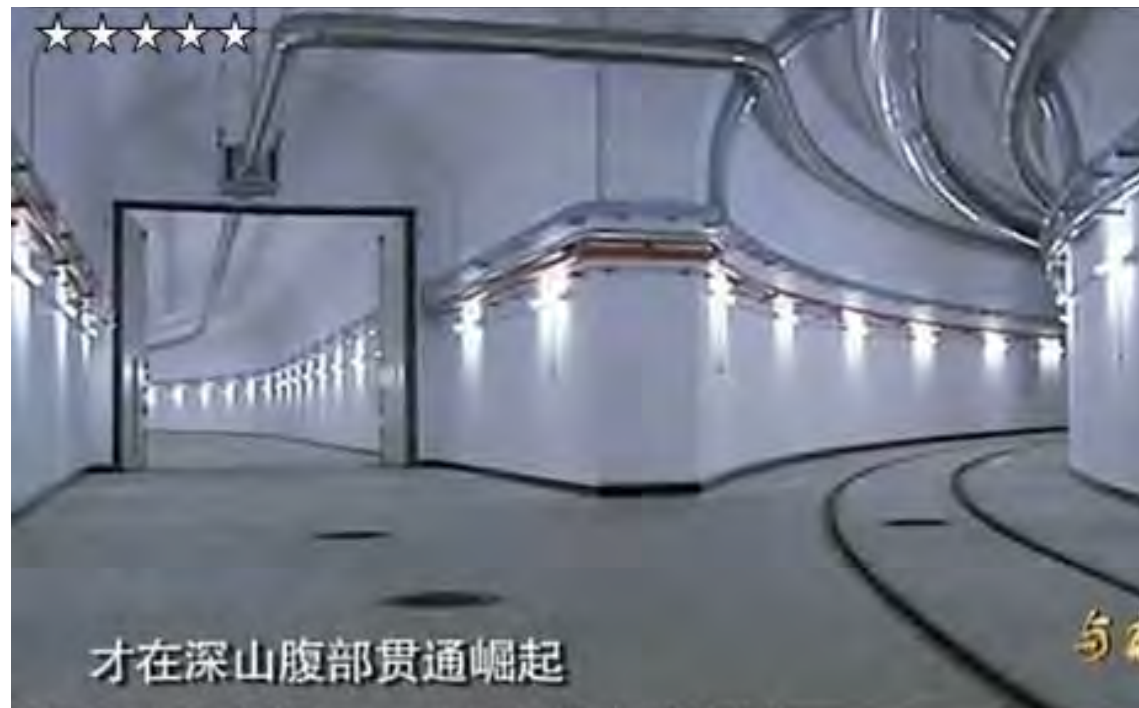


Above: finished underground launcher storage bay with double track rail; left: bay doors opening; right: bay doors closing.



“PLA’s Second Artillery Corps Creates a Mysterious ‘Underground Great Wall,’” of 13 Dec. 2009, op cit.

1989
&
2009



2nd Artillery Tunneling: 2010

- 21 Oct [Wang Hailong, battalion commander of an engineering unit, SAC] In the past, to support such a section, it used to take 15 people working three days. Now, with our independently developed buttress vehicle, the job can be done by eight people in one day.
- 11 Mar [Wang Liping, political commissar, Engineering Design Academy, Second Artillery Corps] During the period of the 11th Five-Year Program, we took part in the underground railway air defense shelter projects in Beijing, Nanjing, Shenyang, Dalian, and Changchun. A large number of advanced technologies and outstanding designs were applied
- 27 Oct Today, Gong Xiaobin and the team led by him performed a repeat survey of a national defense project of the Second Artillery Corps and **tendered a report containing the data of more than 100 locations**. The engineering team checked the data and found them error-free.



“DVD/Web Product of PRC Military Activities in Oct 10,” (FEA20110124013666; Washington, DC: Open Source Center, 4-30 Oct.); and
“Video: PRC PLA, PAPF Take Part in Key Projects During 11th Five-Year Program,” (CPP20110505048001, Washington DC: Open Source Center, 1 March 11)

2nd Artillery Tunneling: 2010 (cont.)

15 May The report says that the remote-controlled tunneling machine has a robotic arm that can turn 360 degrees and can be remotely controlled from within a 200-meter radius. The machine can bore a 25-meter-deep hole at one time, the report says. Workers can use this machine on hazardous terrain, the report says.



“New Tunneling Machine in PLA Second Artillery Corps Engineering Unit,” (CPP20110516072001; Washington, DC: 15 May 11)

2nd Artillery Tunneling: 2011



Not all Tunnels are built by the PLA

Contract Construction of Underground Defenses



Illustrations from: "国防工程 [Defense Projects]," *Geological Team of Zhejiang, Zhejiang Tunnel Engineering Company*, (2009.03.16), at < <http://www.dzqidi.com/newsShow.asp?id=403> > [accessed 10 Dec. 2010; translated by IP-1011].

Not all Tunnels are built the PLA

Contract Construction of Underground Defenses



Illustrations from: "国防工程 [Defense Projects]," *Geological Team of Zhejiang, Zhejiang Tunnel Engineering Company*, (2009.03.16), at < <http://www.dzqdui.com/newsShow.asp?id=403> > [accessed 10 Dec. 2010; translated by IP-1011].

South Korean Newspaper

“China Builds **Underground ‘Great Wall’** Against Nuke Attack”

*The Chinese Army is believed to have **built an underground "Great Wall" that stretches for more than 5,000 km** in the Hebei region of northern China. Citing the People's Liberation Army's official newsletter, the Ta Kung Pao daily of Hong Kong on Saturday said China's strategic missile squadron, the Second Artillery Division, built a massive underground tunnel to conceal nuclear weapons, including the Dongfeng 5 intercontinental ballistic missile with a range of 13,000 km.*

***Since 1995, the Second Artillery Division has mobilized tens of thousands of soldiers to build a network of tunnels stretching for more than 5,000 km below the mountain regions of Hebei,** China's state-run CCTV reported. "A missile base has been built hundreds of meters underground and can withstand several nuclear attacks," CCTV said. "People refer to the network of tunnels connecting to the missile base as the 'Underground Great Wall.'"*

*"The early version of China's mid- to long-range missiles had all been deployed above ground and were vulnerable to detection by spy satellites and attacks by interceptor missiles. That prompted the Chinese military to move all of their missiles hundreds of meters underground." As a result, **the squadrons of the PLA deployed there are completely undetectable because they are based in subterranean bunkers and move around beneath the surface.***

The purpose of the secretly constructed underground Great Wall is to give China a second chance after a nuclear attack, military experts said. The main objective of the Second Artillery Division is to be able to launch a counterattack against enemy targets after escaping the first volley of attacks.

*The Ta Kung Pao daily reported that **it was unprecedented for the PLA's newsletter to reveal classified information about the tunnels and that this demonstrates Beijing's confidence in its military power.***

Similar coverage in Japan, Taiwan, Russia and Pakistan, but not the U.S..

"China Builds Underground 'Great Wall' Against Nuke Attack," Chosun Ilbo, [Seoul, ROK Daily], (14 December 2009), translated by OSC KPP20091214971047.

Future Issues

- Supporting an Operational Underground
 - Logistics
 - Maintenance
 - Training
 - Mobilization/Field Sustainability
- Surging Larger, Longer-Range Missiles
 - Can Underground ICBMs be Survivable & Credible?
- Strategic Concept for Political Impact
 - Intra-war Deterrence and Escalation Dominance
 - Regional Dissuasion
 - Arms Control without Verification

Monthly Alerts & Training



club.china.com
中华网论坛

Second Artillery Corps is only once a month live-action simulation of bomb turned out to [喜讯:二炮每月仅一次实弹操作仿真弹横空出世...], *Military China*, (25 March 2010) at < http://military.china.com/zh_cn/important/11052771/20100325/15869765.html > [accessed 29 Mar. 10].

Centralized Maintenance



"PLA Second Artillery Brigade Conducts Year-End Assessment Exercise," Military Report, CCTV-7 [Beijing, WMV in Mandarin 32 sec], (2009.11.29) at [translated by OSC CPM20100129017079, accessed 3 June 2010].

Automated Logistics



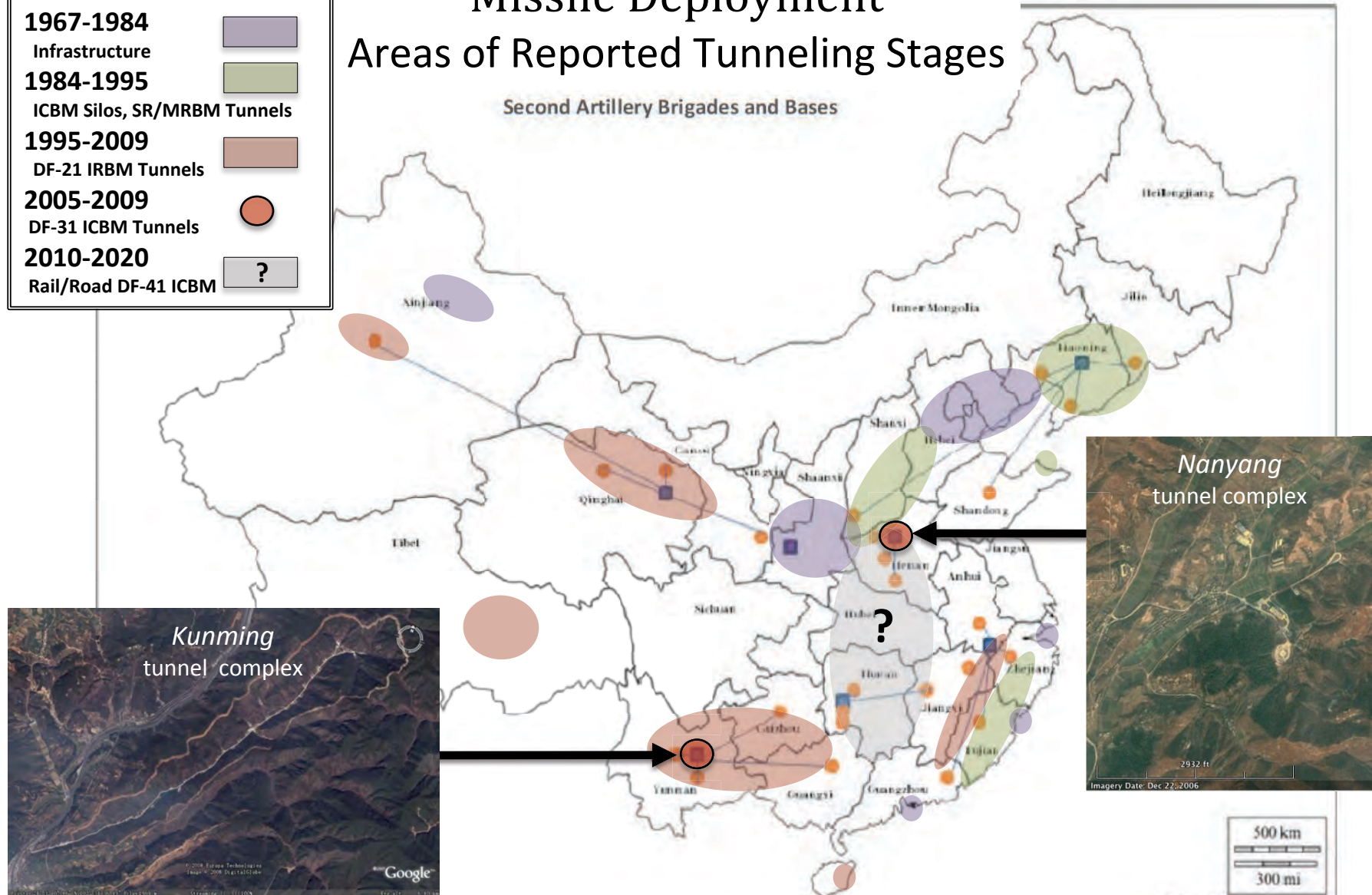
"Second Artillery Corps Logistics Department Improves Fast-Track Comprehensive Support Capability," CCTV-7 [Beijing, WMV: 1 min 15 sec in Mandarin], (2009.11.27) at [OSC CPM20100129017042: "PLA Second Artillery Unit Conducts Comprehensive Logistics Support Exercise;" accessed 1 June 2010].

Underground Stages:

1967-1984	
Infrastructure	
1984-1995	
ICBM Silos, SR/MRBM Tunnels	
1995-2009	
DF-21 IRBM Tunnels	
2005-2009	
DF-31 ICBM Tunnels	
2010-2020	
Rail/Road DF-41 ICBM	

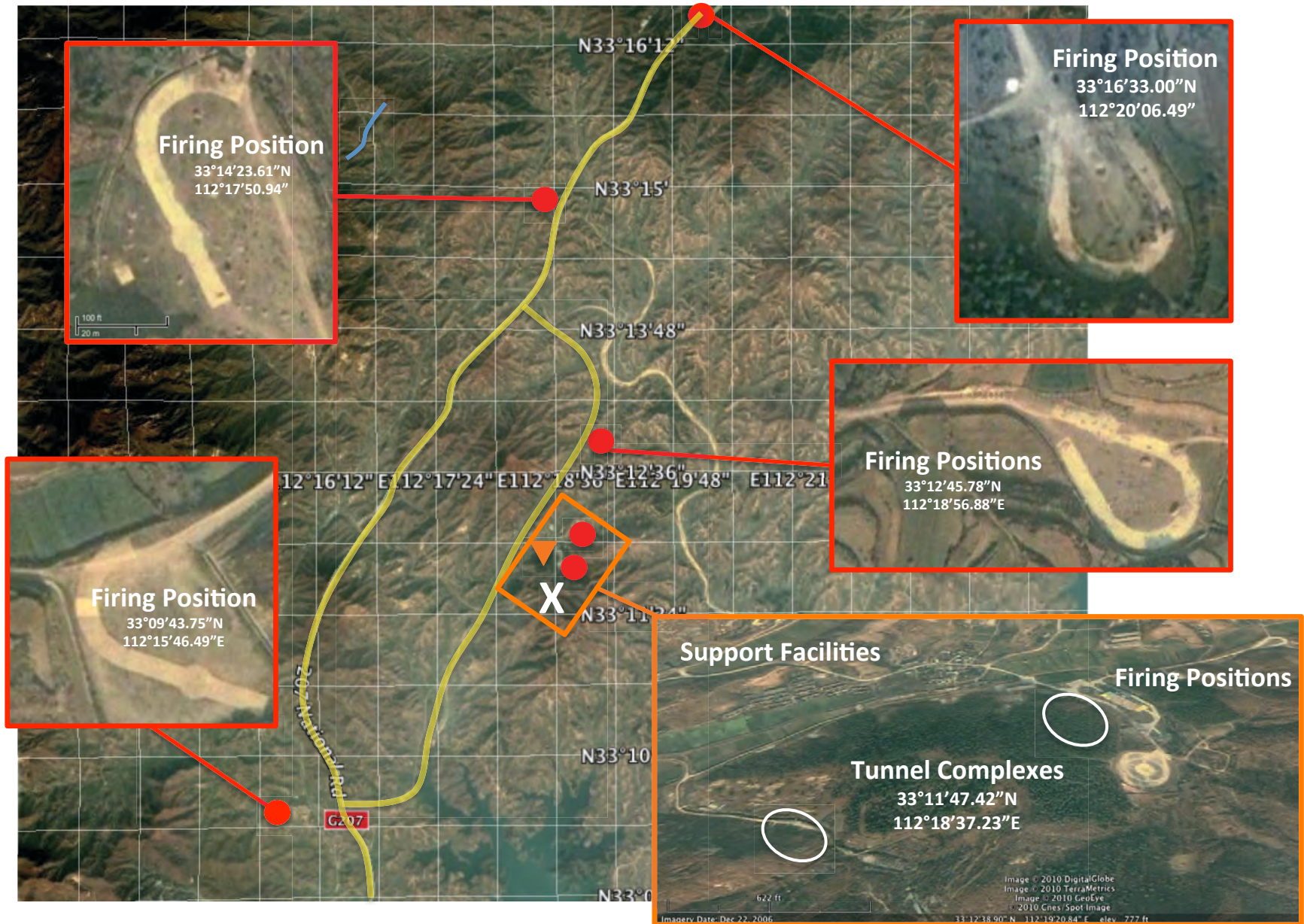
Missile Deployment Areas of Reported Tunneling Stages

Second Artillery Brigades and Bases

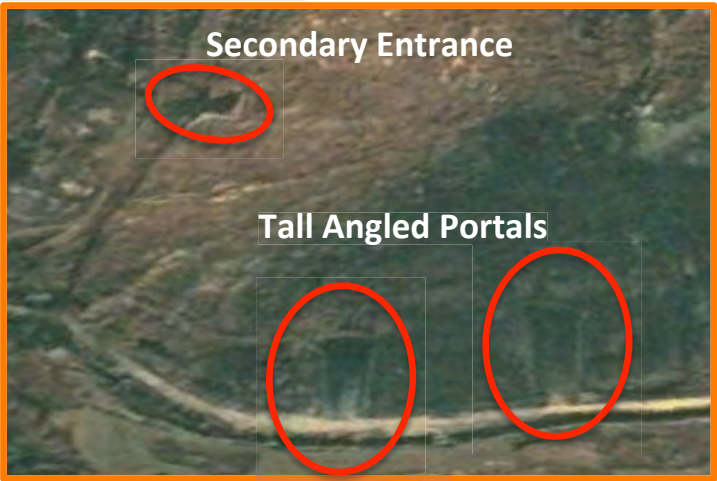
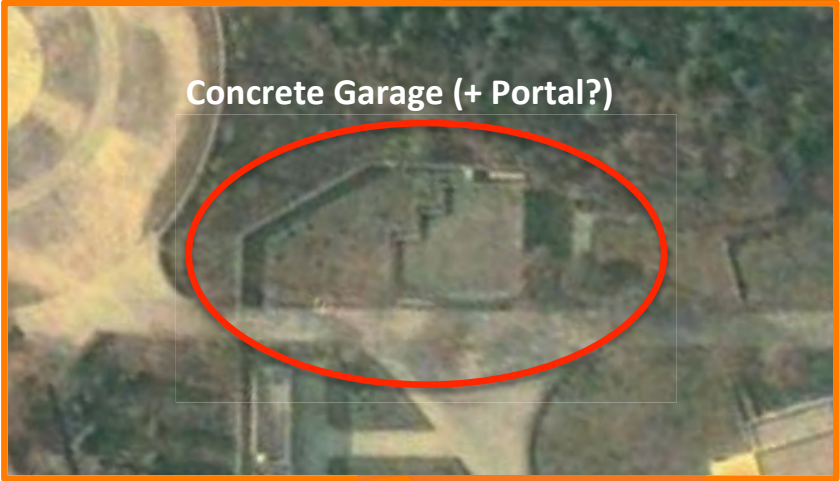


Map from: Mark A. Stokes and Ian Easton, *Evolving Aerospace Trends in the Asia-Pacific Region*, (monograph; Washington, DC: The Project 2049 Institute, 27 May 2010), pp. 8, 39. Tunnel stages estimated on the basis of PRC reference and reporting.

DF-31A ICBM Complex NW of Nanyang



Tunnel Complex NW of Nanyang



DF-31A ICBM Nanyang Tunnel Complex





传说中的中国二炮导弹列车 [China's Second Artillery Missile Legendary Train?] (2008.11.26), at < http://tuku.military.china.com/military/html/2008-11-26/115803_1017746.htm > .

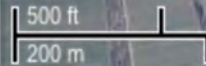
Rail loading area typical for loading Intercontinental Missile Train



Tunnel Complex & 6 Firing Positions
15-20 km to NW



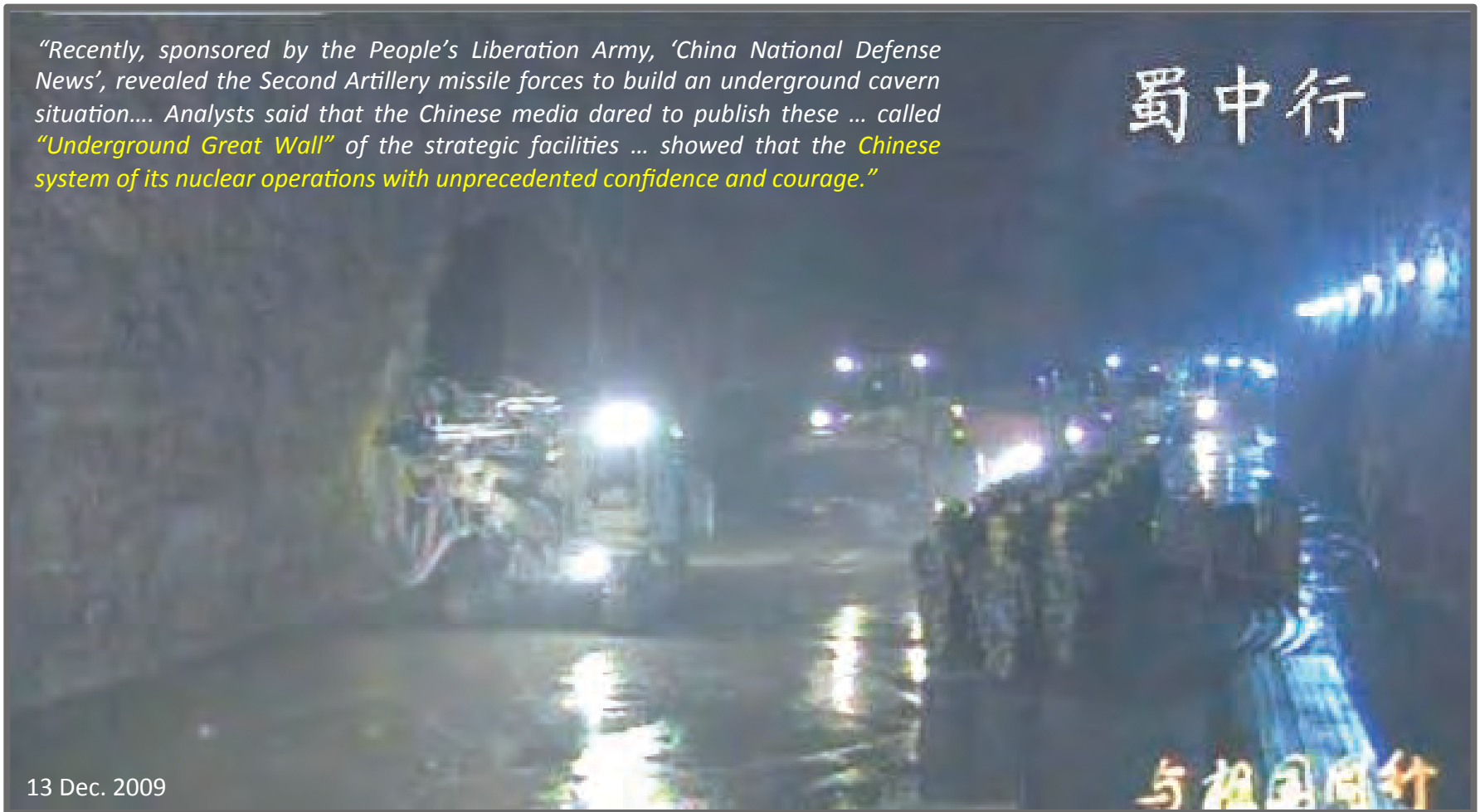
DF-31A facility
813th Brigade
at Nanyang



“PLA's Second Artillery Corps to Create a Mysterious ‘Underground Great Wall’”

“Recently, sponsored by the People’s Liberation Army, ‘China National Defense News’, revealed the Second Artillery missile forces to build an underground cavern situation.... Analysts said that the Chinese media dared to publish these ... called “Underground Great Wall” of the strategic facilities ... showed that the Chinese system of its nuclear operations with unprecedented confidence and courage.”

蜀中行



13 Dec. 2009

与祖国同行

“PLA's Second Artillery Corps to Create a Mysterious ‘Underground Great Wall’ Anti-Earth-Penetrating Nuclear Bombs,” China Military Report, (13 Dec. 2009), at <<http://wuxinghongqi.blogspot.com/2009/12/plas-second-artillery-corps-to-create.html>> [accessed 19 Feb. 2010]. Photos accompanied the website posting.

Chinese photo of “DF-31 Underground Deployment” **Kunming ICBM Tunnel Complex**

24°33'01.73"N 102°35'10.54"E

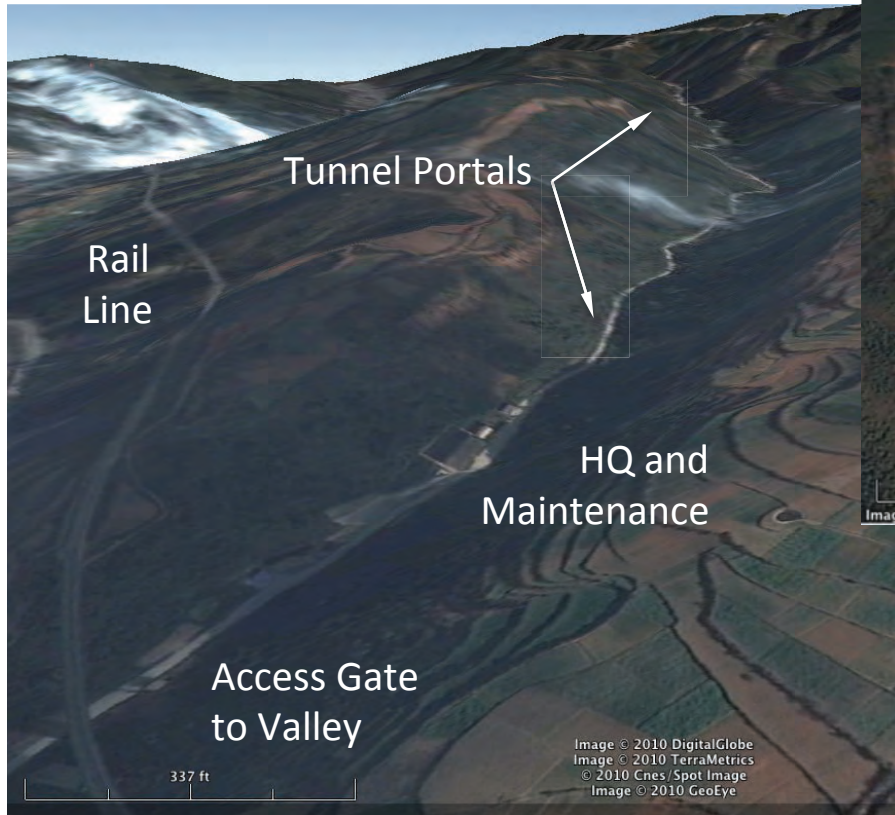


Image as shown at: “我军东风31导弹筒阵地这样被曝光了! [Dongfeng-31 missile army positions so easy to light it!], *Sina Military Forum*, (2010.11.15), < <http://club.mil.news.sina.com.cn/viewthread.php?tid=245876> > [accessed 15 Nov. 2010, translated by IP-1011].

Valley Tunnel Complex south of Kunming

UPPER VALLEY

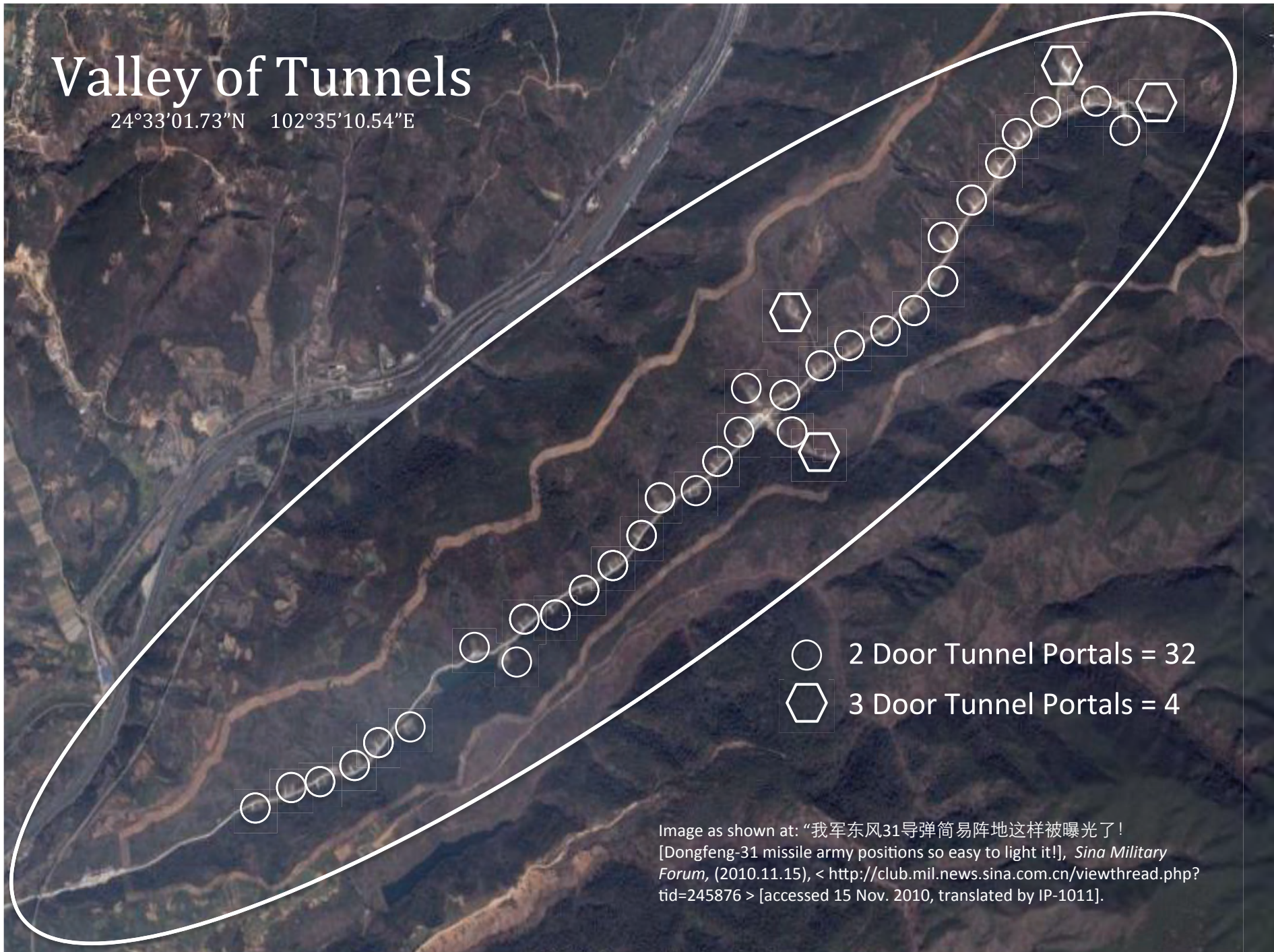
LOWER VALLEY



Photos from Google Earth 3D

Valley of Tunnels

24°33'01.73"N 102°35'10.54"E



- 2 Door Tunnel Portals = 32
- ⬡ 3 Door Tunnel Portals = 4

Image as shown at: “我军东风31导弹筒易阵地这样被曝光了!
[Dongfeng-31 missile army positions so easy to light it!], *Sina Military Forum*, (2010.11.15), < <http://club.mil.news.sina.com.cn/viewthread.php?tid=245876> > [accessed 15 Nov. 2010, translated by IP-1011].

Two Door Tunnel Portals (total = 32 positions)

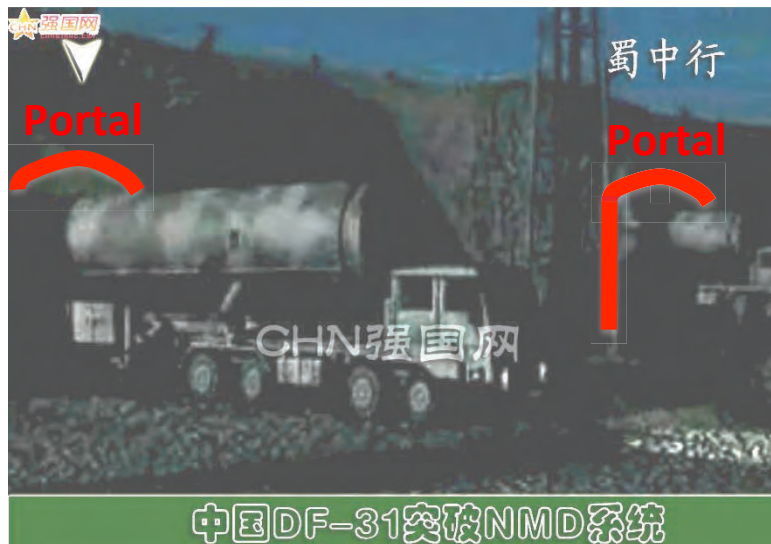
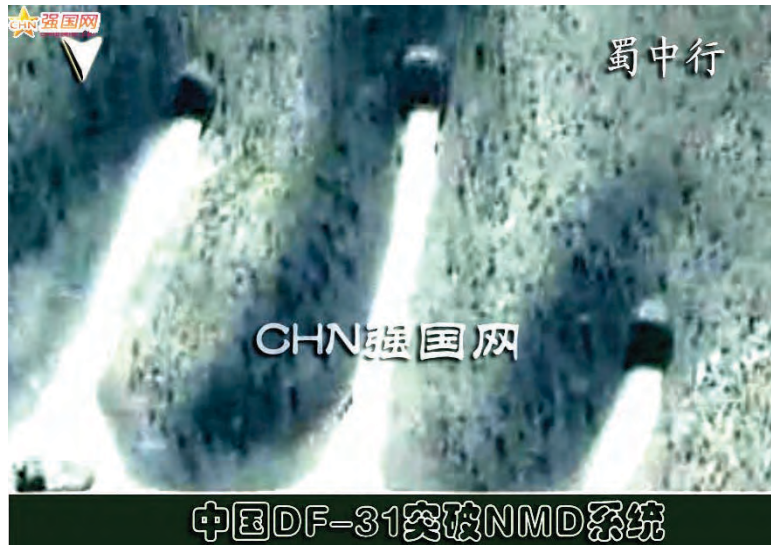


3 Door Tunnel Portals (total =4 positions)



DF-31A ICBM Animation

Deployment from Underground & Salvo Launch



Screen shots from : “中国暗示可完全突破NMD系统DF31太空变轨能力,” *Tiexue*, (2010.11.01), at < http://bbs.tiexue.net/post_4582886_1.html > [accessed 9 Sept. 2011; translated by IP-1011], with only four screen shots; and full set of illustrations from: “中国暗示可完全突破NMD系统 DF31太空变轨能力 [China hinted DF31 with anti-NMD orbital space capabilities],” *CHN强国网 强国论坛*, (2010. 11. 02), at < http://www.chnqiang.com/article/2010/1102/mil_31253.shtml > [accessed 1 Sept. 2011; translated by IP-1011]. Video may actually be a Chinese copy of US produced animation.

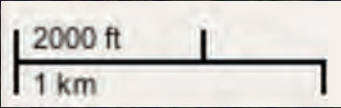


2008 Winter Tunnel Construction



2009 Summer Interior Outfitting

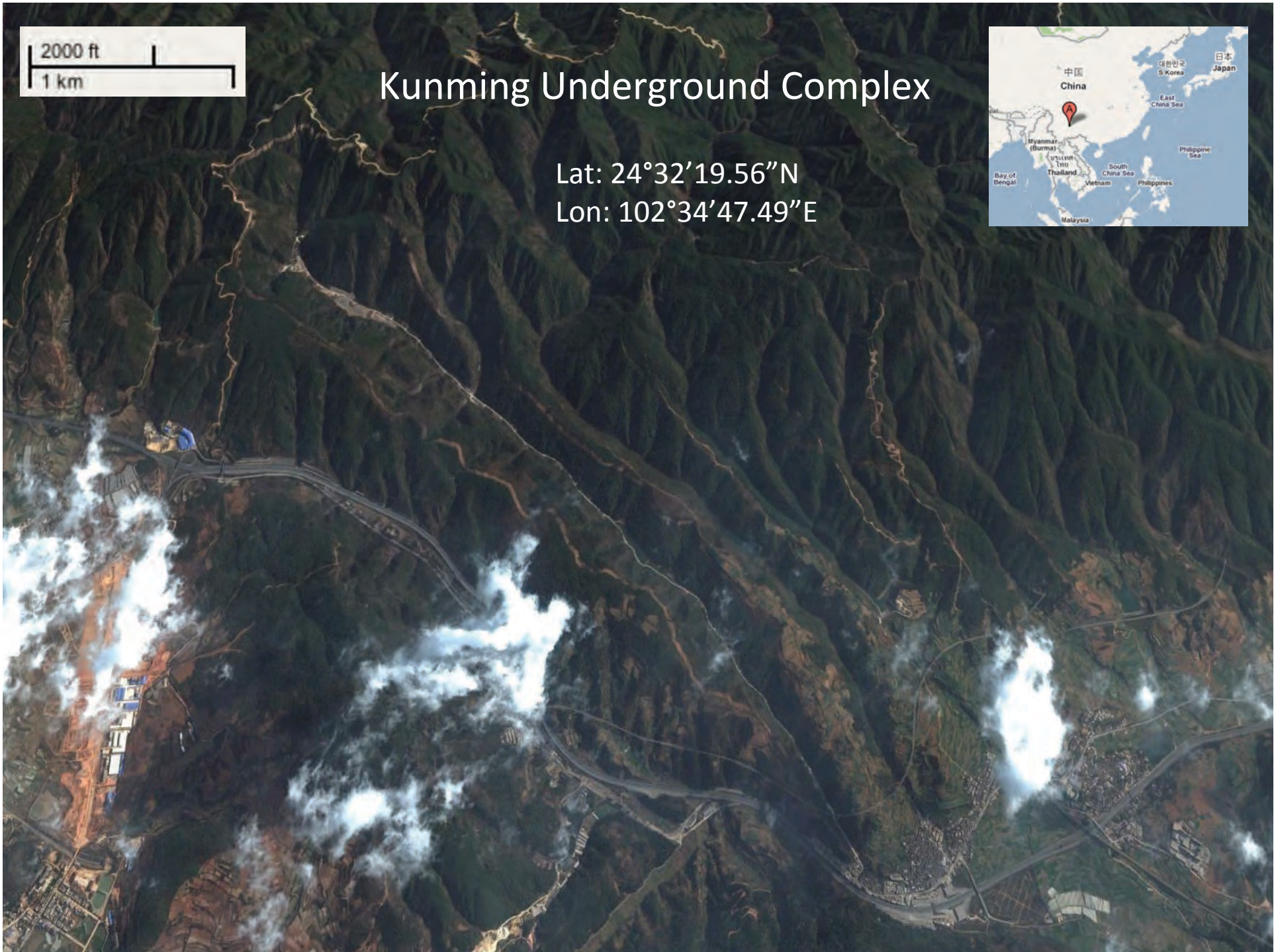


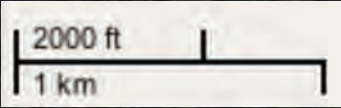


Kunming Underground Complex

Lat: 24°32'19.56"N

Lon: 102°34'47.49"E





Kunming Underground Complex

Lat: 24°32'19.56"N

Lon: 102°34'47.49"E



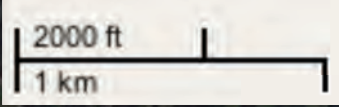
Cleared Security Perimeter

Freeway

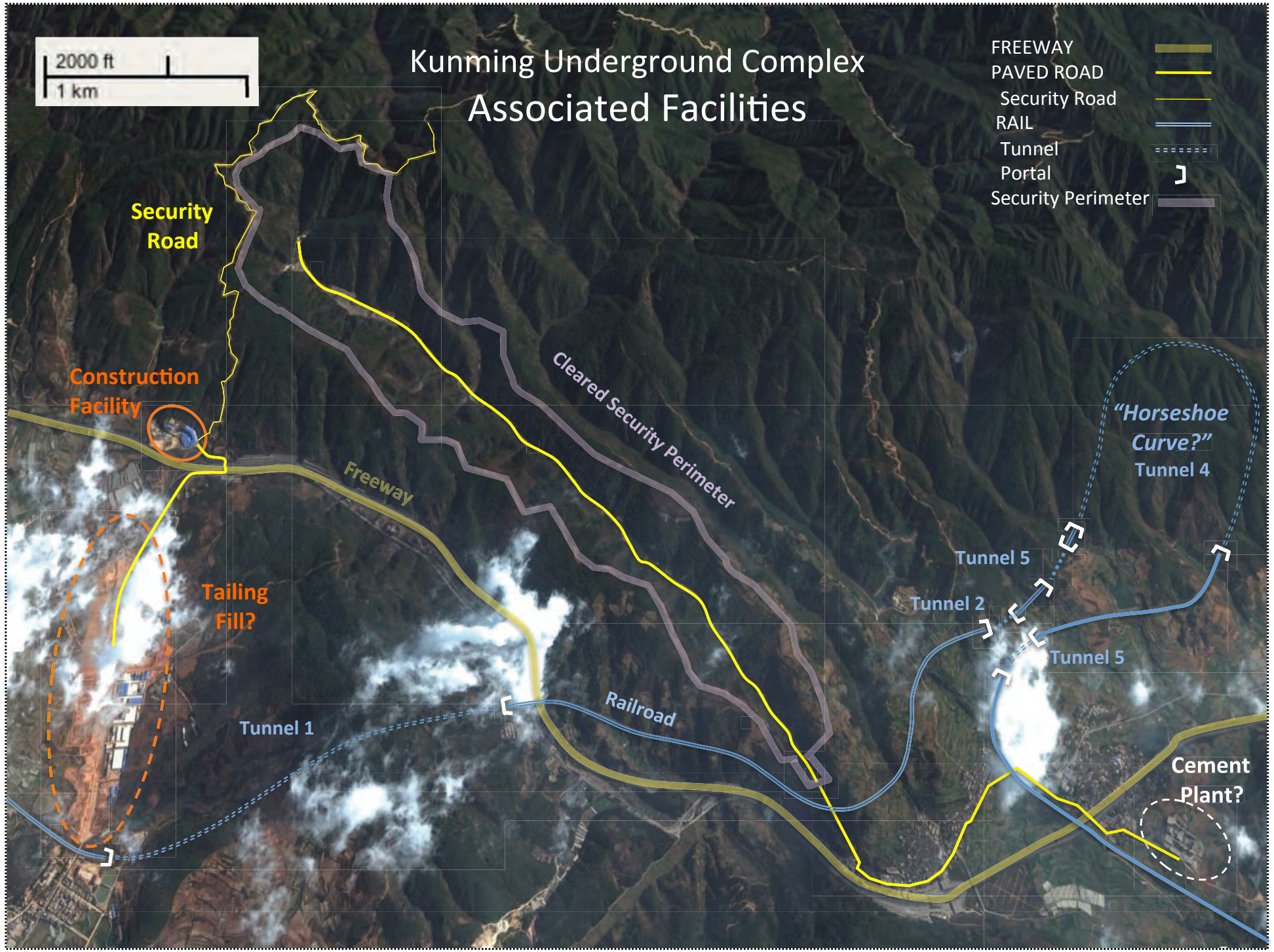
Railroad



Kunming Underground Complex Associated Facilities



- FREEWAY
- PAVED ROAD
- Security Road
- RAIL
- Tunnel
- Portal
- Security Perimeter

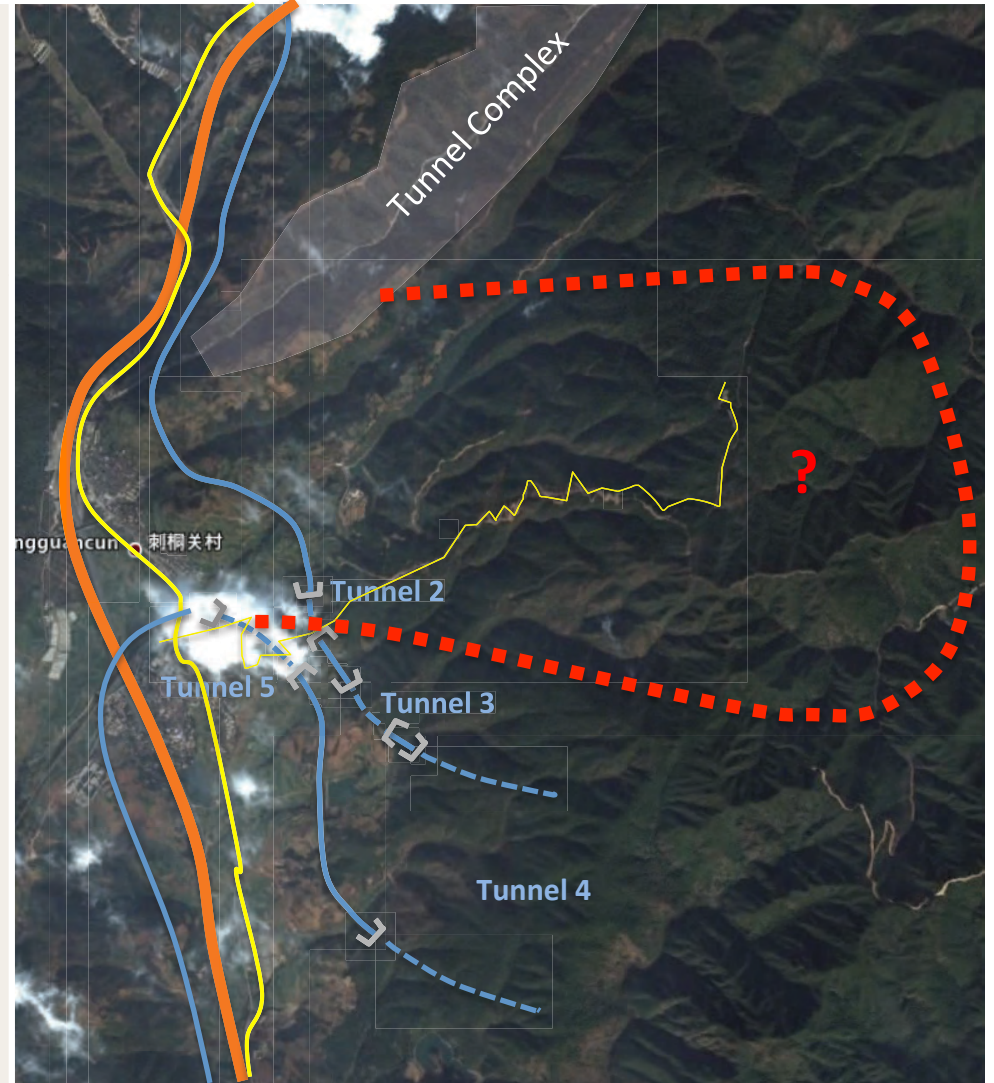
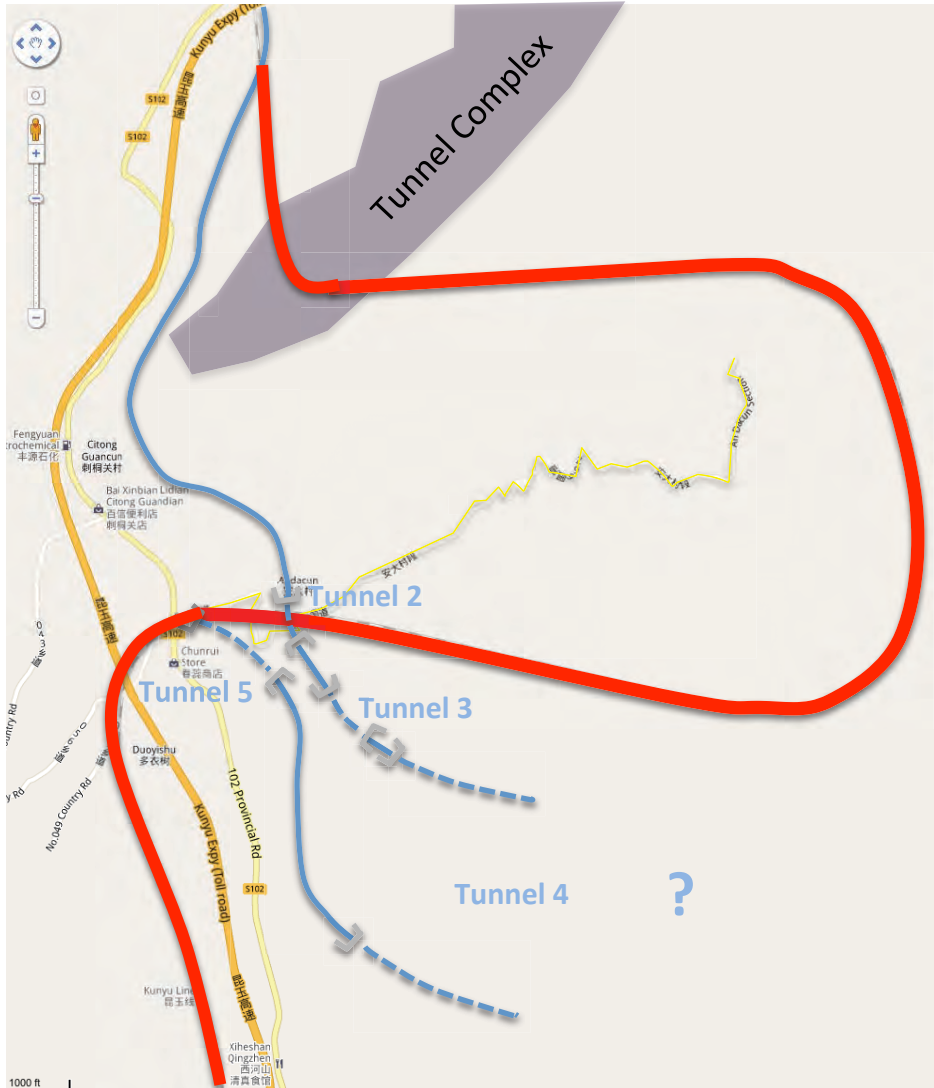




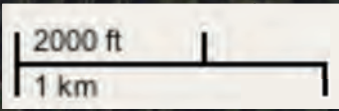
UPPER VALLEY

The Missing Underground Railroad

Road Map (not including blue) vs **Satellite** (not including red)



Kunming Underground Complex Destabilizing Hypothesis?



- FREEWAY
- PAVED ROAD
- Security Road
- RAIL
- Tunnel
- Portal
- Security Perimeter

total tunnels = 10km?

"U" Tunnel Connecting Portals?

Longer Tunnel?

Linked?

Disguised Exit?



Freeway

Railroad

Tunnel 1

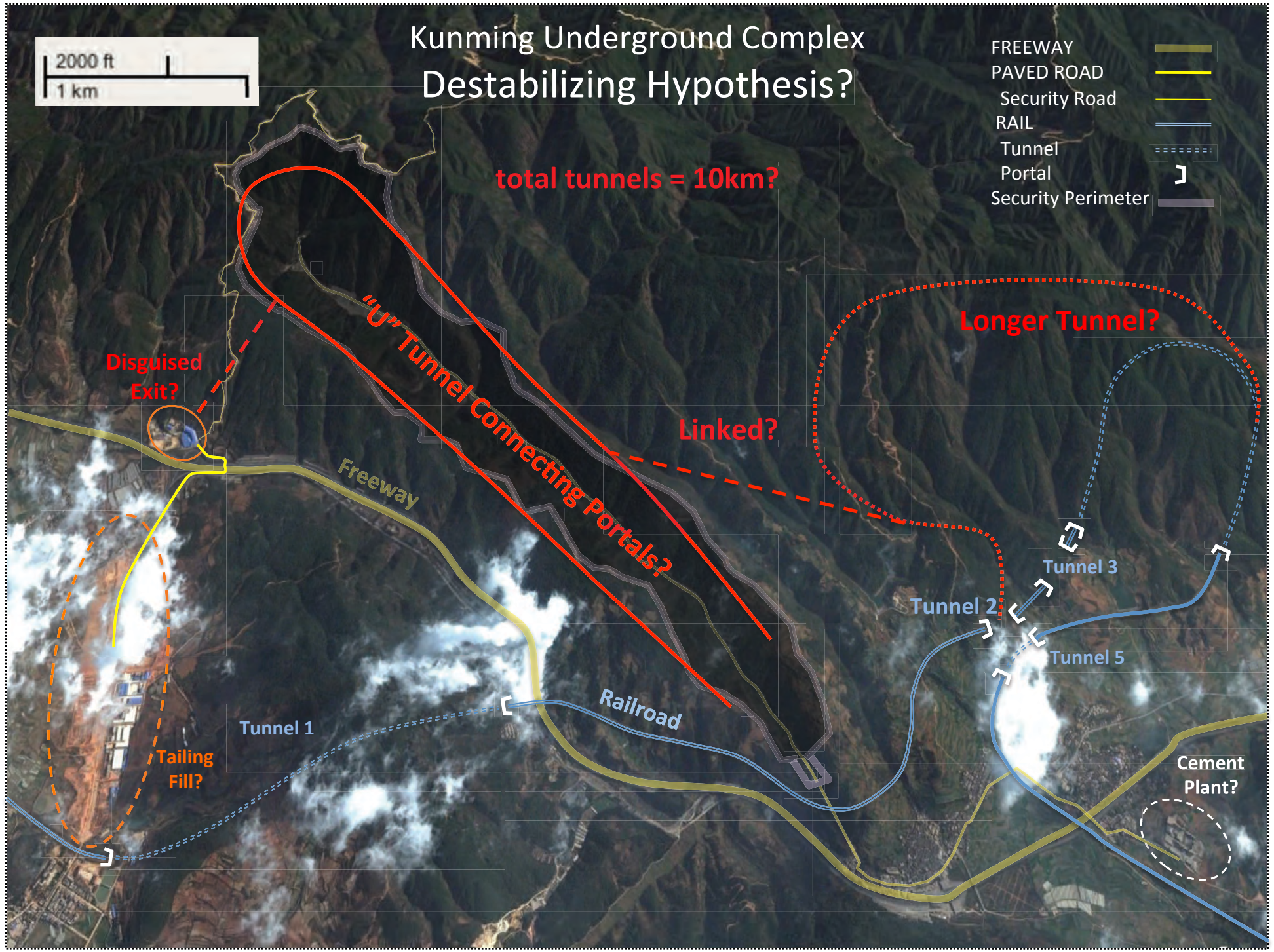
Tunnel 2

Tunnel 3

Tunnel 5

Tailing Fill?

Cement Plant?



STUDY #6

“Enhanced Mobility” & Crisis Stability

“The Surge”

Deployment from Underground



“The Surge” as Operational Deployment

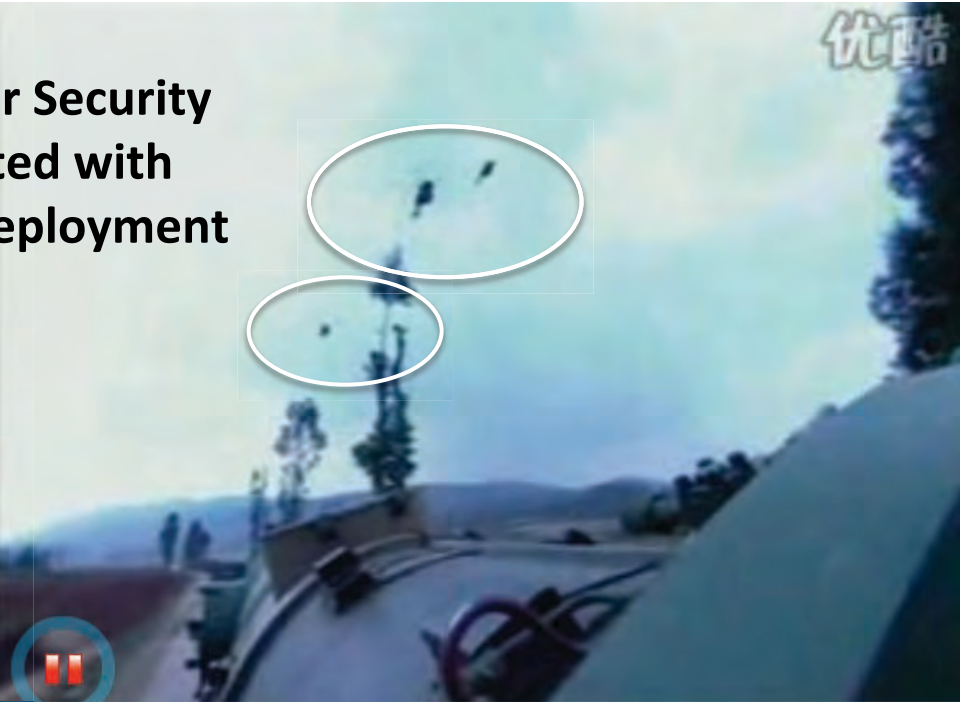
Coercive Potential but Heightened Vulnerability and Questionable Sustainability



Surge Deployment



Helicopter Security associated with Nuclear Deployment



优酷

**DF-21 use of Highway Tunnels during “pulse”
Enhanced Mobility during Crisis Deployment**



Practice of Salvo Launches





CHINA'S 2ND ARTILLERY

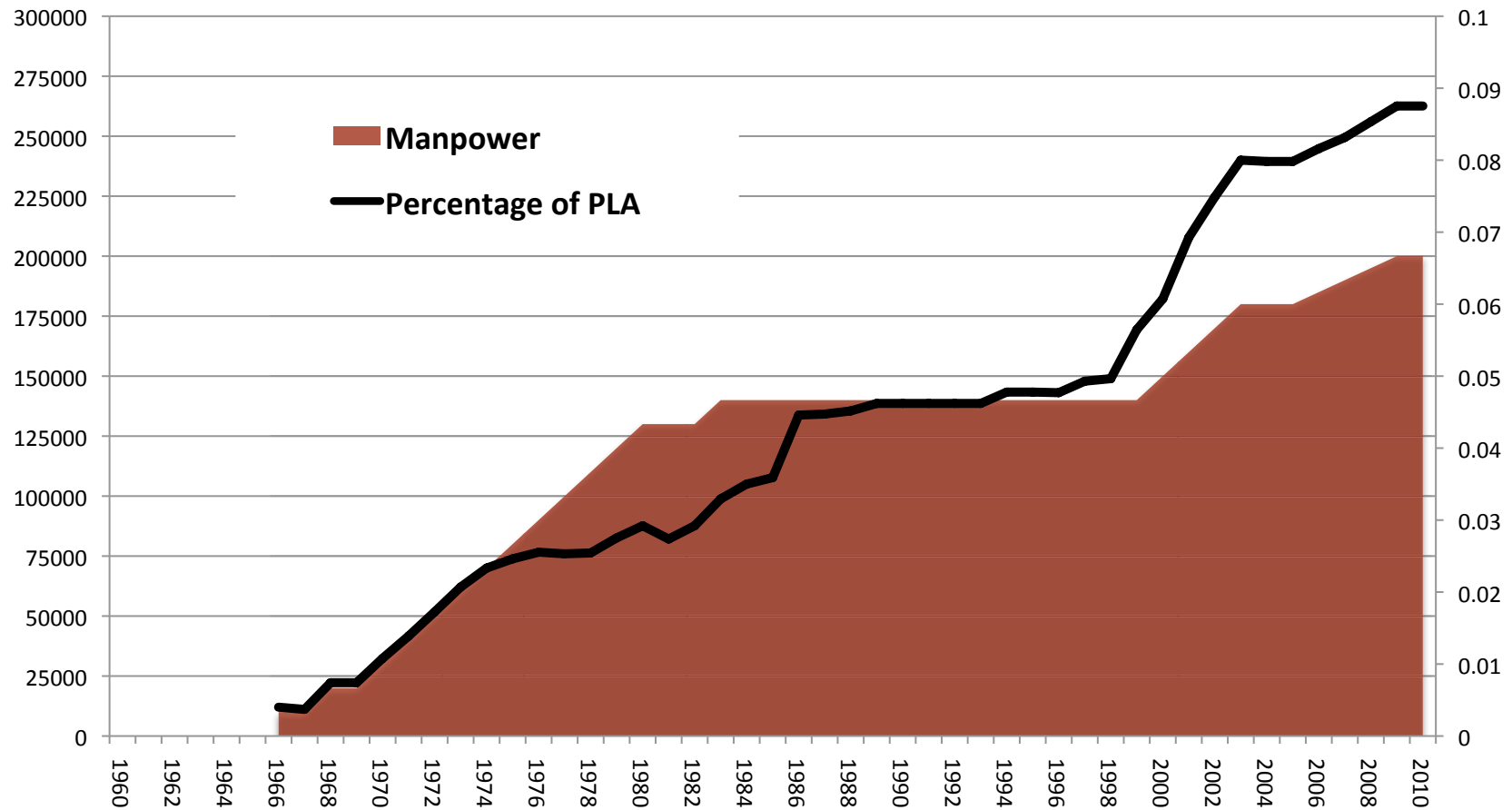
- Started in late 1950s with Mao's need for "2 bombs & a satellite"
- 1953, 1955 & 1958 US Nuclear Threats
- Break with Soviets over "Peaceful Coexistence"
- 1959 – Khrushchev withdrawal -- last National Parade for 25 years
- 1st Atomic Bomb Test in 1964
- 2nd Artillery founded in 1966 – named for "deception"
- 1st Hydrogen Bomb Test in 1967
- Soviet threat of preemption in 1969
- Disruption of 3rd line construction and "Cultural Revolution"
- Proponent of "No First Use" doctrine
- 1st ICBM shown in 1984 National Parade
- Slow missile development and low key deployment
- Digitized Chinese language – introduced Internet
- PRC lead in experimentation with Cyber & Space Warfare
- Late 1990s "dual capable" Nuclear/Conventional IRBM emphasis
- Announce 3,000 miles of Tunnel for Missiles and Warheads

PRC Underground Development 1950-2010

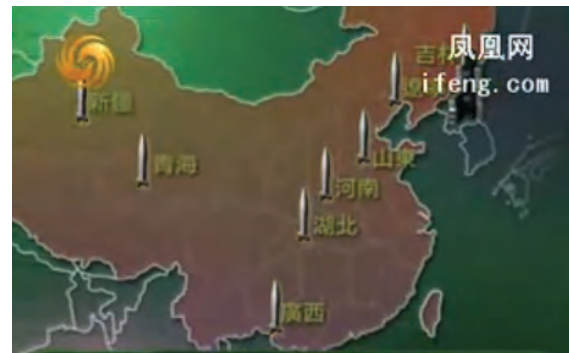
	Civil Defense:	2nd Artillery	Nuclear Weapons
1950	-- People's Air Defense works '50 -- 1 st Civil Defense Conf. '53		
1955	-- Coastal fortifications & tunneling		-- Site selection for test & storage '58
1960	-- Mao calls for "Urban Air Defense" '56 -- Lin Bao – fear attack on coast '62	-- People's Air Defense works '50 -- 1 st Civil Defense Conf. '53 -- Coastal fortifications & tunneling	
1965	-- "Third Line Defense" dispersal '64 -- Disruption of Cultural Rev. '67	-- Mao calls for "Urban Air Defense" '56 -- Lin Bao – fear attack on coast '62	-- 1 st Atomic test + tunnel '64 -- NDSC controls storage '65
1970	-- Fear of Soviet preemption '69 -- 2 nd Civil Defense Conf. '71	-- "Third Line Defense" dispersal '64	-- 1 st Thermonuclear test -- Warheads moved Taibai '69
1975	-- 3 rd Civil Defense Conf. '78	-- Disruption of Cultural Rev. '67 -- Fear of Soviet preemption '69	
1980	-- abandon expensive projects -- focus on military hardening	-- 2 nd Civil Defense Conf. '71 -- 3 rd Civil Defense Conf. '78	-- Warhead control 2 nd Arty '79
1985		-- abandon expensive projects -- focus on military hardening	
1990			
1995	-- People's Air Defense Law '96 -- Civil-Military integration		
2000	-- 4 th Civil Defense Conf. '00		
2005	-- mention of "indestructible 'Underground Great Wall'"		
2010	-- Urban renew/subway defense -- "Stimulus" investment in subway/rail		



2nd Artillery Manpower 1966-2010



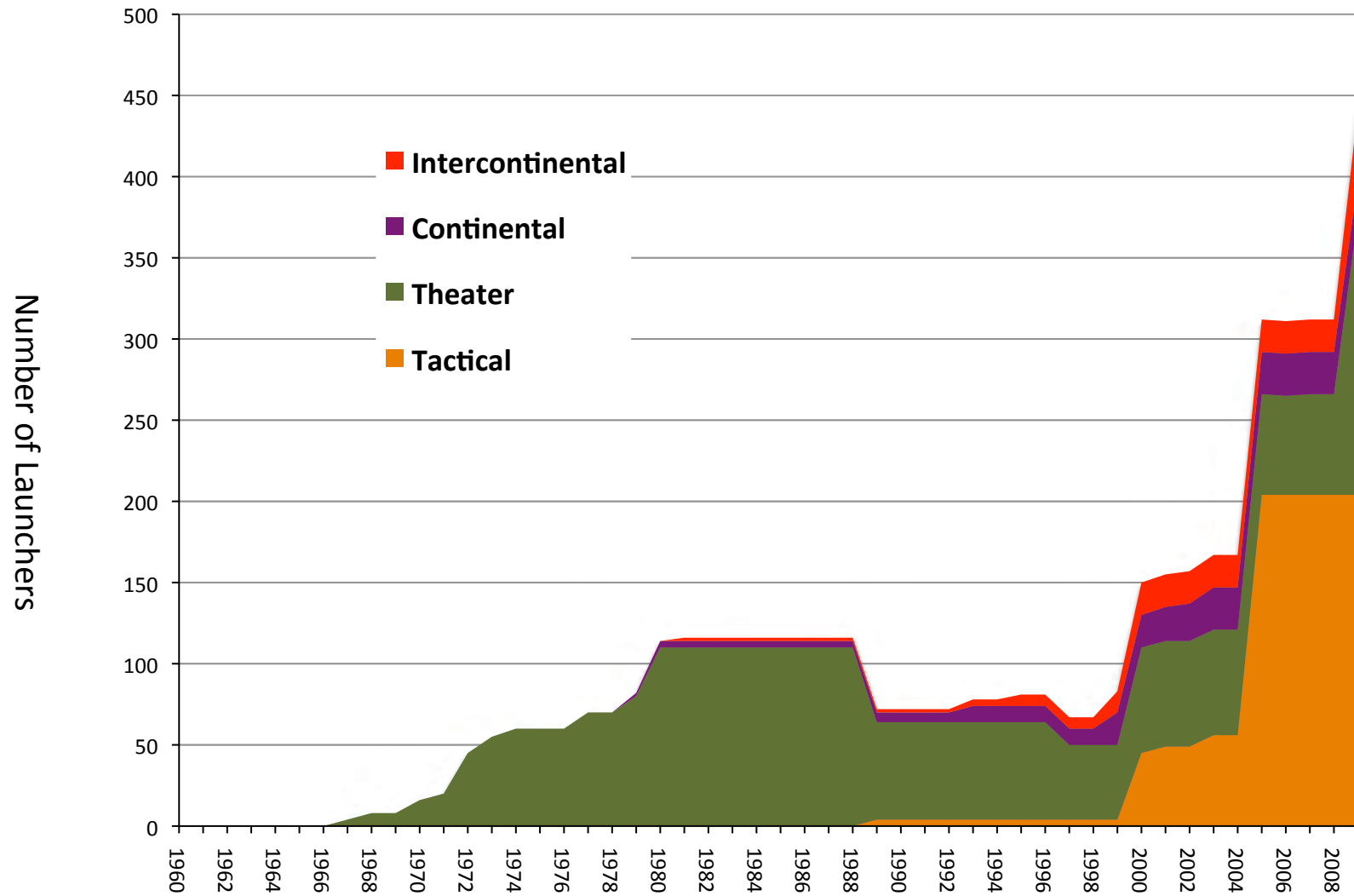
2nd Artillery Strategic Directions





2nd Artillery Missiles by Range

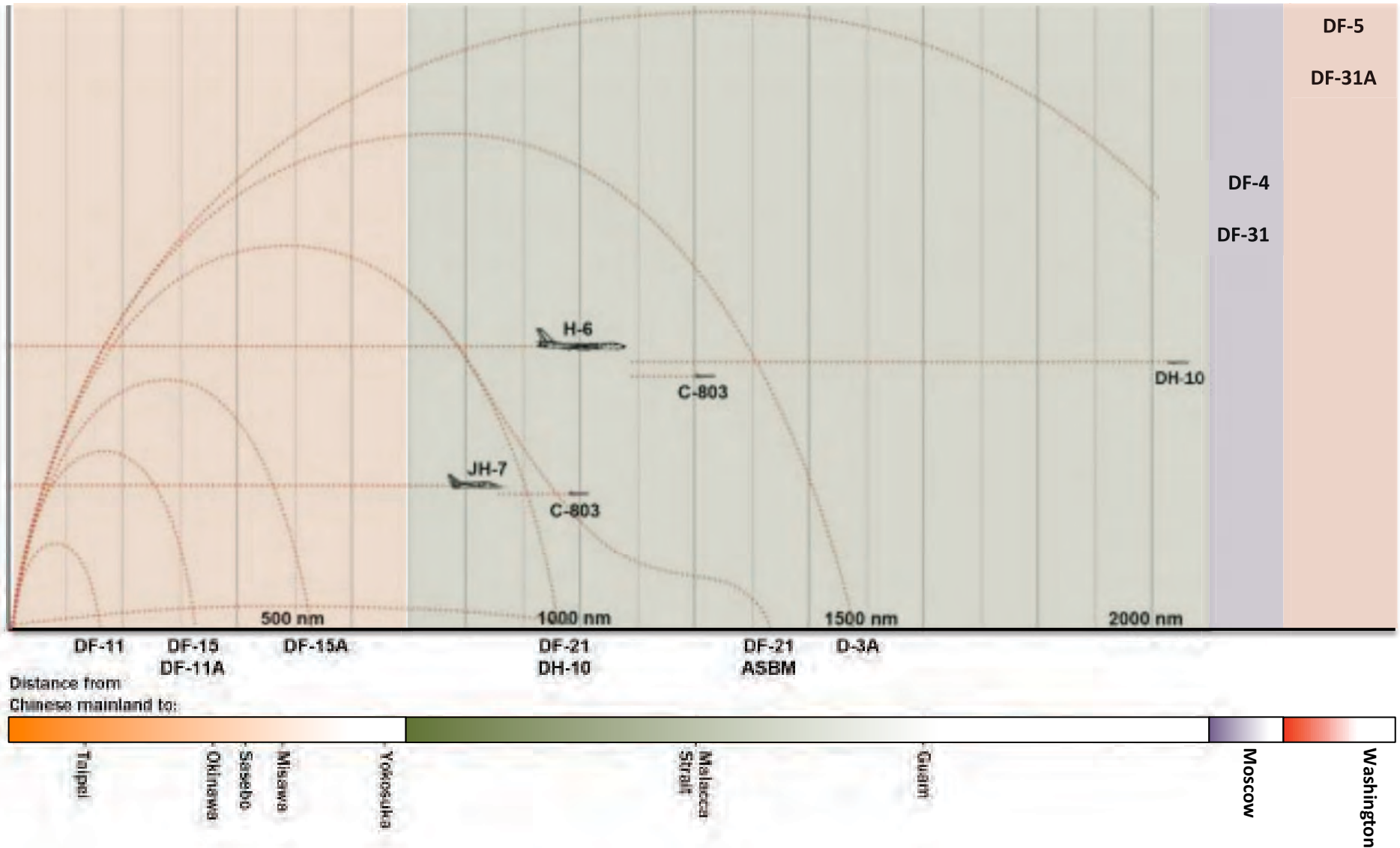
Quantity of Launchers: 1966-2009



Data derived from the annual Military Balance reports (London, UK: International Institute for Strategic Studies, 1960-2010).



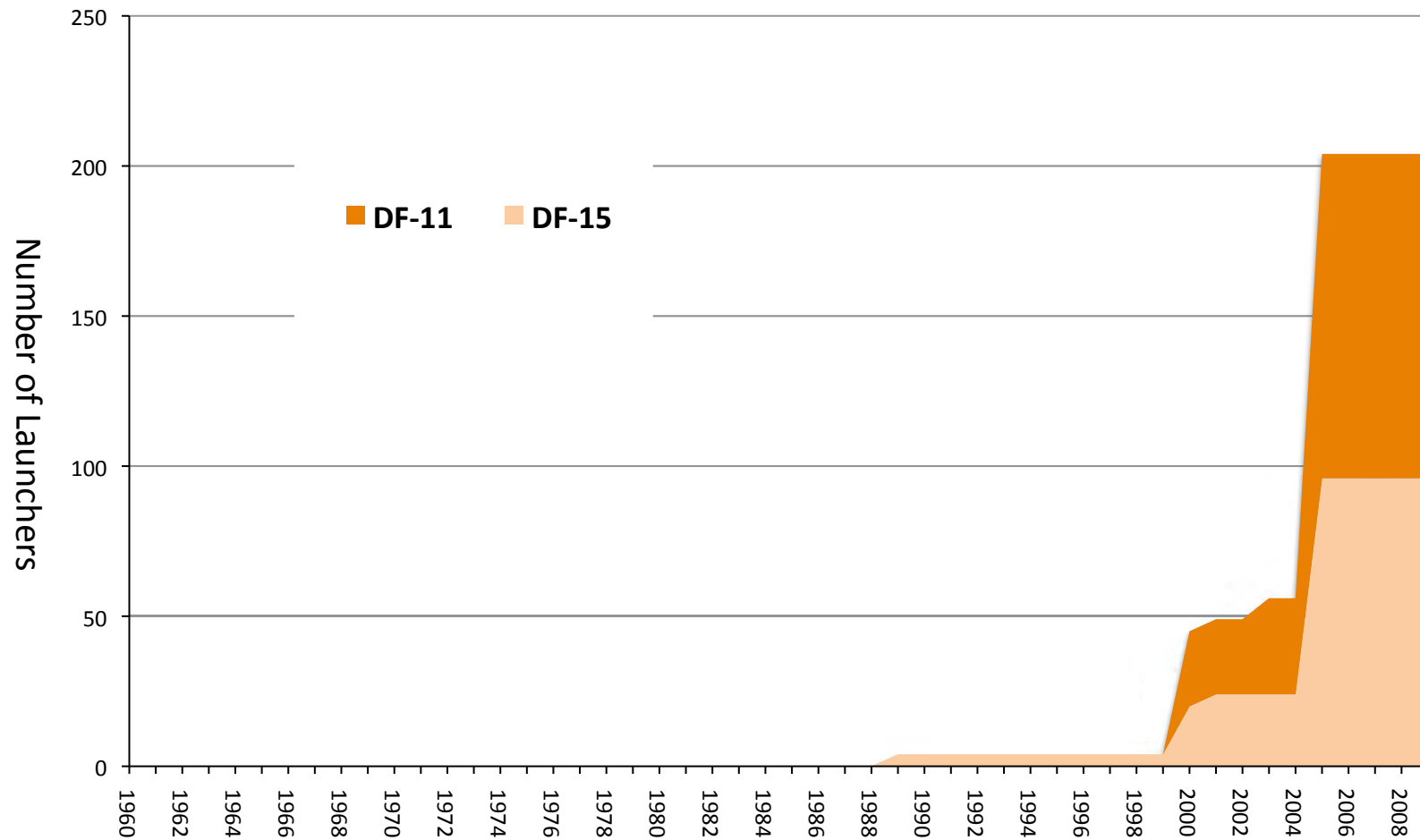
Targeting Range





Tactical Ballistic Missile Systems

Quantity of Launchers: 1966-2009



Data derived from the annual Military Balance reports (London, UK: International Institute for Strategic Studies, 1960-2010).



Tactical Dual-Capable: DF-11 & DF-15

Quantitative and Qualitative Emphasis of Last Decade

DF-11



DF-15



Tactical SRBM exiting Tunnels





Tactical TELs in New Tunnels

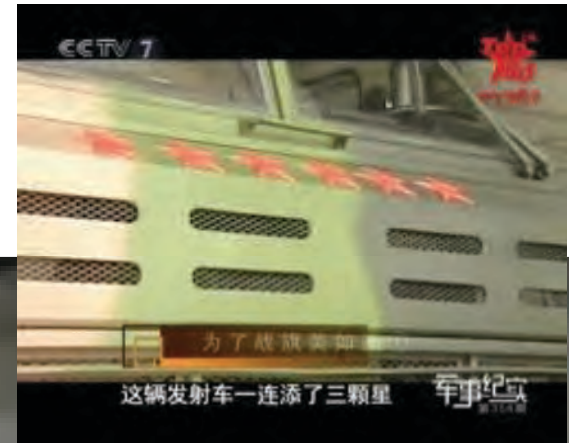


"军情观察室 [Military Observation Room," *Ifeng TV*, (17 December 2009), at < <http://v.ifeng.com/mil/200912/2d0731ef-b476-4e80-ae6e-c497b3f33076.shtml> > [accessed 28 Dec. 2009].

Tactical TELs in New Tunnels



2nd Artillery Tactical Training Exercise in Tunnel



“国之利刃:超猛的二炮导弹发射车[XXX],” *China.com*, (2007-11-15), at < > [accessed 19 Sept. 2001; translated by IP-1011, image subsequently redacted.

Dongfeng-15 Tactical Missile reload in Storage



“二炮已装备国产新型延迟爆炸及智能战斗部 [Second Artillery Corps has equipment made of new and intelligent warhead explosion delay],” *Huanqiu*, (2008.04.08), at < <http://mil.huanqiu.com/china/2008-04/86451.html> > [accessed 30 Dec. 2010].

PLA “Model of the Second Artillery firing positions” 二炮发射阵地模型

Example of Tunnel Based Rail Deployed Tactical Missile

- Stationed in underground facility
- Unit deployed on special train
- With supporting equipment
- DF-11/DF-15/DF-21 TELs on flat car or “special transport car”
- Normally fired from ground positions but also discussion of launch from “special transport car” from pre-surveyed siding

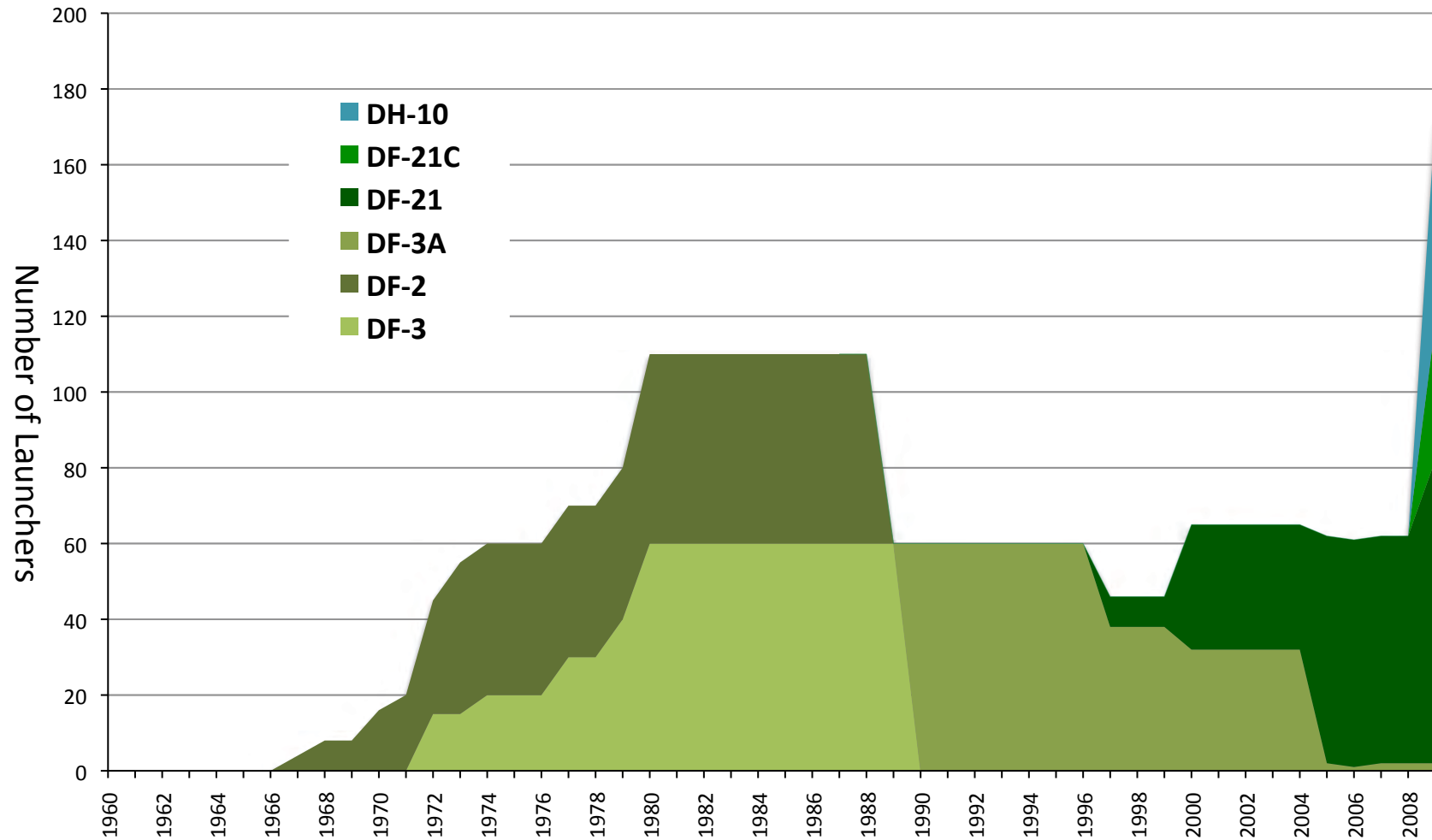


Illustration from: "防护工程建设的中外比较和战略思考 [Protection Project at Home and Abroad and Strategic Thinking]," *ShowChina*, (2009.03.06), at < <http://translate.google.com/translate?hl=en&sl=zh-CN&u=http://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm&ei=MzspTeTXEY-u8Ab97s22AQ&sa=X&oi=translate&ct=result&resnum=1&ved=0CB0Q7gEwAA&prev=/search%3Fq%3Dhttp://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm%26hl%3Den%26client%3Dsafari%26rls%3Den%26prmd%3Divns> > [accessed 10 Dec. 2010; translated by IP-1011].



Theater Missiles


Quantity of Launchers: 1966-2009



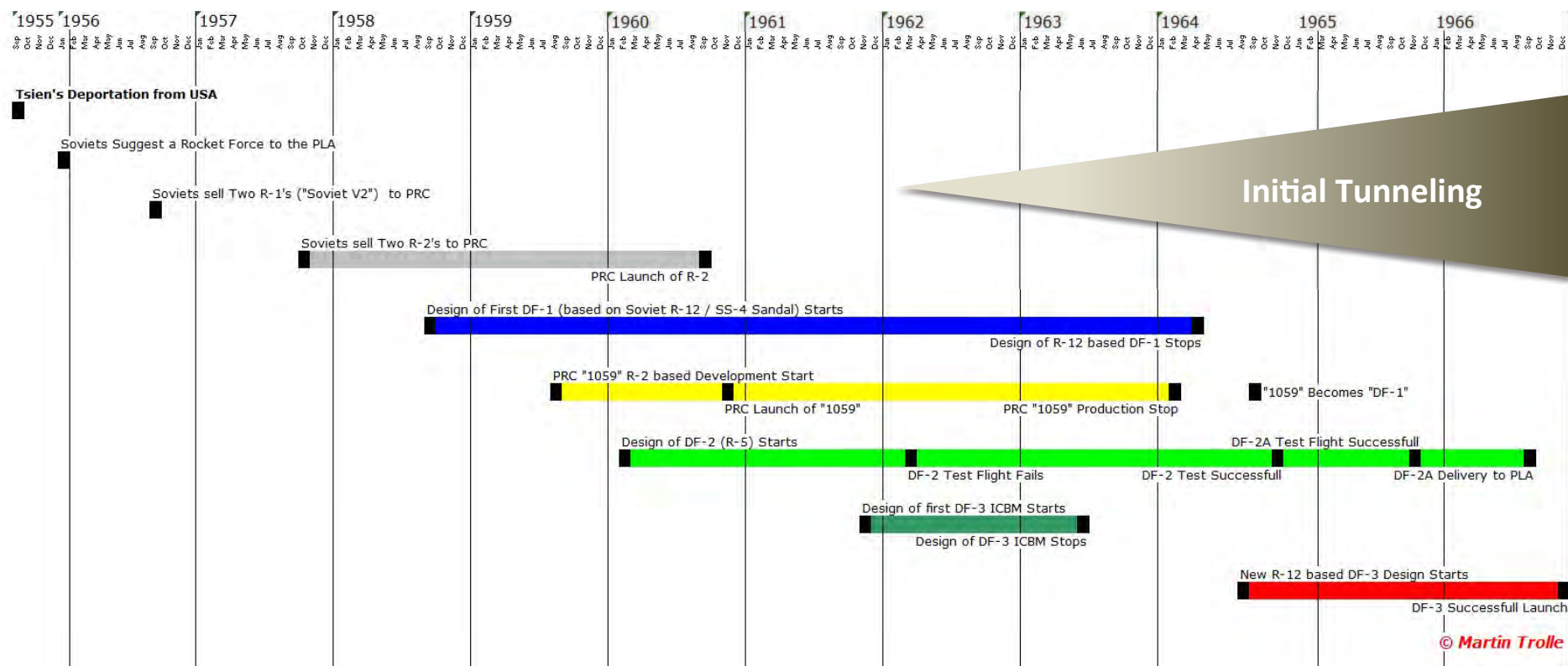
Data derived from the annual Military Balance reports (London, UK: International Institute for Strategic Studies, 1960-2010).

Early 2nd Artillery Timeline

Missile Development, Organization & Tunneling

Creation of 2nd Artillery 

1st Missile Bn



Martin Trolle, "Timeline: China's 1st Generation of Nuclear Missiles," *Chinese Missiles*, (2011), < <http://www.flickr.com/photos/martintrolle/5643043428/sizes/o/in/set-72157627695491874/> > [accessed 25 Aug. 2011].

Theater Nuclear Missiles



* = Dual Capable

DF-3 Tunnels in Dalian Peninsula



Unclassified Google Earth imagery courtesy of Tim Brown, (1 April 2009).

Interior Mating of DF-2 Components on Rails



DF-3 Tunnel Interiors shown on Chinese TV



Modern DF-21 Deployment in Tunnels

The logical assumption is that the vast network of UGFs located near the missile garrisons and launch sites are used to protect, store, and transfer these items. Storing warheads and missiles in UGFs allows TELs to be loaded and armed under protected cover, and away from the prying eyes of intelligence satellites....



"DF-21C导弹在中国中部部署兵 [Dragon's Fire: The PLA's 2nd Artillery Corps]," 环球防务 [GlobalMil], (2009.12.29), at <http://www.globalmil.com/Military/News/China/2010/1114/271.html> > [accessed 14 Aug. 2011].

Theater Missile Tunnels in the West



“Nuclear Lies and China’s Terrorism,” *TibetTruth*, (2010.04.12), at < <http://tibettruth.com/2010/04/12/nuclear-lies-and-chinas-terrorism/> > [accessed 21 Jan. 2011].

Two variants of the DF-21C (DF-25?) MRBM



The fuzzy photo above was released in Nov. 2006 on the Chinese Internet claiming to show the DF-25. The 2007 photo on the right shows the same DF-21C TEL and missile booster with different warheads – believed to be nuclear (rear) and conventional (fore).



DF-21 TEL being Reloaded in Operational Facility



Vulnerability of 2nd Arty Transport



“美稱中國核彈儲存地安全性高但運輸環節薄弱 [Reputation of China's Nuclear Storage Sites Safe Transport Link is Weak],” at “China's Military,” *CNR.CN*, (2010.03.19) at < http://211.89.225.4:82/gate/big5/mil.cnr.cn/zgjd/201003/t20100319_506176384.html ml > [accessed 12 May 2010, translated by IP-1011].

Large quantity of DF-21s moved by rail



DF-21 on the Move

Tunnel Concealment combined with Emphasis on Mobility

"To Frighten the West"

西方惊惧

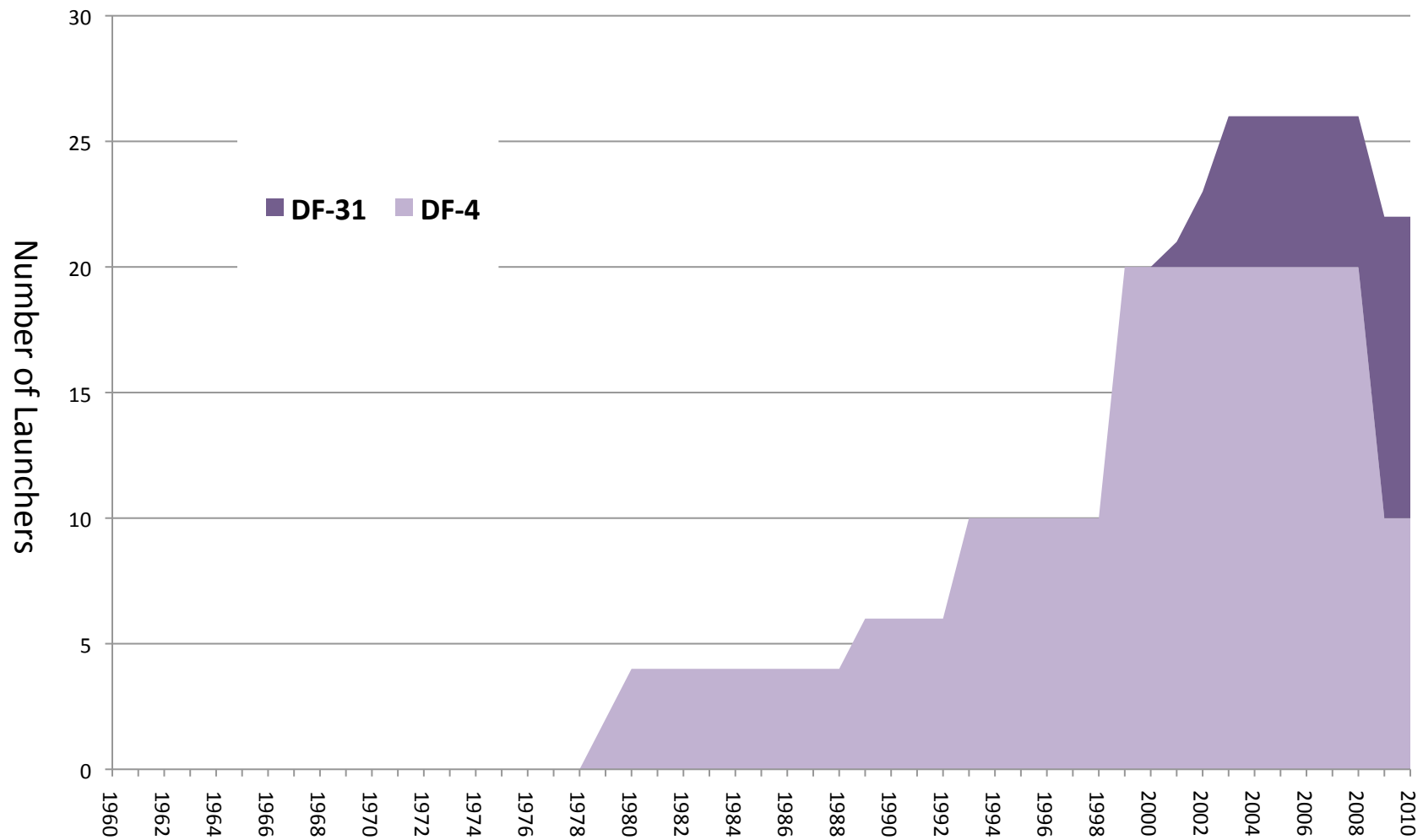


"Military News: To Frighten the West: China's Hiding Appearance of a Large Number of Intercontinental Missiles" [军事新闻: 西方惊惧: 中国藏匿的大批洲际导弹露面了] *China Soul* [中国军魂] blog (29 June 2009), at < <http://qun.51.com/lihuaqing999/topic.php?pid=52241> > [accessed 15 Mar. 2010].



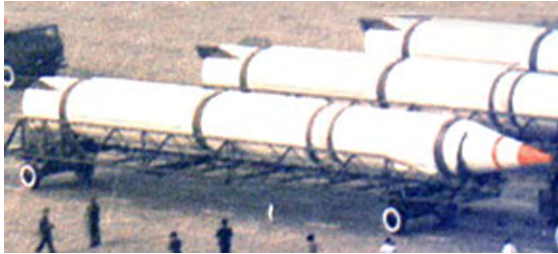
Continental Missiles

Quantity of Launchers: 1978-2009



Data derived from the annual Military Balance reports (London, UK: International Institute for Strategic Studies, 1960-2010).

Continental Nuclear Missiles



DF-4

- Range =
- Liquid Fuel
- Slow Preparation
- Accuracy Degraded by Movement



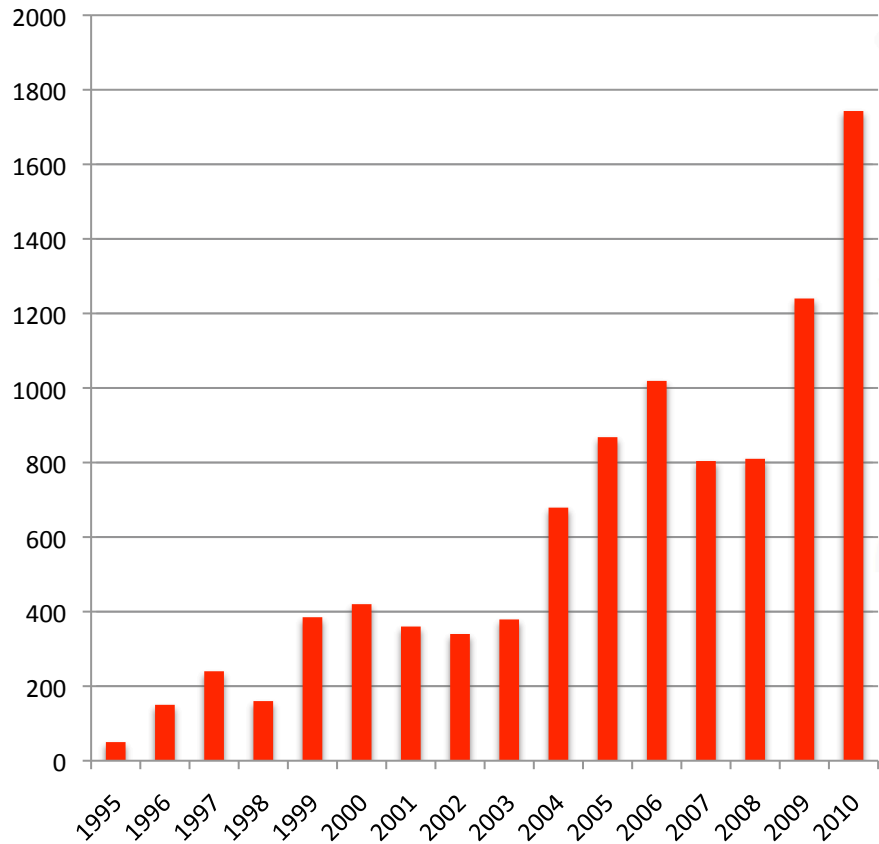
Concrete Sheds in Berms
& Shallow Tunnels

DF-31

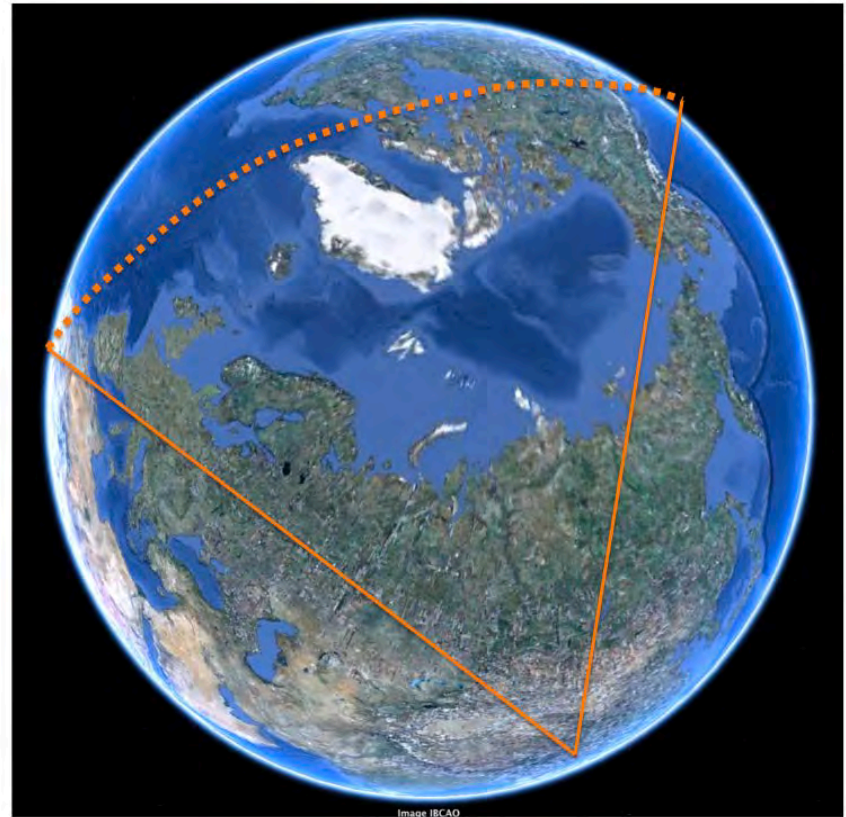


Tripolarization = Targeting Europe

Articles in People's Daily
referencing "multipolarization"



DF-31 Continental Ballistic Missile
too short for US, too long for Russia

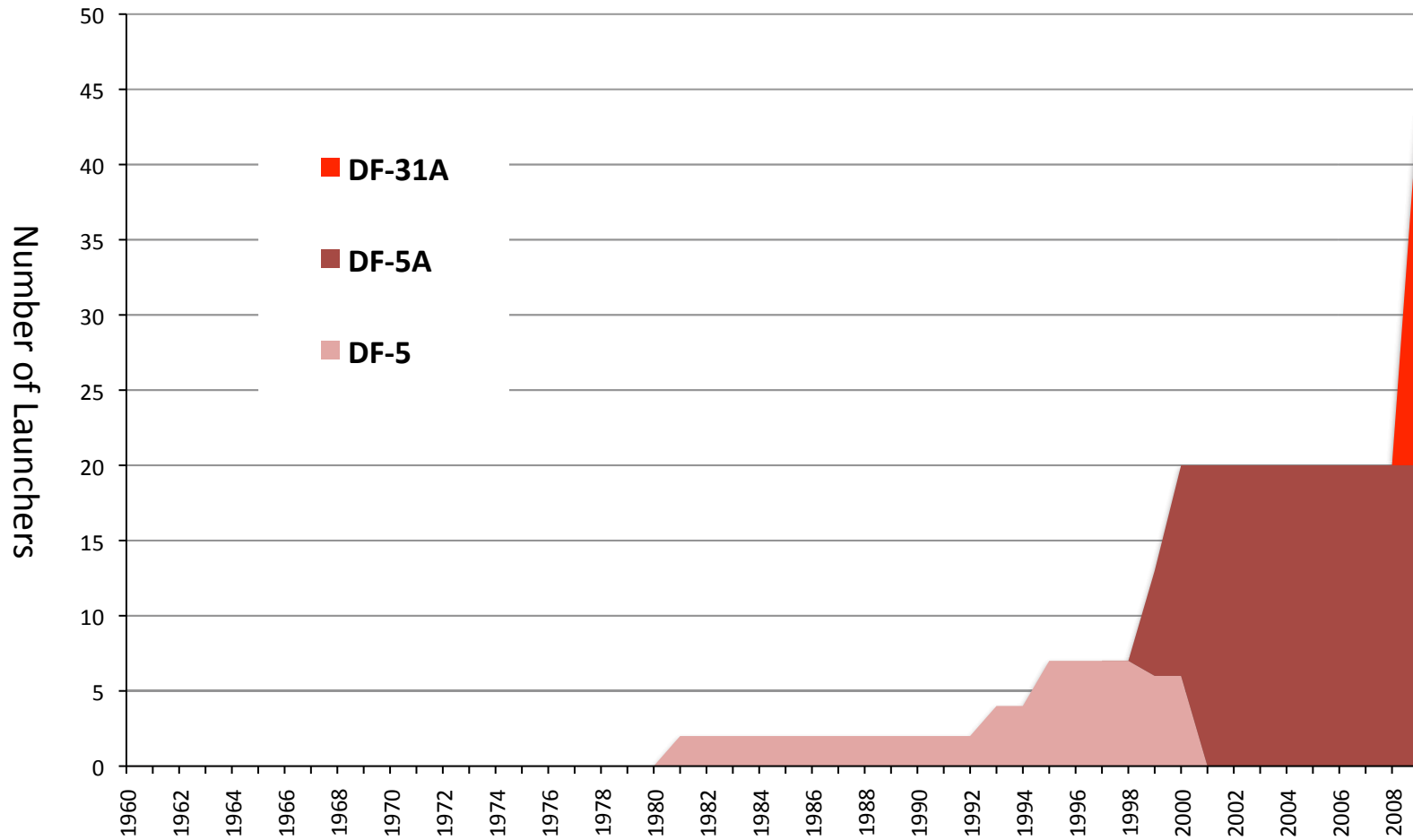


走向多极化的世界军事战略格局 [Military strategy toward a multipolar world pattern],” *Armed Forces Departments Source*, (2008.08.14) < http://www.china001.com/show_hdr.php?xname=PPDDMV0&dname=T5T6D41&xpos=67 > [accessed 12 Feb. 2010].



Intercontinental Missiles

Quantity of Launchers: 1966-2009



Data derived from the annual Military Balance reports (London, UK: International Institute for Strategic Studies, 1960-2010).

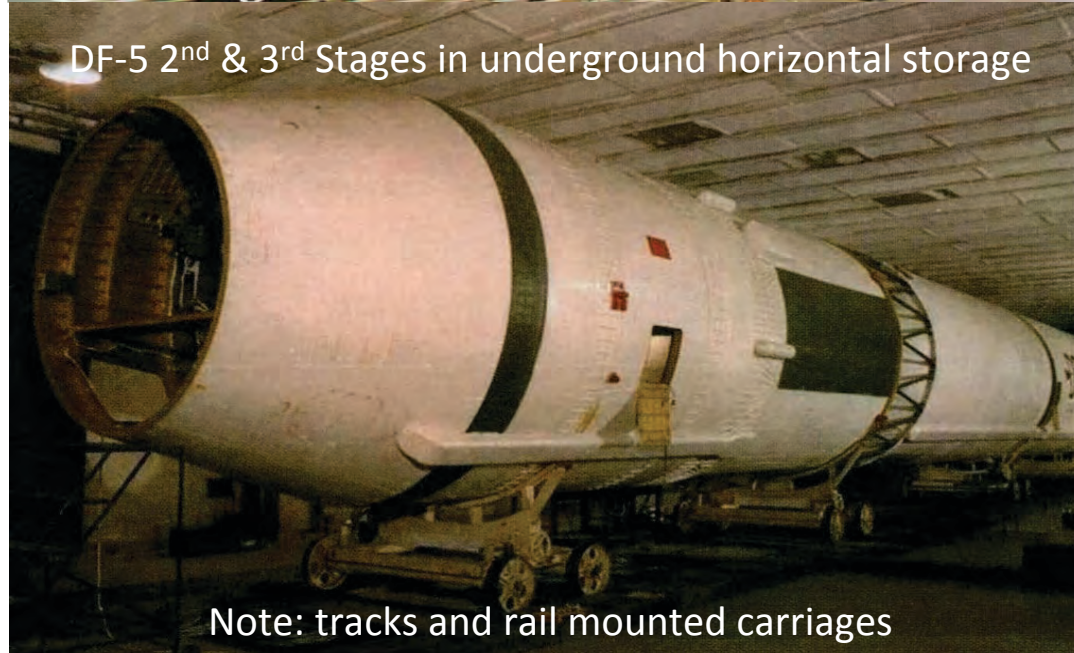
DF-5 ICBM shown in Silo launch and tunnel storage



DF-5 Warhead with 2nd & 3rd Stages shown in 1984 Parade



Silo launch of DF-5



DF-5 2nd & 3rd Stages in underground horizontal storage

Note: tracks and rail mounted carriages



Photo from: "DongFeng 5 (CSS-4) Intercontinental Ballistic Missile," *SinoDefense*, (2009.02.15), at < <http://www.sinodefence.com/strategic/missile/df31.asp> > [accessed 7 Jul. 2010].

DF-5 Underground Silo



The image above depicts a DF-5 (CSS-4) ICBM silo located in southern China near Huitong. Chinese ICBM silos are very difficult to identify. As seen in the image above, they are allowed to become overgrown with vegetation and may actually be camouflaged. This is part of a denial and deception effort intended to mask their locations from overhead imaging sensors. Using effective concealment efforts can make targeting these strategic assets very difficult if the sites are effectively hidden. As shown here, however, these concealed missile sites can still be located if an observer is aware of their layout and cognizant of the relevant features that need to be identified.

Sean O'Connor, "Hidden CSS-4 Silo," *IMINT & Analysis*, (2008.12.19) at < <http://geimint.blogspot.com/> > [accessed 17 Oct. 2010].

DF-31A ICBM



ICBM Warhead and 3rd Stage -- Mating with 1st/2nd Stages



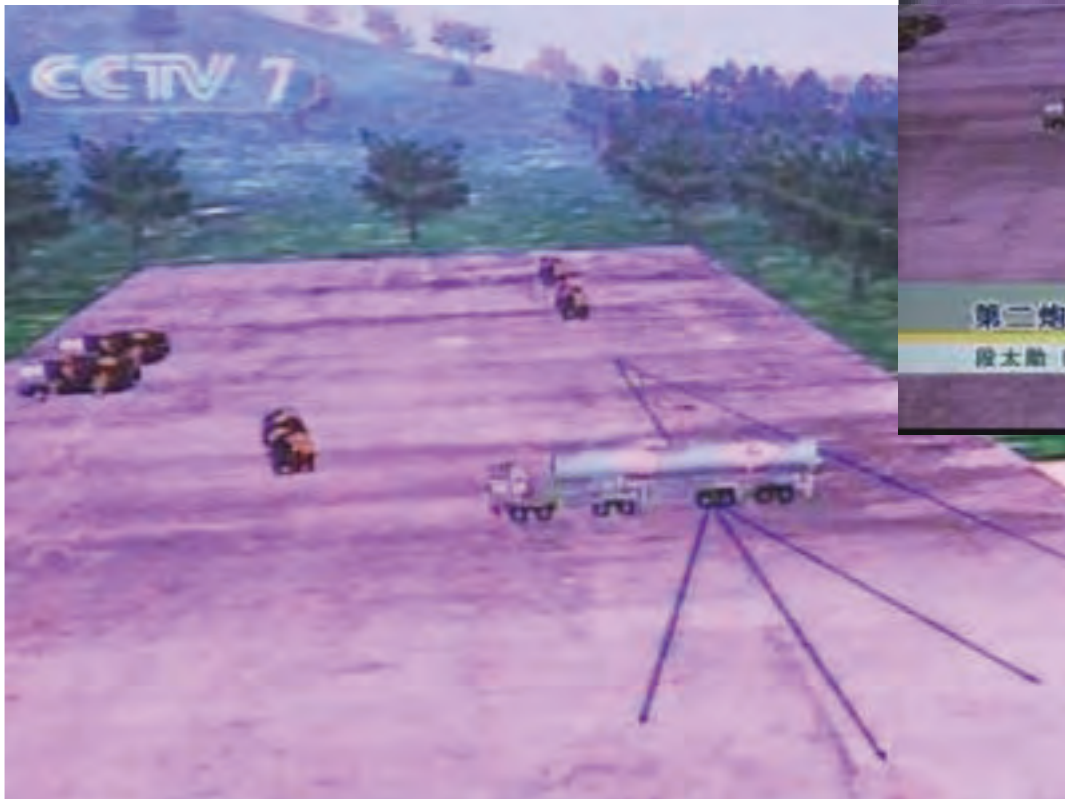
Photo shows 2nd Artillery diagnostic test facility and procedure for coupling stages. Note use of track and rail mounted carriages typical of tunnel deployment.

Photo from: "DongFeng 31A (CSS-9) Intercontinental Ballistic Missile," *SinoDefense*, (2009.02.15), at < <http://www.sinodefence.com/strategic/missile/df31.asp> > [accessed 7 Jul. 2010].

“Declaration of War signals”

CCTV exposure of DF-31A intercontinental ballistic missiles

Text claims DF-31A ICBM deployment in Shaoyang and Hunan provinces



Animation of DF-31A ICBM Deployment from Tunnel to pre-surveyed firing position

“宣战信号:央视曝光湖南邵阳DF-31A洲际导弹. 中国设在湖南邵阳的某旅是二炮第二个 ... [Declaration of war signals: CCTV exposure Shaoyang, Hunan DF-31A intercontinental ballistic missiles],” **CCTV-7, (2011.09.16)**, at < <http://www.google.com/imgres?q=二炮DF-41洲际核导弹列车亮相央视→铁血网&startg> > [accessed 19 Sept. 2011; translated by IP-1011].

DF-31/41 ICBM Train

“CCTV intercontinental nuclear missile train appeared!”

Text suggests that rail-mounting of ICBMs is related to this new line and tunnel construction.



“洲际核导弹列车亮相央视 [CCTV intercontinental nuclear missile train appeared!], 铁血网, (2007.02.28), at < http://bbs.tiexue.net/post2_1845648_1.html > [accessed 19 Sept. 2011; translated by IP-1011].

Is there a Road Mobile DF-41?

SS-25 with Chinese Characteristics

Heavy road-mobile MIRV ICBM?



Photos taken in China: 2007



If it exists – where is it?



CCTV 7

2006 Television Shot
Is there a Rail Mobile ICBM?

“Rocket arrives at launch facility”

火箭运抵发射场

“PLA Missile Thread,” *Sino Defense Forum*, (2006.02.02), at < <http://www.sinodefenceforum.com/world-military-pictures/pla-missile-thread-pictures-4-832.html> > [accessed 31 Aug. 2011].

“Our Country Arms Factory with a Railway Container Train of Cars that Actually Hide the Second Artillery Important Secret!”

A Chinese SS-24?



“This train car is no longer applicable in peacetime, but how do I find his car roof to be demolished, then it is specialized equipment like arms, but rather a disguised Second Artillery Corps train! Our units used to transport arms seem ordinary trains!”

“我国某铁路车辆厂里的军火货柜列车竟隐藏二炮重要秘密！ [Our Country Arms Factory with a Railway Container Train of Cars that Actually Hide the Second Artillery Important Secret!],” *Zhenhua Military Network*, (2010.05.09) at < http://www.zhjunshi.com/mil/2010-05-09/content6_13432.shtml > [accessed 11 May 2010, translated by IP-1011].

China's Dong Feng Missile Train



“二炮DF-31/41洲际核导弹列车亮相央视！中国的东风31/41导弹列车 [Second Artillery Corps DF-31/41 intercontinental nuclear missile train appeared CCTV! 31/41 China's Dong Feng Missile Trains],” at “Air Force Forum,” *Texue.Net*, (2007.02.15) at < http://bbs.tiexue.net/post_1829716_1.html > [accessed 11 May 2010, translated by IP-1011].

洲际核导弹列车亮相央视

Intercontinental Nuclear Missile Train appeared CCTV



“二炮DF-31/41洲际核导弹列车亮相央视！中国的东风31/41导弹列车 [Second Artillery Corps DF-31/41 intercontinental nuclear missile train appeared CCTV! 31/41 China's Dong Feng Missile Trains],” at “Air Force Forum,” *Texue.Net*, (2007.02.15) at < http://bbs.tiexue.net/post_1829716_1.html > [accessed 11 May 2010, translated by IP-1011].

ICBM Rail Transport/Launcher





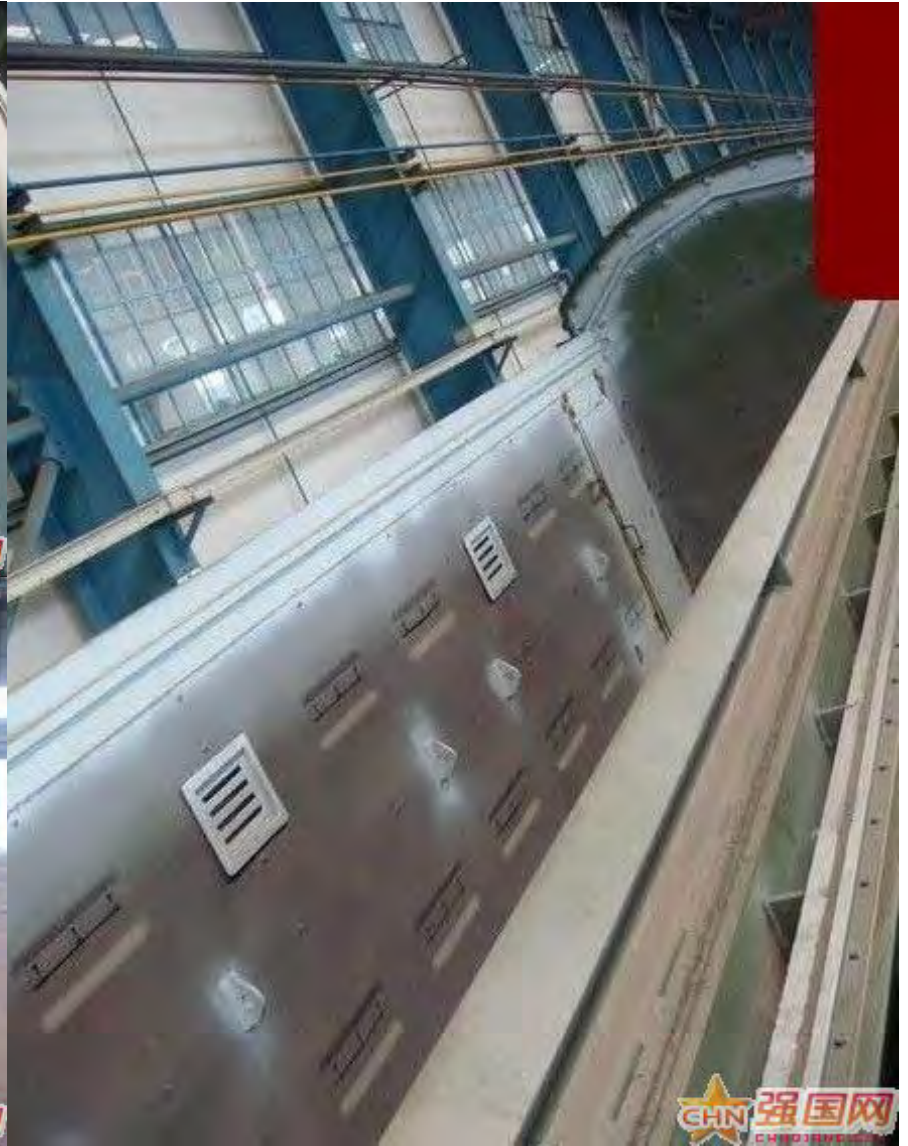
“我国某铁路车辆厂里的军火货柜列车竟隐藏二炮重要秘密！ [Our Country Arms Factory with a Railway Container Train of Cars that Actually Hide the Second Artillery Important Secret!],” *Zhenhua Military Network*, (2010.05.09) at < http://www.zhjunshi.com/mil/2010-05-09/content6_13432.shtml > [accessed 11 May 2010, translated by IP-1011].



CHN 强国网



CHN 强国网



CHN 强国网

11.3 09.3 眉厂
17.3 09.3 眉厂

取消辅修



载重 20t
自重 32.1t

容积 154m³
(20.6x2.5x2.4)



CCTV 7

蜀中行



军事报道

CCTV 9

蜀中行

军事报道





天鼎 0017.com
Top
Y81
VX9999

军事报道

天鼎 9917.com

TOP
Y8.1
VX9990



军事报道

不吃人的狼top81



CCTV 1

蜀中行



*“Second Artillery bomb train appeared on CCTV,
China's Military began a Showdown”*



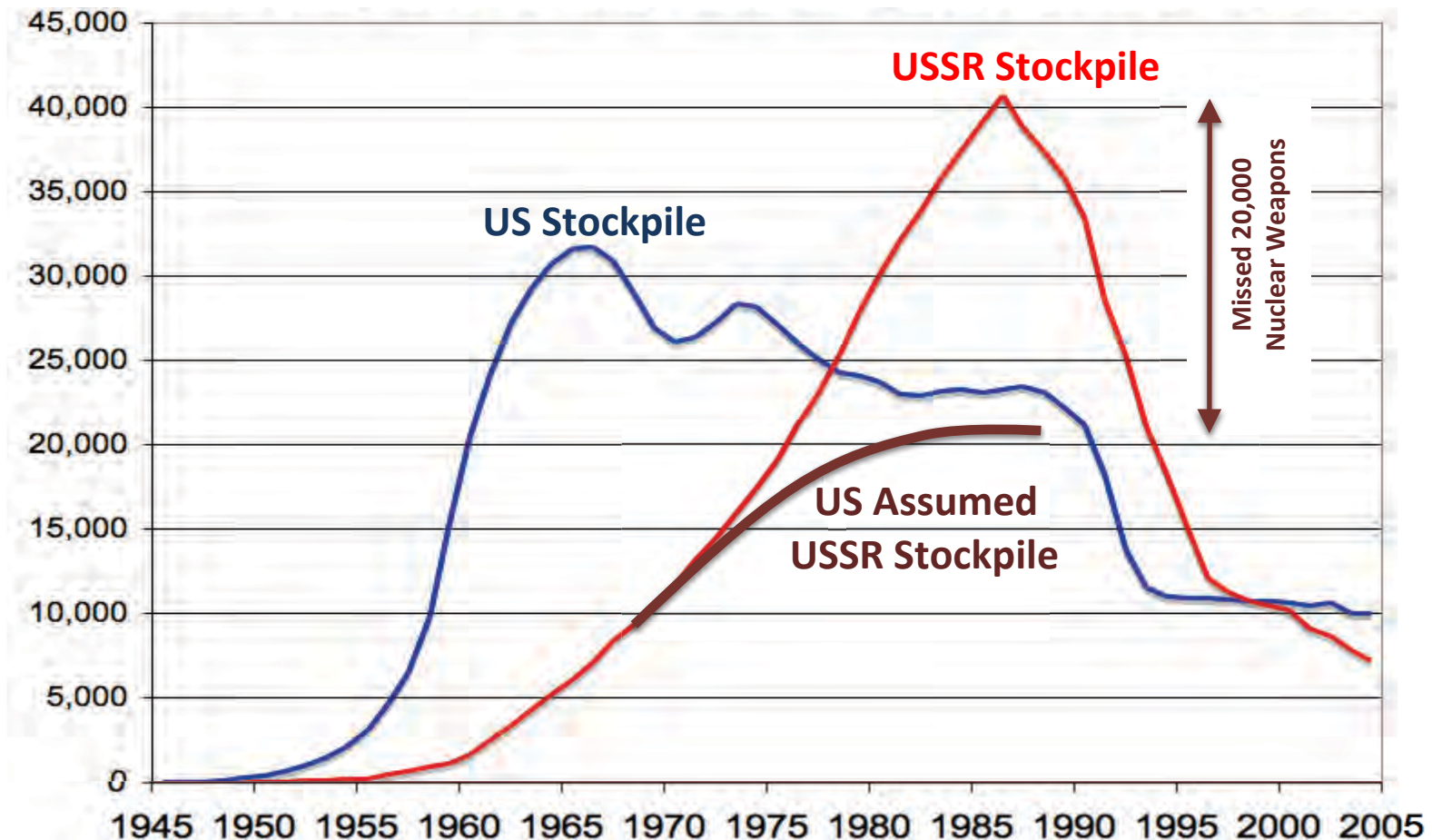
UPPER RIGHT: 传说中的中国二炮导弹列车 [China's Second Artillery Missile Legendary Train?] (2008.11.26), at < http://tuku.military.china.com/military/html/2008-11-26/115803_1017746.htm > . OTHERS: “二炮核弹列车亮相央视，中国军方开始摊牌了 [Second Artillery bomb train appeared CCTV, China's military began a showdown],” IT商业新闻网， (20011.06.05), at < http://news.itxinwen.com/IT_life/2011/0628/310852.html > [accessed 7 Sept. 2011; translated by IP 1011].

STUDY #7

***Underground “Great Wall” Implications for
Deterrence & Arms Control***

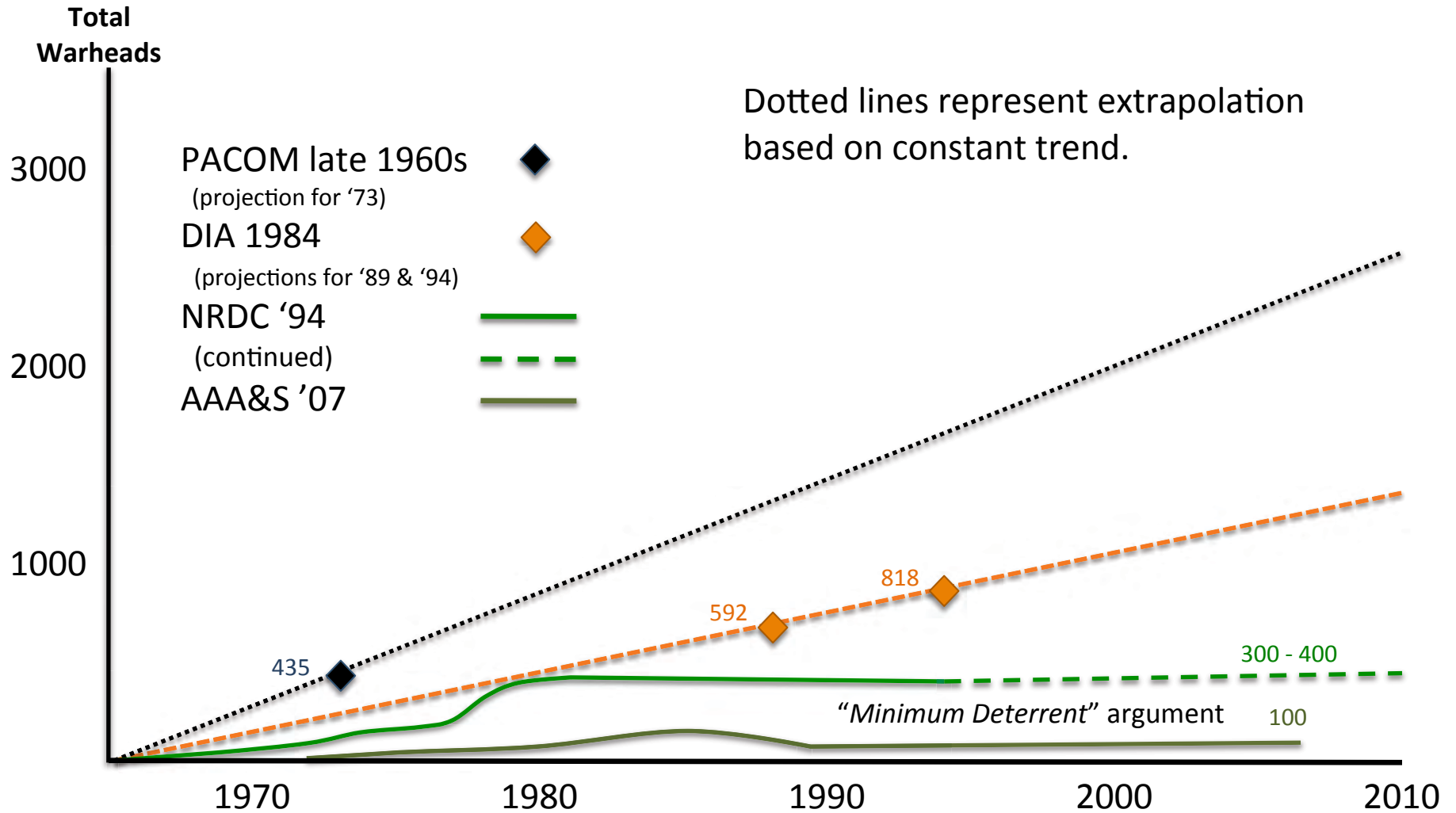
Nuclear Warheads are Not Amenable to National Means of Verification

During the Cold War the U.S. Missed 20,000 Soviet Nuclear Weapons



"US and USSR nuclear stockpiles," *Wikimedia Commons*, (2010.05.18), at < http://commons.wikimedia.org/wiki/File:US_and_USSR_nuclear_stockpiles.png > with Data from < <http://www.nrdc.org/nuclear/nudb/datab19.asp> Natural Resources Defense Council > [accessed 19 Dec. 2010].

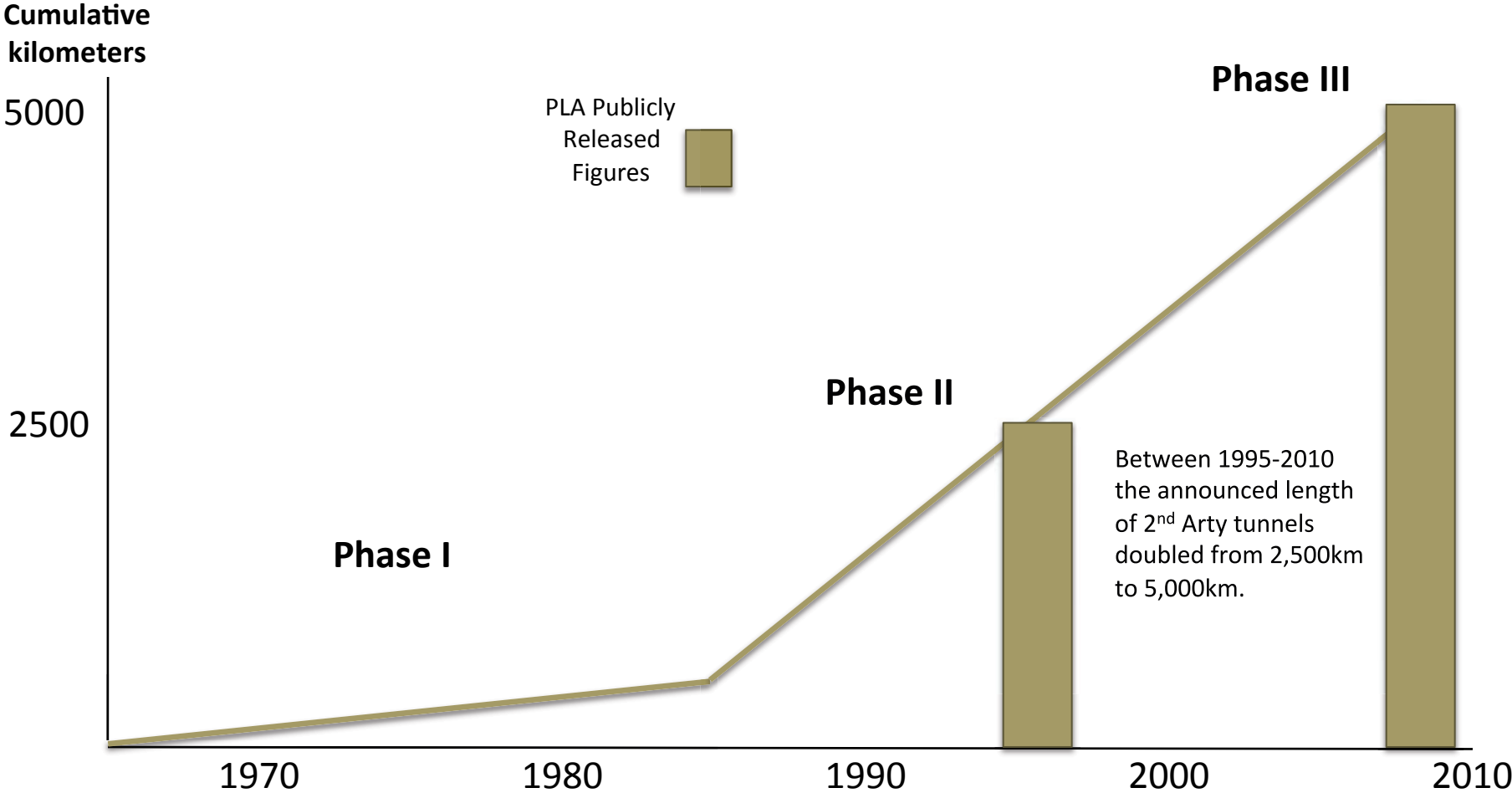
How Small is China's Nuclear Arsenal?



R. Norris, A. Burrows, and R. Fieldhouse, British, French, and Chinese Nuclear Weapons, (NRDC: 1994): p. 359; and Jeffrey Lewis, The Minimal Means of Reprisal: China's Search for Security in the Nuclear Age, (AAA&S: 2007): p. 54.

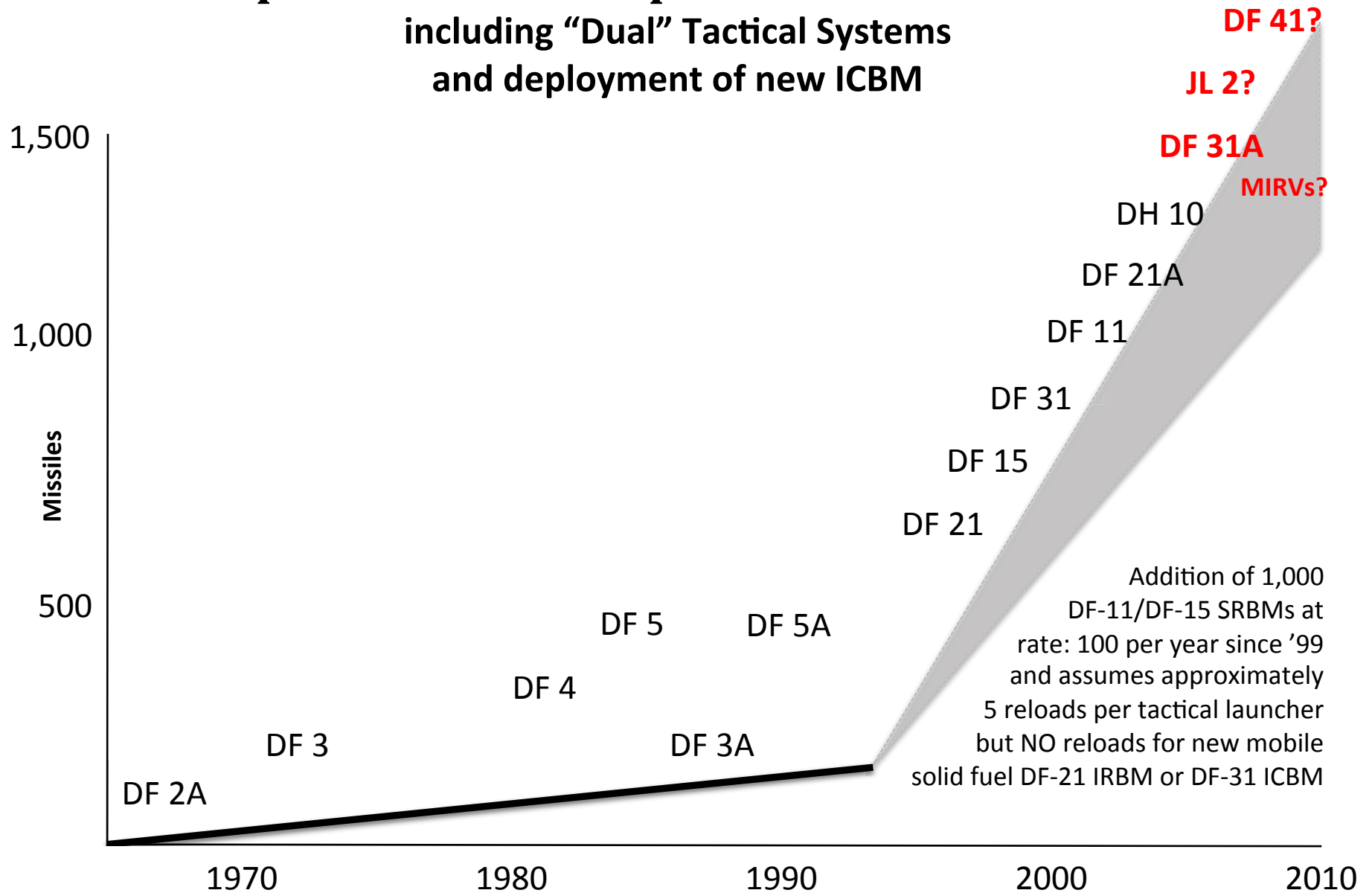
Tunnel Expansion

Stages of Underground Development



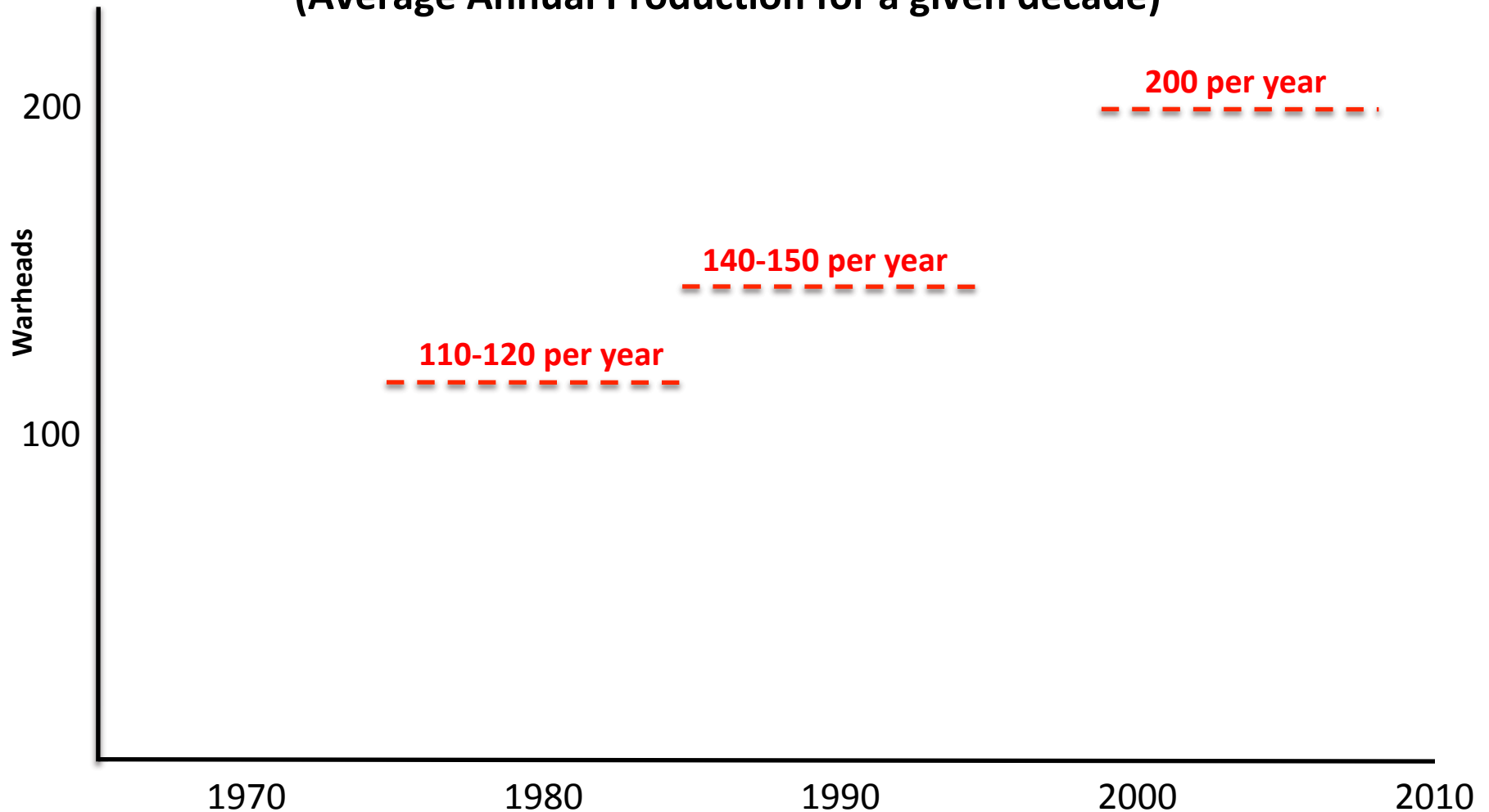
Reported Nuclear Capable Missile Increases

including "Dual" Tactical Systems
and deployment of new ICBM



China Military Power, (various editions: 2003-2011).

Chinese Statements of Nuclear Warhead (Average Annual Production for a given decade)



“长城工程灭倭震美：没有核潜艇，布什照样不敢动!!! [Great Wall engineering fight an old name for Japan earthquake beauty: no nuclear submarines, Bush went to move!!!]” *Baidu*, (2005.08.25), at < <http://tieba.baidu.com/f?kz=34902741> > [accessed 15 Jan. 2009; translated by IP-1011]; “中国目前拥有2, 350颗核弹头! [China currently has 2,350 nuclear warhead!]” *Sina*, (2007.12.29), at < http://blog.sina.com.cn/s/blog_49439760010085gd.html > [accessed 4 May 2011; translated by IP-1011]; “中国目前拥有2, 350颗核弹头? [China currently has 2,350 nuclear warheads? !]” *Baidu blog*, (2010.06.22), at < <http://tieba.baidu.com/f?ct=335675392&tn=baiduPostBrowser&sc=9311399299&z=733745887> > [accessed 4 May 2011; translated by IP-1011]; and “中国人民解放军第二炮兵导弹旅驻防示意图 [PLA Second Artillery missile brigade stationed diagram],” (2009.05.02) at < <http://binsys.cn/military/strategic/organisation/safob.php> > and < <http://binsys.cn/military/strategic/organisation/safob.php> > [accessed 22 May. 2010, translated IP-1011].

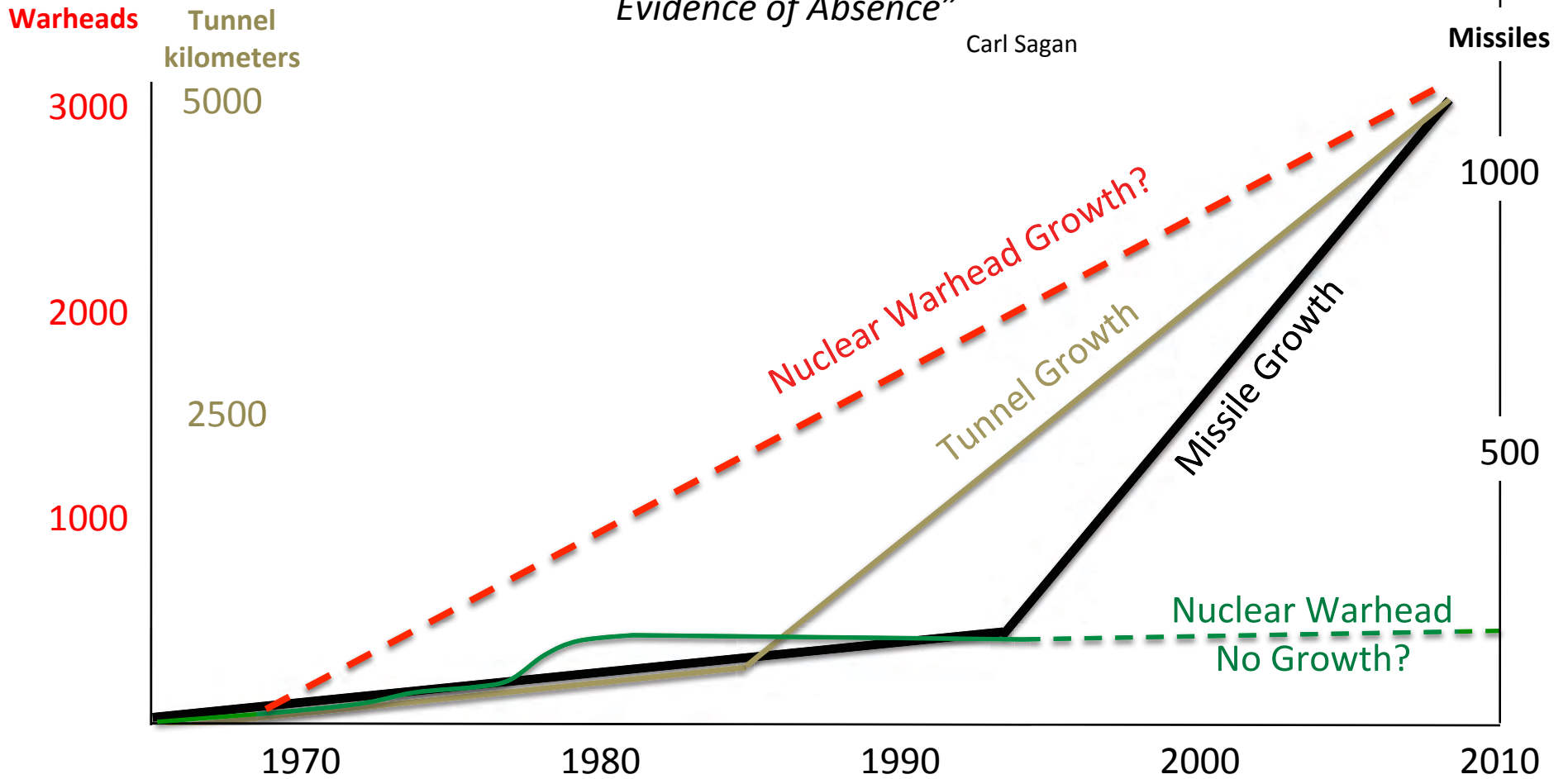
SAC DEVELOPMENT

Is "No Nuclear Growth" Plausible?

there be as many as 3,000 nuclear warheads

"Absence of Evidence is not Evidence of Absence"

Carl Sagan



Hypothesized Chinese Deterrent Criteria based on rare comments

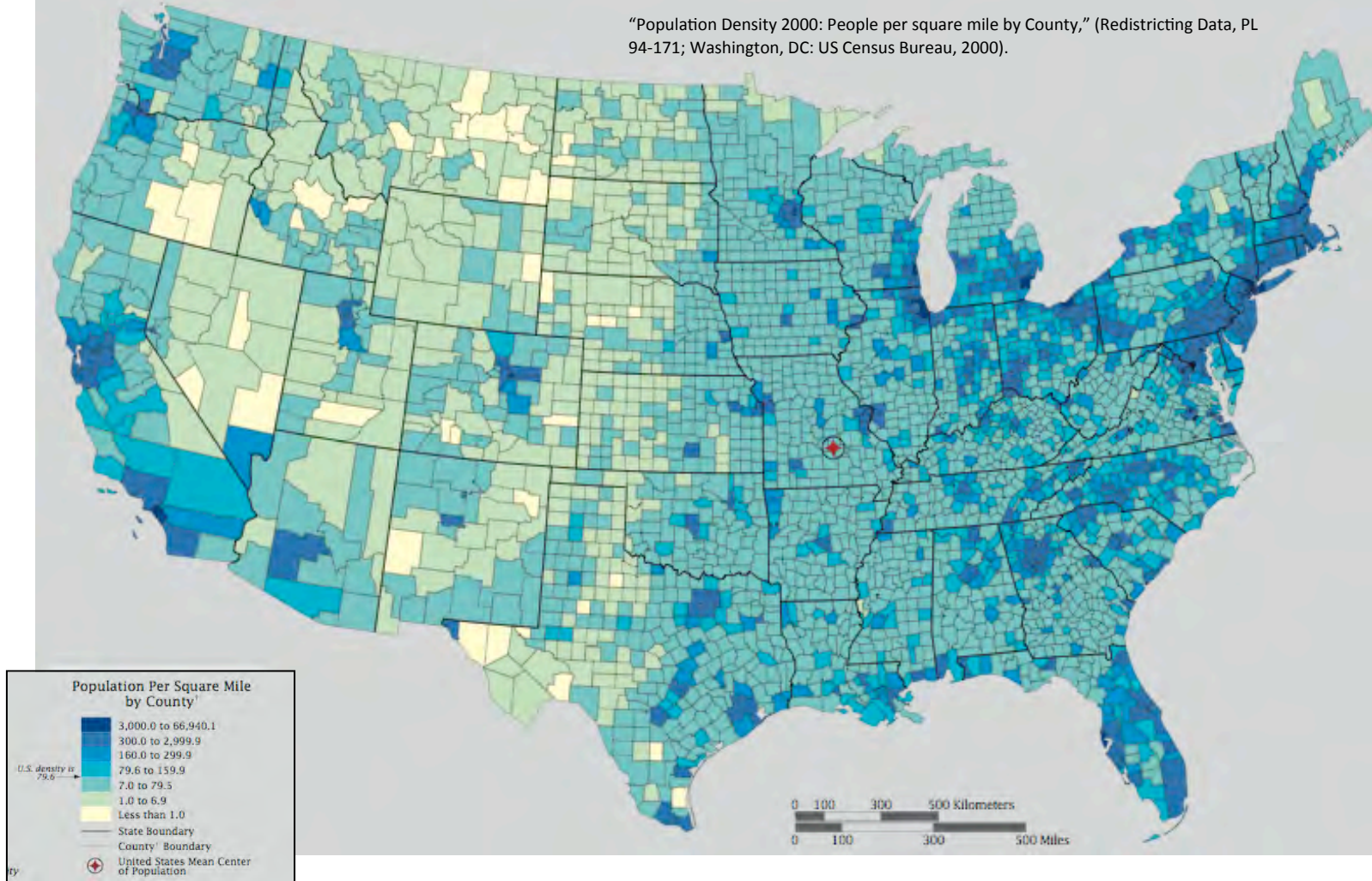
- Hold opponents values hostage;
- Target 300 American cities;
- Believable capacity to kill 200,000,000 Americans;
- Reduce Vulnerability -- they can't target what they can't see -- hide and move;
- Reduce cost of "high ready" systems with mobilization;
- Discussion of 2nd and 3rd Strategic Strikes, with implied:
 - Stored reserve;
 - Reloads;
 - Multiple launch positions.
- Demonstrate enhanced capability during a crisis.

What would it take?

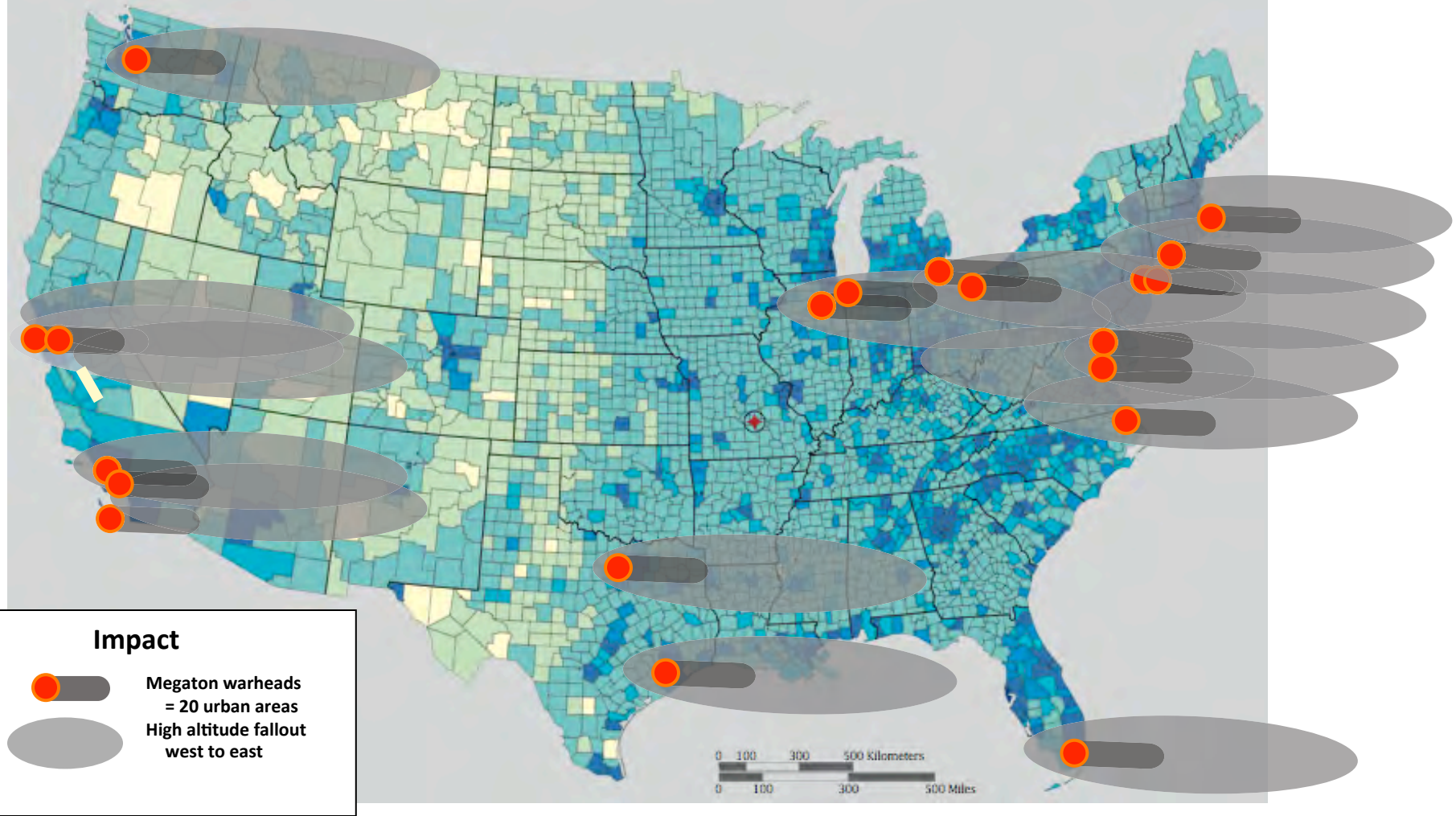
Distribution of US Population



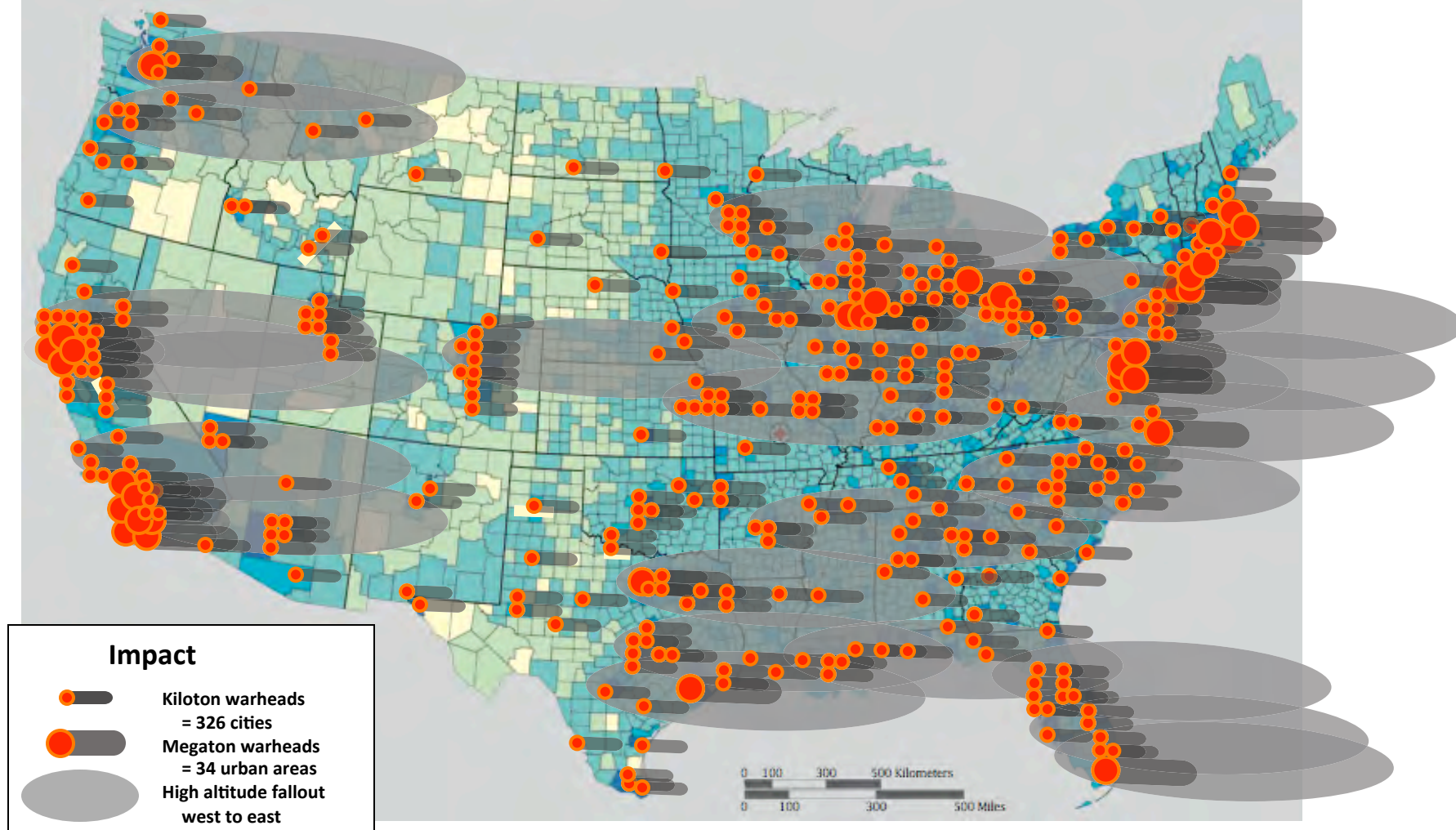
"Population Density 2000: People per square mile by County," (Redistricting Data, PL 94-171; Washington, DC: US Census Bureau, 2000).



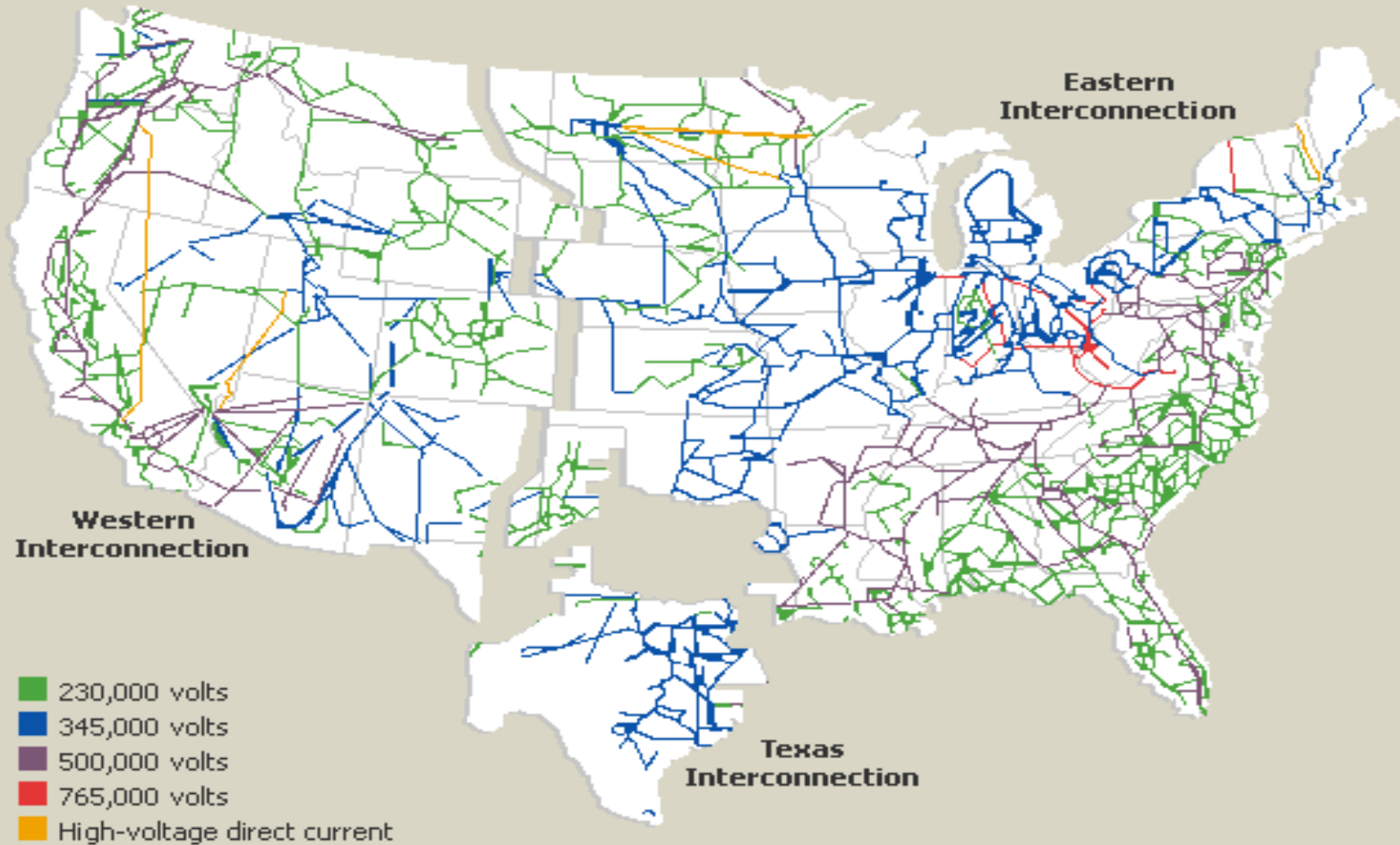
PRC Counter-Value Strike Against US Cities: 2000



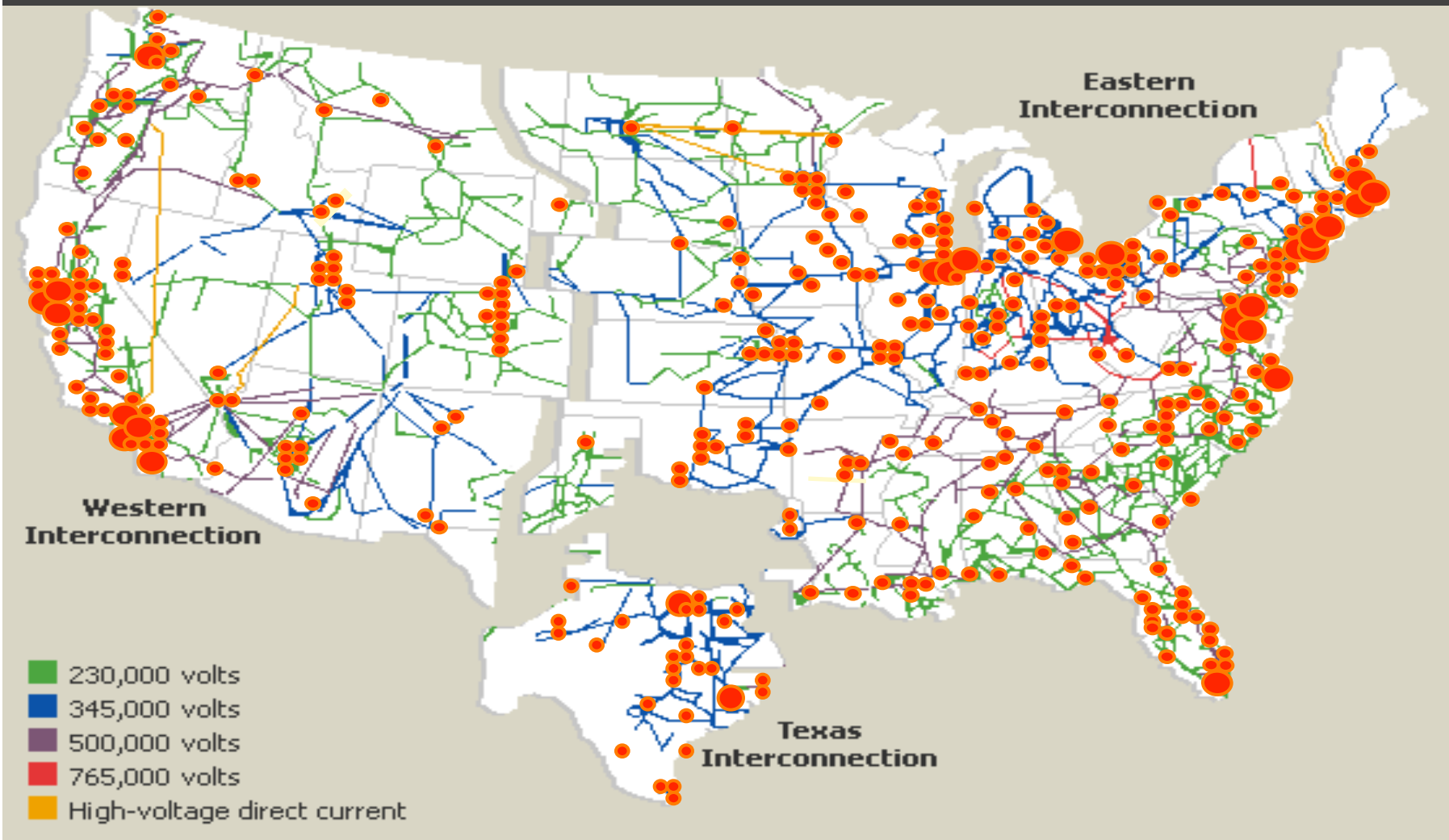
Counter-Value Strike Against US Cities with MIRV



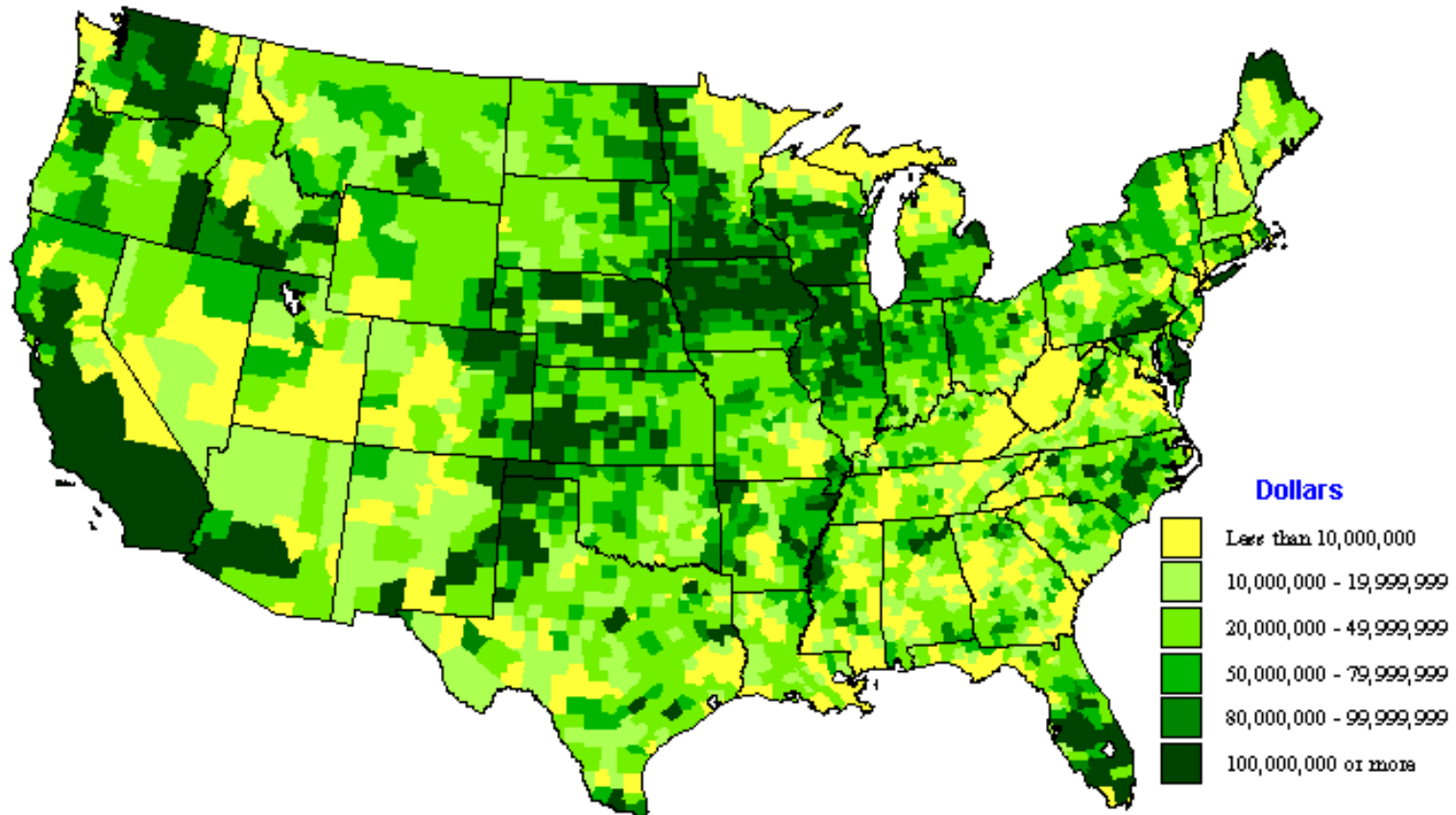
Distribution of US Electrical Grid



Collateral Destruction of US Electrical Grid with City Attack

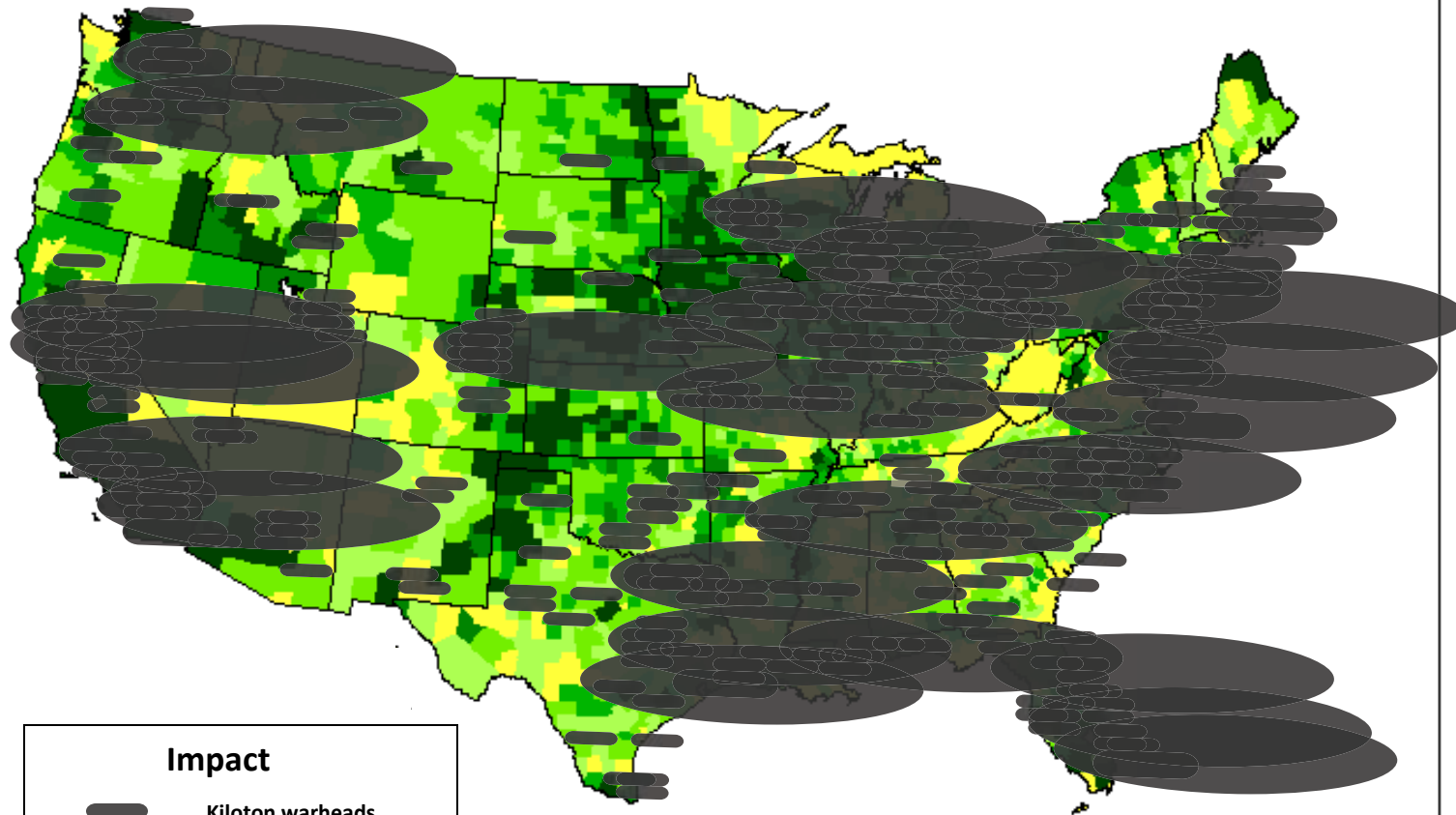


Value Distribution of US Agriculture






"Market Value of Agricultural Products Sold by County," *Agricultural Atlas of the United States*, (Washington, DC: Census of Agriculture, 1992), at < <http://www.nass.usda.gov/census/census92/atlas92/html/m029.htm> > [accessed 15 Dec. 2007].

Residual Radiation Coverage of US Agriculture



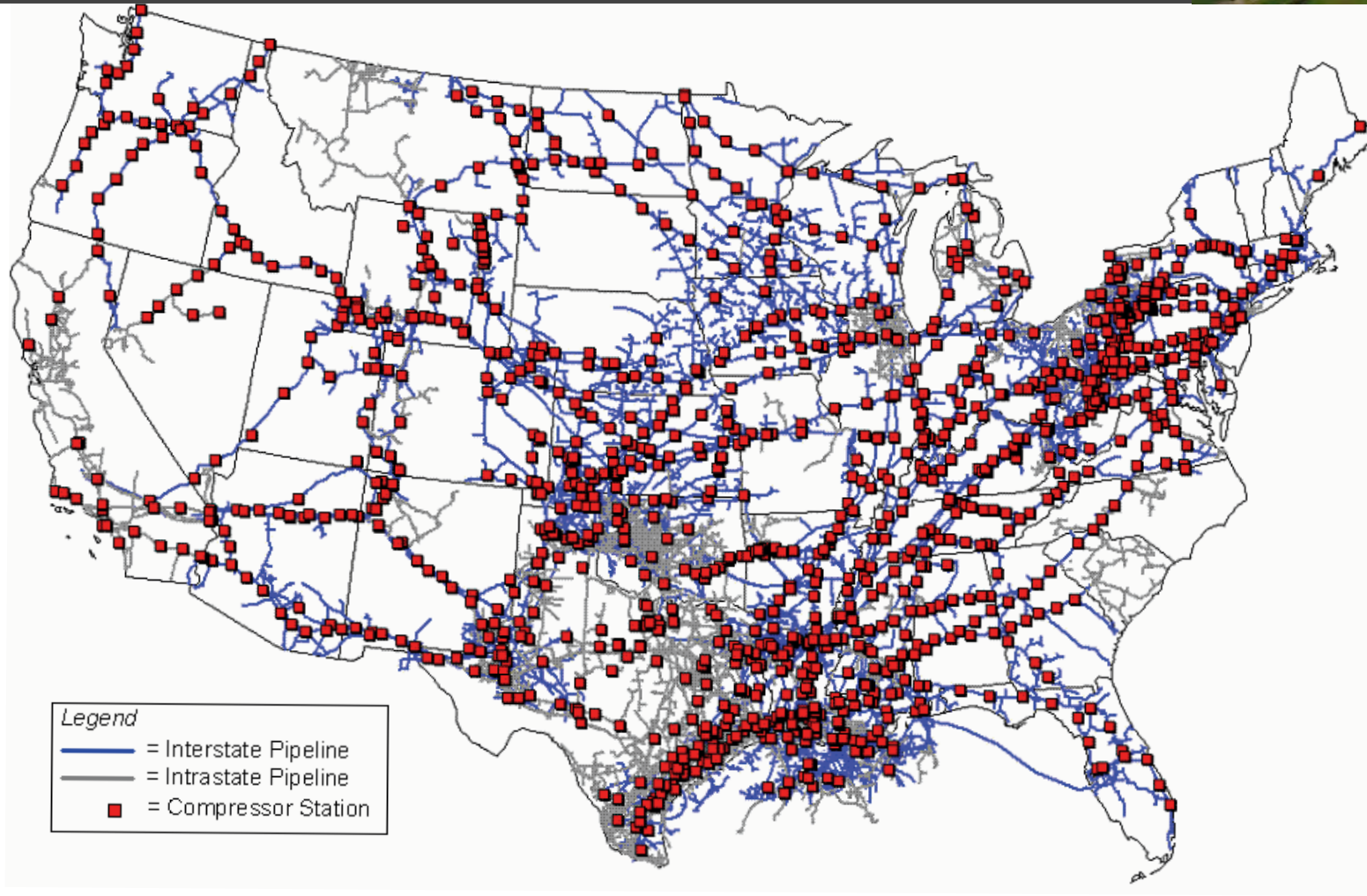
Impact

-  Kiloton warheads
= 326 weapons
-  Megaton warheads
= 34 weapons
-  High altitude fallout
west to east

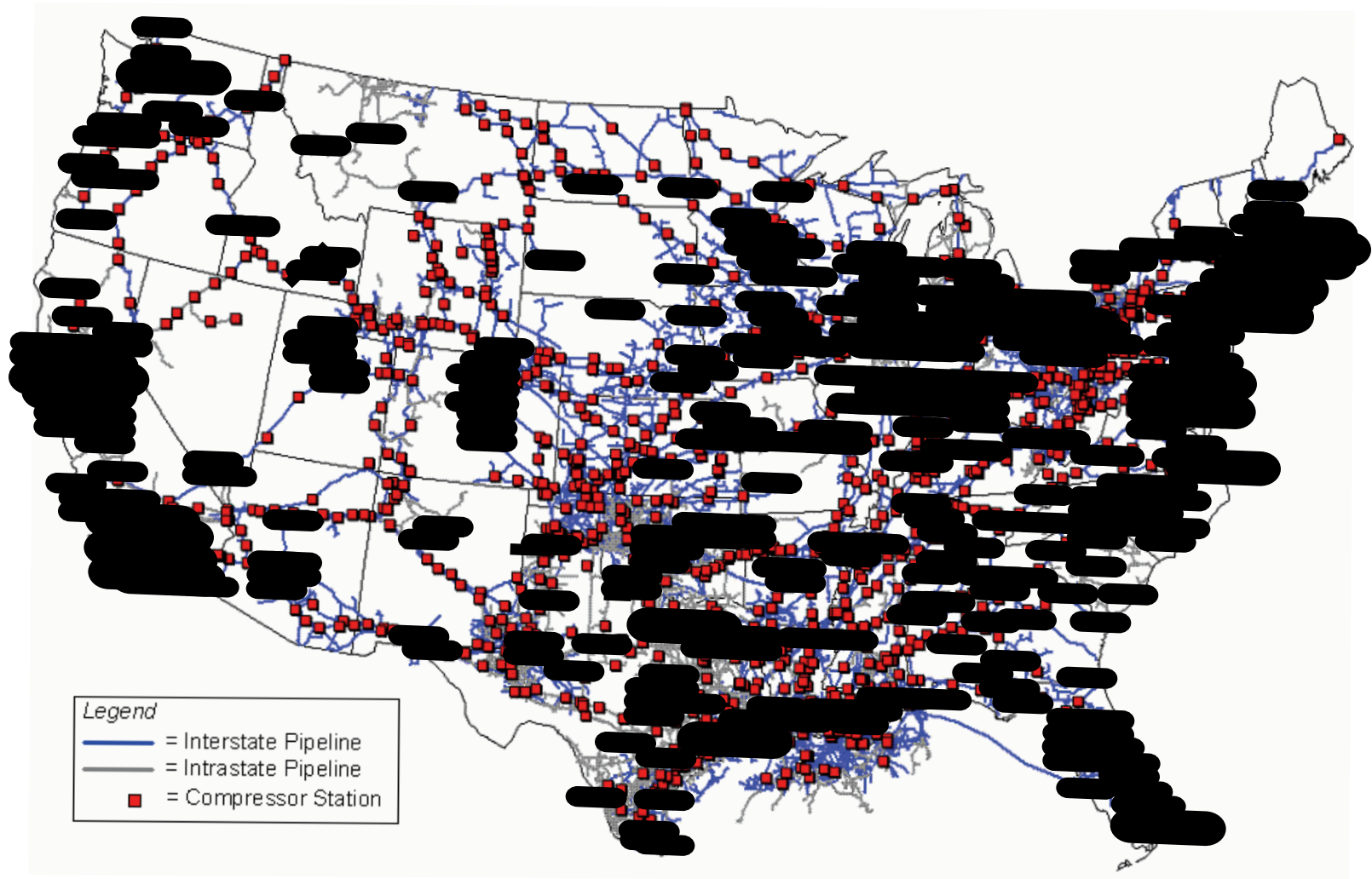
Assumptions: Counter-Value City Attack

average kiloton yield = 200KT airburst
average megaton yield = 2MT airburst

POL Pumping Stations and Pipelines



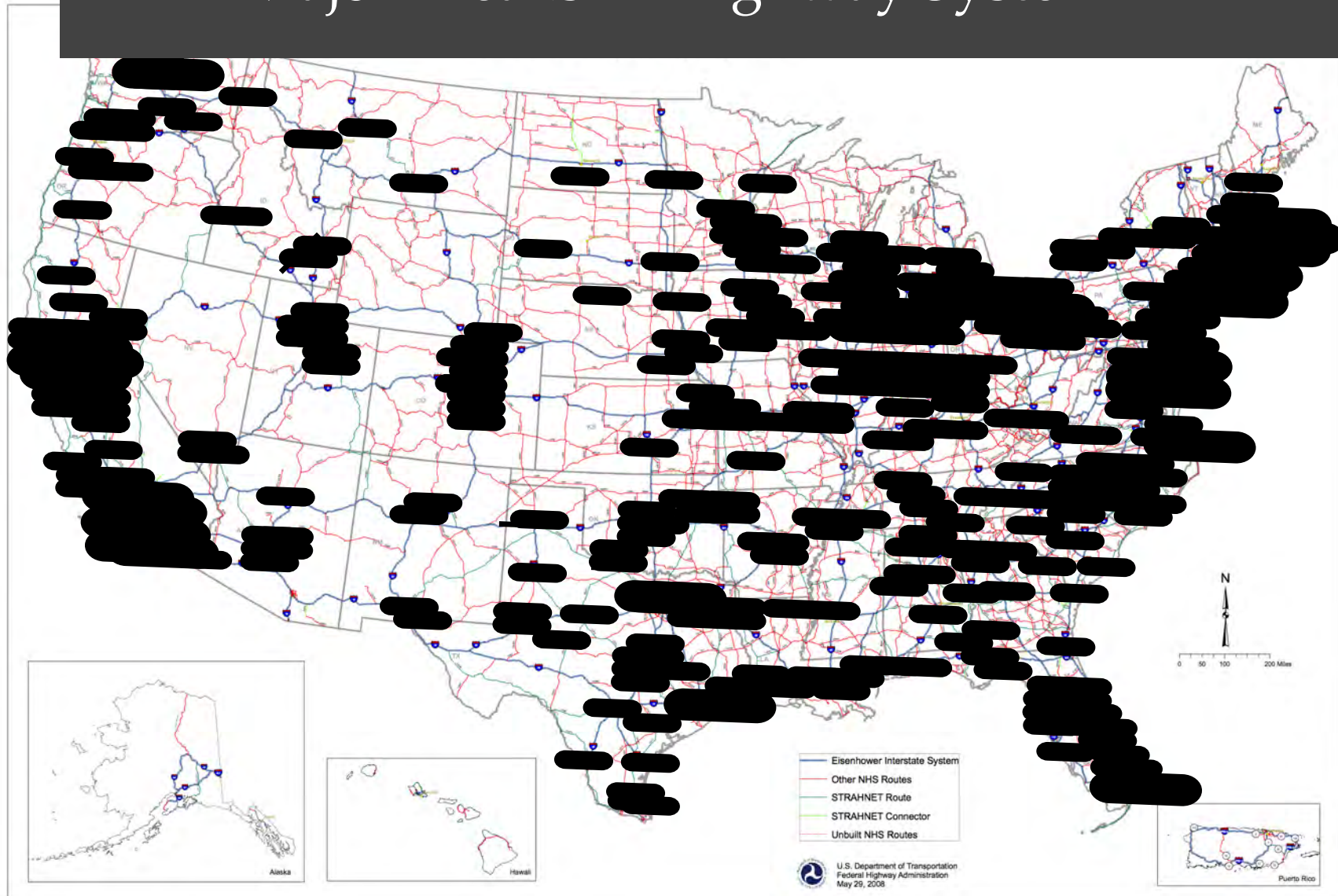
Major Breaks in Distribution



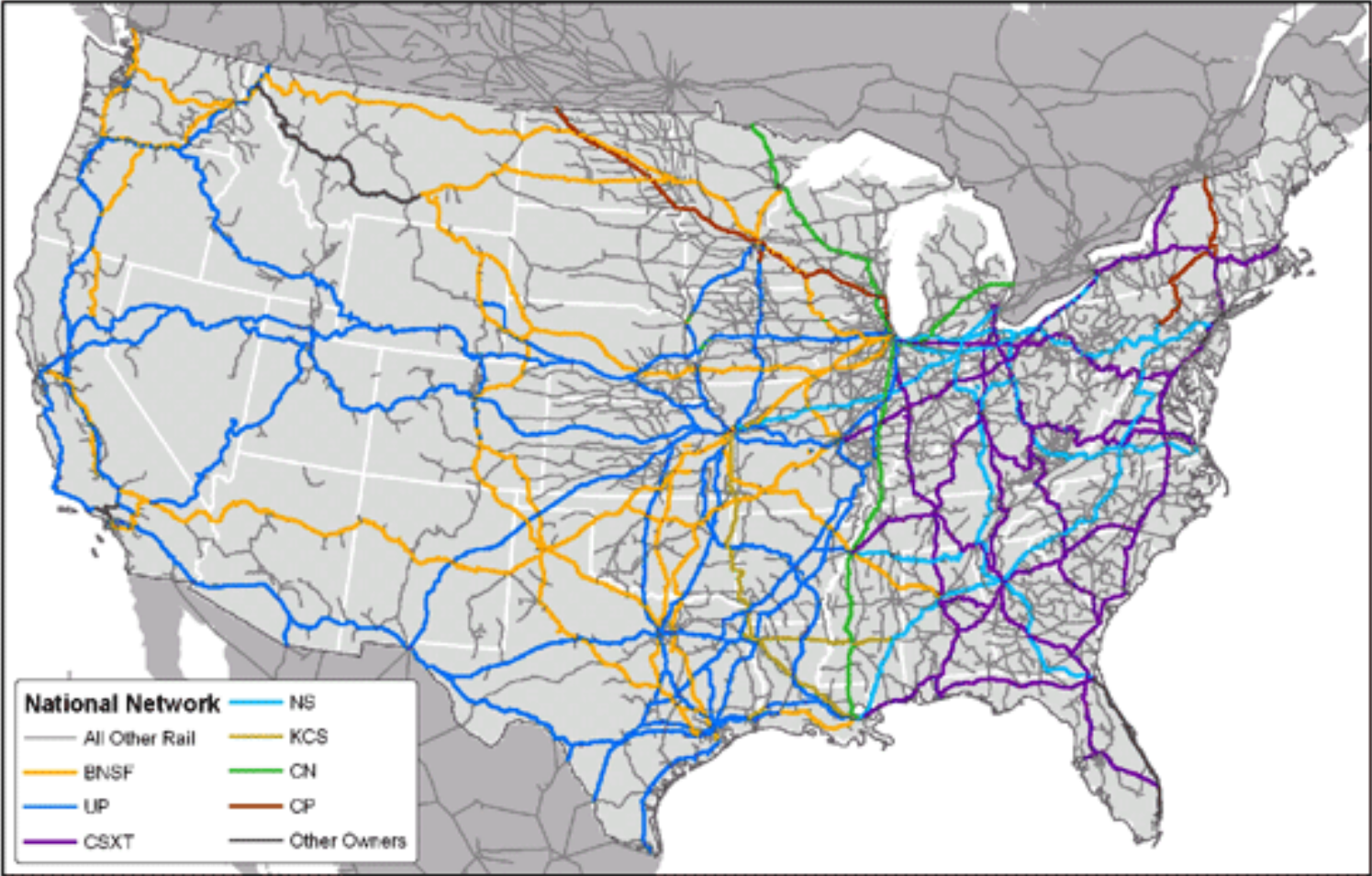
National Highway System



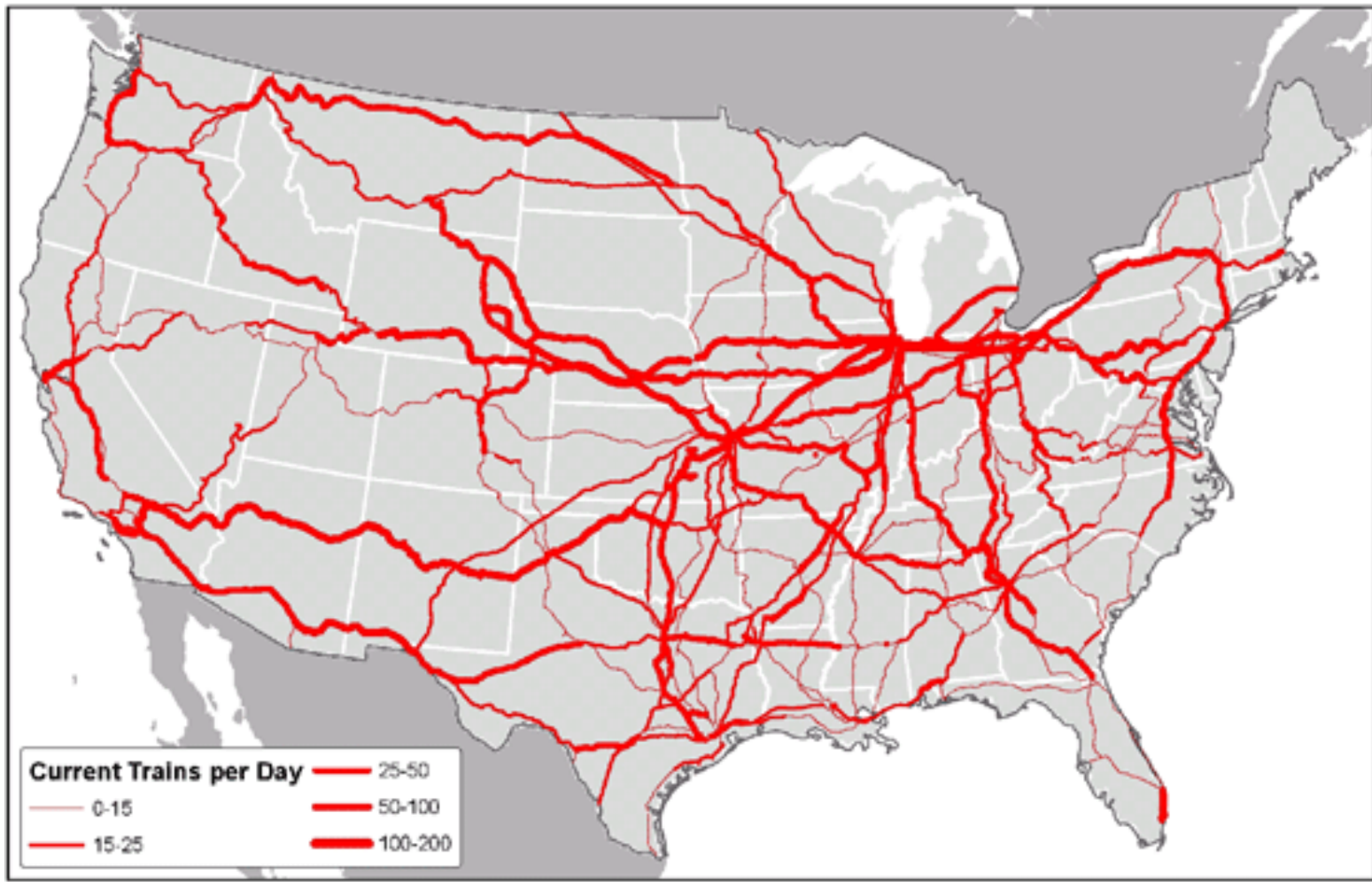
Major Breaks in Highway System



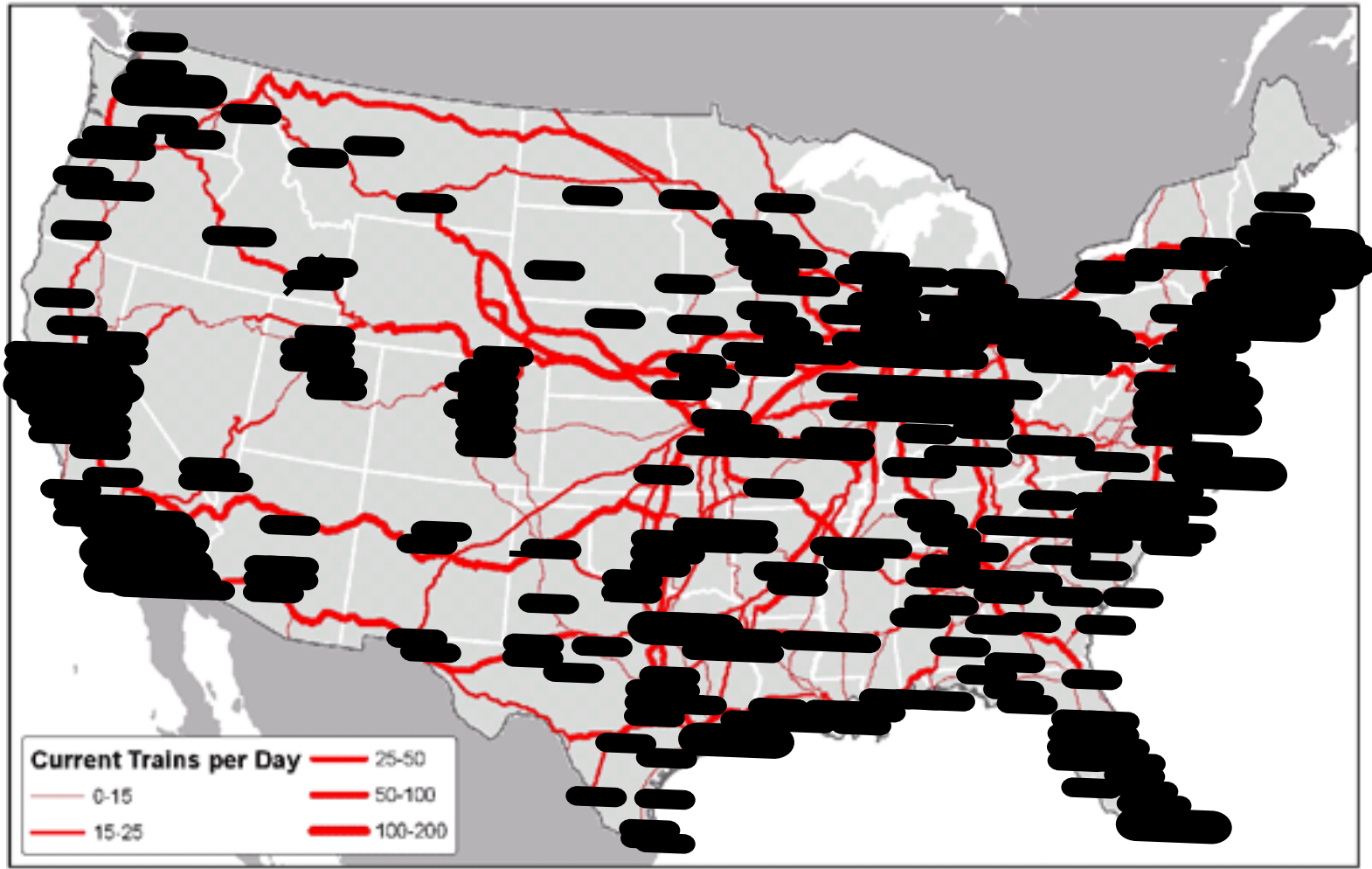
National Rail Net



National Rail Net Traffic



Major Breaks in Railway System



Impact of Chinese Counter-value Attack

- **Impact on Population**
 - 50,000,000 are likely to be direct casualties (immediate deaths and severely injured requiring medical attention to survive);
 - A similar number (+/-50%) will suffer radiation sickness ranging from debilitating to life-shortening;
 - At least 2/3 of the nations 7,569 hospitals will be destroyed or inoperable and half the physicians/surgeons and other healthcare professionals themselves casualties.
- **Impact on Electrical Generation**
 - The national electrical grid will be broken in over 200 major areas and at least 1/3 of the generation capacity destroyed;
 - The lack of electricity for food sustenance, water pumping, transportation and fossil fuel production and distribution will mean that virtually all surviving population in urban areas and towns will begin starving within a week of the attack;
 - For at least 2 years following the attack, lack of electricity will impact 80% of American households.
- **Impact on Agricultural Production**
 - At least 40% of the national food producing agricultural land will be exposed to significant residual radiation;
 - Farming productivity will drop to less than 25% due to lack of water pumping, equipment fuel, feed, seed, fertilizer and manpower; slaughter of feed stock in the first six months of national famine will take decade to replace;
 - Starvation will be a reality for at least 100,000,000 Americans surviving the initial attack.

BOTTOM LINE: 200 million lost, and surviving Americans will be living in the dark, on a subsistence diet, with a life style and life expectancy equivalent to the dark ages.

Strategic Arms Control Implications of a Large Chinese Nuclear Force

- **Post START II**

- A larger than estimated Chinese strategic nuclear force raises grave questions about US national security:
 - US nuclear force levels needed?
 - US nuclear force reliability/capabilities/effectiveness?
 - US extended deterrent for Asian Allies and as non-proliferation incentive?
 - Self-deterred by threat of “unacceptable damage” to American population?
 - Constraints on US Prompt Global Strike capabilities
 - China is developing a strong conventional ballistic missile force
 - Constraints on US missile defenses
 - China is developing its own national missile defense

- **Potential future US-China strategic nuclear arms control issues**

- History of highly successful Chinese secrecy and deception
- Dual capable tactical/theater ballistic missile systems – US constrained by INF Treaty
- 4th generation nuclear weapons not covered by current treaties
- US capabilities to verify, in light of Chinese Underground Great Wall effort to reduce effectiveness of US national technical means

机动展开 “*Mobile Expansion*”

Deployment from Underground in a Crisis

“... *during peacetime only small quantities of units will be allocated in pre-determined operational areas for emergency use, and the main operational units will be allocated in areas outside the operational areas that are transportation accessible. Prior to war, only missile units that bear the mission of conducting fire assault and small quantities of support units (or elements) will be allocated in the concealed tunnels within the operational areas, while the remaining units will be positioned in concealed areas that are far from the theater, thereby reducing the overall exposed forces. During the war is when forward **mobile expansion** is conducted at the appropriate time.*”



Top Cover Helicopter Security = Nuclear Warhead Deployment?

优酷



Chinese *DETERRENCE* Terminology

KEY WORDS

Dominate	威	wēi	might, prestige
Afraid	慑	shè	cower, scared, fearful
Shake	震	zhèn	quake, symbol of thunder
Force	逼	bī	make someone do something
Power	力	lì	strength, influence
Capability	量	liàng	capacity, quantity, amount
Nuclear	核	hé	atom

KEY CONSTRUCTS

Deterrence	威 慑	wēishè	dominate thru fear, cower by force
Intimidate	震 慑	zhènshè	to be in awe, shake/tremor,
Compellence	威 逼	wēibī	threaten, coerce
Deterrent	威 慑 力 量	wēishèlìliang	dominating power capability
Nuclear Deterrence	核 威 慑	hégēishè	nuclear domination thru fear
Nuclear Deterrent	核 威 慑 力 量	hégēishèlìliang	nuclear dominating power capability

PRC View of Deterrence is neither Minimal nor Passive

Warfighting and deterrence are two major basic functions of the armed forces. What is termed **deterrence** is the military conduct of a state or a political group in displaying force or showing determination to **use force to compel the enemy to submit to one's volition and to refrain from taking hostile actions or escalating the hostility.**

Strategic deterrence and strategic operations are dialectically unified. Strategic operations secure the strategic objective through direct engagement with the enemy on the battlefield, with a view to winning the war or to curbing the war by war, which the objective of strategic deterrence **is to contain the outbreak of war or to limit the scope and the escalation of war**, with a view to curbing the war, and its strategic objective is attained by non-fighting means or fighting a small war.

Strategic deterrence and strategic operations are interacted, and their objectives are for attaining one's strategic objectives by frustrating the enemy's attempts.

Peng Guangquian and Yao Youzhi, Science of Strategy, (Beijing: 2005): pp. 213-214.

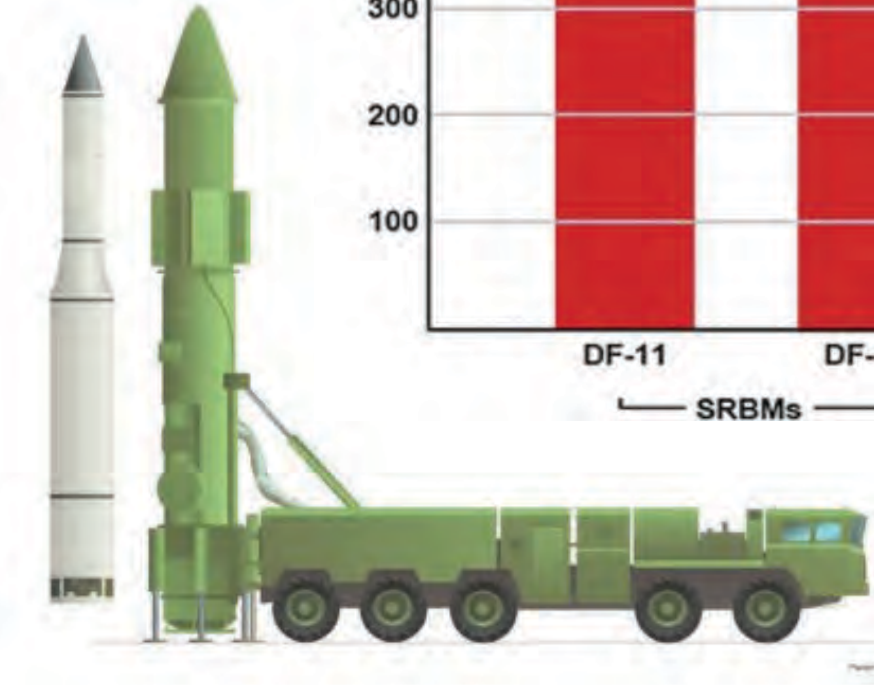
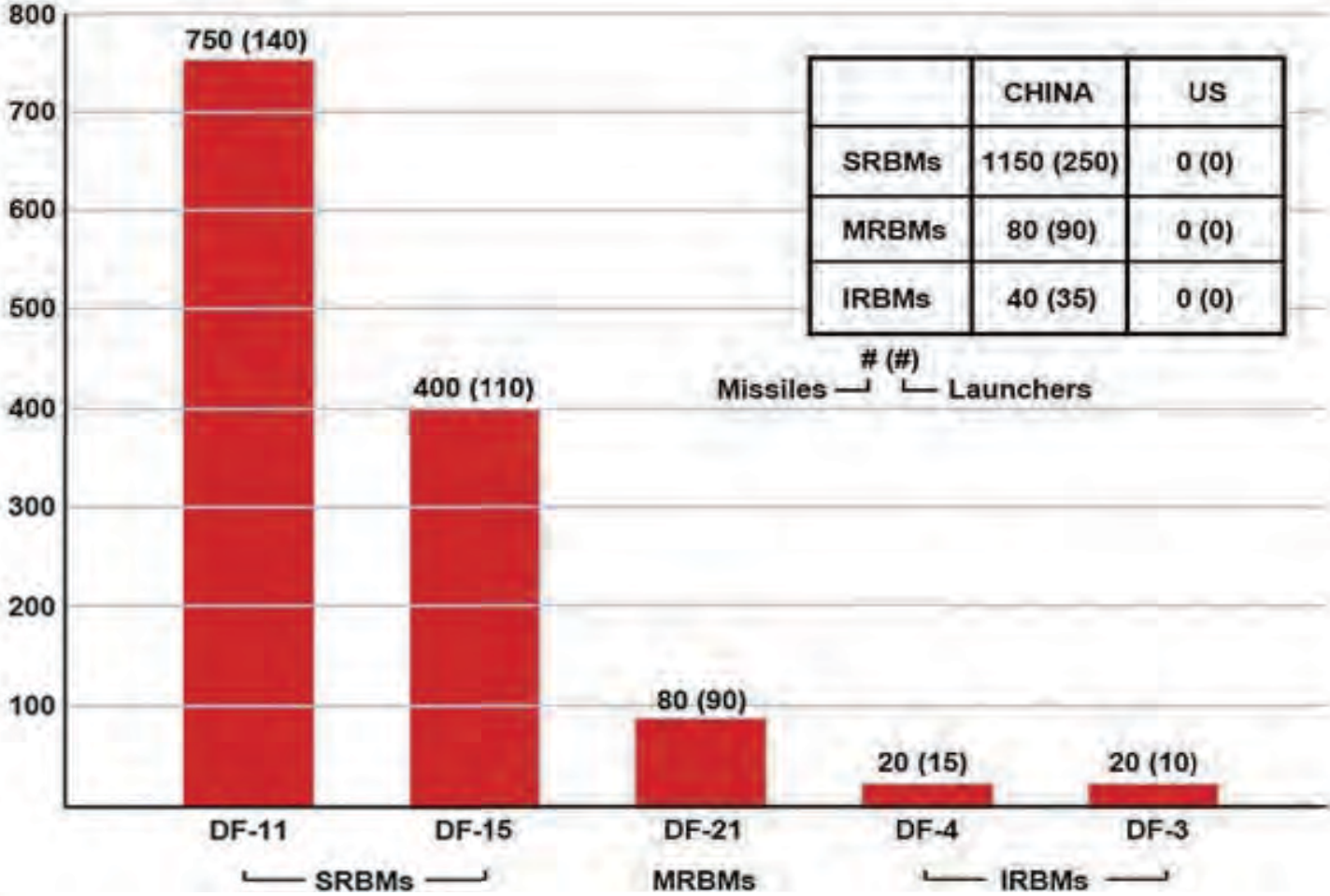
With regard to the Second Artillery **conventional missile strike campaign, it will be carried out under nuclear deterrence conditions.** Despite the fact that future wars primarily will be conventional local wars, in the global [community,] those that have nuclear weapons are primarily nations with strong militaries, and have not promised no first use of nuclear weapons; moreover local wars that erupt in the near future will implement nuclear deterrence many times.

The Second Artillery must successfully handle preparations for nuclear strike and nuclear deterrence, and **must be rooted in nuclear conditions or operations under nuclear deterrence conditions.** Missile deterrence operations are the operational activities to contain enemy strategic intentions or major military risky operations through the specific use of forces and firepower from the Second Artillery conventional missile campaign large formation in order to demonstrate firm will and formidable actual strength against the enemy side's implementation of containment.

Missile deterrent operations are permeated with stratagem qualities and artistry. Their essence lies in the ingenious selection of targets, ingenious choice of timing opportunities, ingenious use of forces and firepower, and the ingenious application of operational methods. The campaign commander and the command organ must fully anticipate all the situations that might emerge during the campaign, while formulating multiple deterrence operational methods and advance plans. When implementing the missile deterrence operation, one should flexibly employ deterrence operational methods based on the strategic intentions of the higher-level authorities and the dynamic state of the enemy side and make every effort to achieve the goals of deterrence.

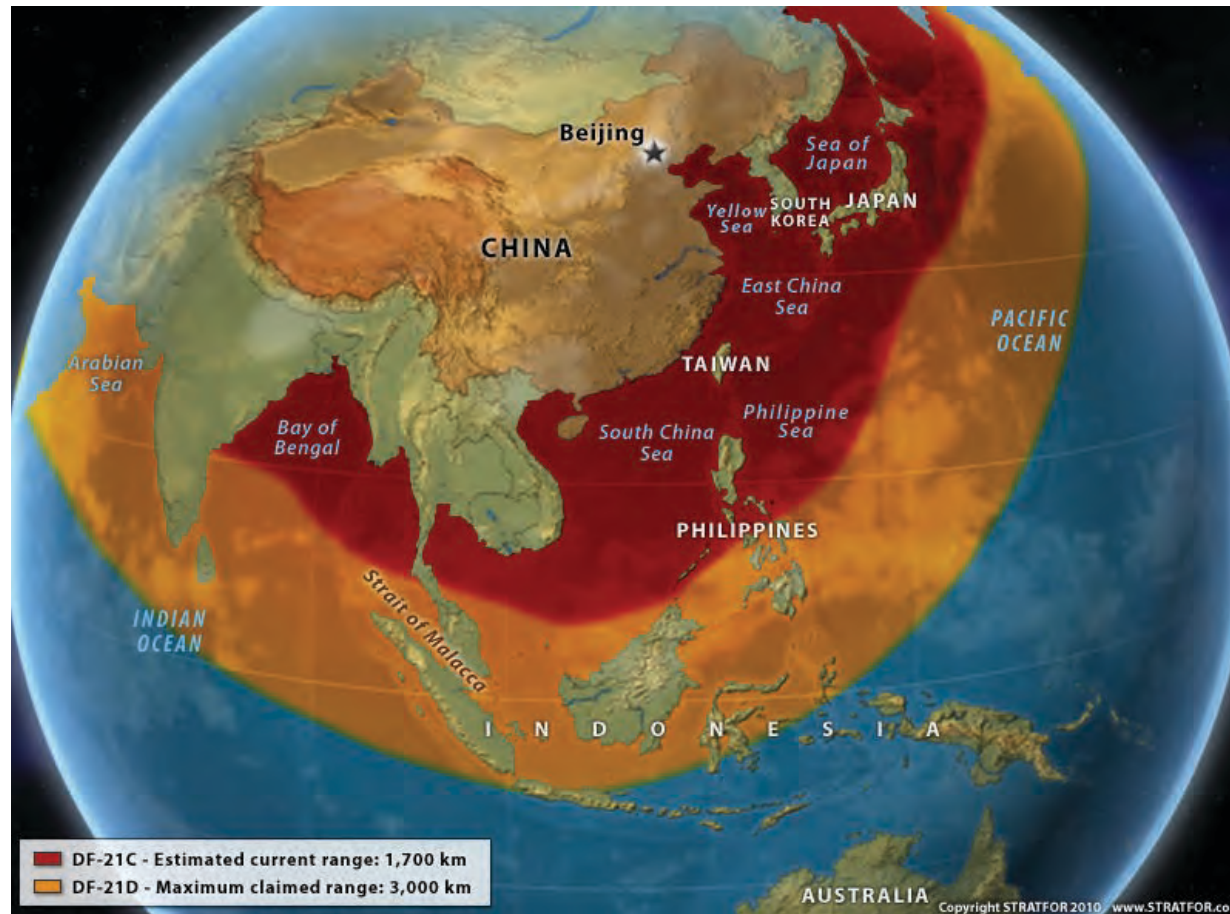
Science of Campaigns, edited by Zhang Yuliang, (Beijing: 2006): pp. 709-710, 727.

Chinese Nuclear Capable Tactical & Theater Missile Systems



“Chinese Missiles News & Discussions,” *Pakistan Defense Forum*, (2011.01.-7), at < <http://www.defence.pk/forums/china-defence/84215-chinese-missiles-news-discussions.html> > [accessed 21 Jan. 2011]

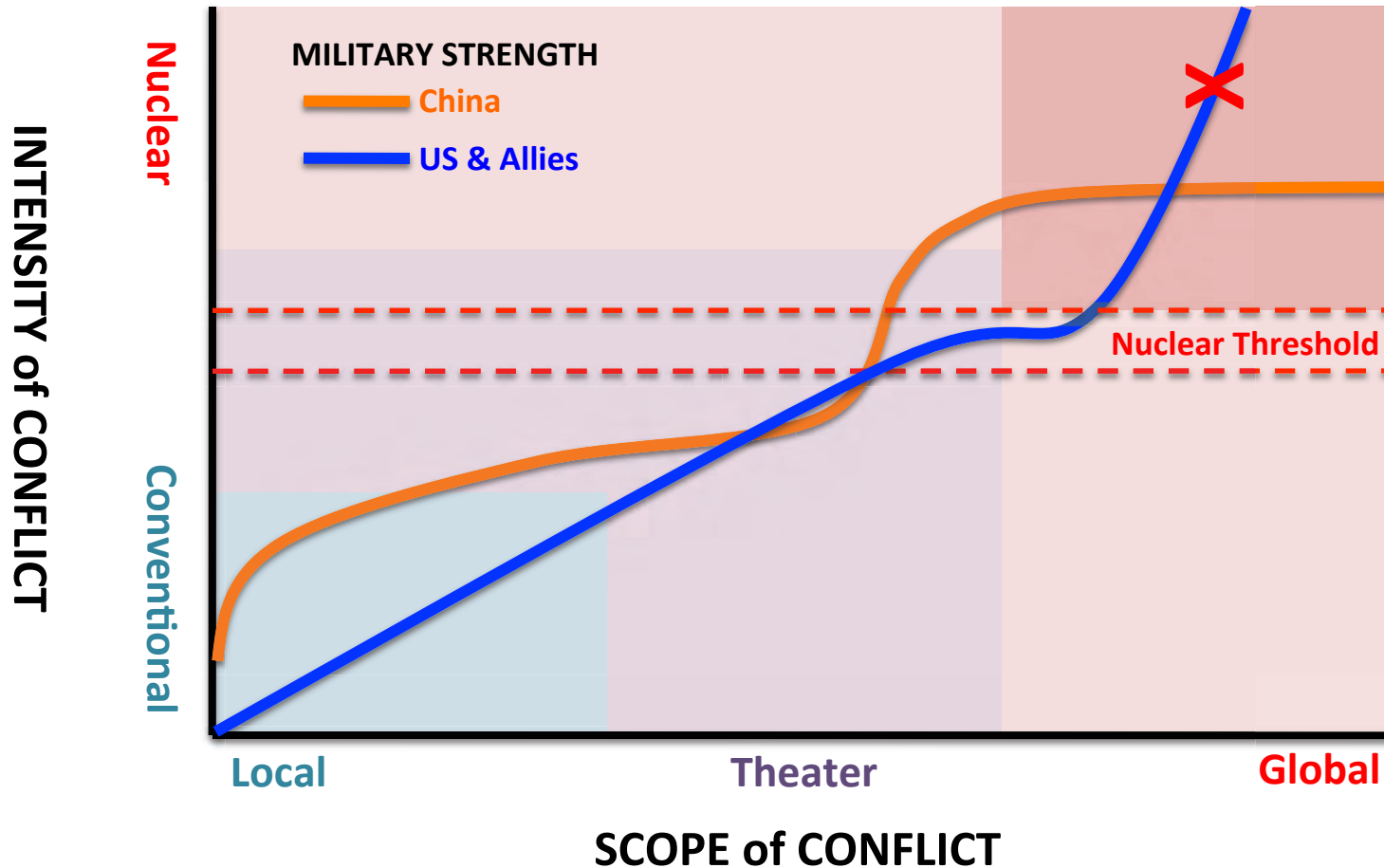
“Once everything is stored underground, and given that China tends to decouple warheads from the missiles, it will be next to impossible to quantify China's entire nuclear arsenal. Not only would 5,000km of storage allow for a greatly expanded arsenal, but transport capabilities within the tunnel could allow for the launch of nuclear weapons from a number of locations along the tunnel.... Any substantial increase in its arsenal would mean that Beijing's limited deterrent is (or could become) far greater than what we have come to expect. If this were to materialize, the entire strategic balance in Asia would be shaken and would inevitably force the US, the sole security guarantor in the region, to reassess how it calculates the risks and costs of intervention, such as during a crisis....”*



Cole, J. Michael. "What Is the PLA Hiding underneath Hebei?" Taipei Times. 30 Aug. 2011. Web. 13 Sept. 2011. <<http://www.taipetimes.com/News/editorials/archives/2011/08/30/2003511997>>. MAP from: "Getting Beyond the 'Transparency' Discussion," Discussion blog, US Naval Institute, (2011.01.26), at < <http://blog.usni.org/2011/01/26/getting-beyond-the-'transparency'-discussion/> > [accessed 19 July 2011].

Strategic Parity & Theater Escalation Dominance

“... no one wants to escalate the conflicts but everyone is eager to restrain the other.”*



*Maj.Gen. Zheng Shenxia, quoted in: *Chinese Views of Future Warfare*, M. Pillsbury, (Washington, DC: National Defense University Press, 1007): p. xli. For various other views, see: Peng Guangqian and Yao Youzhi, *The Science of Military Strategy*, (Beijing, PRC: Military Science Publishing House, 2005); and Qiao Liang and Wang Xiangsui, *Unrestricted Warfare*, (Beijing, PRC: Literature and Arts Publishing House, 1999).

China's "Underground Great Wall"

Strategic Implications

- It is real – actual size unknown but strong evidence that it is the **largest nuclear underground complex ever** constructed by anyone;
- At least **half (1,500 miles) constructed in the last 15 years** to accommodate solid-fuel missiles;
- It involves **hiding ICBMs** as well as Tactical and Theater TELS;
- We do NOT know what they are hiding in the Tunnels but evidence suggests **much larger nuclear warhead & missile reload inventory**;
- Underground Great Wall appears to be **associated with introduction of MIRV ICBM and Strategic Trains**;
- Continued Theater SRBM/IRBM expansion designed to “Deter the Deterrer,” if not reversed -- **will threaten US-Russian INF Treaty**;
- Failure to get China's forces constrained via negotiation will produce major **challenge to US counter-proliferation Nuclear Umbrella in Asia**.

炮兵某
的名

为核心
力，
主

End of the Tunnel or a New Opening?

昼夜施工打洞库

繁，
常艰
行肩负

所
评为
设先
程均达到
术要求，优