

D.I.Y. NUKEPROOFING

A NEW "DIG" AT "DATA-MINING"



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DEFCON 24


BACKGROUND (RADIATION?)

(why?) didn't we do this last year?

-A lot of F.U.D. about current and future nuclear threats

-Civilian rad-hardening an ongoing Achilles' heel, lack of cogent preparedness especially against EMP

-Ordering Tritium from Thailand is bad, mkay?




HACKADAY

HOME BLOG HACKADAY.IO STORE HACKADAY PRIZE SUBMIT ABOUT

DEF CON UBER BADGE SO HOT IT'S RADIOACTIVE

by: Mike Szczys 21 Comments

August 7, 2015



NEVER MISS A HACK

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I went to the Opening Ceremonies of DEF CON 23 this morning to get more information on the badge challenge and I was not disappointed. The talk covered the Uber badge, which is hot in a literally radioactive sense. This badge, which is also known as the black badge, is reserved for people who are first to solve one of the official DEF CON challenges. It grants lifetime free admission and opens just about any door when listed on your resume.

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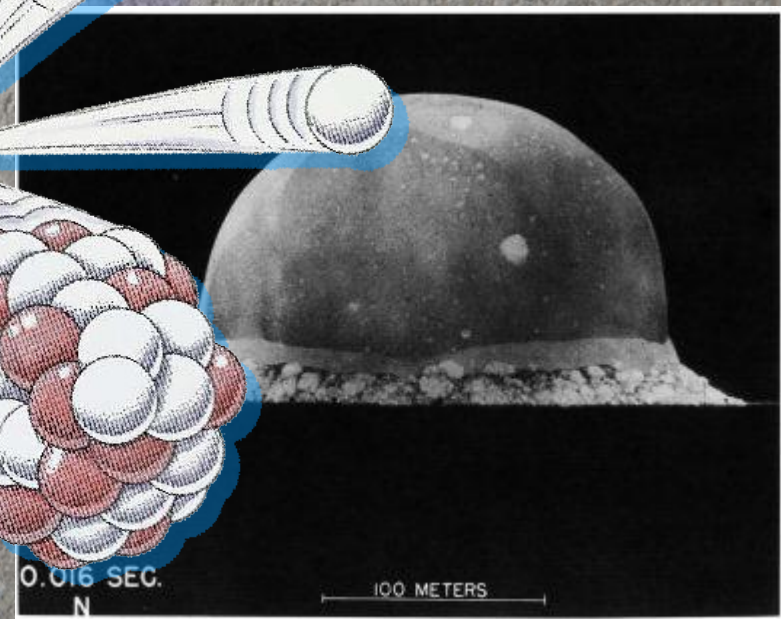
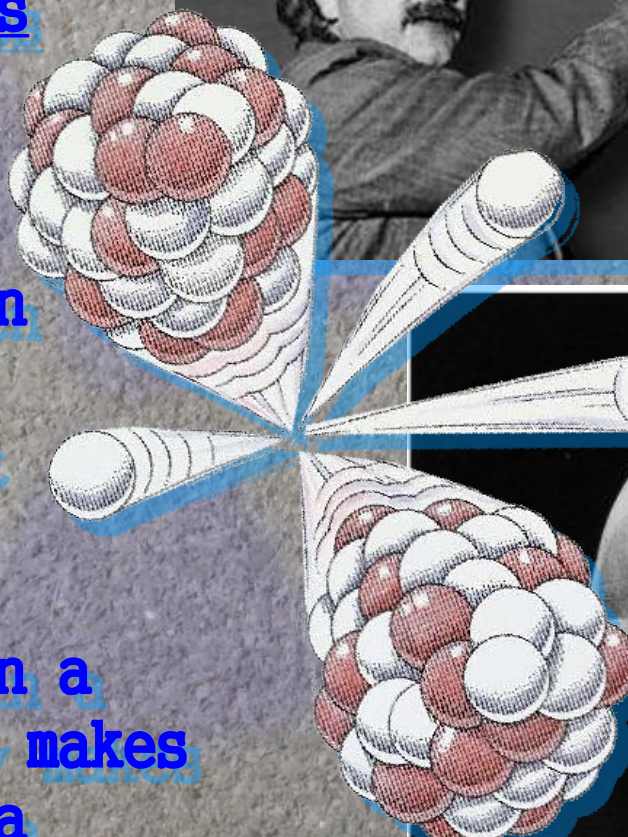
SOME PHYSICS HISTORY

RELEVANT TO PROLIFERATION

-Neutrons, discovered in 1930, are responsible for isotopes of elements with differing mass

-Fissile isotopes split when bombarded by neutrons: U-235, Pu-239 are important regarding proliferation

-A critical mass can sustain a reaction, critical assembly makes a very dense softball into a "physics package" (*euphemism!*)



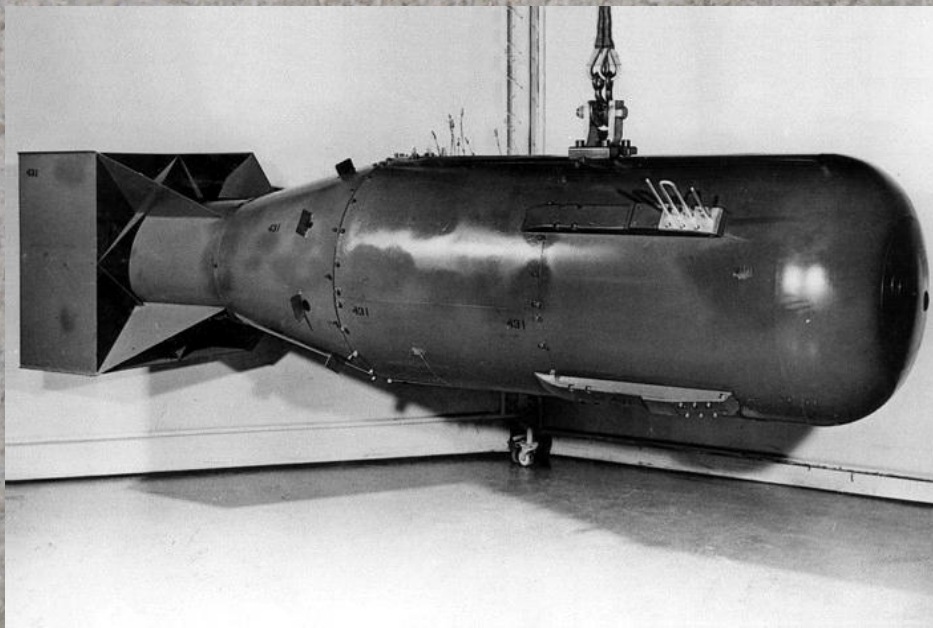
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THE MANHATTAN PROJECT

THE \$26B O.G. OF PROLIFERATION*

**inflation-adjusted*



-Little Boy: ~80% uranium-235 (HEU) "gun-type" device; gaseous diffusion and calutron enrichment. 13-18kt yield



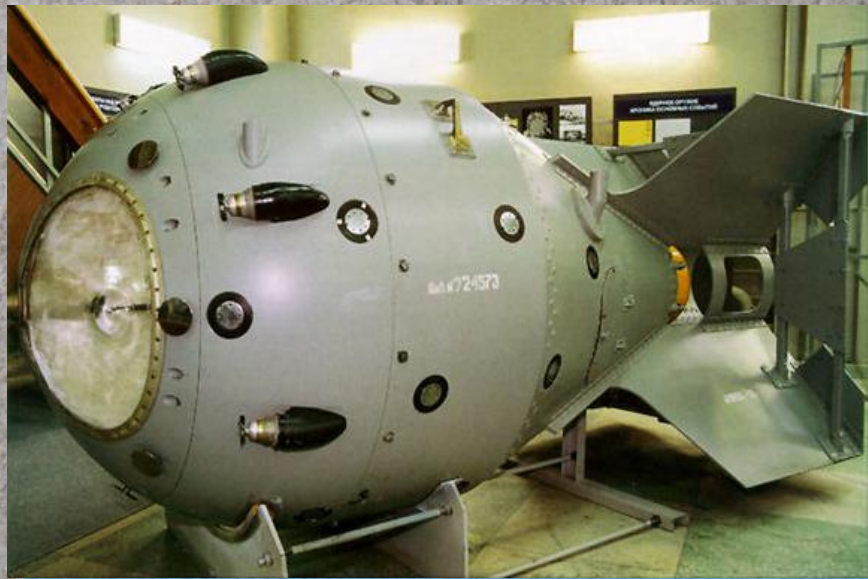
Fat Man: 96% Pu-239 (WG Pu) "implosion-type" device (explosive lensing); X-10 reactor U-238 transmutation 20-22kt yield

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BACK IN THE USSR

CRAZY LIKE A FUCHES: COPYING 'THE BOMB'



Paranoia Protip
Exfiltration of sensitive information is all but inevitable despite what seemed like reasonable countermeasures at the time.

Inside knowledge of the Manhattan Project combined with looting Germany's failed program produces a 22kt Fat Man clone, RDS-1 or "Stalin's Jet Engine"

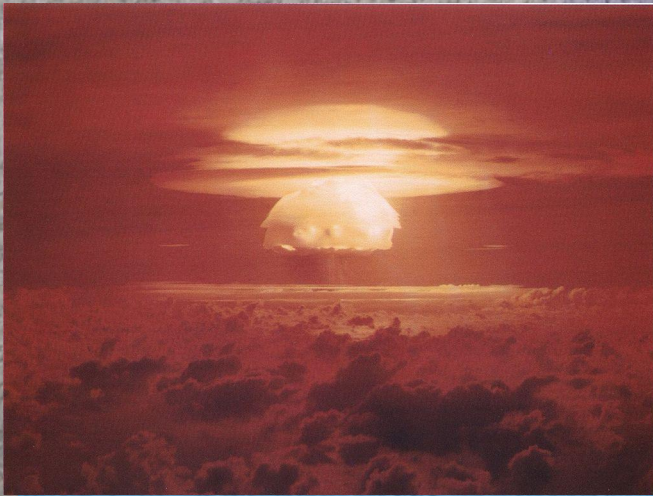
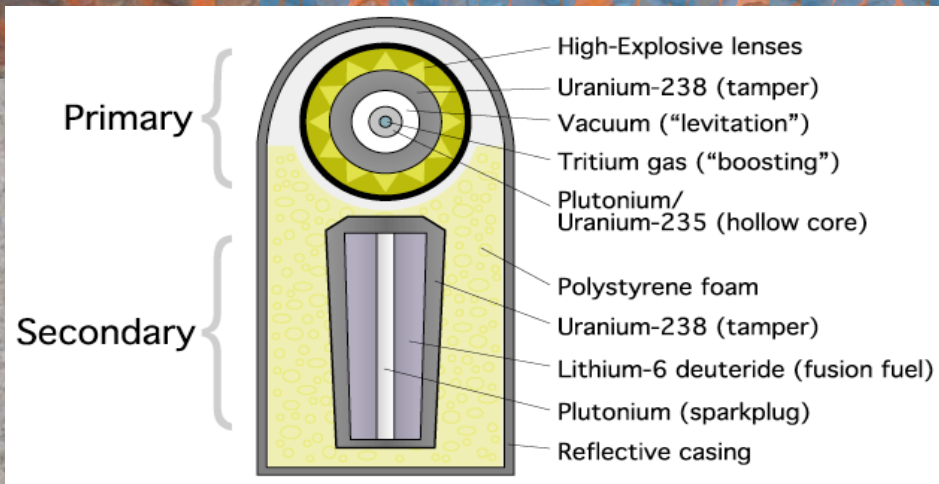


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THE GREAT NUCLEAR PISSING CONTEST

THE TELLER-ULAM DESIGN REVOLUTIONIZES FIREWORKS



Fission-Fusion staging allowed increased yields.
Castle Bravo (15MT yield) and Tsar Bomba (50MT yield) largest

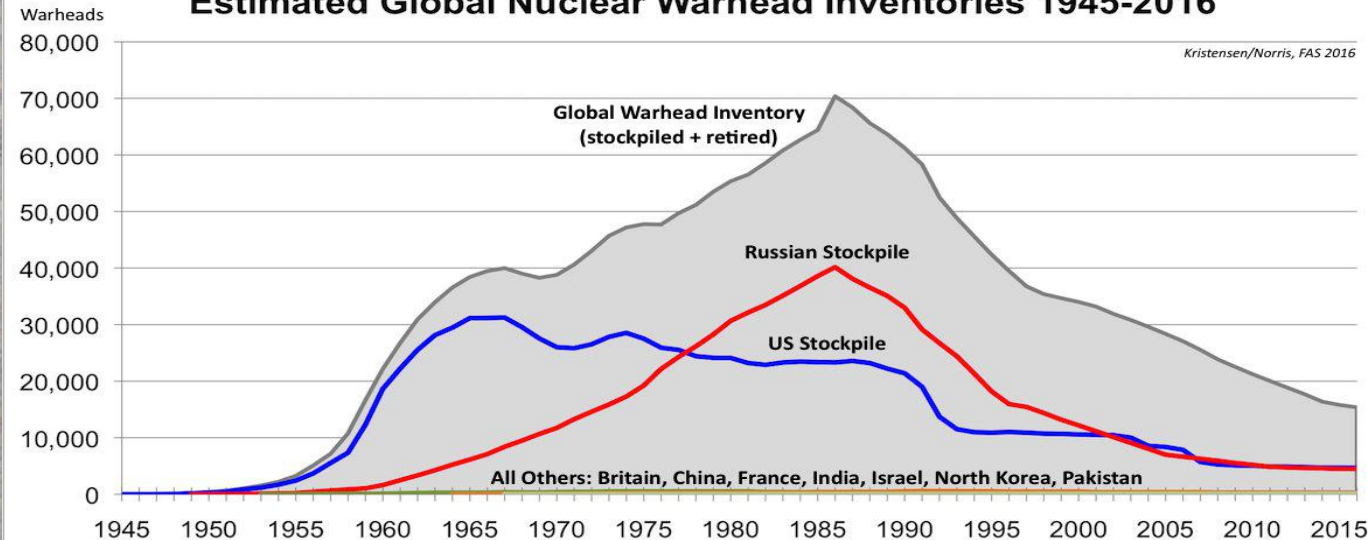
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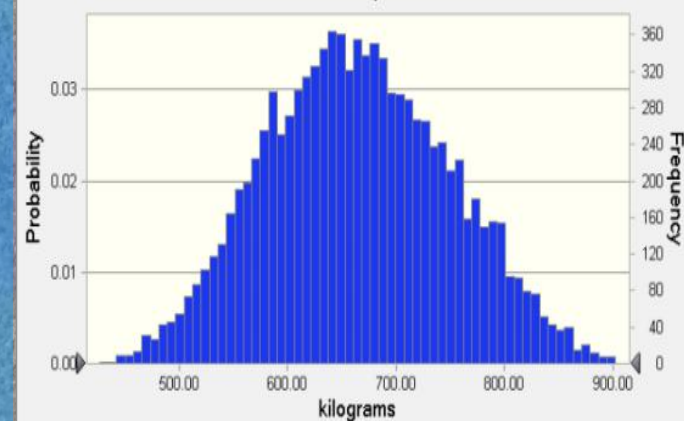
THE 'ALSO-RANS', NPT & START

THE ONLY WINNING MOVE WAS NOT TO PLAY

Estimated Global Nuclear Warhead Inventories 1945-2016



Net Plutonium, end 2014



After joining the *nuclear club* in 1952, 1960 and 1964 respectively, the UK, France and China try to make it exclusive ratifying the non-proliferation treaty. US and USSR begin stockpile reduction after SALT talks and START treaty.

Israel prefers 'nuclear ambiguity' never signed NPT, see 1979 *Vela Incident*

@3ALARM Lampscot

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M.A.D., a Kahn and a Khan

THE ONLY WINNING MOVE IS DIG DEEPER



John von Neumann's
Mutually Assured Destruction

- Rational Actors
- Correct Attribution
- Assured Destruction



Herman Kahn

Questioned credibility
of deterrence and coined
the term "megadeath".



Abdul Qadeer Khan
Improved the Zippe
centrifuge and dealt
it to Pakistan,
North Korea, Iran,
Iraq, Libya and an
unknown customer.

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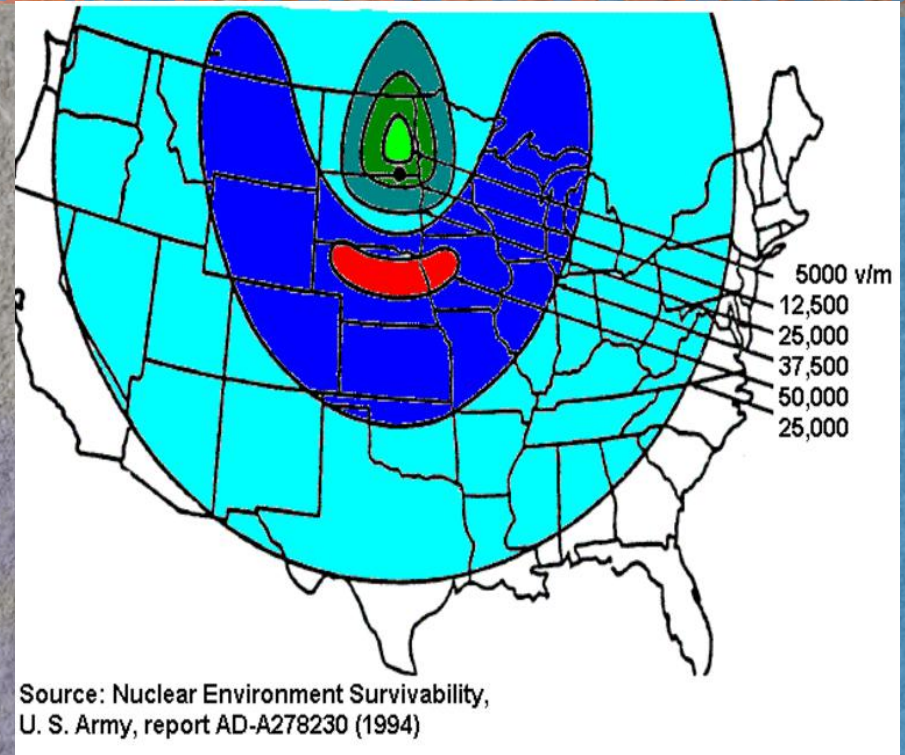
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REEXAMINING THE THREAT MODEL

GLOBAL THERMONUCLEAR WAR OR A POT SHOT?



1.4MT *Starfish Prime* shot over Johnston atoll caused a devastating electromagnetic pulse, resulting Van Allen belts destroyed a third of satellites in low earth orbit.

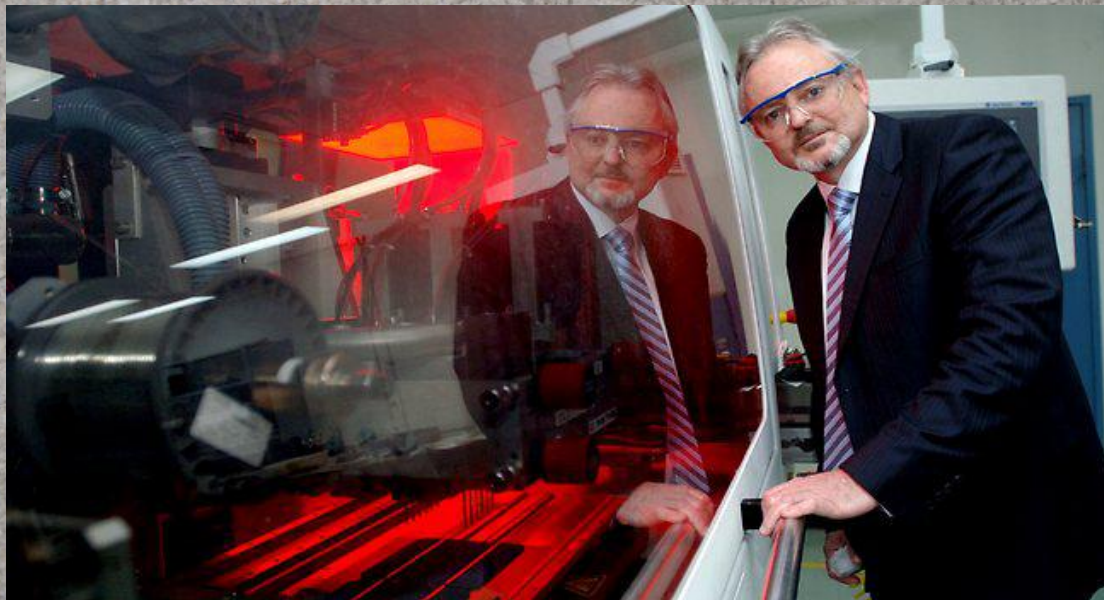


Over half a century later, civilian infrastructure remains woefully unprotected from even the smallest EMPs

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TOMORROW'S DISRUPTIVE TECHNOLOGY *IS IN FACT FREAKIN' LASERS*



SILEX Systems, the Australian startup that:

- Tried to commercialize laser enrichment
- Partnered with USEC and GE, spun off GLE
- First case of privately held information classified by the U.S. Government
- Proliferation threat outside 'scope' of NRC
- GE-Hitachi announces intention to sell 76% GLE stake in April 2016, citing poor market

Science & Global Security: The Technical Basis for Arms Control, Disarmament, and Nonproliferation Initiatives

Volume 24, Issue 2, 2016



Original Articles

A Proliferation Assessment of Third Generation Laser Uranium Enrichment Technology

DOI: 10.1080/08929682.2016.1184528

Ryan Snyder^a
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A wild proliferation assessment appears, calling out carbon monoxide lasers and concludes "the possibility exists that such a system may be indigenously assembled"

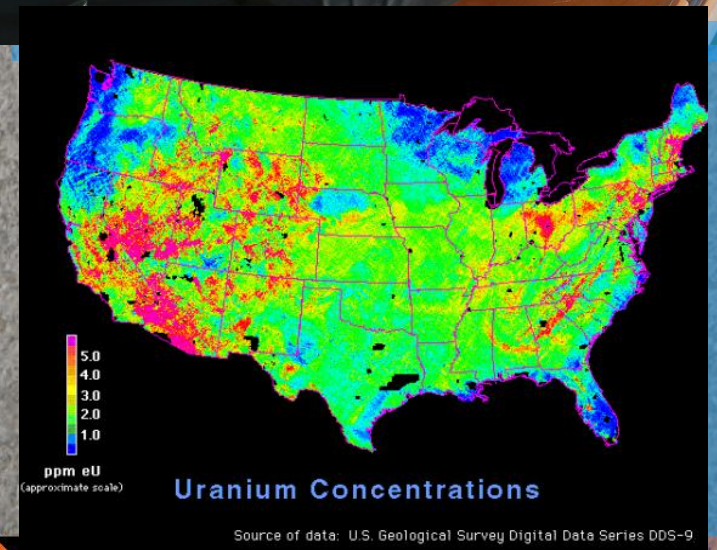
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A FUTURE OF ARMS CONTROL FAILURE

NATION STATES MAY NO LONGER DOMINATE

- Undeclared/clandestine enrichment facilities to become a widespread issue
- 'Rogue States' like North Korea a harbinger of smaller, less organized proliferators with varied motives
- Technically sophisticated non-state actors likely to proliferate and maintain nuclear ambiguity
- Seizing uranium ore deposits perhaps the last line of defense from widespread proliferation until seawater extraction of uranium matures



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SO WHAT DO YOU DO ABOUT IT?

START WITH THE LOW HANGING FRUIT

- Small electronics can be easily protected by a factor of over -80dB stored offline in metal trash cans taped shut with copper or aluminum to prevent the slot antenna effect.
- Larger or running electronics may be difficult to tailor harden and the cost of replacement should be weighed against extensive engineering efforts
- In areas where a ground burst or low altitude nuclear explosion are considered more probable, consider engineering need for overpressure, fire, spall and ionizing radiation shielding!



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SERIOUS IMPROVISED PROTECTION

START THINKING SUBTERRANEAN



- Drainage culverts used for their intended purpose are obviously disqualified!
- 200psi overpressure protection can be achieved with burial greater than twice the culvert's diameter as discovered in *Upshot-Knothole Encore*



Burial alone does not necessarily provide EMP protection if overburden is poorly conductive! But it's great for fire and ionizing radiation...

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CUT AND COVER METHODS AND MATERIALS

TUNE IN AT DEF CON 24!

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GROK THE ROCK: IN-SITU SHELTERS

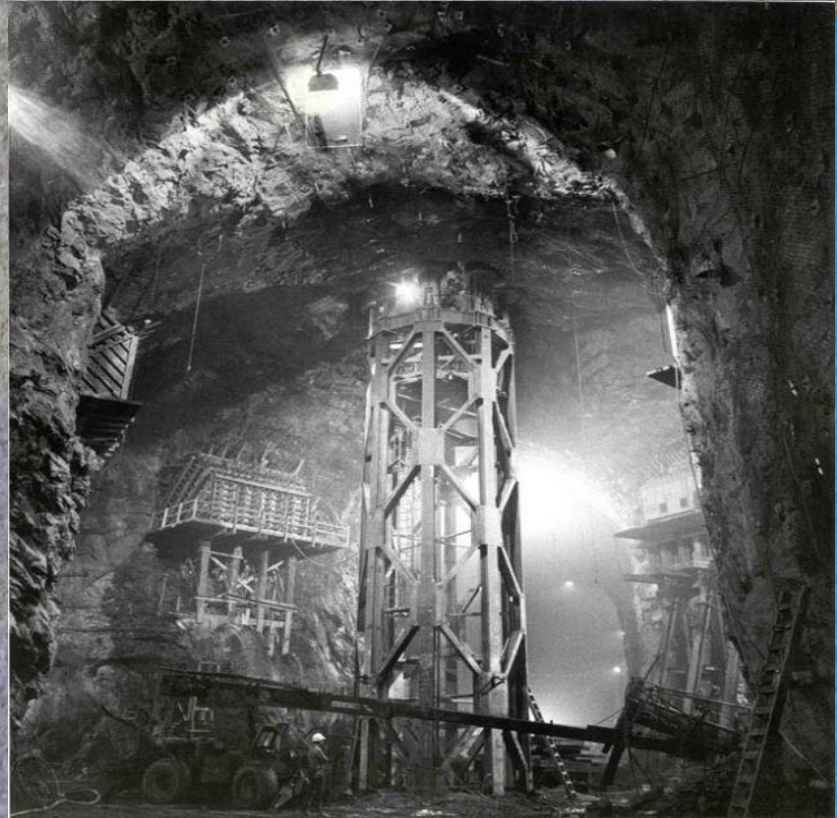
SO UNDERGROUND, EVEN THE HIPSTERS DON'T KNOW



-Purpose-built facilities can be excavated from strata underlying hard rock far more cheaply than cut and cover

-Only appropriate below the water table if you have long-term backup power for pumps!

US Army Technical Manual 5-858-8 was state of the art until FEA!



-The Cheyenne Mountain facility was excavated under (sometimes brecciated) granite, rated 600psi

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HARD ROCK METHODS AND MATERIALS

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