# Solar Sails CP

## 2AC Block

### Perm do both

### Solar sails cant get humans to space- all their ev is about unmanned missions. They cant mine H3 or colonize moon.

### Sails fail – no tech, practical weaknesses, huge investment- links to ptx too.

Bonometti et al 2k ( 19 January 2000, J. A. Bonometti, P. J. Morton and G. R. Schmidt, Space Technology and Applications International Forum-2000, Volume 504, pp. 1236-1241, “External Pulsed Plasma Propulsion.”[http://www.angelfire.com/stars2/projectorion/EPPP.html](http://www.angelfire.com/stars2/projectorion/EPPP.html" \t "_blank), mrs)

NASA is currently conducting research on advanced propulsion technologies capable of supporting ambitious human exploration of the solar system in the early part of the next century. Most research to date has been geared towards concepts that offer tremendous performance improvements over current systems. The only problem is that virtually all of these technologies, such as fusion, antimatter and beamed-energy sails, have fundamental scientific issues and practical weaknesses that must be resolved before they can be seriously considered for actual applications. For instance, fusion is limited by the fact that we are still far away from demonstrating a device having energy gains sufficient for commercial power, let alone space applications. Antimatter has much appeal because of its high energy density, but it is severely hampered by extremely low propulsion efficiencies and high costs of current production methods. Beamed energy offers great potential too, but requires materials far beyond current state-of-the-art and tremendous investment in ground/space-based power beaming infrastructure. Although we are optimistic that some of these issues will eventually be overcome, there is no guarantee that any of these technologies will be available by the first half of the next century. This state-of-affairs points to the disappointing fact that none of the advanced, high-power density propulsion concepts being considered by NASA could, with any degree of certainty, meet the goals and timetables of NASA’s own Strategic Plan. This is especially true in light of the conservative fiscal environment of the post-Apollo era, which could limit the sizable investment needed to resolve the fundamental issues associated with these concepts. Moreover, the cost for developing actual vehicles based on these technologies and their required infrastructure could realistically be on the order of hundreds of billions of dollars. To obtain a quantum jump in propulsive capability by the early part of the next century, we must have safe, affordable systems with very high-power densities. Precedents suggest that any device engineered within the next 30 to 50 years should be based on the well-understood physics of today. The need for high power densities eliminates all but nuclear energy sources. The emphasis on known physics and affordability limits the scope still further to fission processes. Of the fission-based concepts that have been considered in the past (e.g., solid-core nuclear thermal, gas-core, internal and external nuclear pulse), only external nuclear pulse circumvents the Isp constraints imposed by containment of a heated gas, and provides the very high power densities needed for ambitious space transportation.

### Only the plan solves warming

Comb 6 — Bruno, founder and president of the international association, Environmentalists For Nuclear Energy “THE BENEFITS OF NUCLEAR ENERGY” <http://www.ecolo.org/documents/documents_in_english/BENEFITS-of-NUCLEAR.pdf>

Nuclear energy is a clean, safe, reliable and competitive energy source. It is the only source of energy that can replace a significant part of the fossil fuels (coal, oil and gas) which massively pollute the atmosphere and contribute to the greenhouse effect. If we want to be serious about climate change and the end of oil, we must promote the more efficient use of energy, we must use renewable energies – wind and solar – wherever possible, and adopt a more sustainable life style. But this will not be nearly enough to slow the accumulation of atmospheric CO2, and satisfy the needs of our industrial civilization and the aspirations of the developing nations. Nuclear power should be deployed rapidly to replace coal, oil and gas in the industrial countries, and eventually in developing countries An intelligent combination of energy conservation, and renewable energies for local low-intensity applications, and nuclear energy for base-load electricity production, is the only viable way for the future.

### Extinction

Comb 6 — Bruno, founder and president of the international association, Environmentalists For Nuclear Energy “THE BENEFITS OF NUCLEAR ENERGY” <http://www.ecolo.org/documents/documents_in_english/BENEFITS-of-NUCLEAR.pdf>

In burning fossil fuels, we inject 23 billion tons of carbon dioxide every year into the atmosphere – 730 tons per second. Half of it is absorbed in the seas and vegetation, but half remains in the atmosphere. This is significantly altering the composition of the atmosphere and seriously affecting the climate of our planet. We have only this one fragile planet to live on. If we want it to remain livable, to ensure the comfort of our modern lives and indeed the very continuation of our industrial civilization, then we must urgently adopt new lifestyles and find other energy sources.

### No solvency- solar sails rip and are too difficult to manuever

Orbital Vector 5 [Orbital Vector- online encyclopedia for the technology “Solar Sails” Article added 2005; <http://www.orbitalvector.com/Deep%20Space%20Propulsion/Solar%20Sails/Solar%20Sails.htm> //STRONG]

The sun is not necessarily the only source of propulsive light available for a solar sail. Gigantic laser projectors, constructed in orbit or deep space, can train their beams on solar sail vessels, pushing them with continuous concentrations of high-intensity light beams that can reach for many millions of miles. Using beamed light in this way, solar sails could operate efficiently in the outer system and even interstellar space.

One of the main problems that keeps rising in RL solar sail experiments is how to both fold and unfurl the ultra-thin sail material without it tearing or creasing, as well as how to keep it taut enough to operate efficiently but loose enough so that it can be easily manipulated and tacked.

One tertiary use for solar sails is that, because they are basically gigantic space-based mirrors, they can be deployed in orbit solely to focus more sunlight on cities in extreme latitudes, such as the arctic circle. Cities in extreme northern climes can therefore be made more hospitable for human inhabitants.

### Nuclear pulse propulsion results in global disarmament.

Schweitzer 2009 [Curtis, Writer, Composer & Political Researcher, Resurrecting Orion, April 27th, <http://curtisschweitzer.net/blog/?p=2546> //STRONG]

Ultimately, however, the most important obstacle to remove is the irrational fear and loathing that the worldwide public has toward nuclear devices. Although the strong dislike for and fear of nuclear weapons is understandable given the harrowing experience of the Cold War, the international community has moved into a new era. Continuing bans on and limitations of militarized nuclear weapons is, of course, still a necessary obligation of the international community. Nonetheless, as has been the theme in this essay thus far, the emerging realization that there are better uses for the world’s massive nuclear stockpiles is a key component in mankind’s progress toward seriously exploring (and possibly colonizing) the solar system. Developing nuclear-pulse propulsion systems could even play a role in the larger issue of global nuclear disarmament. Reducing nuclear stockpiles by repurposing warheads for space exploration is a far better use of both the nuclear material and the time and effort spent researching and developing those devices than is the incredibly expensive, ultimately fruitless process of disassembling and destroying them. Moreover, repurposing weapons means that concerns over increased nuclear proliferation as a result of Orion programs can be significantly mitigated. All of Orion’s problems are solvable. All of them have known, inexpensive, often beneficial answers, and the product of addressing them is a vast leap forward in human spaceflight and expansion beyond the borders of our fragile earth. The benefits are immeasurably greater than the risks. It is not rationality that stands between humanity and nuclear-propelled spaceflight– indeed, it is irrationality. In the end, the only thing that will ever prove to be an effective means of making Orion a reality is a change in heart among everyday people. All the politicians in the world will not change the hearts and minds of millions of people who either don’t know about the prospects for project Orion or who are indifferent to it. Since there has never been a serious effort by any government to consider the technology, let alone promote it, there remains a significant opportunity to galvanize support for an Orion program, especially if its lofty promises are communicated clearly. Orion promises us a way forward. In difficult economic times, it is a far more efficient use of limited funds, and the benefits of the program promise to revolutionize the world of technology just as the moonshot did during the space race. There are new markets, technologies, and wealth waiting to be discovered, and the only thing standing between us and that future is our own illogical fear of nuclear devices. Overcoming that fear (and strictly regulating a world with an amended partial-test-ban treaty) will not be easy– but going to the moon will. Going to Mars will be– at least comparatively. The International Space Station could be finished in a single mission. A moon base established in two. Manned missions to Saturn and beyond in the near future. Americans once had a dream, not to conquer space, but to blaze the trail for humanity. It is an American flag that flies on the moon today, next a plaque proclaiming that we came “in peace for all mankind”. We have a chance to do that again, and what’s more, to use our most destructive weapons to do so. We have the opportunity to beat our swords into plowshares, to harness our most feared and reviled technology for a peaceful and scientific end. That day– the day when, collectively, Americans come together in front of our TV sets, en masse in Times Square, on the new media outlets like YouTube and the blogosphere to watch the American flag being driven into the cold red soil of Mars while overhead a hundred scientists, engineers and explorers wait to be ferried down to the surface– on that day, we will once again know that rare kinship for which we have always yearned. We will know the solemn pride that accompanies the knowledge that we have helped lift humanity from amidst its petty squabbles, that we have put to shame those who seek to build weapons, not engines– missiles, not spacecraft.

### Absent disarmament nuclear war is inevitable**.**

Harrell 2009 [Eben, writer for Time, 2-20-09, The Nuclear Risk: How Long Will Our Luck Hold? <http://www.time.com/time/world/article/0,8599,1880702,00.html#ixzz0dt55cGcXhttp> //STRONG]

But to marvel at the bizarre coincidence of the collision, or to breathe a sigh of relief that nuclear safety was not breached, is to miss the point. The seemingly impossible collision of two subs in a large ocean should remind us of the fallacy by which we assume nuclear weapons will never be used. Because the threat of global nuclear war is not zero, even a small chance of war each year, multiplied over a number of years, adds up to the likelihood that the weapons will be used. Like those two subs stalking through the Atlantic, the odds will begin to align. Mathematically, they are destined to. This is not a mere logic game. If there is a single "big idea" to have emerged in the first decade of the new millennium — from [the September 11 attacks](http://www.time.com/time/magazine/article/0,9171,1000761,00.html" \t "_blank) to the [financial crash](http://www.time.com/time/business/article/0,8599,1846450,00.html" \t "_blank) — it is the notion of the ["black swan,"](http://www.time.com/time/business/article/0,8599,1853531,00.html" \t "_blank) the danger posed by difficult to predict, high-impact events. The short history of nuclear weapons is already scattered with unplanned and seemingly improbable incidents that suggest we feel more secure than we should. In 1995, a communication failure with the Russian Embassy led the Russian military to believe that a weather rocket launched off the coast of Norway was an incoming submarine-launched ballistic missile. In the 1980s, malfunctioning U.S. missile defense systems relayed information to U.S. officials of a massive incoming first strike — twice. As recently as 2007, a U.S. Air Force plane flew across the American heartland while unknowingly carrying several live warheads on board. At the time, all of these events were described as freak occurrences. The truth is they were freak occurrences. But they happened.([Read the Top 10 underreported stories of 2008.](http://www.time.com/time/specials/2008/top10/article/0,30583,1855948_1861760,00.html" \t "_blank)) A day after the latest nuclear accident became public, an analyst from the Federation of American Scientists, a nonproliferation think tank, released U.S. Naval intelligence documents obtained through the Freedom of Information Act that showed that the Russian Navy undertook more underwater ballistic missile submarine patrols in 2008 than it has in a decade. The Russian subs are joined in the word's oceans by nuclear-armed vessels from France, Britain, and China. Under the plains of the American West, and in similar silos in Russia, Air Force missile operators keep constant vigil, launch keys at the ready. Nuclear missiles have no self-destruct button; once launched, they cannot be called back. Twenty years after the end of the cold war, humanity still lives within 30 minutes of its own destruction. The price we pay for maintaining nuclear weapons is the gamble that the highly improbable will not lead to the unthinkable. The question to ask after this latest nervy episode: is it worth it?

### Only NPP can solve the problems of nuclear waste terrorism and nuclear weapons.

Sieff 2001 [Martin, Senior News Analyst, JRL, <http://www.cdi.org/russia/johnson/5550-12.cfm> //STRONG]

The sweeping cuts in Russian and U.S. nuclear arsenals agreed in Washington this week by presidents Vladimir Putin and George W. Bush raise major questions of environmental and security safety. But these could be answered in three words: "Build the Orion!" "Orion" in this case refers not to the hunter of classical mythology or to the vast constellation that dominates the night sky in the Northern Hemisphere. It means the manned spaceship powered by nuclear weapons designed more than 40 years ago by the great British-American physicist Freeman Dyson. Dyson was no crackpot. He was one of the greatest scientists of the 20th century. It was he who played a key role in explaining and popularizing the late Richard Feynman's Nobel-prize-winning, revolutionary methodology of calculating quantum electrodynamics theory to the world. In 1958, Dyson, and other young idealistic scientists gathered with small nuclear weapons designer Theodore "Ted" Taylor at the General Atomic division of the General Dynamics Corporation in San Diego, Calif., to work on Project Orion, the idea of a spaceship powered by atomic bombs. And they designed it. Dyson and his colleagues knew that the Soviet Union and the United States would build more rather than less nuclear warheads to keep up with one another. They knew it was only a matter of time before other nations joined the nuclear club. They also knew that even if the United States and the Soviet Union should ever reach strategic arms reduction agreements to mutually slash the size of their huge nuclear arsenals, the radioactive, fissile material taken from those warheads posed almost-eternal security risks of its own. It would have to be guarded with 100 percent perfect security indefinitely to prevent it falling into the hands of terrorists, criminals or political extremist fanatics. Nor could the fissile material once manufactured ever be rendered down into more harmless compounds or other elements. And even if it was protected safely, the environmental and contamination dangers from it would also last at the very least thousands, perhaps even hundreds of thousands of years, given the slow half-life, radioactive decay rates of the lethal elements involved. Dyson and Taylor proposed a radical solution to these problems. The atomic weapons could only be used up and totally rendered useless if they were actually exploded and they proposed to do this with lots of them. This would happen not on the earth or in the main atmosphere, but -- mainly -- in the far reaches of outer space, where the addition of the nuclear radiation to all the background radiation already there would be literally negligible and where the blast effects would be harmless. Dyson and Taylor proposed to explode atomic bombs at regular intervals at very short distances behind a specially designed space ship in order to propel it to the Moon and other planets in the Solar System far more quickly and cheaply than chemical-fuel rockets could ever do. Unlike President Ronald Reagan's 1980s vision of "Star Wars" or the Strategic Defense Initiative, the Taylor-Dyson "Orion" vision was far cheaper and more practical. It did not require the development of any new technologies whatsoever. It did not require the development of electronic sensors of simultaneous enormous sensitivity, robustness and reliability, which President Bush's current Anti-Ballistic Missile defense program will require. These are essential for the Bush ABM program to ensure that ground-based interceptor missiles can reliably intercept incoming intercontinental ballistic missiles at combined speeds of up to 36,000 miles per hour, or 18 times the speed of a fired bullet. Dyson even envisaged inter-planetary regular travel as a practical reality by 1970. "We sketched a 12-year flight program ending with large manned expeditions to Mars, in 1968 and to the satellites of Jupiter and Saturn in 1970," he wrote in his 1979 autobiography "Disturbing the Universe." "The costs of our program added up to about $100 million a year (in 1958 dollars)." Dyson, Taylor and their colleagues were simultaneously scientific visionaries and political idealists. They wanted to boost the space age out into the Solar System as quickly as possible to inspire the world. And they also wanted a safe, practical and even politically popular way to destroy the vast stockpiles of nuclear weapons then accelerating during the most tense years of the Cold War at a fearsome rate. Their answer to both these projects was the Orion project. In July 1958, Dyson spelled out these aims in a paper he called "A Space Traveler's Manifesto." He concluded, "We have for the first time imagined a way to sue the huge stockpiles of our bombs for better purpose than for murdering people. Our purpose, and our belief, is that the bombs which killed and maimed at Hiroshima and Nagasaki shall one day open the skies to man."

### Nuclear waste disposal will inevitably cause extinction.

Hyder 99 [Charles, B.S. and M.S. degrees in physics from the University of New Mexico (1958,1960), and a Ph.D. in Astrogeophysics from the University of Colorado (1964). He has published more than twenty solar and comet papers. He has worked, for NASA, UCLA, UNM, and the Southwest Research and Information Center, Human Extinction on this contaminated planet, http://members.fortunecity.com/osservatorio/charleshyderbook2.html //STRONG]

It is in that context, and in the inescapable belief and conviction that the operation of WIPP will lead to Human Extinction if even 1/100 of the WIPPu reaches the biosphere. That may occur soon: e.g. during the 30 yrs. of radioactive transport accidents; or a prompt Radioactive Brine/Gas Geyser Erupt; or a "Karst Connection" for water to scour WIPP in 10 to 100 years; or ... during the next 30,000 years. So, WIPP operation gets "National/Global Emergency" status. Thus, I charge that the DOE, the AEC, et al. have been guilty of Treason for Intentionally Withholding Crucial, Relevant Evidence about the real biological Hazards of Radioactivity from the U.S. President, from the U.S. Congress, from their own workers, and from "The People" throughout most of my long life. The Global Amphibian Extinctions are Chernobyl's ominous Legacy: Their Deaths are an "Epitaph by Example" for Humans.

### Terrorism causes nuclear miscalc –extinction

Robert Ayson, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington, 2010 (“After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, Available Online to Subscribing Institutions via InformaWorld I love you akshay!!!!!)

**Washington’s early response to a terrorist nuclear attack** on its own soil **might** also **raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China**. For example, **in the noise and confusion during the immediate aftermath** of the terrorist nuclear attack, **the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment**, when careful planning runs up against the friction of reality, **it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow**, although it must be admitted that **any preemption would probably still meet with a devastating response**.

**As part of its initial response** to the act of nuclear terrorism (as discussed earlier) **Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group**. Depending on the identity and especially the location of these targets, **Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty**. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents’ … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide.

**There is also the question of how other nuclear-armed states respond to the act of nuclear terrorism on another member of that special club**. It could reasonably be expected that following a nuclear terrorist attack on the United States, both Russia and China would extend immediate sympathy and support to Washington and would work alongside the United States in the Security Council. But there is just a chance, albeit a slim one, where the support of Russia and/or China is less automatic in some cases than in others. For example, what would happen if the United States wished to discuss its right to retaliate against groups based in their territory? If, for some reason, Washington found the responses of Russia and China deeply underwhelming, (neither “for us or against us”) might it also suspect that they secretly were in cahoots with the group, increasing (again perhaps ever so slightly) the chances of a major exchange. If the terrorist group had some connections to groups in Russia and China, or existed in areas of the world over which Russia and China held sway, and if Washington felt that Moscow or Beijing were placing a curiously modest level of pressure on them, what conclusions might it then draw about their culpability?

If Washington decided to use, or decided to threaten the use of, nuclear weapons, the responses of Russia and China would be crucial to the chances of avoiding a more serious nuclear exchange. They might surmise, for example, that while the act of nuclear terrorism was especially heinous and demanded a strong response, the response simply had to remain below the nuclear threshold. It would be one thing for a non-state actor to have broken the nuclear use taboo, but an entirely different thing for a state actor, and indeed the leading state in the international system, to do so. If Russia and China felt sufficiently strongly about that prospect, there is then the question of what options would lie open to them to dissuade the United States from such action: and as has been seen over the last several decades, the central dissuader of the use of nuclear weapons by states has been the threat of nuclear retaliation.

**If some** readers **find this simply too fanciful**, and perhaps even offensive to contemplate, **it may be informative to reverse the tables. Russia**, which possesses an arsenal of thousands of nuclear warheads and that has been one of the two most important trustees of the non-use taboo, **is subjected to an attack of nuclear terrorism. In response, Moscow places its nuclear forces very visibly on a higher state of alert and declares that it is considering the use of nuclear retaliation against the group and any of its state supporters. How would Washington view such a possibility?** Would it really be keen to support Russia’s use of nuclear weapons, including outside Russia’s traditional sphere of influence? And if not, which seems quite plausible, what options would Washington have to communicate that displeasure?

**If China had been the victim of the nuclear terrorism and seemed likely to retaliate in kind, would the United States and Russia be happy to sit back and let this occur? In the charged atmosphere immediately after a nuclear terrorist attack, how would the attacked country respond to pressure from other major nuclear powers not to respond in kind? The phrase “how dare they tell us what to do” immediately springs to mind. Some might even go so far as to interpret this concern as a tacit form of sympathy or support for the terrorists. This might not help the chances of nuclear restraint.**

Interpretation- the negative can read as many dispo or uncondo advocacies as they please.

Prefer it—

A. Argumentative irresponsibility- it encourages disingenuous advocacy to forward shot term political goals. This teaches immorality and outweighs policy education.

B. Fairness- the affirmative is limited to one unconditional advocacy that we can’t kick if it is straight turned- the negative should be responsible for their advocacy just the same as the affirmative. Perms are tests of competition and don’t check because they aren’t advocacies.

C. Evaluate depth before breadth- learning a little about a lot of things is worse than a lot than a few. Dispo forces the negative to think about what they read because the risk of straight turns. This solve aff education too because the aff has to think about what to force the negative to go for.

D. Vote Aff on theory- rejecting the argument is implicitly voting that conditionality is okay. Maintain a strict offense/defense paradigm because abuse is impossible to quantify and time commitment prevents the aff from winning conditionality and other arguments.

E. Err aff- the negative empirically wins more out rounds because of conditional advocacies—Greenhill alone was 21 to 10

## 1AR—solves warming better

### Solar isn’t effective

Comb 6 — Bruno, founder and president of the international association, Environmentalists For Nuclear Energy “THE BENEFITS OF NUCLEAR ENERGY” <http://www.ecolo.org/documents/documents_in_english/BENEFITS-of-NUCLEAR.pdf>

Some environmentalists are enchanted by the simplicity of solar cells and the pristine elegance of wind turbines, and they refuse to accept the fact that they are quantitatively incapable of supplying the energy required by an industrial civilization.I do not mean to say that these renewable energies should be excluded; they are useful and have important niche roles to play – in remote locations and under special circumstances. But they can make only a marginal contribution to the energy needs of a growing industrial civilization

## 1AR—plan solves better

### The plan is cheaper and more solvent

Ragheb 11 (5/5/2011, Magdi Ragheb, Associate Professor of nuclear, plasma, and radiological engineering, Ph.D. Nuclear Engineering, “Nuclear And Plasma Space Propulsion,” https://netfiles.uiuc.edu/mragheb/www/NPRE%20402%20ME%20405%20Nuclear%20Power%20Engineering/Nuclear%20and%20Plasma%20Space%20Propulsion.pdf, ngoetz)

This is a nuclear propulsion concept generating its thrust with plasma waves generated from a series of miniature supercritical fission or fusion pulses. The intense plasma wave energy transfers its momentum into vehicle acceleration that can be withstood by the structure of the vehicle and its crew. Very high specific impulses and thrust to weight ratios can be obtained by this approach, which other technologies cannot obtain. Their appeal also stems from their low costs and reusability. They offer fast interplanetary transit times, safety and reliability, and do not require major technological breakthroughs. This could be the only realistic approach available with present day technology for a Mars mission in the twenty first century.

## 1AR—links to politics

### It links to politics worse than the aff- less support from the white house

Grossman 10 [Harold. Quotes SpaceNews. Space Alert is published by Global Network Against Weapons and Nuclear Power in Space, Newsletter #22, Summer 2010. http://www.space4peace.org/newsletter/Space\_Alert\_22.pdf]

**The Obama administration is seeking to renew the use of nuclear power in space**. It is calling for revived production by the U.S. of plutonium-238 for use in space devices—**despite solar energy having become a substitute** for plutonium power in space. And the **Obama** administration appears to also **want to revive** the decadesold and long-discredited scheme of **nuclear-powered rockets**—despite strides made in new ways of propelling spacecraft. Last month, Japan launched what it called its “space yacht” which is now heading to Venus propelled by solar sails utilizing ionized particles emitted by the Sun. “Because of the frictionless environment, such a craft should be able to speed up until it is traveling many times faster than a conventional rocket-powered craft,” wrote Agence France-Presse about this spacecraft launched May 21. But the Obama administration would return to using nuclear power in space— despite its enormous dangers. A cheerleader for this is the space industry publication Space News. “Going Nuclear” was the headline of its editorial on March 1 praising the administration for its space nuclear thrust. Space News declared that “for the second year in a row, the Obama administration is asking Congress for at least $30 million to begin a multiyear effort to restart domestic production of plutonium-238, the essential ingredient in long-lasting spacecraft batteries.” The Space News editorial also noted “President Obama’s NASA budget [for 2011] also includes support for nuclear thermal propulsion and nuclear electric propulsion research under a $650 million Exploration Technology and Demonstration funding line projected to triple by 2013.” Space News declared: “Nuclear propulsion research experienced a brief revival seven years ago when then-NASA administrator Sean O’Keefe established Project Prometheus to design reactorpowered spacecraft. Mr. O’Keefe’s successor, Mike Griffin, wasted little time pulling the plug on NASA’s nuclear ambitions.” Being referred to by Space News, as “spacecraft batteries” are what are called radioisotope thermoelectric generators or RTGs, power systems using plutonium-238 to provide on board electricity on various space devices including, originally, on satellites. But this came to an end when in 1964 a U.S. Navy navigational satellite with a SNAP-9A (SNAP for Systems Nuclear Auxiliary Power) RTG on-board failed to achieve orbit and fell to the Earth, disintegrating upon hitting the atmosphere. The 2.1 pounds of plutonium fuel dispersed widely. A study by a group of European health and radiation protection agencies subsequently reported that “a worldwide soil sampling program carried out in 1970 showed SNAP-9A debris present at all continents and at all latitudes.” Long linking the SNAP-9A accident to an increase of lung cancer in people on Earth was Dr. John Gofman, professor of medical physics at the University of California at Berkeley, who was involved in isolating plutonium for the Manhattan Project.

## **2AC—CP Doesn’t Solve Deep Space**

### **Solar sails can’t achieve deep space—can’t solve the aff.**

Downey et al. 4 (James R. Downey, Lt Col, USAFR Anthony M. Forestier, Wg Cdr. RAAF David E. Miller, Lt Col, USAF “FLYING REACTORS: THE POLITICAL FEASIBILITY OF NUCLEAR POWER IN SPACE” <http://www.fas.org/nuke/space/downey.pdf> //Donnie)

Why can't this mission be done with solar electric propulsion and solar sails? Solar arrays would have to be far too large to produce the electrical power required to operate the electric propulsion system and scientific instruments for the Jupiter Icy Moons Orbiter mission. The Sun's energy at Jupiter is less than 1/25th of its level at Earth, which make this type of mission virtually impossible to perform with solar arrays, even taking into account expected improvements in solar array efficiency in the foreseeable future. NASA is researching the ability of solar sails (not to be confused with large solar arrays) to enable low mass spacecraft to achieve large increases in velocity by using the pressure of sunlight to fill a lightweight sail, thereby “pushing” the spacecraft. Solar sails may one day be used to propel small spacecraft to the outer solar system, but presently their most effective use appears to be within a ‘zone’ no more than twice the Earth’s distance from the Sun. Therefore, solar sails are not a viable option for propelling a JIMO-like spacecraft to Jupiter, let alone maneuvering it around Jupiter’s three icy moons.

## 2AC—CP Doesn’t Solve Physics

### **Solar sails violate carrots rule—no chance it solves**

Gold 3 (Thomas Gold (Center for Radiophysics and Space Research, Cornell University) “The solar sail and the mirror” <http://arxiv.org/html/physics/0306050> //Donnie)

The radiation pressure exerted by incoherent light on diverse surfaces is examined. The thermodynamic rule, first given by Carnot in 1824, describes the limitation to the amount of free energy that can be obtained from a source of thermal energy, and he gave the compelling reason for this rule, that if more free energy than he had prescribed could ever be extracted, then a heat pump could use that free energy and re-create all the heat energy that had been consumed. A perpetual motion machine could then be constructed. Now, 179 years later, it is proposed to fly a spacecraft that is expected to gain velocity from the radiation pressure the sunlight is expected to exert on solar sails, panels of thin plastic sheets, mirror surfaced on the side facing the sun. However a detailed examination of this proposal shows it to be in direct conflict with Carnot's rule, and no such pressure can be expected. Either Carnot's accepted rule is in error, or the solar sail proposal will not work at all. Carnot, a French engineer had described in 1824 a basic law of thermodynamics: heat energy can be converted into "free" energy, such as mechanical energy of motion, but only in an engine which must have certain properties. Heat must enter it at a temperature which we will call T1, and it must then be degraded in the engine to a lower temperature, T2. A certain fraction of this flow of heat energy can then be converted into free energy. The maximum fraction that can be so converted is given by (T1 - T2)/T1. He had shown that the cycle is reversible, so that a heat pump can be constructed that would use free energy to deliver heat; moreover that it would be able to reverse the heat flow from T1 to T2 precisely, if given the maximum free energy obtainable from the heat engine. Thus he showed that a perpetual motion machine could be constructed if either the heat engine or the heat pump could achieve a higher efficiency than that which he had stipulated. Any device that can obtain free energy from a supply of heat, by whatever means, is thus covered by Carnot's rule. 179 years have gone by during which all the heat engines we now employ for every aspect of our civilization have been designed, and all their designers have recognized Carnot's rule as the ultimate aim of their designs. The physicists of that long period have all agreed with that rule. Lord Kelvin based his deduction of the absolute zero of temperature on Carnot's considerations. The absence of perpetual motion machines seems to show that no one has succeeded in overcoming the limitations prescribed by Carnot. Yet now, we have a proposal on the table that runs counter to the rule of Carnot. It is proposed that the radiation pressure on a mirror from a hot body, the Sun, could be used to supply propulsion energy and momentum to a spacecraft, and thus facilitate interplanetary travel of vehicles, without the need for any other means of propulsion. What a desirable solution this would be! The Sun would pour out its energy whatever we do to it, and the momentum associated with that, calculated by Maxwell and confirmed later by Einstein, would be E/c, where E is the amount of energy emitted in a given interval of time, and c is the velocity of light. If a perfect mirror is used to receive the sunlight and its momentum, the re-emission of that light would gain the same momentum once more, and thus the force exerted on a perfect mirror would be doubled. The best mirrors are not completely perfect, but this would cause only a small loss of efficiency. It is proposed to use thin plastic sheet with aluminized mirror surfaces for these "solar sails". The speeds were calculated for a certain speeds of interplanetary travel to be obtained. A fund of several million dollars was assembled for the first space experiment of the new technology is proposed to be launched within a few months of writing this. But what will be the performance of the mirror as a heat engine? If the mirror receives heat energy from the Sun and converts some of this into free energy, namely the kinetic energy of its motion, it falls into the strict definition of a heat engine, and Carnot's rule defining the maximum efficiency for this energy conversion must apply. We can determine the incoming temperature of the radiation by measuring the temperature an absorbing (black) body would reach when exposed to the radiation being sent to the mirror, and the temperature a black body would reach exposed to the outgoing radiation from the mirror, both measurements carried out in common motion with the mirror. Carnot's rule would then give the maximum efficiency as that fraction of the heat flow trough the mirror, given by the difference of the two temperatures, divided by the input temperature. It would be that fraction of the heat flow that could maximally appear as kinetic energy gained by the mass of the mirror. If this was a perfect mirror, the two temperatures will be the same, and it follows that the mirror cannot act as a heat engine at all: no free energy can be obtained from the light. The proposed solar sail cannot be accelerated by sunlight. Would it be better to place a black sheet there instead of a mirror-faced one? Unlike the mirror, this could absorb energy and the momentum associated with that. But it would do this only from the moment of its exposure until it reached thermal equilibrium with the available radiation. Then energy absorption would cease, and with that the delivery of momentum to the sheet would also cease. For any lightweight sheet, this time would be only seconds. It seems that the failure to apply the thermodynamic limitations to radiation physics has shown up in many experiments involving radiation pressure. Thus Crookes' radiometer has invariably rotated in the opposite sense to the expected one. The black side of the paddles invariably recedes from the light, and many explanations have been offered, but not including that which would seem the most obvious: the absence of radiation pressure on the bright side. Similarly all attempts to observe a steady deflection of a pendulum exposed to a light beam have always only shown a brief effect following the sudden beginning of the illumination. Experimental evidence has been ignored and "explained away" each time as some unexpected artifact, because of the widespread belief that the conventional momentum conservation law must be correct. But this law was recognized by Newton only for material bodies, and he had no information about radiation effects. But the momentum conservation law can be shown not to apply to the interaction of radiation with any material objects. For example: take a black (light absorbing) body, initially at rest with a transmitter of radiation. Have the transmitter turn on a beam focused entirely on the body, for an interval during which the total amount of energy emitted is E. The momentum ascribed to this is then E/c, where c is the speed of light. If the entire energy E is used to accelerate the body, the kinetic energy it will then possess is given by 1/2(Mv^2) where M is the mass of the body, while the conservation of momentum with the radiation would have demanded an acceleration of the body to an energy content of Mvc, which is always more than 1/2(Mv^2)while the momentum of the radiation would have to accelerate the body to an energy content of Mvc. From a formal point of view, it is clear that one could not equate radiative momentum content with Newtonian momentum. Newtonian momentum is Mv, clearly a vector, while the momentum attributed to radiation is E/c, a scalar, since E is a scalar and c is a universal constant of nature. When an amount of energy E is captured as heat energy in a body from the light, this amount is thereby converted into a vectorial quantity, moving with the velocity of the body. It is only at this stage that this vectorial quantity can be compared with Newtonian momentum. How much of the radiant energy is absorbed depends not only on the amount of radiation that is directed towards the body, but also on the temperature of the body and the difference of that to the average radiation temperature striking it. This is defined as the temperature a black body would have when equilibrated in the radiation environment to which it is exposed. It is this consideration that brings the radiation result into compliance with Carnot's rule and thus with the amount of free energy that can be obtained from a source of heat. The mass added to the body is given by the equivalent relativistic mass of the energy absorbed, and the radiation pressure is the force we would deduce as necessary to change the momentum of the body by the observed amount. If the body is a perfect mirror or reflector of all incident energy, instead of a black body, then the energy absorbed is zero and so the radiation pressure is zero also. The same is true for any body, when it has reached temperature equilibrium with the radiation to which it is exposed.

## 1AR—CP Doesn’t Solve Physics

Here is more evidence, your toast

New Scientist 3 (“Solar sailing 'breaks laws of physics'” <http://www.newscientist.com/article/dn3895-solar-sailing-breaks-laws-of-physics.html> //Donnie)

The next generation of spacecraft propulsion systems could be dead in the water before they are even launched. A physicist is claiming that solar sailing - the idea of using sunlight to blow spacecraft across the solar system - is at odds with the laws of thermal physics. Both NASA and the European Space Agency are developing solar sails and, although never tested, the concept is quite simple. A solar sail is essentially a giant mirror that reflects photons of sunlight back in the direction they came from. Although photons do not have mass, they are considered to have momentum, so according to the law of conservation of momentum, the photon loses some of its energy to the sail as it bounces off, giving the sail a shove in the opposite direction. But Thomas Gold from Cornell University in New York says the proponents of solar sailing have forgotten about thermodynamics, the branch of physics governing heat transfer. Solar sails are designed to be perfect mirrors, meaning that they reflect all the photons that strike them. Gold argues that when photons are reflected by a perfect mirror, they do not suffer a drop in temperature. That brings in a thermodynamic law called the Carnot rule, which basically states that you never get something for nothing: if there is no temperature change when the photons are reflected, it is impossible to extract any free energy from them to push the sail along. "Carnot's rule says there must be a degradation of energy in any machine that turns out free energy," Gold says. "A mirror does not have any degradation." This does not mean sunlight cannot exert a force - comet tails point away from the Sun, and are often cited as evidence in favour of solar sails. But Gold says this is because a comet tail is not a perfect mirror: it absorbs some of the light. In this scenario Carnot's rule says some energy can be extracted, so long as the object absorbing the light remains cooler than the radiation itself.

# DA Materials

## Space Mil DA

### Space militarization is inevitable – it’s a question of when not if- key to heg

**STRATFOR 8** [STRATFOR is a global intelligence company and has been cited by media such as CNN, Bloomberg, the Associated Press, Reuters, The New York Times and the BBC as an authority on strategic and tactical intelligence issues.[6] Barron's once referred to it as "The Shadow CIA".[7] “United States: The Weaponization of Space” April 10, 2008, <http://www.stratfor.com/analysis/united_states_> weaponization\_space]

In the 1950s, the United States began pushing for an international treaty on outer space — even before the 1957 launch of Sputnik atop a modified version of the world’s first intercontinental ballistic missile. Fortunes have changed somewhat in the last 50 years, and the Pentagon has little interest in taking on further legally binding constraints these days. This is especially true in space, where “weaponization” is not only inevitable, but already well under way. In 1967, Washington became party to the “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies” (better known as the Outer Space Treaty). This treaty was quickly and readily accepted, in part because of its utter lack of definitions. Aside from some fairly unequivocal language about prohibiting the deployment of nuclear weapons in outer space and more broad military activities on the moon and other celestial bodies, the treaty is much more a loose collection of very large holes than it is a constraint on sovereign national action in space. Since then, the military utility of space has begun to be realized. Today, it is a cornerstone of global military communications and navigation. In Iraq today, for example, the U.S. military uses the Global Positioning System (GPS) for everything from squad level maneuvers to joint direct attack munition (JDAM) delivery. Largely from facilities inside the continental United States, the Pentagon controls some unmanned aerial systems half a world away. GPS has given rise to a new degree of precision in guided weapons. Imagery from space-based surveillance platforms has become commonplace and the Defense Support Program constellation continually monitors the surface of the earth for the launch plume of a ballistic missile. It is an incredibly valuable military domain. And just as it has become more valuable, the United States has become increasingly dependent on it. Thus, space-based assets are susceptible targets for U.S. adversaries. Were the United States to lose these assets, its military capability on the ground would be severely affected. Any symmetric enemy knows that and will act to neutralize U.S. space capability. The United States knows that this attack will take place and must therefore defend the assets. In this sense, space is already a domain of military competition and conflict. There is no escaping it. In other words, space has already been weaponized, except that the actual projectiles are not yet located in space. Beijing’s 2007 and Washington’s recent anti-satellite weapons tests only emphasize this point.

### China is taking the lead- we need to militarize to win

**Adams**, Jonathan. "China is on path to 'militarization of space'." *Christian Science Monitor* 28 Oct. **2010**: N.PAG. *Academic Search Premier*. EBSCO. Web. 22 June 2011

China looks set to pull ahead in the Asian space race to the moon, putting a spacecraft into lunar orbit Oct. 6 in a preparatory mission for an unmanned moon landing in two or three years. Chinese engineers will maneuver the craft into an extremely low orbit, 9.5 miles above the moon's surface, so it can take high-resolution photos of a possible landing site. Basically, China is looking for a good "parking space" for a moon lander, in a less-known area of the moon known as the Bay of Rainbows. The mission, called Chang'e 2 after a heroine from Chinese folklore who goes to the moon with a rabbit, highlights China's rapidly growing technological prowess, as well as its keen desire for prestige on the world stage. If successful, it will put China a nose ahead of its Asian rivals with similar lunar ambitions – India and Japan – and signal a challenge to the American post-cold-war domination in space. The Asian space race Compared with the American and Soviet mad dashes into space in the late 1950s and '60s, Asia is taking its time – running a marathon, not a sprint. "All of these countries witnessed the cold war, and what led to the destruction of the USSR," says Ajey Lele, an expert on Asian space programs at the Institute for Defense Studies and Analysis in New Delhi, referring to the military and space spending that helped hasten the decline of the Soviet regime. "They understand the value of money and investment, and they are going as per the pace which they can go." But he acknowledged China's edge over India. "They started earlier, and they're ahead of us at this time," he says. India put the Chandrayaan 1 spacecraft into lunar orbit in 2008, a mission with a NASA payload that helped confirm the presence of water on the moon. It plans a moon landing in a few years' time, and a manned mission as early as 2020 – roughly the same timetable as China. Japan is also mulling a moonshot, and has branched out into other space exploration, such as the recent Hayabusa mission to an asteroid. Its last lunar orbiter shared the moon with China's first in 2007. Both Japan's and India's recent missions have been plagued by glitches and technical problems, however, while China's have gone relatively smoothly. Mr. Lele said the most significant aspect of the Chang'e 2 mission was the attempt at a 9.5-mile-high orbit, a difficult feat. India's own lunar orbiter descended to about 60 miles in 2008, he said, but was forced to return to a more stable, 125-mile-high orbit. A low orbit will allow for better scouting of future landing sites, said Lele. "They [the Chinese] will require huge amounts of data on landing grounds," said Lele. "A moon landing hasn't been attempted since the cold war." During the famed 1969 Apollo 11 manned mission to the moon, astronaut Neil Armstrong had to take control of the lander in the last moments of descent to avoid large moon boulders strewn around the landing site. China hopes to avoid any such last-minute surprises with better reconnaissance photos, which would allow them to see moon features such as rocks as small as one-meter across, according to Chinese media. Is China's space exploration a military strategy? Meanwhile, some have pointed out that China's moonshot, like all space programs, has valuable potential military offshoots. China's space program is controlled by the People's Liberation Army (PLA), which is steadily gaining experience in remote communication and measurement, missile technology, and antisatellite warfare through missions like Chang'e 2. The security implications of China's space program are not lost on India, Japan, or the United States. The Pentagon notes that China, through its space program, is exploring ways to exploit the US military's dependence on space in a conflict scenario – for example, knocking out US satellites in the opening hours of a crisis over Taiwan. "China is developing the ability to attack an adversary's space assets, accelerating the militarization of space," the Pentagon said in its latest annual report to Congress on China's military power. "PLA writings emphasize the necessity of 'destroying, damaging, and interfering with the enemy's reconnaissance … and communications satellites.' " More broadly, some in the US see China's moon program as evidence that it has a long-range strategic view that's lacking in Washington. The US has a reconnaissance satellite in lunar orbit now, but President Obama appears to have put off the notion of a manned return to the moon. With China slowly but surely laying the groundwork for a long-term lunar presence, some fear the US may one day find itself lapped –"like the tale of the tortoise and the hare," says Dean Cheng, an expert on China's space program at the Heritage Foundation in Washington. "I have to wonder whether the United States, concerned with far more terrestrial issues, and with its budget constraints, is going to decide to make similarly persistent investments to sustain its lead in space."

### Weaponization inevitable – historical development of British warships prove.

Hardesty 05 [Hardesty, David. Captain of U.S. Naval forces, 21st president of West Virginia University. “Space-Based Weapons – Long term strategic implications and alternatives”]

There is, nonetheless an inevitability-based argument that is more strongly supported by history – that once a nation deploys weapons or find asymmetric ways to avoid their effect. Britain’s introduction of the dreadnought battleship at the beginning of the last century, with its combination of heavy guns, armor and speed, caused in Germany “something close to panic”. However, this revolution in warship effectiveness did not forever solidify Britain’s hold on the seas. Only four year later, in 1909,m it was the British who were in a panic, over the rapid buildup of dreadnought by Germany; the new concept, by making precious ships almost irrelevant, was allowing Germany to overtake British naval power much more quickly than would otherwise have been possible. History is filled with other examples: chemical weapons, atomic bombs, multiple independently targetable reentry vehicles, etc; it is difficult to think of a single counterexample, even when the original innovator had the clear capability to maintain a numerical lead.

### Offensive capabilities are key to heg

**Macdonald 9** [Bruce W, senior director of the Nonproliferation and Arms Control Program with the USIP Center for Conflict Analysis and Prevention, testimony before the strategic forces subcommittee, March 18, 2009]

The U.S. and China have already crossed a space Rubicon of sorts. ASAT capabilities already developed cannot be un-invented, and missile defense, with inherent ASAT capabilities, is here to stay. This is reality. U.S. security crucially depends on space and will do so even more in the future, and such capabilities must be preserved. Defensive steps can help, but ultimately it is difficult to protect space assets. We also can and should decentralize our space assets, putting our space eggs in more baskets to reduce our vulnerability, which would help, but likely not resolve, our problem. Arms control and other diplomatic steps certainly have a larger role to play and can help limit some of these threats. But verification issues make a comprehensive diplomatic-only solution seem improbable at present, which means the U.S. may need at least some offensive space capabilities, though we should tread carefully and thoughtfully into this new, highly uncertain world. We need to know where the pitfalls are, and not just develop space weapons now and worry about the implications later. The real question is what kind abd level of offensive capability might we need, and to what purpose? Any offensive space capability should have at least seven characteristics: 1. Effectiveness – they should be able to negate hostile space assets to differing levels. 2. Temporary and reversible effects – the space targets should not be permanently destroyed, only rendered ineffective during the conflict. 3. Survivability – the systems themselves should be largely invulnerable to attack, and thus stabilizing in a crisis, which would tend to favor ground-based systems. 4. Cost-effectiveness – it should be cheaper to add a unit of offense than for the adversary to defend against it. 5. Resilience – systems should be capable of performing in multiple scenarios. 6. Credibility – systems must appear credible to an adversary. A space nuclear burst would be a very effective ASAT, but it would be so damaging to U.S. space assets that it would have no credibility as a U.S. weapon. 7. Minimal collateral damage – systems should have little/no effect on other satellites. We should not seek offensive counterspace capability at the expense of effective steps to protect U.S. space capabilities. We must be very careful, if we acquire offensive capabilities, to do so in a manner that other nations will find as unthreatening as possible. Otherwise, we could create a self-fulfilling prophecy: as nations like China or Russia see evidence of U.S. attempted space hegemony, they would accelerate their own efforts, just as we would if the roles were reversed. Above all, we want to avoid the space policy and doctrinal near-vacuum 5 we currently are in, where our space technology seems to shape our policy, rather than our policy shaping technical solutions.

### Key to deterrence

**Morgan 10** [Forrest E, senior political scientist at the RAND corporation, Ph.D. in policy studies, University of Maryland; M.A.A.S. in airpower arts and sciences, Maxwell Air Force; M.A. in computer systems management, Webster University; B.S. in business management, University of Maryland, “Deterrence and First-Strike Stability in Space A Preliminary Assessment” RAND corporation 2010]

Deterrence entails discouraging an opponent from committing an act of aggression by manipulating the expectation of resultant costs and beneits. Deterring attacks on U.S. space systems will require the United States to fashion credible threats of punishment against potential opponents, persuade adversaries that they can be denied the bene-Summary xiii its of their aggression, or some combination of both approaches. However, fashioning a space deterrence regime that is suiciently potent and credible will be dificult given that U.S. warfighting capabilities, much more so than those of any potential adversary, depend on space support. Threatening to punish aggressors by destroying their satellites might not deter them from attacking U.S. assets—a game of satellite tit-for-tat would likely work to the adversary’s advantage. Conversely, threats of punishment in the terrestrial domain may lack credibility in crises and at lower levels of limited war and would likely be irrelevant at higher levels of war, when heavy terrestrial attacks are already under way. Denial strategies face other hurdles. Efforts to deny adversaries the beneits of space aggression are hindered by the inherent vulnerability of some important U.S. space systems and the high degree of U.S. dependence on those assets. As long as those systems are vulnerable, the enemy’s beneit in attacking space assets is proportionate to the United States’ dependence on the capabilities they provide. (See pp. 24–33.) While these factors suggest that it may be dificult to deter potential enemies from attacking certain U.S. space systems in some circumstances, the task of strengthening first-strike stability in space is by no means impossible. As illustrated earlier, the orbital infrastructures of some U.S. systems are already suiciently robust that they present poor targets for prospective attackers. he challenge will be to ind ways to raise the thresholds of deterrence failure for those systems that are both vulnerable and important for force enhancement. Meeting this challenge will require the United States to develop and employ a coherent national space deterrence strategy. (See p. 35.)

### Key to the economy

**Lambakis 7** [Steven Lambakis, from the National Institute for Public Policy, “Missile Defense From Space” realclearpolitics, February 19, 2007]

Modern-day U.S. defense strategy, of necessity, is global in scope, and it will likely retain this character for decades. Fundamental to maintaining this global awareness and presence are satellite operations. National economic and commercial interrelationships thrive on the flow of invisible ones and zeros through space channels, so that timely, agile intercontinental trade is now taken for granted. U.S. and coalition forces routinely leverage earth-circling platforms to enhance military capabilities: the Global Positioning System for improved navigation and precision timing, reconnaissance and early warning sensors, and high-bandwidth communications. Space, moreover, is an open arena, a global commons increasingly used by many countries for military purposes. The proliferation of space technologies offers foreign governments and nonstate entities unparalleled opportunities to enhance diplomatic and military influence over the U.S. and strike with strategic effect. Potential enemies of the United States today have improved "vision" over the U.S. homeland and battlefield activities, a better sense of direction and geographic position, and an improved ability to mobilize forces and coordinate activities. With battle space now reaching up to at least 22,000 miles above the Earth -- the orbital altitudes for early warning and communications satellites -- protecting ourselves from future attacks will depend mightily on space power. But the country lacks a unified, coherent approach to expanding the use of space to improve combat effectiveness, a problem that is compounded by a politically charged debate over weapons in space.1 Critics contend that weapons in space would destabilize existing security relationships, precipitate an arms race, undermine U.S. foreign policy, and seed anti-American coalitions. Not only are such criticisms based on questionable assumptions,2 but they also have not persuaded the country to forgo the advantages of space weapons. The most one could say at this stage is that the American people are indifferent, noncommittal, and confused. Yet given the efficiencies space offers, and given the unpredictable, catastrophic, and global nature of threats we expect to face, it makes sense to explore the possible benefits of taking other combat missions to space. Once the benefits of active space defense programs and operations are made plain, the support of the American people will be forthcoming.

## Accidents DA

### Extend Bonnometti 8- two arguments-Nukes are used now for the military and they are really safe and have been tested

1. **No impact- durrible fiat means the project wont be cut, and the public couldn’t shut down NASA- the Challenger explosion proves that shit down wont happen**
2. **Your ev concedes nuke propulsion is inevitable**

Tyson, 4/08/11 (Bruce; Russia and US plan talks on new nuclear spacecraft, Helium, Inc., http://www.helium.com/items/2133329-russia-and-us-plan-talks-on-new-nuclear-spacecraft)

Space travel requires an enormous amount of energy to sustain spacecraft during increasingly lengthy journeys that will eventually take them to the outermost regions of the universe. In search of a way to power future space journey the United States and Russia are meeting to discuss the use of nuclear power. Hoping to work together on the project engineers from both countries will share their ideas to see if safe and practical nuclear power can be used in spacecraft. Although military use of nuclear power has proven safe and reliable, the technology has never been used in space and therefore raises obvious concerns. For example, if a nuclear –powered space craft should malfunction on liftoff, the impact on the world could prove to be disastrous. Similarly, there are questions to be addressed when it comes to nuclear fallout in space which could prove disastrous to humans and equipment. The Register says that all nations with well-developed manufacturing sectors are sought as partners in the endeavor, meaning Japan, Britain, France, China and Russia. For its part, Russia has already said that it wants to roll out its design for a nuclear space engine by the end of 2012 The engine would be used for power and propulsion simultaneously, creating new challenges. The register story says that nuclear power appears to be the only option to traditional rockets for lift-off, although nuclear ion or plasma-based solutions are expected to work better for propulsion after spacecraft are in orbit. Although some space-based nuclear projects have already been deployed, they have been relatively small. The Register says that radioisotope power is currently used in an array of satellites and will be used in future space rovers. NASA experience has shown that solar powered machines such as the Mars rovers cannot move very far with only solar power. In spite of the emerging plans Russia has for nuclear propulsion in space, it may be redundant, seeing that NASA reportedly has completed plans of its own. Regarding the joint initiative, the Register appears to be skeptical, making the inference that Russia’s inability to finance such a project on its own is the factor that drives its desire for an international partnership in the endeavor. Perhaps one of the greatest lessons of the Russian – US collaboration in nuclear power is that solar power does not have the potential to create enough energy to power the developed world. Just as space projects appear poised to abandon solar power; developed western nations that have pinned al future hopes on solar and wind energy may ultimately discover that the only way to fuel the future is with safe implementations of nuclear energy.

### Extend Schmitt 4- the plan spills over to the creation of fission reactors that prevent accidents in the future

### No impact-

### Time frame and launch plates

Smith 2003 (Warne,, March 12 2003, writer for Nuclearspace.com, “The Case for Orion”, http://www.spacedaily.com/news/nuclearspace-03h.html, SS)

Fallout is a serious objection to building and launching Orions. It's caused by debris from the ground being sucked into the fireball of an atomic blast, irradiated and then spewed out of the top. This radioactive plume coalesces in the atmosphere before eventually falling back to earth. It's a mix of isotopes with varying half lives. The most vicious of them are shortlived and are gone in just a few hours.The milder ones can hang around for millennia. This is called a groundburst. With groundbursts the blast and heat throws debris outwards. The debris sucked into the fireball and turned into fallout comes from the crater scoured in the ground by the energy of the blast.One answer to avoiding fallout for an Orion launch is ludicrously simple. Use a thick metal launchpad. Its as straightforward as that. The Orion team discovered that a thick metal plate can withstand close proximity nuclear blasts very well.Evidence of this obtained from nuclear tests was the foundation for further research into the feasibility of a pusher plate. It was discovered that ablation (erosion) of the surface of a pusher plate could also be reduced by coating it with graphite. Coating the launch pad in similar fashion would minimise ablation of the surface and therefore create very little fallout indeed. Airbursts are relatively clean from a fallout point of view. They do generate some fallout from atmospheric dust and water vapor but not as much as legend holds. Further reduction of fallout can be achieved by using more state of the art pulse units than those proposed back in the 60's. Over 80% of the atmosphere lies within the first 16km from the ground. Its almost completely gone at around 50km. Lessening the concern of bomb schrapnel as a source of residual fallout would make airbursts cleaner still. Casings could be composed of something less amenable to absorbing blast radiation for a start.

### Empirics—it couldn’t even get to Chernobyl level

Smith 2003 (Warne,, March 12 2003, writer for Nuclearspace.com, “The Case for Orion”, http://www.spacedaily.com/news/nuclearspace-03h.html,SS)

But isn't any level of fallout totally unacceptable? Thats the commonly held myth. Hundreds of atomic devices were detonated back in the 50's and 60's which would make Orion pulses look like xmas crackers by comparison. They were used without any attempt to minimise fallout whatsoever. Many thousands of tons of fallout would therefore have been created by any one of them. I hardly need to point out that the World was not destroyed as a consequence. We seem more than prepared to use big dirty nuclear weapons such as 'bunker busters' for war so why not small and relatively cleaner ones for peace? A study by the Center for Disease Control and Prevention in Atlanta which became public last March is the first to consider the health effects of nuclear detonations. It includes tests by all countries between 1951 and 1962 when open-air testing was finally banned. Public exposure to iodine-131, which can cause thyroid cancer, was included in light of new information obtained after the Chernobyl nuclear accident in Russia.According to the results obtained, of the 3.8 million Americans born in 1951 who would have been exposed to the highest fallout levels in their most vulnerable early years, atomic tests account for an estimated 1000 additional cancer deaths. Smoking, by comparison, is expected to account for about 250,000 cancer deaths within the same group. Considering the number and magnitude of tests conducted back in the 50's and 60's the figure of 11,000 total deaths seems small but even that is grossly exagerrated.

### Computer simulations and technical improvements

Smith et al 03

[Wayne. Wayne Smith is the founder of NuclearSpace (the Pro-Nuclear Space Movement. Letter to President Bush.]

My name is Wayne Smith and I founded the Pro-Nuclear Space Movement back in 1998 to promote nuclear powered energy and propulsion systems in space. We have had some measure of success over the years. The nuclear space initiative was cause for celebration as you can quite imagine. Over the years I've written articles and helped journalists seeking information. I even went head to head with Bruce Gagnon at SpaceDaily.com . Sometimes I worked to the point of utter exhaustion trying to help popularise nuclear space science and dispel it's myths. The turnaround in public opinion since I first started has been nothing short of staggering. The best option for affordable manned missions to Mars and beyond is the controversial Orion concept. www.projectorion.com The feasibility of this technology was established nearly half a century ago. It promises both high exhaust velocity and thrust. I am hoping you are open minded enough to hear me out. I realise that the word fallout conjures panic but I believe the residual radiation from a ground launch can be minimised to an acceptable level. In the past, any amount of radiation was considered lethal but recently this assumption has been proven false. The linear non threshold method of estimating the threat from fallout has come under fire in light of research into hormesis and cellular repair. Back in the 1960's it was estimated that an Orion launch might kill 10 people around the world from cancer. More recent calculations have revised this figure down to maybe 1 and even that calculation is questionable. This is for a launch straight off the desert floor of Nevada without any attempt to prevent contamination. It would have sucked many tons of dirt through the fireballs to become irradiated. I and other members of NuclearSpace have discussed this scenario for years and come up with many ways to reduce such fallout. The most obvious is to use a thick metal pad 1km or more in diameter coated with a graphite based oil. Oil has special opaquing properties and steel is sufficiently resilient to suffer only millimetres of ablation. Even without an extra graphite oil coating. No dirt means no fallout. Another option is a sea launch. This idea was suggested to me by Jerry Pournelle. Airbursts do create some fallout from atmospheric dust and water vapour but not as much as legend holds. I believe that preventing the groundburst alone would eliminate 99.99999% or more of the fallout generated. The remaining traces would gradually dissipate into the background radiation. We both know that the number one challenge for reaching Mars is getting payload off earth. Orion can reach space with almost the same mass it had on the pad. Not only is a Mars mission feasible but practical. The brilliant men who worked on this project are getting older and not everything they learned can be found in text form. Eventually they will pass on to the next world and take this invaluable knowledge with them forever. It should be pointed out that over 1 million people died last year in automobile related incidents. Over 10,000 from coal burning. Both Thorium and Uranium exist in coal beds and this material gets burned up with the coal before being pumped into our atmosphere. By comparison an Orion launch with sensible precautions would have negligible impact. Other ways of reducing fallout further include specially designed pulse units with radiation resistant casings. We could experiment with short lived radioisotopes too. Some only last a few hours. They would have to be placed in a pulse unit very quickly and used soon but we only need these expensive versions for the atmospheric stage. Launching vertically without an orbital trajectory would mean only a few minutes in the atmosphere. We would only need one launch. Building big means we can carry everything necessary for decades of spaceflight. Ten thousand tons is not unreasonable. Even one hundred thousand tons is possible. In fact, the bigger you construct it, the more efficient an Orion is. Orion's can't easily land but shuttles could be taken along. The industrial infrastructure to utilise space resources too. This opens up the possibility of building more ships in space. Perhaps with asteroid materials. Larger Orions are simpler to build, can carry more payload and make it easier to shield the crew against radiation. A small bunker could be built into the infrastructure with 60cm walls. Building big also means we can use larger pulse units. Hydrogen devices are a thousand times more powerful and cleaner than fission. Yet another way fallout can be reduced. There are other ways and I'm certain a research panel could think up more. An environmental impact study would demonstrate that a launch can be made perfectly safe. To both ensure zero risk to the surrounding area and prevent protestors from GNAWNPIS invading the launch area I would recommend launching from Antarctica. It has less atmospheric dust/water vapour to irradiate and no life exists there. If you check the figures by computer simulation you will find the fallout produced is insignificant. I believe the public can be convinced that such a mission is worthwhile. Back in the 60's shortly after Orion was declassified some of the Orioneers were on a plane and with a captive audience they explained their objectives. The response was overwhelmingly in favour of the idea. People are individuals with the ability to make good decisions when informed enough to weigh things up rationally.

## I Law/Test Ban Treaty

### No link – Fusion avoids violating the treaty – that’s winterburg

### No impact – no major singnatures and normal means of the plan is withdraw from the treaty

Reynolds 2(September 11, 2002, Glenn Harlan Reynolds, Beauchamp Brogan Distinguished Professor of Law, he teaches Space law among other forms of law @ University of Tennessee, “The Road Not Taken (Yet),” http://www.ideasinactiontv.com/tcs\_daily/2002/09/the-road-not-taken-yet.html, ngoetz)

So what about now? Could Orion ever come back? The answer is yes. The Test Ban Treaty is a real obstacle to any future deployment of Orion. However, it binds only a few nations, and many nations (like India and China) that are both nuclear-capable and interested in outer space have never signed it. For an up-and-coming country looking to seize the high ground in space in a hurry, Orion could have considerable appeal. And, of course, even the United States could withdraw from the Treaty, on three months' notice, under the Treaty's own terms.

1. NPP will not cost the United States diplomatically, even if it results in withdraw from the test-ban treaty.

Schweitzer 2009 [Curtis, Writer, Composer & Political Researcher, Resurrecting Orion, April 27th, <http://curtisschweitzer.net/blog/?p=2546> //STRONG]

If amending the treaty proves to be an nonviable option in readying the world for Orion, the United States and any partner nations in a potential Orion project should withdraw or threaten to withdraw from the test-ban treaty until it is either amended or they are given the world community’s blessing to launch an Orion spacecraft. Though it functions with an extremely useful purpose, in the aftermath of the Cold War, the test-ban treaty has become outmoded, and is causing more problems than it solves. Weaponized nuclear detonations for military purposes have long been banned, and should continue to be so. However, launching a city into orbit is clearly worth the risks imposed by atmospheric detonation, but diplomatically, there should be no need to worry about international backlash or protest for a project so obviously peaceful and beneficial to mankind.

1. Plan results in treaty renegotiations that solve.

USAF 1996 [US Air Force, COL (Sel) John M. Urias, Iole M. DeAngelis, Maj Donald A. Ahern, Maj Jack S. Caszatt, Maj George W Fenimore III, Michael J. Wadzinski, October 1996, "A Research Paper Presented to Air Force 2025," csat.au.af.mil/2025/volume3/vol3ch16.pdf //STRONG]

As the planetary defense problem becomes better understood and accepted within the global community, and as potential solutions, including a PDS, are developed, it will likely become necessary to selectively renegotiate existing treaties that currently prohibit testing and using weapons in space. Perhaps a treaty specifically tailored to the evolutionary development of a planetary defense system as well as its use during an ECO threat crisis will be needed. Regardless of the outcome, however, it is safe to say that the use of weapons in space, especially WMD, will remain highly restricted.

### No impact – Medellin proves non-adherence doesn’t spark impacts.

Bader 9. [DC Scotus Examiner Supreme Court Justice's inconsistency on international law

http://www.examiner.com/x-7812-DC-SCOTUS-Examiner~y2009m4d13-Supreme-Court-Justices-Hypocrisy-on-International-Law]

It is hard to fight these claims even when they are false, because ordinary people (and even most lawyers) don’t know much about foreign law. The lawyers who fashion “customary international law” are thus largely [unaccountable](http://volokh.com/archives/archive_2008_03_23-2008_03_29.shtml#1206570143). Perhaps as a result, customary international law is generally of [poorer quality than domestic law](http://www.law.gmu.edu/assets/files/publications/working_papers/08-19%20Democracy%20&%20International.pdf). Scholars have [cited this fact in celebrating the Supreme Court’s recent decision in Medellin v. Texas (2008)](http://volokh.com/archives/archive_2008_03_23-2008_03_29.shtml#1206501266), which refused to make Texas hear yet another challenge to a murderer’s conviction (which had already twice been upheld by different court systems) when ordered to do so by the International Court of Justice (a ruling at odds with the fact that virtually all ICJ member countries permit only one appeal of a conviction, not successive appeals).

### International law isn’t key to global cooperation to solve transnational problems

Estreicher3 (Samuel, Law Professor at NYU, “Rethinking the Binding Effect of Customary International Law,” Virginia Journal of International Law Association, Fall, 44 Va. J. Int'l L. 5)

As for the subsidiary law that an increasingly interdependent world needs in advance of treaties, traditional CIL could not easily play this role as it was essentially backwards looking. The new, instantaneous customary law tries to play this role, but in a way that hardly comports with legitimacy. Without relying on CIL, states, international organizations, and other actors have ample means of identifying problems requiring interstate cooperation, drafting instruments that might command state support, and marshaling the forces of moral suasion. It is hard to see that the "law" aspiration of CIL offers the prospect of a significant incremental gain. In any event, the ultimate question is whether any such benefit warrants the accompanying costs - to which I now turn.

# Moon Based Add-Ons

## China War

### China’s beating us to the moon- makes China war inevitable

**Adams 10** [Jonathan, China is on a path to ‘militarization of space’ CSM, 10-26-2010, <http://www.csmonitor.com/World/Asia-South-Central/2010/1028/China-is-on-path-to-militarization-of-space>]

Meanwhile, some have pointed out that China's moonshot, like all space programs, has valuable potential military offshoots. China's space program is controlled by the People's Liberation Army (PLA), which is steadily gaining experience in remote communication and measurement, missile technology, and antisatellite warfare through missions like Chang'e 2. The security implications of China's space program are not lost on India, Japan, or the United States. The Pentagon notes that China, through its space program, is exploring ways to exploit the US military's dependence on space in a conflict scenario – for example, knocking out US satellites in the opening hours of a crisis over Taiwan. "China is developing the ability to attack an adversary's space assets, accelerating the militarization of space," the Pentagon said in its latest annual report to Congress on China's military power. "PLA writings emphasize the necessity of 'destroying, damaging, and interfering with the enemy's reconnaissance ... and communications satellites.' " More broadly, some in the US see China's moon program as evidence that it has a long-range strategic view that's lacking in Washington. The US has a reconnaissance satellite in lunar orbit now, but President Obama appears to have put off the notion of a manned return to the moon. With China slowly but surely laying the groundwork for a long-term lunar presence, some fear the US may one day find itself lapped –"like the tale of the tortoise and the hare," says Dean Cheng, an expert on China's space program at the Heritage Foundation in Washington. "I have to wonder whether the United States, concerned with far more terrestrial issues, and with its budget constraints, is going to decide to make similarly persistent investments to sustain its lead in space."

### China war causes extinction

(**STRAIT TIMES**, June 25, **2K**, Pg. l/n)  
**THE high-intensity scenario postulates** a cross-strait war escalating into **a full-scale war between the US and China**. If Washington were to conclude that splitting China would better serve its national interests, then a full-scale war becomes unavoidable. **Conflict on such a scale would embroil other countries far and near and** -horror of horrors -**raise the possibility of a nuclear war. Beijing has already told the US** and Japan **privately that it considers any country providing bases and logistics support to any US forces attacking China as belligerent parties open to its retaliation. In the region, this means South Korea, Japan, the Philippines and**, to a lesser extent, **Singapore**. **If China were to retaliate, east Asia will be set on fire. And the conflagration may not end there as opportunistic powers elsewhere may try to overturn the existing world order. With the US distracted, Russia may seek to redefine Europe's political landscape. The balance of power in the Middle East may be similarly upset** by the likes of Iraq**. In south Asia, hostilities between India and Pakistan, each armed with its own nuclear arsenal, could enter a new and dangerous phase.** Will a full-scale Sino-US war lead to a nuclear war? According to General Matthew Ridgeway, commander of the US Eighth Army which fought against the Chinese in the Korean War, the US had at the time thought of using nuclear weapons against China to save the US from military defeat. In his book The Korean War, a personal account of the military and political aspects of the conflict and its implications on future US foreign policy, Gen Ridgeway said that US was confronted with two choices in Korea -truce or a broadened war, which could have led to the use of nuclear weapons. If the US had to resort to nuclear weaponry to defeat China long before the latter acquired a similar capability**, there is little hope of winning a war against China, 50 years later, short of using nuclear weapons.** The US estimates that **China possesses about 20 nuclear warheads that can destroy major American cities.** **Beijing also seems prepared to go for the nuclear option.** **A Chinese military officer disclosed recently that Beijing was considering a review of its "non first use" principle regarding nuclear weapons.** Major-General Pan Zhangqiang, president of the military-funded Institute for Strategic Studies, told a gathering at the Woodrow Wilson International Centre for Scholars in Washington that although the government still abided by that principle, there were strong pressures from the military to drop it. He said **military leaders considered the use of nuclear weapons mandatory if the country risked dismemberment as a result of foreign intervention**. Gen Ridgeway said that should that come to pass, **we would see the destruction of civilization**.

## 1AR—china race

### China militarizing the moon now

Goosen, 11 [Yoshihisa– Special Editor, weapons / technology, “China’s Star Wars Program” Weapons and Technology, <http://weapons.technology.youngester.com/2011/05/chinas-star-war-program.html> //STRONG]

The expert also emphasized the importance of China's lunar exploration program. China in October 2007 successfully launched the "Chang'e I" lunar probe satellite. He said: "China's decision to use the past two years, two rockets spacecraft will weigh 130 tons into low orbit, the manned lunar exploration program to prepare. The scheme is in fact similar to the U.S. 'Constellation'. U.S. President Barack Obama was terminated in February last year, 'Constellation', while China is planning to carry small 2013 radar and laser range finder device soft landing on the moon. These two instruments are a military function, may capture to the U.S. early warning satellites, deep space place. " Therefore, the development of exploration technologies in China, it may be a military conflict with the United States upset the occasion of the combat situation on the million. The expert also emphasized that China plans to launch in 2020 manned spacecraft to the moon to the moon by 2049 with the military functions of the base building. On the other hand, the United States is prepared to abandon the lunar exploration program. The expert also emphasized that the Chinese have access to natural resources of the moon's strategic intent. He said: "The Chinese want the moon tritium or helium 3, and helium-3 is the best fuel fusion reactors, tritium is a very precious resource. China is promoting the development of fusion reactors, and attempt to achieve its commercial applications. Nuclear Fusion energy has the military strategic significance, which reflect China's lunar exploration program with a lot of military purposes. " To further prove this point, the expert example, saying that China North Industries Corporation has recently announced the establishment of the Institute of lunar resources to investigate. He said: "China North Industries Corporation is a corporate manufacturing guns and tanks, is also begun to study lunar resources and the development of the lunar surface in a moving vehicle. Can be inferred that China will eventually build military bases on the moon." In other words, the long-term objective of China's space strategy is the military use of the Moon and begin it own STAR WARS Program.

## Russia Moon Race

### Russia is competing with the US for H3- it will be worse than the cold war

Osborn 6 [Andrew, foreign correspondent since 1998 and currently covers Russia and the former Soviet Union January 27, The Independent “plans to put a mine on the Moon to help boost energy supply” lexisnexis accessed 6/21/11//STRONG]

Russia has staked out plans to recapture its Soviet-era space-race glory and start mining the Moon for a promising energy resource that scientists say could meet the Earth's power needs for more than a thousand years. Nikolai Sevastyanov, head of Russia's giant En-ergia Space Corporation, has unveiled plans to build a permanent base on the Moon within a decade and to start mining the planet for helium 3, a sought-after isotope, by 2020. The idea would be to use helium 3 to power thermonuclear power stations, harnessing its potency to achieve nuclear fusion. The technology to exploit helium 3 is still under development, but it has been touted by a significant academic school of thought as "the ideal fuel of the future" with several countries expressing interest. The race is now on to be the first to make it work. Russian scientists have come up with the idea of using "lunar bulldozers" to heat the Moon's surface in order to get at the resource, and Mr Sevastyanov has told an academic conference that Moscow is keen to institute regular cargo flights of helium 3 back to Earth as soon as possible. His heavily state-controlled firm, one of the most powerful in the Russian space sector, is already drafting plans to turn the base and mining proposals into reality. Russia's new space shuttle Klipper would play a significant role in the project, as would the International Space Station. "We are planning to build a permanent base on the moon by 2015 and by 2020 we can begin the industrial-scale delivery... of the rare isotope helium 3," Mr Sevastyanov said. "The Earth's known hydrocarbon reserves will last mankind 50 to1 00 year sat the present rate of consumption. There are practically no reserves of helium 3 on Earth. On the Moon, there are between one million and 500 million tons, according to estimates." Much of those reserves are reported to be in the Sea of Tranquillity. Mr Sevastyanov predicted that nuclear reactors capable of running on helium 3 would soon be developed and said that just one ton of the isotope would generate as much energy as 14 million tons of oil. "Ten tons of helium 3 would be enough to meet the yearly energy needs of Russia," he added. However, Russia is not the only country interested in the technology. American scientists have expressed interest in helium 3, arguing that one shuttle-load of the isotope would be sufficient to meet US electrical energy needs for a year. During the Cold War the space race had more to do with prestige but in an era when the world has become acutely aware of the finite nature of its resources, a new 21st-century race is developing with a very different aim: to secure a new source of energy for future generations. Helium 3's chief advantage is that it is not radioactive, so there would not be a problem disposing of it once it had been used. But it is not without its skeptics, who argue that it will be too costly and impractical to develop. The Russian cabinet earmarked pounds 6.1bn last year to restore its cash-starved space agency to its former Soviet glory but whether that is enough to begin realizing plans to mine helium 3 remains to be seen.

### That solves great power wars

Stephen J. Blank 9 [strategic Studies Institute's expert on the Soviet bloc and the post-Soviet world since 1989; former Associate Professor of Soviet Studies at the Center for Aerospace Doctrine, Research, and Education, Maxwell Air Force Base; B.A. in History from the University of Pennsylvania, and a M.A. and Ph.D. in History from the University of Chicago, March 09. “RUSSIA AND ARMS CONTROL: ARE THERE OPPORTUNITIES FOR THE OBAMA ADMINISTRATION?”]

Proliferators or nuclear states like China and Russia can then deter regional or intercontinental attacks either by denial or by threat of retaliation.168 Given a multipolar world structure with little ideological rivalry among major powers, it is unlikely that they will go to war with each other. Rather, like Russia, they will strive for exclusive hegemony in their own “sphere of influence” and use nuclear instruments towards that end. However, wars may well break out between major powers and weaker “peripheral” states or between peripheral and semiperipheral states given their lack of domestic legitimacy, the absence of the means of crisis prevention, the visible absence of crisis management mechanisms, and their strategic calculation that asymmetric wars might give them the victory or respite they need.169 Simultaneously, The states of periphery and semiperiphery have far more opportunities for political maneuvering. Since war remains a political option, these states may find it convenient to exercise their military power as a means for achieving political objectives. Thus international crises may increase in number. This has two important implications for the use of WMD. First, they may be used deliberately to offer a decisive victory (or in Russia’s case, to achieve “intra-war escalation control”—author170) to the striker, or for defensive purposes when imbalances 67 in military capabilities are significant; and second, crises increase the possibilities of inadvertent or accidental wars involving WMD.171 Obviously nuclear proliferators or states that are expanding their nuclear arsenals like Russia can exercise a great influence upon world politics if they chose to defy the prevailing consensus and use their weapons not as defensive weapons, as has been commonly thought, but as offensive weapons to threaten other states and deter nuclear powers. Their decision to go either for cooperative security and strengthened international military-political norms of action, or for individual national “egotism” will critically affect world politics. For, as Roberts observes, But if they drift away from those efforts [to bring about more cooperative security], the consequences could be profound. At the very least, the effective functioning of inherited mechanisms of world order, such as the special responsibility of the “great powers” in the management of the interstate system, especially problems of armed aggression, under the aegis of collective security, could be significantly impaired. Armed with the ability to defeat an intervention, or impose substantial costs in blood or money on an intervening force or the populaces of the nations marshaling that force, the newly empowered tier could bring an end to collective security operations, undermine the credibility of alliance commitments by the great powers, [undermine guarantees of extended deterrence by them to threatened nations and states] extend alliances of their own, and perhaps make wars of aggression on their neighbors or their own people.

Only risk of extinction

**Bostrom 2** (Nick, Faculty of Philosophy, Oxford University, http://www.nickbostrom.com/existential/risks.html)

**A much greater existential risk emerged with the build-up of nuclear arsenals in the US and the USSR. An all-out nuclear war was a possibility with both a substantial probability and with consequences that might have been persistent enough to qualify as global and terminal.** There was a real worry among those best acquainted with the information available at the time that **a nuclear Armageddon would occur and that it might annihilate our species or permanently destroy human civilization.**[**[4]**](http://www.nickbostrom.com/existential/risks.html#_ftn4)**Russia and the US retain large nuclear arsenals that could be used in a future confrontation, either accidentally or deliberately**.

## Nuke Terror

### Declining Helium-3 supplies will undermine DHS nuclear smuggling detection --- necessary to prevent nuclear terrorism

**Wald 9** [11/23/09, Matthew L., NY Times, “Shortage Slows a Program to Detect Nuclear Bombs,” <http://www.nytimes.com/2009/11/23/us/23helium.html> //STRONG]

WASHINGTON — The Department of Homeland Security has spent $230 million to develop better technology for **detecting smuggled nuclear bombs** but has had to stop deploying the new machines because the United States has run out of a crucial raw material, experts say. The ingredient is helium 3, an unusual form of the element that is formed when tritium, an ingredient of hydrogen bombs, decays. But the government mostly stopped making tritium in 1989. “I have not heard any explanation of why this was not entirely foreseeable,” said Representative Brad Miller, Democrat of North Carolina, who is the chairman of a House subcommittee that is investigating the problem. An official from the Homeland Security Department testified last week before Mr. Miller’s panel, the Investigations and Oversight Subcommittee of the House Science Committee, that **demand for helium 3 appeared to be 10 times the supply.** Some government agencies, Mr. Miller said, did anticipate a crisis, but the Homeland Security Department appears not to have gotten the message. The department had planned a worldwide network using the new detectors, which were supposed to detect plutonium or uranium in shipping containers. The government wanted 1,300 to 1,400 machines, which cost $800,000 each, for use in ports around the world **to thwart terrorists who might try to deliver a nuclear bomb to a big city** by stashing it in one of the millions of containers that enter the United States every year. At the White House, Steve Fetter, an assistant director of the Office of Science and Technology Policy, said the helium 3 problem was short-term because other technologies would be developed. But, he said, while the government had a large surplus of helium 3 at the end of the cold war, “people should have been aware that this was a one-time windfall and was not sustainable.” Helium 3 is not hazardous or even chemically reactive, and it is not the only material that can be used for neutron detection. The Homeland Security Department has older equipment that can look for radioactivity, but it does not differentiate well between bomb fuel and innocuous materials that naturally emit radiation — like cat litter, ceramic tiles and bananas — and sounds false alarms more often. Earlier this year, the Pacific Northwest National Laboratory, part of the Energy Department, said in a report, “No other currently available detection technology offers the stability, sensitivity and gamma/neutron discrimination” of detectors using helium 3. Helium 3 is used to detect neutrons, the subatomic particles that sustain the chain reaction in a bomb or a reactor. Plutonium, the favorite bomb-making material of most governments with nuclear weapons, intermittently gives off neutrons, which are harder for a smuggler to hide than other forms of radiation. (Detecting the alternative bomb fuel, enriched uranium, is a separate, difficult problem, experts say.) Helium 3 is rare in nature, but the Energy Department accumulated a substantial stockpile as a byproduct of maintaining nuclear weapons. Those weapons use tritium, which is the form of hydrogen used in the H-bomb, but the hydrogen decays into helium 3 at the rate of 5.5 percent a year. For that reason the tritium in each bomb has to be removed, purified and replenished every few years. It is purified by removing the helium 3. The declining supply is also needed for physics research and medical diagnostics. The Energy Department used to make tritium in reactors at its Savannah River Site, near Aiken, S.C., but those were shut after many operational problems. It enlisted the Tennessee Valley Authority to make some tritium in a power reactor, using the same method it had used at Savannah River, breaking up another material, a form of lithium, with neutrons. One of the fragments is tritium. But that project has run into technical problems as well. Mr. Miller estimated that demand for helium 3 was about 65,000 liters per year through 2013 and that total production by the only two countries that produce it in usable form, the United States and Russia, was only about 20,000 liters. In a letter to President Obama, he called the shortage “a national crisis” and said the price had jumped to $2,000 a liter from $100 in the last few years, which threatens scientific research.

### Terrorism causes nuclear miscalc –extinction

Robert Ayson, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington, 2010 (“After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, Available Online to Subscribing Institutions via InformaWorld I love you akshay!!!!!)

**Washington’s early response to a terrorist nuclear attack** on its own soil **might** also **raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China**. For example, **in the noise and confusion during the immediate aftermath** of the terrorist nuclear attack, **the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment**, when careful planning runs up against the friction of reality, **it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow**, although it must be admitted that **any preemption would probably still meet with a devastating response**.

**As part of its initial response** to the act of nuclear terrorism (as discussed earlier) **Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group**. Depending on the identity and especially the location of these targets, **Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty**. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents’ … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide.

**There is also the question of how other nuclear-armed states respond to the act of nuclear terrorism on another member of that special club**. It could reasonably be expected that following a nuclear terrorist attack on the United States, both Russia and China would extend immediate sympathy and support to Washington and would work alongside the United States in the Security Council. But there is just a chance, albeit a slim one, where the support of Russia and/or China is less automatic in some cases than in others. For example, what would happen if the United States wished to discuss its right to retaliate against groups based in their territory? If, for some reason, Washington found the responses of Russia and China deeply underwhelming, (neither “for us or against us”) might it also suspect that they secretly were in cahoots with the group, increasing (again perhaps ever so slightly) the chances of a major exchange. If the terrorist group had some connections to groups in Russia and China, or existed in areas of the world over which Russia and China held sway, and if Washington felt that Moscow or Beijing were placing a curiously modest level of pressure on them, what conclusions might it then draw about their culpability?

If Washington decided to use, or decided to threaten the use of, nuclear weapons, the responses of Russia and China would be crucial to the chances of avoiding a more serious nuclear exchange. They might surmise, for example, that while the act of nuclear terrorism was especially heinous and demanded a strong response, the response simply had to remain below the nuclear threshold. It would be one thing for a non-state actor to have broken the nuclear use taboo, but an entirely different thing for a state actor, and indeed the leading state in the international system, to do so. If Russia and China felt sufficiently strongly about that prospect, there is then the question of what options would lie open to them to dissuade the United States from such action: and as has been seen over the last several decades, the central dissuader of the use of nuclear weapons by states has been the threat of nuclear retaliation.

**If some** readers **find this simply too fanciful**, and perhaps even offensive to contemplate, **it may be informative to reverse the tables. Russia**, which possesses an arsenal of thousands of nuclear warheads and that has been one of the two most important trustees of the non-use taboo, **is subjected to an attack of nuclear terrorism. In response, Moscow places its nuclear forces very visibly on a higher state of alert and declares that it is considering the use of nuclear retaliation against the group and any of its state supporters. How would Washington view such a possibility?** Would it really be keen to support Russia’s use of nuclear weapons, including outside Russia’s traditional sphere of influence? And if not, which seems quite plausible, what options would Washington have to communicate that displeasure?

**If China had been the victim of the nuclear terrorism and seemed likely to retaliate in kind, would the United States and Russia be happy to sit back and let this occur? In the charged atmosphere immediately after a nuclear terrorist attack, how would the attacked country respond to pressure from other major nuclear powers not to respond in kind? The phrase “how dare they tell us what to do” immediately springs to mind. Some might even go so far as to interpret this concern as a tacit form of sympathy or support for the terrorists. This might not help the chances of nuclear restraint.**

## Disease

### Lunar research solves disease

Davis, 9- senior aerospace scientist at Boeing [Spring 2009, Dean E., Ad Astra, “Why Go to the Moon?” Ad Astra 21 nol.mat]

Of course there are significant scientific reasons for establishing a permanent human presence on the Moon, as well, mostly due to the unique characteristics mentioned earlier. Since there is no atmosphere to distort observations, the Moon makes an excellent place to both continually observe the Earth and Sun, and observe space without limitations constrained by manmade radio interference emissions from Earth. The far side of the Moon is a perfect place for radio astronomy, while the near side is a wonderful site for Earth and solar astronomy. Since there is no wind or water erosion on the Moon, it is an excellent geological laboratory to observe the effects of asteroid and comet impacts.

The Moon could also be useful as a laboratory for space explorers with further destinations in mind. Due to its-remoteness from human life, the Moon would be an excellent site for biological isolation and decontamination of astronauts following exploration of other worlds, where they may inadvertently pick up a virus or bacteria. A lunar facility could also be used in examining extraterrestrial-biology specimens, or conducting dangerous biological gene-alteration experiments, which might be able to yield cures to many of today's diseases.

### Disease risks extinction

Frank **Ryan**, M.D., **1997**, virus X, p. 366

How might the human race appear to such an aggressively emerging virus? That teeming, globally intrusive species, with its transcontinental air travel, massively congested cities, sexual promiscuity, and in the less affluent regions — where the virus is most likely to first emerge — a vulnerable lack of hygiene with regard to food and water supplies and hospitality to biting insects' The virus is best seen, in John Hollands excellent analogy, as a swarm of competing mutations, with each individual strain subjected to furious forces of natural selection for the strain, or strains, most likely to amplify and evolve in the new ecological habitat.3 With such a promising new opportunity in the invaded species, natural selection must eventually come to dominate viral behavior. In time the dynamics of infection will select for a more resistant human population. Such a coevolution takes rather longer in "human" time — too long, given the ease of spread within the global village. A rapidly lethal and quickly spreading virus simply would not have time to switch from aggression to coevolution. And there lies the danger. Joshua Lederbergs prediction can now be seen to be an altogether logical one. Pandemics are inevitable. Our incredibly rapid human evolution, our overwhelming global needs, the advances of our complex industrial society, all have moved the natural goalposts. The advance of society, the very science of change, has greatly augmented the potential for the emergence of a pandemic strain. It is hardly surprising that Avrion Mitchison, scientific director of Deutsches Rheuma Forschungszentrum in Berlin, asks the question: "Will we survive!” We have invaded every biome on earth and we continue to destroy other species so very rapidly that one eminent scientist foresees the day when no life exists on earth apart from the human monoculture and the small volume of species useful to it. An increasing multitude of disturbed viral-host symbiotic cycles are provoked into self-protective counterattacks. This is a dangerous situation. And we have seen in the previous chapter how ill-prepared the world is to cope with it. It begs the most frightening question of all: could such a pandemic virus cause the extinction of the human species?

## 1AR- Disease

### Dwindling supplies of helium-3 are detrimental to medical imaging technology

**AAAS, 10** [4/22/10, American Association for the Advancement of Science, “AAAS Workshop Explores How to Meet Demand for Helium-3 in Medicine, Industry, and Security”, [http://www.aaas.org/news/releases/2010/0423helium3.shtml //STRONG]](http://www.aaas.org/news/releases/2010/0423helium3.shtml%20//STRONG%5d)

Helium-3—a variation of the helium used in balloons—can reduce temperatures to nearly absolute zero, provide non-radioactive medical lung imaging, and detect neutrons emanating from smuggled nuclear devices. It may even be an element of a clean energy source. For decades, this non-toxic and non-corrosive gas has been in adequate supply, but now that supply is dwindling just as demand is rising dramatically. At an AAAS-organized workshop, participants from academia, industry, government and national labs met to discuss how to meet the growing need for helium-3. The numbers tell a stark story: This year, there’s about 12,000 liters of helium-3 available. For the next five years, about 8000 liters of helium-3 each year will accumulate from the decay of tritium, said Steve Fetter, assistant director at large in the White House Office of Science and Technology Policy (OSTP). But demand is at least 40,000 liters per year, Fetter said, and forecasts show a growing demand for helium-3 for neutron detectors, scientific research, medical imaging and other uses. “It’s not a sustainable situation,” he said.

### Medical Imaging is key to solve disease

**Right Scan Time** (“The Value of Medical Imaging, <http://rightscanrighttime.org/value-of-medical-imaging/>)

Medical imaging, and its critical role in disease prevention, early detection, diagnosis and treatment, has changed the face of health care delivery. When patients have access to and receive the right scan at the right time, outcomes improve and costs are reduced. It’s no wonder the New England Journal of Medicine proclaimed medical imaging as one of the top “developments that changed the face of clinical medicine” during the last millennium.

## SSP/Tourism/Mining

### Colonization enable SSP deployment- solves warming

Davis, 9 [senior aerospace scientist at Boeing Spring 2009, Dean E., Ad Astra, “Why Go to the Moon?” Ad Astra 21 no1, //STRONG]

Based upon this analysis, the best economic reason to establish a permanent human presence on the Moon is to provide the prospecting, mining, manufacturing, agriculture, and transportation logistics infrastructure necessary for an affordable Space Solar Power (SSP) constellation. SSP can provide America and the rest of the Earth with most of its power needs from the sun-day or night, in all weather conditions, and without dependence on foreign energy interests, while minimizing the effects of global warming. Other economic reasons for establishing a permanent human presence on the Moon include helium-3 mining (assuming a nuclear fusion technology breakthrough occurs), significant reductions in space transportation costs, the prospect of space tourism (lunar hotels and resorts.)

## Debris/Travel

### Lunar mining solves space debris.

Stone 9 [aerospace engineer and chairman of Shackleton Energy Co. June 2009, IEEE Spectrum, “Mining the Moon”, <http://spectrum.ieee.org/aerospace/space-flight/mining-the-moon> //STRONG]

Two years ago, I and a group of like-minded businessmen, expeditionary explorers, and space-systems managers and engineers formed the Shackleton Energy Co. in Del Valle, Texas, to conduct lunar prospecting. Should we find significant reserves of ice, we would then establish a network of refueling service stations in low Earth orbit and on the moon to process and provide fuel and consumables. Like modern highway service stations, these celestial stations would be able to refuel space vehicles of all kinds and would be positioned at key transportation nodes; an obvious spot would be near the International Space Station. Such stations would radically change the way nearly every space system is designed. No longer would you have to carry your fuel and water into orbit with you. Entirely new classes of space vehicles would become possible, ones that operate only at and beyond low Earth orbit, such as vehicles for orbital transfer and satellite repair. Today launch systems must be designed to withstand the punishing effects of high-speed atmospheric drag, pressure, vibration, and heating that occur on the way to space. Protecting the rocket and its payload adds enormously to launch costs. But a vehicle that is designed from the start to operate only in space—say, between low Earth orbit and the moon—is not bound by the same design rules. We would also be able to clear up the ever-growing space debris problem. There’d be plenty of fuel for maneuvering satellites and other spacecraft to avoid debris, and you could also deploy cleanup vehicles to remove obsolete materials from orbit. Within a decade or two, we would soon see the dawn of a new age of space exploration, space tourism, and space business ventures.

# Nuke Based Add-Ons

## Internal Link

The Plan leads to advances in terrestrial nuclear power

IAEA 5 (“The Role of Nuclear Power and Nuclear Propulsion in the Peaceful Exploration of Space,” p. 91-92, ngoetz)

Space nuclear power on the other hand is characterized by the need for systems to be lightweight and small in volume, to be independent of gravity, to have heat transfer systems that support both direct and indirect conversion, to operate in hostile environments, to achieve a very high degree of robustness and reliability, and, in some applications, by the need for high efficiencies. This research and development can be the basis for innovative nuclear reactor and fuel cycle developments for different terrestrial missions.

An example of the relevance of such research and development for innovative terrestrial concepts can be found in the development of materials resistant to high fluences and temperatures. Improved, more reliable and innovative heat transport and removal systems are other areas where common research and development objectives exist.

In particular, advances in space nuclear systems can apply to small and/or remote terrestrial applications, provide for more reliable heat transfer systems and ‘open the door’ to the use of plasma or ionic conversion systems. Another research and development area having a considerable synergy potential is energy production; advanced cycles for energy production and alternative energy products (such as hydrogen) are salient examples. Synergies exist in the safety and reliability areas since common requirements for safety relying on intrinsic core properties are put forward. Commonalities are also found in the need to enhance reliability for concepts with long lifetimes and/or for use in hostile environments (e.g. deep water and subarctic/arctic locations).

## Warming

### The plan is key to solve warming

Bruno **Comb no date**- founder and president of the international association

Environmentalists For Nuclear Energy “THE BENEFITS OF NUCLEAR ENERGY” <http://www.ecolo.org/documents/documents_in_english/BENEFITS-of-NUCLEAR.pdf>

Nuclear energy is a clean, safe, reliable and competitive energy source. It is the only source of energy that can replace a significant part of the fossil fuels (coal, oil and gas) which massively pollute the atmosphere and contribute to the greenhouse effect. If we want to be serious about climate change and the end of oil, we must promote the more efficient use of energy, we must use renewable energies – wind and solar – wherever possible, and adopt a more sustainable life style. But this will not be nearly enough to slow the accumulation of atmospheric CO2, and satisfy the needs of our industrial civilization and the aspirations of the developing nations. Nuclear power should be deployed rapidly to replace coal, oil and gas in the industrial countries, and eventually in developing countries An intelligent combination of energy conservation, and renewable energies for local low-intensity applications, and nuclear energy for base-load electricity production, is the only viable way for the future.

### extinction

Bruno **Comb no date**- founder and president of the international association

Environmentalists For Nuclear Energy “THE BENEFITS OF NUCLEAR ENERGY” <http://www.ecolo.org/documents/documents_in_english/BENEFITS-of-NUCLEAR.pdf>

In burning fossil fuels, we inject 23 billion tons of carbon dioxide every year into the atmosphere – 730 tons per second. Half of it is absorbed in the seas and vegetation, but half remains in the atmosphere. This is significantly altering the composition of the atmosphere and seriously affecting the climate of our planet. We have only this one fragile planet to live on. If we want it to remain livable, to ensure the comfort of our modern lives and indeed the very continuation of our industrial civilization, then we must urgently adopt new lifestyles and find other energy sources.

## Prolif

### H3 mining spurs a transition to a nuclear fusion economy --- solves safety and proliferation risks

**Kulcinski & Schmitt 2000** (July 2000, G.L. Kulcinski and H.H. Schmitt, with the Fusion Technology Institute in the Department of Engineering Physics at the University of Wisconsin-Madison, Fusion Technology Institute, “Nuclear Power Without Radioactive Waste – The Promise of Lunar Helium-3,” Presented at the Second Annual Lunar Development Conference, “Return to the Moon II”, 20–21 July 2000, Las Vegas NV, <http://fti.neep.wisc.edu/FTI/pdf/fdm1131.pdf>)

Observations on the Development of Fusion Energy in the 21st Century If one accepts the need to develop nuclear energy to satisfy the needs of Earth’s inhabitants in the 21st century and beyond, then it is reasonable to ask “How can one transition from the current fission nuclear economy to a future fusion economy and what would be the benefits of such a transition?” A detailed discussion of this important question is beyond the scope of this paper but the general outline of an answer is summarized in Figure 6. For example, the level of concern over proliferation, nuclear waste, safety, and radiation damage to reactor components is very high in the case of fission reactors. This is not to say that the fission industry has not or cannot solve those problems, but it is clear that the public has concerns in those areas. If one moves to the first-generation fusion fuels, the issues of proliferation, nuclear waste, and safety are somewhat alleviated. However, the radiation damage issue is as difficult (or some would say even more difficult) to solve. One additional area of concern that is faced by first-generation fuels is the safe handling of large amounts of radioactive tritium. Basically, the use of second-generation fuels (D3He) eliminates the proliferation issue and the safety issues are greatly reduced. However, these advantages are purchased at the price of more difficult physics requirements. Finally, the move to the third-generation fuel (3He3He) completely removes the concerns over proliferation, radiation damage, nuclear waste, safety, and tritium. However, these benefits have to be balanced against the much more difficult physics requirements of this fuel cycle. Conclusions It is appropriate, as society enters a new millennium, to question how future generations will be able to sustain life on Earth while expanding into the solar system. One of the essential questions to answer is how will future generations find enough energy to avoid the economic and environmental collapse that could occur if fossil fuels become prohibitively expensive in the next 50-100 years. Presently, nuclear energy appears to be the only solution capable of sustaining society as we know it. There is a growing resistance, whether justified or not, to expansion of fission energy. Fusion energy represents an improvement over fission, if it can be shown to be economic, but the first-generation fuels (DT, DD) are very capital intensive because they generate large amounts of radioactive waste and must contain large amount of radioactive materials in a hostile environment. The second-generation fuels (D3He) represent a tremendous improvement over the DT and DD cycles but face somewhat more difficult plasma physics requirements. Ultimately, the third generation fusion fuels (3He3He) could remove the concern of the public over radioactive waste and releases of radioactivity during reactor malfunctions. This optimism must be balanced against much more challenging physics regimes compared to those for the first- and second-generation fusion fuels. If one takes the long-range viewpoint, it is clear that some effort should be expended early in the 21st century to developing the third-generation fusion fuels. The ultimate payoff from such research could be the “pot of gold at the end of the rainbow”, the production of clean, safe, economical, and long lasting nuclear energy without nuclear waste in the 21st century.

### Proliferation escalates to nuclear war

Utgoff 2 (Victor A., Deputy Director of the Strategy, Forces, and Resources Division of the Institute for Defense Analysis, Survival Vol 44 No 2 Proliferation, Missile Defence and American Ambitions, p. 87-90)

In sum, widespread proliferation is likely to lead to an occasional shoot-out with nuclear weapons, and that such shoot-outs will have a substantial probability of escalating to the maximum destruction possible with the weapons at hand. Unless nuclear proliferation is stopped, we are headed toward a world that will mirror the American Wild West of the late 1800s. With most, if not all, nations wearing nuclear 'six-shooters' on their hips, the world may even be a more polite place than it is today, but every once in a while we will all gather on a hill to bury the bodies of dead cities or even whole nations.

## ECON

### H3 mining spurs a transition to a nuclear fusion economy --- solves safety and economic collapse

**Kulcinski & Schmitt 2000** (July 2000, G.L. Kulcinski and H.H. Schmitt, with the Fusion Technology Institute in the Department of Engineering Physics at the University of Wisconsin-Madison, Fusion Technology Institute, “Nuclear Power Without Radioactive Waste – The Promise of Lunar Helium-3,” Presented at the Second Annual Lunar Development Conference, “Return to the Moon II”, 20–21 July 2000, Las Vegas NV, <http://fti.neep.wisc.edu/FTI/pdf/fdm1131.pdf>)

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### Econ collapse causes extinction

Mead 9. [2/4, Walter Russell, Henry A. Kissinger Senior Fellow in U.S. Foreign Policy at the Council on Foreign Relations, Only Makes You Stronger: Why the recession bolstered America, The New Republic]

None of which means that we can just sit back and enjoy the recession. History may suggest that financial crises actually help capitalist great powers maintain their leads--but it has other, less reassuring messages as well. If financial crises have been a normal part of life during the 300-year rise of the liberal capitalist system under the Anglophone powers, so has war. The wars of the League of Augsburg and the Spanish Succession; the Seven Years War; the American Revolution; the Napoleonic Wars; the two World Wars; the cold war: The list of wars is almost as long as the list of financial crises. Bad economic times can breed wars. Europe was a pretty peaceful place in 1928, but the Depression poisoned German public opinion and helped bring Adolf Hitler to power. If the current crisis turns into a depression, what rough beasts might start slouching toward Moscow, Karachi, Beijing, or New Delhi to be born? The United States may not, yet, decline, but, if we can't get the world economy back on track, we may still have to fight.

## AG Collapse

### H3 mining spurs a transition to a nuclear fusion economy --- solves safety and environmental collapse from resource scarcity

**Kulcinski & Schmitt 2000** (July 2000, G.L. Kulcinski and H.H. Schmitt, with the Fusion Technology Institute in the Department of Engineering Physics at the University of Wisconsin-Madison, Fusion Technology Institute, “Nuclear Power Without Radioactive Waste – The Promise of Lunar Helium-3,” Presented at the Second Annual Lunar Development Conference, “Return to the Moon II”, 20–21 July 2000, Las Vegas NV, <http://fti.neep.wisc.edu/FTI/pdf/fdm1131.pdf>)

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### Environmental Degradation collapses agriculture

Suurküla 6 (JaanChairman of Physicians and Scientists, M.D., for Responsible Application of Science and Technology (PSRAST), “[World-wide cooperation required to prevent global crisis; Part one— the problem](http://www.psrast.org/globecolcr.htm)”, Physicians and Scientists for Responsible Application of Science and Technology, 6/24, http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions)

The world environmental situation is likely to be further aggravated by the increasingly rapid, large scale global extinction of species. It occurred in the 20th century at a rate that was a thousand times higher than the average rate during the preceding 65 million years. This is likely to destabilize various ecosystems including agricultural systems. …In a slow extinction, various balancing mechanisms can develop. No one knows what will be the result of this extremely rapid extinction rate. What is known, for sure, is that the world ecological system has been kept in balance through a very complex and multifacetted interaction between a huge number of species. This rapid extinction is therefore likely to precitate collapses of ecolosystems at a global scale. This is predicted to create large-scale agricultural problems, threatening food supplies to hundreds of millions of people. This ecological prediction does not take into consideration the effects of global warming which will further aggravate the situation. Industrialized fishing has contributed importantly to mass extinction due to repeatedly failed attempts at limiting the fishing. A new global study concludes that 90 percent of all large fishes have disappeared from the world’s oceans in the past half century, the devastating result of industrial fishing. The study, which took 10 years to complete and was published in the international journal Nature, paints a grim picture of the Earth’s current populations of such species as sharks, swordfish, tuna and marlin. …The loss of predatory fishes is likely to cause multiple complex imbalances in marine ecology. Another cause for extensive fish extinction is the destruction of coral reefs. This is caused by a combination of causes, including warming of oceans, damage from fishing tools and a harmful infection of coral organisms promoted by ocean pollution. It will take hundreds of thousands of years to restore what is now being destroyed in a few decades. …According to the most comprehensive study done so far in this field, over a million species will be lost in the coming 50 years. The most important cause was found to be climate change

### Global nuclear war – we’re on the brink

**Brown, 9** - founder of the Worldwatch Institute and the Earth Policy Institute

(Lester R, “Can Food Shortages Bring Down Civilization?” Scientific American, May)

The biggest threat to global stability is the potential for food crises in poor countries to cause government collapse. Those crises are brought on by ever worsening environmental degradation

One of the toughest things for people to do is to anticipate sudden change. Typically we project the future by extrapolating from trends in the past. Much of the time this approach works well. But sometimes it fails spectacularly, and people are simply blindsided by events such as today's economic crisis. For most of us, the idea that civilization itself could disintegrate probably seems preposterous. Who would not find it hard to think seriously about such a complete departure from what we expect of ordinary life? What evidence could make us heed a warning so dire--and how would we go about responding to it? We are so inured to a long list of highly unlikely catastrophes that we are virtually programmed to dismiss them all with a wave of the hand: Sure, our civilization might devolve into chaos--and Earth might collide with an asteroid, too! For many years I have studied global agricultural, population, environmental and economic trends and their interactions. The combined effects of those trends and the political tensions they generate point to the breakdown of governments and societies. Yet I, too, have resisted the idea that food shortages could bring down not only individual governments but also our global civilization. I can no longer ignore that risk. Our continuing failure to deal with the environmental declines that are undermining the world food economy--most important, falling water tables, eroding soils and rising temperatures--forces me to conclude that such a collapse is possible. The Problem of Failed States Even a cursory look at the vital signs of our current world order lends unwelcome support to my conclusion. And those of us in the environmental field are well into our third decade of charting trends of environmental decline without seeing any significant effort to reverse a single one. In six of the past nine years world grain production has fallen short of consumption, forcing a steady drawdown in stocks. When the 2008 harvest began, world carryover stocks of grain (the amount in the bin when the new harvest begins) were at 62 days of consumption, a near record low. In response, world grain prices in the spring and summer of last year climbed to the highest level ever. As demand for food rises faster than supplies are growing, the resulting food-price inflation puts severe stress on the governments of countries already teetering on the edge of chaos. Unable to buy grain or grow their own, hungry people take to the streets. Indeed, even before the steep climb in grain prices in 2008, the number of failing states was expanding [see sidebar at left]. Many of their problem's stem from a failure to slow the growth of their populations. But if the food situation continues to deteriorate, entire nations will break down at an ever increasing rate. We have entered a new era in geopolitics. In the 20th century the main threat to international security was superpower conflict; today it is failing states. It is not the concentration of power but its absence that puts us at risk. States fail when national governments can no longer provide personal security, food security and basic social services such as education and health care. They often lose control of part or all of their territory. When governments lose their monopoly on power, law and order begin to disintegrate. After a point, countries can become so dangerous that food relief workers are no longer safe and their programs are halted; in Somalia and Afghanistan, deteriorating conditions have already put such programs in jeopardy. Failing states are of international concern because they are a source of terrorists, drugs, weapons and refugees, threatening political stability everywhere. Somalia, number one on the 2008 list of failing states, has become a base for piracy. Iraq, number five, is a hotbed for terrorist training. Afghanistan, number seven, is the world's leading supplier of heroin. Following the massive genocide of 1994 in Rwanda, refugees from that troubled state, thousands of armed soldiers among them, helped to destabilize neighboring Democratic Republic of the Congo (number six). Our global civilization depends on a functioning network of politically healthy nation-states to control the spread of infectious disease, to manage the international monetary system, to control international terrorism and to reach scores of other common goals. If the system for controlling infectious diseases--such as polio, SARS or avian flu--breaks down, humanity will be in trouble. Once states fail, no one assumes responsibility for their debt to outside lenders. If enough states disintegrate, their fall will threaten the stability of global civilization itself.

## Disarm

### Successful development of nuclear pulse propulsion results in global disarmament.

Schweitzer 2009 [Curtis, Writer, Composer & Political Researcher, Resurrecting Orion, April 27th, <http://curtisschweitzer.net/blog/?p=2546> //STRONG]

Ultimately, however, the most important obstacle to remove is the irrational fear and loathing that the worldwide public has toward nuclear devices. Although the strong dislike for and fear of nuclear weapons is understandable given the harrowing experience of the Cold War, the international community has moved into a new era. Continuing bans on and limitations of militarized nuclear weapons is, of course, still a necessary obligation of the international community. Nonetheless, as has been the theme in this essay thus far, the emerging realization that there are better uses for the world’s massive nuclear stockpiles is a key component in mankind’s progress toward seriously exploring (and possibly colonizing) the solar system. Developing nuclear-pulse propulsion systems could even play a role in the larger issue of global nuclear disarmament. Reducing nuclear stockpiles by repurposing warheads for space exploration is a far better use of both the nuclear material and the time and effort spent researching and developing those devices than is the incredibly expensive, ultimately fruitless process of disassembling and destroying them. Moreover, repurposing weapons means that concerns over increased nuclear proliferation as a result of Orion programs can be significantly mitigated. All of Orion’s problems are solvable. All of them have known, inexpensive, often beneficial answers, and the product of addressing them is a vast leap forward in human spaceflight and expansion beyond the borders of our fragile earth. The benefits are immeasurably greater than the risks. It is not rationality that stands between humanity and nuclear-propelled spaceflight– indeed, it is irrationality. In the end, the only thing that will ever prove to be an effective means of making Orion a reality is a change in heart among everyday people. All the politicians in the world will not change the hearts and minds of millions of people who either don’t know about the prospects for project Orion or who are indifferent to it. Since there has never been a serious effort by any government to consider the technology, let alone promote it, there remains a significant opportunity to galvanize support for an Orion program, especially if its lofty promises are communicated clearly. Orion promises us a way forward. In difficult economic times, it is a far more efficient use of limited funds, and the benefits of the program promise to revolutionize the world of technology just as the moonshot did during the space race. There are new markets, technologies, and wealth waiting to be discovered, and the only thing standing between us and that future is our own illogical fear of nuclear devices. Overcoming that fear (and strictly regulating a world with an amended partial-test-ban treaty) will not be easy– but going to the moon will. Going to Mars will be– at least comparatively. The International Space Station could be finished in a single mission. A moon base established in two. Manned missions to Saturn and beyond in the near future. Americans once had a dream, not to conquer space, but to blaze the trail for humanity. It is an American flag that flies on the moon today, next a plaque proclaiming that we came “in peace for all mankind”. We have a chance to do that again, and what’s more, to use our most destructive weapons to do so. We have the opportunity to beat our swords into plowshares, to harness our most feared and reviled technology for a peaceful and scientific end. That day– the day when, collectively, Americans come together in front of our TV sets, en masse in Times Square, on the new media outlets like YouTube and the blogosphere to watch the American flag being driven into the cold red soil of Mars while overhead a hundred scientists, engineers and explorers wait to be ferried down to the surface– on that day, we will once again know that rare kinship for which we have always yearned. We will know the solemn pride that accompanies the knowledge that we have helped lift humanity from amidst its petty squabbles, that we have put to shame those who seek to build weapons, not engines– missiles, not spacecraft.

### **Absent disarmament nuclear war is inevitable.**

Harrell 2009 [Eben, writer for Time, 2-20-09, The Nuclear Risk: How Long Will Our Luck Hold? <http://www.time.com/time/world/article/0,8599,1880702,00.html#ixzz0dt55cGcXhttp> //STRONG]

But to marvel at the bizarre coincidence of the collision, or to breathe a sigh of relief that nuclear safety was not breached, is to miss the point. The seemingly impossible collision of two subs in a large ocean should remind us of the fallacy by which we assume nuclear weapons will never be used. Because the threat of global nuclear war is not zero, even a small chance of war each year, multiplied over a number of years, adds up to the likelihood that the weapons will be used. Like those two subs stalking through the Atlantic, the odds will begin to align. Mathematically, they are destined to. This is not a mere logic game. If there is a single "big idea" to have emerged in the first decade of the new millennium — from [the September 11 attacks](http://www.time.com/time/magazine/article/0,9171,1000761,00.html" \t "_blank) to the [financial crash](http://www.time.com/time/business/article/0,8599,1846450,00.html" \t "_blank) — it is the notion of the ["black swan,"](http://www.time.com/time/business/article/0,8599,1853531,00.html" \t "_blank) the danger posed by difficult to predict, high-impact events. The short history of nuclear weapons is already scattered with unplanned and seemingly improbable incidents that suggest we feel more secure than we should. In 1995, a communication failure with the Russian Embassy led the Russian military to believe that a weather rocket launched off the coast of Norway was an incoming submarine-launched ballistic missile. In the 1980s, malfunctioning U.S. missile defense systems relayed information to U.S. officials of a massive incoming first strike — twice. As recently as 2007, a U.S. Air Force plane flew across the American heartland while unknowingly carrying several live warheads on board. At the time, all of these events were described as freak occurrences. The truth is they were freak occurrences. But they happened.([Read the Top 10 underreported stories of 2008.](http://www.time.com/time/specials/2008/top10/article/0,30583,1855948_1861760,00.html" \t "_blank)) A day after the latest nuclear accident became public, an analyst from the Federation of American Scientists, a nonproliferation think tank, released U.S. Naval intelligence documents obtained through the Freedom of Information Act that showed that the Russian Navy undertook more underwater ballistic missile submarine patrols in 2008 than it has in a decade. The Russian subs are joined in the word's oceans by nuclear-armed vessels from France, Britain, and China. Under the plains of the American West, and in similar silos in Russia, Air Force missile operators keep constant vigil, launch keys at the ready. Nuclear missiles have no self-destruct button; once launched, they cannot be called back. Twenty years after the end of the cold war, humanity still lives within 30 minutes of its own destruction. The price we pay for maintaining nuclear weapons is the gamble that the highly improbable will not lead to the unthinkable. The question to ask after this latest nervy episode: is it worth it?

## Waste Add

### **Only NPP can solve the problems of nuclear waste terrorism and nuclear weapons.**

Sieff 2001 [Martin, Senior News Analyst, JRL, <http://www.cdi.org/russia/johnson/5550-12.cfm> //STRONG]

The sweeping cuts in Russian and U.S. nuclear arsenals agreed in Washington this week by presidents Vladimir Putin and George W. Bush raise major questions of environmental and security safety. But these could be answered in three words: "Build the Orion!" "Orion" in this case refers not to the hunter of classical mythology or to the vast constellation that dominates the night sky in the Northern Hemisphere. It means the manned spaceship powered by nuclear weapons designed more than 40 years ago by the great British-American physicist Freeman Dyson. Dyson was no crackpot. He was one of the greatest scientists of the 20th century. It was he who played a key role in explaining and popularizing the late Richard Feynman's Nobel-prize-winning, revolutionary methodology of calculating quantum electrodynamics theory to the world. In 1958, Dyson, and other young idealistic scientists gathered with small nuclear weapons designer Theodore "Ted" Taylor at the General Atomic division of the General Dynamics Corporation in San Diego, Calif., to work on Project Orion, the idea of a spaceship powered by atomic bombs. And they designed it. Dyson and his colleagues knew that the Soviet Union and the United States would build more rather than less nuclear warheads to keep up with one another. They knew it was only a matter of time before other nations joined the nuclear club. They also knew that even if the United States and the Soviet Union should ever reach strategic arms reduction agreements to mutually slash the size of their huge nuclear arsenals, the radioactive, fissile material taken from those warheads posed almost-eternal security risks of its own. It would have to be guarded with 100 percent perfect security indefinitely to prevent it falling into the hands of terrorists, criminals or political extremist fanatics. Nor could the fissile material once manufactured ever be rendered down into more harmless compounds or other elements. And even if it was protected safely, the environmental and contamination dangers from it would also last at the very least thousands, perhaps even hundreds of thousands of years, given the slow half-life, radioactive decay rates of the lethal elements involved. Dyson and Taylor proposed a radical solution to these problems. The atomic weapons could only be used up and totally rendered useless if they were actually exploded and they proposed to do this with lots of them. This would happen not on the earth or in the main atmosphere, but -- mainly -- in the far reaches of outer space, where the addition of the nuclear radiation to all the background radiation already there would be literally negligible and where the blast effects would be harmless. Dyson and Taylor proposed to explode atomic bombs at regular intervals at very short distances behind a specially designed space ship in order to propel it to the Moon and other planets in the Solar System far more quickly and cheaply than chemical-fuel rockets could ever do. Unlike President Ronald Reagan's 1980s vision of "Star Wars" or the Strategic Defense Initiative, the Taylor-Dyson "Orion" vision was far cheaper and more practical. It did not require the development of any new technologies whatsoever. It did not require the development of electronic sensors of simultaneous enormous sensitivity, robustness and reliability, which President Bush's current Anti-Ballistic Missile defense program will require. These are essential for the Bush ABM program to ensure that ground-based interceptor missiles can reliably intercept incoming intercontinental ballistic missiles at combined speeds of up to 36,000 miles per hour, or 18 times the speed of a fired bullet. Dyson even envisaged inter-planetary regular travel as a practical reality by 1970. "We sketched a 12-year flight program ending with large manned expeditions to Mars, in 1968 and to the satellites of Jupiter and Saturn in 1970," he wrote in his 1979 autobiography "Disturbing the Universe." "The costs of our program added up to about $100 million a year (in 1958 dollars)." Dyson, Taylor and their colleagues were simultaneously scientific visionaries and political idealists. They wanted to boost the space age out into the Solar System as quickly as possible to inspire the world. And they also wanted a safe, practical and even politically popular way to destroy the vast stockpiles of nuclear weapons then accelerating during the most tense years of the Cold War at a fearsome rate. Their answer to both these projects was the Orion project. In July 1958, Dyson spelled out these aims in a paper he called "A Space Traveler's Manifesto." He concluded, "We have for the first time imagined a way to sue the huge stockpiles of our bombs for better purpose than for murdering people. Our purpose, and our belief, is that the bombs which killed and maimed at Hiroshima and Nagasaki shall one day open the skies to man."

### Nuclear waste disposal will inevitably cause extinction.

Hyder 99 [Charles, B.S. and M.S. degrees in physics from the University of New Mexico (1958,1960), and a Ph.D. in Astrogeophysics from the University of Colorado (1964). He has published more than twenty solar and comet papers. He has worked, for NASA, UCLA, UNM, and the Southwest Research and Information Center, Human Extinction on this contaminated planet, http://members.fortunecity.com/osservatorio/charleshyderbook2.html //STRONG]

It is in that context, and in the inescapable belief and conviction that the operation of WIPP will lead to Human Extinction if even 1/100 of the WIPPu reaches the biosphere. That may occur soon: e.g. during the 30 yrs. of radioactive transport accidents; or a prompt Radioactive Brine/Gas Geyser Erupt; or a "Karst Connection" for water to scour WIPP in 10 to 100 years; or ... during the next 30,000 years. So, WIPP operation gets "National/Global Emergency" status. Thus, I charge that the DOE, the AEC, et al. have been guilty of Treason for Intentionally Withholding Crucial, Relevant Evidence about the real biological Hazards of Radioactivity from the U.S. President, from the U.S. Congress, from their own workers, and from "The People" throughout most of my long life. The Global Amphibian Extinctions are Chernobyl's ominous Legacy: Their Deaths are an "Epitaph by Example" for Humans.