Nuclear Propulsion Neg

[Nuclear Propulsion Neg 1](#_Toc298158568)

[\*\*Weaponization/Space Race 3](#_Toc298158569)

[Nukes = Weaponization 4](#_Toc298158570)

[Nukes = Weaponization – Star Wars 5](#_Toc298158571)

[Nukes = Space Race 6](#_Toc298158572)

[Weaponization = Space Race 7](#_Toc298158573)

[Space Race Bad – China 8](#_Toc298158574)

[Space Race Bad – China 9](#_Toc298158575)

[Space Race Bad – Link Magnifier – China 10](#_Toc298158576)

[Space Race Bad – China UQ 11](#_Toc298158577)

[Space Race Bad – Russia 12](#_Toc298158578)

[Space Race Bad – Russia 13](#_Toc298158579)

[Space Race Bad – Russia – Weaponization 14](#_Toc298158580)

[Space Race Bad – Russia UQ 15](#_Toc298158581)

[Space Race Bad – Russia I/L – Relations 16](#_Toc298158582)

[Space Race ! – Russia Relations 17](#_Toc298158583)

[Space Race ! – Russia 18](#_Toc298158584)

[Space Race ! – Uq 19](#_Toc298158585)

[Space Race ! – Uq 20](#_Toc298158586)

[Space Race ! – UQ – Russia/China Alliance Down 21](#_Toc298158587)

[Space Race ! – Russia/China 22](#_Toc298158588)

[Space Race ! – Russia/China – Hegemony 23](#_Toc298158589)

[Space Race ! – Russia/China – Hegemony 24](#_Toc298158590)

[Space Race ! – China – Nuclear War 25](#_Toc298158591)

[Space Race ! – China 26](#_Toc298158592)

[Space Race ! – China – Modernization Module 27](#_Toc298158593)

[Space Race ! – China – Modernization Module 28](#_Toc298158594)

[Space Race ! – China – Modernization Module 29](#_Toc298158595)

[Space Race ! – China – Relations 30](#_Toc298158596)

[Space Race ! – China – Relations 31](#_Toc298158597)

[Space Race ! – China – ASATs Module 32](#_Toc298158598)

[Space Race ! – China – ASATs Link Ext. 33](#_Toc298158599)

[Space Race ! – General 34](#_Toc298158600)

[\*\*Accidents D/A 35](#_Toc298158601)

[Accidents 1NC 36](#_Toc298158602)

[Accidents Link 37](#_Toc298158603)

[Accidents Link 38](#_Toc298158604)

[Accidents – ! Helper 39](#_Toc298158605)

[Accidents ! 40](#_Toc298158606)

[Accidents ! 41](#_Toc298158607)

[Accidents ! 42](#_Toc298158608)

[\*\*Production D/As 44](#_Toc298158609)

[Uq – Plutonium Production 45](#_Toc298158610)

[Contamination D/A 46](#_Toc298158611)

[Natives D/A 47](#_Toc298158612)

[Natives D/A 48](#_Toc298158613)

[Natives D/A Ext. 49](#_Toc298158614)

[Natives D/A Ext. 50](#_Toc298158615)

[Testing = Radiation 51](#_Toc298158616)

[Radiation ! – Extinction 52](#_Toc298158617)

[\*\*PTBT/CTBT D/A 53](#_Toc298158618)

[CTBT 1NC 54](#_Toc298158619)

[CTBT 1NC 55](#_Toc298158620)

[CTBT Uq 56](#_Toc298158621)

[PTBT Link 57](#_Toc298158622)

[PTBT 🡪 CTBT I/L 58](#_Toc298158623)

[PTBT ! – Prolif 59](#_Toc298158624)

[CTBT ! – Prolif 60](#_Toc298158625)

[CTBT ! – Multilat 61](#_Toc298158626)

[CTBT ! – Iran/NK Nuclearization 62](#_Toc298158627)

[CTBT ! – Disarm 63](#_Toc298158628)

[CTBT ! – Heg 64](#_Toc298158629)

[CTBT ! – A2 – ! Turns 65](#_Toc298158630)

[Testing ! 66](#_Toc298158631)

[\*\*Politics 67](#_Toc298158632)

[Obama Pushing Nukez Now 68](#_Toc298158633)

[Politics Link 69](#_Toc298158634)

[Politics Link 70](#_Toc298158635)

[Politics Link – Public 71](#_Toc298158636)

[Politics Link – Public 72](#_Toc298158637)

[Politics Internal – Anti-Nuclear Lobby 73](#_Toc298158638)

[Politics Internal – Anti-Nuclear Lobby – A2 – Turns 74](#_Toc298158639)

[Politics Link – Spin 75](#_Toc298158640)

[Politics Link – Appropriations 76](#_Toc298158641)

[Politics Internal – Appropriations Powerful 77](#_Toc298158642)

[Link Turn – Politics – Nuclear Lobby 78](#_Toc298158643)

[Politics Internal – Nuclear Lobbies Key 79](#_Toc298158644)

[Politics Internal – Nuclear Lobbies 80](#_Toc298158645)

[Politics Internal – Nuclear Lobbies – A2 – Turns 81](#_Toc298158646)

[Link Turn – Politics – Defense Lobby 82](#_Toc298158647)

[Link Turn – Politics – Defense Lobby Key 83](#_Toc298158648)

[\*\*Spending/Trade-Off 84](#_Toc298158649)

[Spending Link 85](#_Toc298158650)

[Spending Link 86](#_Toc298158651)

[Spending Link 87](#_Toc298158652)

[Spending Link 88](#_Toc298158653)

[Spending Link 89](#_Toc298158654)

[AT: Spending Link Turn 90](#_Toc298158655)

[AT: Spending Link Turn 91](#_Toc298158656)

[Intra NASA T/O D/A 92](#_Toc298158657)

[Trade Off Link 93](#_Toc298158658)

[Trade Off Link 94](#_Toc298158659)

[\*\*Solvency 95](#_Toc298158660)

[Solvency – General 96](#_Toc298158661)

[Solvency – General 97](#_Toc298158662)

[Solvency – Technology 98](#_Toc298158663)

[Solvency – Propulsion = Inefficient 99](#_Toc298158664)

[Solvency – Empirics 100](#_Toc298158665)

[Solvency – Weight 101](#_Toc298158666)

[Solvency – Pusher Plate 102](#_Toc298158667)

[Solvency – Exaggeration 103](#_Toc298158668)

[Solvency – Heat 104](#_Toc298158669)

[Solvency – NASA = Bad 105](#_Toc298158670)

[Solvency – Launch Failure 106](#_Toc298158671)

[Solvency – Misc 107](#_Toc298158672)

[Solvency – Timeframe 108](#_Toc298158673)

[Solvency – Timeframe 109](#_Toc298158674)

[Solvency – Turn Magnifier 110](#_Toc298158675)

[Solvency – Plutonium 111](#_Toc298158676)

[Solvency – A2 – Foust 112](#_Toc298158677)

[Solvency – A2 – Freeman Dyson 113](#_Toc298158678)

[\*\*EMP D/A 114](#_Toc298158679)

[EMP Shell (1/2) 115](#_Toc298158680)

[EMP Shell (2/2) 116](#_Toc298158681)

[EMP Link 117](#_Toc298158682)

[EMP Link 118](#_Toc298158683)

[EMP Link – Fission 119](#_Toc298158684)

[EMP ! – Econ 120](#_Toc298158685)

[EMP ! – Econ 121](#_Toc298158686)

[EMP ! – Satellites Module (1/2) 122](#_Toc298158687)

[EMP ! – Satellites Module (2/2) 123](#_Toc298158688)

[EMP ! – Sats Impacts – Heg & Econ 124](#_Toc298158689)

[EMP ! – Sats Impacts – Heg & Econ 125](#_Toc298158690)

[EMP ! – Hegemony 126](#_Toc298158691)

[EMP ! – General – Biological Weapons Module 127](#_Toc298158692)

[EMP ! – General 128](#_Toc298158693)

[EMP ! – General 129](#_Toc298158694)

[EMP ! – General 130](#_Toc298158695)

[EMP ! – Helpers 131](#_Toc298158696)

[EMP ! – Grid Failure 132](#_Toc298158697)

[\*\*HEU Trade-Off D/A 133](#_Toc298158698)

[HEU – 1NC 134](#_Toc298158699)

[HEU – 1NC 135](#_Toc298158700)

[HEU – Uq 136](#_Toc298158701)

[HEU – Uq 137](#_Toc298158702)

[HEU – Uq 138](#_Toc298158703)

[HEU – Link 139](#_Toc298158704)

[HEU – Internal – Shortages = Delays 140](#_Toc298158705)

[HEU – Cancer ! 141](#_Toc298158706)

[HEU – A2 – X-Rays Solve 142](#_Toc298158707)

[HEU – A2 – “Other Isotopes Solve” 143](#_Toc298158708)

[HEU – A2 – “You Don’t Use U-238” 144](#_Toc298158709)

[HEU – A2 – New Facilities 145](#_Toc298158710)

[\*\*Atmosphere DA 146](#_Toc298158711)

[Atmosphere DA (1/2) 147](#_Toc298158712)

[Atmosphere DA (2/2) 148](#_Toc298158713)

[Atmosphere DA – UQ 149](#_Toc298158714)

[Atmosphere DA – Link 150](#_Toc298158715)

[Atmosphere DA – Link 151](#_Toc298158716)

[Atmosphere DA – Link 152](#_Toc298158717)

[Atmosphere DA – Link Magnifiers 153](#_Toc298158718)

[Atmosphere ! – Warming 154](#_Toc298158719)

[Atmosphere ! – Warming 155](#_Toc298158720)

[Atmosphere ! – Pakistan 156](#_Toc298158721)

[Atmosphere ! – Pakistan 157](#_Toc298158722)

[Atmosphere ! – Pakistan 158](#_Toc298158723)

[Atmosphere ! – Impact 159](#_Toc298158724)

[Atmosphere DA – Terminal Impact 160](#_Toc298158725)

[\*\*CPs 161](#_Toc298158726)

[Solar CP – General 162](#_Toc298158727)

[Solar CP – General 163](#_Toc298158728)

[Solar CP – General 164](#_Toc298158729)

[Solar CP – Weaponization Solvency 165](#_Toc298158730)

[Solar Cp – Exploration Solvency 166](#_Toc298158731)

[Solar CP – Deep Space Solvency 167](#_Toc298158732)

[Solar CP – General/Politics = NB 168](#_Toc298158733)

[Solar CP – Obama Bad = NB 169](#_Toc298158734)

[Solar CP – Obama Good = NB 170](#_Toc298158735)

[Solar CP – Obama Good = NB 171](#_Toc298158736)

[Solar CP – Obama Good = NB 172](#_Toc298158737)

[NSWR CP 173](#_Toc298158738)

[ESA CP – General 174](#_Toc298158739)

[ESA CP – General 175](#_Toc298158740)

[\*\*Misc 176](#_Toc298158741)

[AT: Nuclear Inevitable 177](#_Toc298158742)

[AT: Nuclear Inevitable 178](#_Toc298158743)

[Uq – No Plutonium 179](#_Toc298158744)

[Normal Means = Plutonium 180](#_Toc298158745)

[Satellites D/A 181](#_Toc298158746)

[I-Law/OST Link 182](#_Toc298158747)

[A2 – Space Hegemony Adv 183](#_Toc298158748)

[A2 – Space Hegemony Adv 184](#_Toc298158749)

[A2 – Space Hegemony Adv – Int’l Public Backlash 185](#_Toc298158750)

[A2 – Asteroid/Comet Adv 186](#_Toc298158751)

[A2 – Other Solar Systems Adv 187](#_Toc298158752)

[A2 – Weaponization Adv 188](#_Toc298158753)

\*\*Weaponization/Space Race

Nukes = Weaponization

The Pentagon will use nuclear rockets for space weaponization

GNAWNPS 5 (Global Network Against Weapons & Nuclear Power in Space, 5/31/5, http://www.thepowerhour.com/news/space\_statement.htm) JPG

The Pentagon has long maintained they need nuclear reactors in order to provide the enormous power required for weapons in space.  In a Congressional study entitled Military Space Forces: The Next 50 Years it was reported that "Nuclear reactors thus remain the only know long-lived, compact source able to supply military forces with electric power...Larger versions could meet multimegawatt needs of space-based lasers....Nuclear reactors must support major bases on the moon..."  In an article printed in the Idaho Statesman on April 20, 1992 military officials stated "The Air Force is not developing [the nuclear rocket] for space exploration.  They're looking at it to deliver payloads to space."  Considering that NASA says all of their space missions will now be "dual use," meaning every mission will be both military and civilian at the same time, it is important to ask what the military application of the Project Prometheus will be.

Nuclear rockets are a Trojan horse for space militarization

Gagnon 3 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, 1/27/3, http://www.spacedaily.com/news/nuclearspace-03b.html) JPG

Critics of NASA have long stated that in addition to potential health concerns from radiation exposure, the NASA space nukes initiative represents the Bush administration's covert move to develop power systems for space-based weapons such as lasers on satellites. The military has often stated that their planned lasers in space will require enormous power projection capability and that nuclear reactors in orbit are the only practical way of providing such power. The Global Network Against Weapons & Nuclear Power in Space maintains that just like missile defense is a Trojan horse for the Pentagon's real agenda for control and domination of space, NASA's nuclear rocket is a Trojan horse for the militarization of space. NASA's new chief, former Navy Secretary Sean O'Keefe said soon after Bush appointed him to head the space agency that, "I don't think we have a choice, I think it's imperative that we have a more direct association between the Defense Department and NASA. Technology has taken us to a point where you really can't differentiate between that which is purely military in application and those capabilities which are civil and commercial in nature."

Nuclear propulsion guarantees space weaponization – civilian sector will be coopted by the military

Grossman 4 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, Earth First Journal, March-April 2004, http://westgatehouse.com/art154.html) JPG

Space nuclear power also has boosters among the military, which has been considering space-based weapons--devices that need substantial amounts of power. Additionally, the military has been interested in nuclear-powered rockets. In the late 1980s, an earlier series of nuclear rocket projects was first revived with Project Timberwind, a program to build atomic rockets to loft heavy Star Wars equipment and also for trips to Mars. This kind of "dual use" now runs through all NASA operations, says Bruce Gagnon, coordinator of the Global Network Against Weapons and Nuclear Power in Space. "Right after Bush swore the new NASA chief into office, O'Keefe told the nation that from now on every mission would be dual use. By that he meant that every mission would carry military and civilian payloads at the same time. This is further evidence that the space program has been taken over by the Pentagon." "Space is viewed today," says Gagnon, "as open territory to be seized for eventual corporate profit" and for US military control. Gagnon speaks of proposals to "mine the sky"--to extract minerals from celestial bodies, with the moon considered a prime source for rare Helium-3. This elemental substance would be brought back to Earth to fuel supposedly cleaner fusion-power reactors. Gagnon says that the US military wants to establish bases in space, including on the moon, to protect these operations and to control the "shipping lanes of the future." "The Bush space plan will be enormously expensive, dangerous and will create unnecessary conflict as it expands nuclear power and weapons into space," notes Gagnon, "all disguised as the noble effort to hunt for the 'origins of life'."

Nukes = Weaponization – Star Wars

Star wars is contingent upon nuclear propulsion

Grossman 97 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 2/3/97, http://www.flybynews.com/archives/karl/kg9105we.htm) JPG

Star Wars is contingent on the launching of 100 orbiting battle platforms, each with a large nuclear reactor to provide power for its laser weapons, hypervelocity guns and particle beams. GE is now busy manufacturing what is to be the main Star Wars space reactor, the SP-100. In coming days, the Synthesis Group, a panel established last year (1990) by NASA and the White House, is expected to recommend nuclear-powered rockets for the manned Moon-Mars missions proposed by President George Bush. And the Pentagon, amid great secrecy to avoid public objections (not for national defense reasons) is developing a nuclear-propelled rocket to haul Star Wars weaponry into space. To spread radioactivity, a nuclear-propelled rocket need not crash back to Earth. As they fly, these rockets would inevitably trail clouds of radioactivity in their exhaust. A flight test in space above Antarctica is being planned for the Star Wars nuclear rocket. It seems the location was chosen so that if there is a malfunction, the chief victims would be penguins. Unfortuntely, New Zealand also gets in the way. One U.S. government study says that the likelihood of the nuclear-powered rocket crashing into New Zealand is 1 in 2,325. This may sound like fairly good odds, but remember, NASA put the odds of a space shuttle crash at 1 in 100,000, before the Challenger exploded.

Nuclear propulsion would lead to Star Wars

Broad 91 (William, writer @ NYT, 4/3/91, http://www.nytimes.com/1991/04/03/us/secret-nuclear-powered-rocket-being-developed-for-star-wars.html) JPG

In great secrecy, the Pentagon is developing a nuclear-powered rocket for hauling giant weapons and other military payloads into space as part of the "Star Wars" program. The goal is to build a special type of nuclear reactor that would power engines far more energetic than any rocket engines now in use, allowing very large and heavy payloads to be lofted high above the earth. The program was disclosed by the Federation of American Scientists, a private group based in Washington that has opposed the "Star Wars" anti-missile program and some uses of space reactors. The existence of the secret effort was confirmed by internal Government documents obtained by The New York Times.

NASA and the DoD are intertwined

Broad 91 (William, writer @ NYT, 4/3/91, http://www.nytimes.com/1991/04/03/us/secret-nuclear-powered-rocket-being-developed-for-star-wars.html) JPG

While currently run by the Defense Department, the effort is being quietly evaluated by the National Aeronautics and Space Administration, which is considering nuclear reactors to power a manned mission to Mars.

Nukes = Space Race

Developing nuclear propulsion causes a global space race

Smith 3 (Wayne, writer @ SpaceDaily, 1/28/3, http://www.spacedaily.com/news/nuclearspace-03d.html) JPG

How will other nations react to this startlingly bold new objective? The nuclear initiative was first announced over a year ago with NASA requesting a billion dollar funding over five years for nuclear space research and development. Little response was generated overseas as nuclear power in the form of RTG's (Radioisotope Thermionic Generators) for space probes and satellites is nothing new. However, the latest announcement places nuclear power at the forefront of future space development. Spacefaring nations such as the European Union and Russia cannot ignore this challenge. In particular the newest emerging superpower, China, will closely watch how events unfurl. In just over three years, China has gone from Satellite launches to planning a human spaceflight in October of this year. This remarkably rapid advancement was spurred by the realization of the strategic importance of space. Space will be central to tomorrow's world order and national security dictates that a space presence is a sign of strength. Huang Chunping, commander-in-chief of the chinese Shenxhou space launch program has said, "Just imagine, there are outer space facilities of another country at the place very, very high above your head, and so others clearly see what you are doing, and what you are feeling. That's why we also need to develop space technology." Clearly the Chinese have more on their minds than national prestige in attempting to become the third nation to ever have launched a man into space. Manned aerospace is the epitome of space technology. National prestige is clearly an important consideration, and one which westerners can easily relate to as they fondly reminisce about the moon landings. However, the military implications are just as important, if not greater, a consideration. China has already invested too much money into developing a space launch capability to consider pulling back now. In past interviews, they have announced the intention to build space stations, reach the moon and build bases there, and even boasted they will beat the United States with a manned mission to Mars. Their Shenxhou launch system has been played down by critics as primitive but is probably level with 1990's US technology. The fact is we are still using 1990's US technology. The big Saturn V boosters America once used for moonshots are now all gone and funding for NASA's ailing programs such as the ISS have been diminishing annually. With Russia suffering economic problems and the ESA unsure of its future, China seems to be on an inside straight to success. However, Prometheus changes everything. NASA is "moving from windpower to steam" as Sean O'Keefe puts it and that may leave China suddenly out in the cold. Unless of course, they respond with their own nuclear space program. China and Russia have been increasing ties for a number of years now. Space and Arms technology trade in particular have increased due to new treaties. The Russians, who launched more nuclear reactors than the US, are no strangers to nuclear space technology having had their own shadowy nuclear propulsion program -- which no doubt compared very favourably to past US efforts. If pushed to develop their own nuclear space initiative, the Chinese will likely enquire of Russia for help. The Russians, in turn, will demand a high cost for such secret technology, just as they have done for all previously purchased space systems technologies. China will either pay or attempt to develop their own. China, also no stranger to nuclear power, has stated owned national nuclear facilities and a state owned space programme. Efforts at combining nuclear and space branches of Government will face very little red tape within a communist regime. A chinese INSPI or Los Alamos seems very possible. The China Daily reports that China has spent 2.3 billion US dollars toward putting a man into space in October of this year -- and that is only the beginning of their ambitions.

Colonization causes a space race which escalates to conflict

Bailey 6 (Jonathan, read history @ U of Oxford, Dec 20, [www.idebate.org/debatabase/topic\_details.php?topicID=324] AD: 7-8-11, jam)

Sending humans into space or to other planets so that they can erect the flag of a particular nation is a distinctly nationalistic act and one that is likely to create aggressive 'races' in the future just as it has before. China’s manned programme is openly intended to challenge the US dominance of space for the Communist regime’s huge propaganda benefit. George W. Bush’s pledge to boost spending on NASA and to restart the manned mission to Mars programme was a direct response. This is damaging not only because of the potential for space race conflicts to escalate into greater international hostility, but also because of the way such races could result in the militarization of space (as several Chinese hawks have called on the leadership to do), thereby turning something which should be preserved for the common good of humankind into a neo-colonial battlefield.

Weaponization = Space Race

Weaponization causes a space race

Rozoff 9 (Rick, writer @ Global Research, 6/19/9, http://usa.mediamonitors.net/content/view/full/63616) JPG

An Associated Press report published shortly after the above said that:

"The Kremlin has criticized U.S. plans for space-based weapons, saying they could trigger a new arms race. Russia and China have pushed for an international agreement banning space weapons, but their proposals have been rejected by the United States."As part of missile defense plans developed by the previous U.S. administration, the Pentagon worked on missiles, ground lasers and other technology to shoot down satellites." [16] Two days later Russian Foreign Minister Sergey Lavrov spoke at a disarmament conference in Geneva, Switzerland and warned that "an arms race in outer space is inadmissible," adding that "Prevention of an arms race in space will contribute to ensuring the predictability of the strategic situation" and "We plan, jointly with China, to submit to your consideration soon a document generalizing the results of discussions that have taken place at the conference." [17]

Space Race Bad – China

Space race isn’t inevitable – plan causes china to perceive US space militarization – space race

Yoshihara 3 (Toshi, writer @ The Boston Globe, 10/16/3, http://nuclearno.com/text.asp?6998) JPG

First, China views US intentions in space with great suspicion. Washington`s declaration that it intends to maintain overwhelming space superiority above all other nations (and perhaps militarize space in the process) does not sit well with the Chinese. Second, Beijing perceives the proposed US antimissile defense plan, which will be supported by an array of space systems, as a strategic menace to China. Any conceivable missile defense system would threaten to blunt China`s modest arsenal of strategic nuclear weapons and thereby erode its delicate deterrent posture vis-a-vis the United States. Third, China will increasingly need military space capabilities if it is to improve its ability to coerce Taiwan in a conflict and counter US intervention to defend the island in a future crisis or conflict. Above all, China enjoys the resources and boasts the political will to invest in space over the long term. As such, even if China does not pose a credible threat to the United States, perceptions that the Chinese may eventually challenge US space supremacy could spur Washington to view Beijing as a future rival in space. In other words, Chinese apprehensions of US space dominance might easily be reciprocated. Does this mean that a Sino-US space race is just over the horizon? America`s current technological lead ensures that a Cold War-style competition will not likely transpire, in the short term at least. However, as mutual apprehension and threat perceptions heighten, both sides could seek to undermine each other in space. The resulting efforts to outdo each other could prove costly and destabilizing to international security. This scenario is by no means inevitable. Both sides ought to shape this new dimension in Sino-US relations for mutual benefit. Indeed, fostering healthy competition and promoting cooperation would go a long way toward alleviating the pressures to compete.

Plan is perceived as space militarization – causes space competition and nuclear brinksmanship

Martel and Yoshihara 3 (William – Natl security prof @ Naval War College & Toshi, Research fellow @ Inst. For Foreign Policy Analysis, Fall 2003, http://www.cfr.org/china/washington-quarterly-averting-sino-us-space-race/p12158) JPG

Strategists in the United States and in China are clearly monitoring the other’s developments in space. How the United States judges Chinese intentions and capabilities will determine Washington’s response; of course, the reverse is equally true. As each side eyes the other, the potential for mutual misperceptions can have serious and destabilizing consequences in the long term. In particular, both countries’ exaggerated views of each other could lead unnecessarily to competitive action-reaction cycles. What exactly does such an action-reaction cycle mean? What would a bilateral space race look like? Hypothetically, in the next 10 years, some critical sectors of China’s economy and military could become increasingly vulnerable to disruptions in space. During this same period, Sino-U.S. relations may not improve appreciably, and the Taiwan question could remain unresolved. If Washington and Beijing could increasingly hold each other’s space infrastructure hostage by threatening to use military options in times of crisis, then potentially risky paths to preemption could emerge in the policy planning processes in both capitals. In preparing for a major contingency in the Taiwan Strait, both the United States and China might be compelled to plan for a disabling, blinding attack on the other’s space systems before the onset of hostilities. The most troubling dimension to this scenario is that some elements of preemption (already evident in U.S. global doctrine) could become a permanent feature of U.S. and Chinese strategies in space. Indeed, Chinese strategic writings today suggest that the leadership in Beijing believes that preemption is the rational way to prevent future U.S. military intervention. If leaders in Beijing and Washington were to position themselves to preempt each other, then the two sides would enter an era of mutual hostility, one that might include destabilizing, hair-trigger defense postures in space where both sides stand ready to launch a first strike on a moment’s notice. One scenario involves the use of weapons, such as lasers or jammers, which seek to blind sensors on imaging satellites or disable satellites that provide warning of missile launches. Imagine, for example, Washington’s reaction if China disabled U.S. missile warning satellites or vice versa. In that case, Sino-U.S. relations would be highly vulnerable to the misinterpretations and miscalculations that could lead to a conflict in space. Although attacks against space assets would likely be a precursor or a complement to a broader crisis or conflict, and although conflicts in the space theater may not generate many casualties or massive physical destruction, the economic costs of conflict in space alone for both sides, and for the international community, would be extraordinary given that many states depend on satellites for their economic well-being.

Space Race Bad – China

Orion will start a space race with China

Reynolds 2 (Glenn Harlan, Beauchamp Brogan Distinguished Professor of Law at the University of Tennessee, Sep 18, [www.ideasinactiontv.com/tcs\_daily/2002/09/the-new-space-race.html] AD: 7-9-11, jam)

Last week, I wrote about Orion, the nuclear-pulse-powered spacecraft (well, really, a nuclear-explosion-powered spacecraft) and suggested that it might be the favored tool of junior powers looking to leapfrog the United States' position in outer space. This week I'm going to outline just how that might happen. Imagine that you're, say, China. Used to thinking of your nation as the center of the world for thousands of years, and still, at some level, regarding China's relative impotence and backwardness over the past two or three centuries as a mere interlude in history, you'd like to restore things to what you consider normal. You could, of course, become a liberal capitalist democracy, free up your citizens' talents and energy, and let the resulting wealth turn you into a superpower over a few decades. And there's always the hope that China will follow this very path, as India (most of the time, at least) appears to be doing. But the problem with the liberal-democracy route is that it may make the nation as a whole richer and more powerful, but it will endanger the positions and power of a lot of people along the way. That sort of thing makes the command-economy, big-project, military-industrial approach an appealing alternative. At any rate, a China (or, for that matter, perhaps even an India) looking to make a splash and anxious to get around the United States' supremacy in military (and civilian) space activity might well consider Orion to be appealing. China is not a signatory to the Limited Test Ban Treaty, which bars nuclear explosions in the atmosphere and outer space, so that legal barrier would be out of the way. China has acceded to the 1967 Outer Space Treaty, but that treaty bans only the stationing of nuclear "weapons" in outer space, and there is a plausible argument that nuclear explosives designed to propel a spacecraft are not "weapons" for the purposes of the Treaty. With international law thus neutralized, the only remedy would be for people to either (1) start a war; or, short of that, (2) to threaten to shoot down the spacecraft, which probably would amount to starting a war anyway. (Jimmy Carter, the least bellicose of American presidents, said that an attack on a U.S. satellite or spacecraft would be treated as an act of war, and it seems unlikely that the Chinese would take a more pacific approach than Carter.) And even if shooting down the spacecraft were thought unlikely to lead to war, it would be unlikely to succeed - the Orion spacecraft would be huge, fast, and designed to survive in the neighborhood of a nuclear explosion: a very difficult target indeed. The chief restraint on China would thus be world opinion, something to which the Chinese have not shown themselves particularly susceptible. This would be especially true if the Chinese sprung it as a surprise, which they very well might. Much of the physics and engineering behind Orion is already well-known, and - given that American designers working with puny 1960-vintage computer technology saw the problems as tractable - it's very likely that the Chinese could manage to design and build an Orion craft within a few years of deciding to. Hiding Orion-related work probably wouldn't be very hard, either. China already has extensive space and nuclear-weapons programs, which would tend to conceal the existence of Orion-type research. And much of the necessary research and design work on Orion - involving, as it does, things like the resonance of huge steel plates and massive hydraulic shock absorbers - wouldn't look like space-related research even to an American intelligence agency that discovered it. At least, not unless the intelligence analysts were familiar with Orion, and had the possibility in mind. And how likely is that? Will we wake up one day to find that a 4,000-ton Chinese spacecraft has climbed to orbit from Inner Mongolia on a pillar of nuclear fireballs and is now heading to establish a base on the Moon? It wouldn't be the first time America has had such a surprise, now would it?

Space Race Bad – Link Magnifier – China

The threshold is low – China perceive the plan aggressively

Yoshihara 3 (Toshi, the John A. van Beuren Chair of Asia-Pacific Studies @ U.S Naval War College, Oct 16, [nuclearno.com/text.asp?6998] AD: 7-9-11, jam)

But, for once, its self-promotion is well deserved. Indeed, this first step into space promises more economic and technological advances for China while burnishing the prestige of a ruling regime still in search of an alternative to its ailing communist ideology. However, amid the fanfare, a more important implication of this technological feat is being drowned out -- the military dimension of China`s space program and its potential challenges to US national security interests. Indeed, China`s rise as a major space power is already being perceived in Washington as a looming challenge to US space supremacy. It is no secret that the Chinese military controls the resources and the direction of China`s space program. From the program`s inception, China`s space ambitions have been couched in strategic terms. And the dual-use nature of space technologies means that most advances in the civilian space sector -- about 95 percent -- can be converted for military purposes. How then, do the military aspects of China`s space program intersect with US national security interests? First, China views US intentions in space with great suspicion. Washington`s declaration that it intends to maintain overwhelming space superiority above all other nations (and perhaps militarize space in the process) does not sit well with the Chinese.

Space wars escalate quickly and spread to earth

Clary and Krepon 3 (Christopher Clary – south asian defense specialist @ Council on Foreign Relations, and Michael Krepon – Politics prof @ Virginia U, 4/2/3, http://www.stimson.org/images/uploads/research-pdfs/spacefront.pdf) JPG

The inherent escalatory potential of satellite warfare between the United States and a major power such as China is exposed by such anodyne calculations. Any analysis of this scenario for preemptive attacks on space assets—whether initiated by the United States or by China—cannot assume that strikes would be confined to satellites. Moreover, escalation control in this scenario must be considered a highly dubious proposition. After all, the purpose of attacking objects in space, or attacking terrestrial targets from space, is to affect the conduct of military operations on Earth. It is therefore exceedingly hard to envision warfare in space that does not spread elsewhere, whether by asymmetric, conventional, or unconventional means. The resulting combat is likely to be less discriminating and proportional, and far more lethal, either because the stronger party has lost satellites used for targeting and precision guidance, or because the weaker party is unlikely to be concerned about collateral damage. Concepts of limited warfare and escalation control that were intimately associated with nuclear deterrence during the Cold War have not been propounded by U.S. advocates of space warfare. To engage in tit-for-tat, controlled warfare against satellites would suggest that the first kill of a satellite in the history of armed conflict would reflect a mere quest for balance or a novel form of message sending. The rationales provided by proponents of space control are notably different. The object of acquiring space warfare capabilities is to win, not to tie. In other words, U.S. advocates of space warfare capabilities are less interested in deterrence than in dominance and compellance.

Space Race Bad – China UQ

China is undecided between a civilian and military space program – they’re watching the US to decide

Levine 9 (Adam, writer @ CNN, 11/18/9, http://articles.cnn.com/2009-11-18/tech/china.space\_1\_china-views-chinese-officials-xinhua?\_s=PM:TECH) JPG

The United States is still ahead in space development, but China has been making impressive progress in expanding its own program -- and it has not gone unnoticed. "I think anyone who's familiar with the space business, and particularly the history, our history in the space business over the years, would have to be absolutely amazed at the advancements that China has made in such a short period of time," said Gen. Kevin Chilton, head of the U.S. Strategic Command, which is in charge of the military's space operations. "They certainly are on a fast track to improve their capabilities," Chilton said in early November. "They're to be commended for the achievements that they've done in such a short period of time." China's intentions in space are a matter of great interest to the United States. The Pentagon is trying to encourage more transparency by the communist country and last month hosted a delegation that included Gen. Xu Caihou of China's Central Military Commission. Xu met with Defense Secretary Robert Gates and toured various U.S. installations, including STRATCOM, which oversees space, cyberspace and nuclear military operations. "Where they're heading, I think, is one of the things that a lot of people would like to understand better," Chilton said. He would not speak in detail about any of the discussions between U.S. and Chinese officials. Any hope for transparency will be tough to come by. China itself may not have a handle on its intentions, said Roger Cliff, a Chinese military analyst at RAND, a global policy think tank. Cliff said there is an internal struggle within the Chinese military for who will control the space mission. China's president has said its space efforts are "peaceful." But a top Chinese military official spoke of offensive and defensive capabilities in space because "only power could protect peace," Chinese air force Cmdr. Xu Quiliang told the Xinhua news agency. "It is not clear, and in part the reason for that is because China isn't clear where it is going in space, because they are still arguing it out," Cliff said. Also, transparency is in the eye of the beholder, Cliff noted. For China, transparency "is a luxury of the superior military power."

Peaceful cooperation on space between China and the U.S now

Whitesides 8 (Loretta, space advocate, consultant and former astrobiologist, Sep 8, [www.wired.com/wiredscience/2008/09/the-new-red-sca/] AD: 7-9-11, jam)

Science has long been an important diplomatic tie between nations with strained relationships. It is encouraging to see NASA formally establishing cooperative agreements with China on space and earth science and putting in the foundation for long term possibilities. Cooperation may not be as exciting as a space race would be, but seeing all the nations of the world work together peacefully to put the first woman on the moon would be absolutely awe-inspiring. Why? Not because it is easy, but because it is hard. When Kennedy first said it, the challenges were technical, now they are human. But the result would be the same: People being inspired by what we can accomplish when we set a seemingly impossible goal.

Space Race Bad – Russia

Orion creates a US-Russia space race

Madrigal 9 (Alexis, tech writer @ portfolio, 11/3/9, http://www.portfolio.com/views/blogs/the-tech-observer/2009/11/03/russia-winning-nuclear-space-race/index.html) JPG

Other, more-fanciful nuclear propulsion ideas were proposed too. One, Project Orion, would have been powered by nuclear bombs. The physicist Freeman Dyson, who worked on the project, told the New York Times Magazine he saw it “as the solution to a problem. With one trip we’d have got rid of 2,000 bombs.” “Orion was a delightful scientific exercise, but not very feasible,” McDaniel said. These various technologies cost money to develop, of course, and the scale of the cash that flowed their way shows how seriously Americans took nuclear propulsion. Between 1955 and 1972, the United States spent more than $1.4 billion in then-year dollars on developing nuclear rockets and related technologies. At the end of that period, when the Nixon administration cut NASA’s budget generally and NERVA’s specifically, the United States was well on its way to developing nuclear power for spacefaring and space purposes. “It is indeed remarkable that the adoption of the Rover–NERVA database, upgraded and modernized by current rocket-engine technology, would fully satisfy NASA’s space-transfer propulsion and long-distance-exploration requirements and permit realization of a safe and low programmatic risk development programme,” wrote Stanley Gunn, who worked on the nuclear propulsion program for Rocketdyne, in a 2001 article for Space Policy. There were several attempts to resurrect nuclear propulsion of various types, most recently the mothballed Project Prometheus. None, though, have garnered much support. One major reason is that NASA picks its propulsion systems based on its targets—and true exploration of the solar system and beyond hasn’t really been a serious goal, though the Constellation plans for a return to the moon. “The destinations dictate the power system,” said Rao Surampudi, a Jet Propulsion Laboratory engineer who works on the development of power systems. By and large, it’s cheaper and easier to go with solar power or very low-power radioisotope generators like the one that powers the Cassini mission. McDaniel agreed that the targets drive things, citing the general decline of pure technology-development research at NASA. “Until we commit to going back to Mars, we’re not going to have a nuclear rocket,” McDaniel said. Or perhaps a new nuclear-powered Russian spacecraft could get anxious minds at the Pentagon and NASA worrying about the need to keep pace with the Ivanovs. After all, the Soviet nuclear-rocket program may have been more advanced than the American efforts at the time of the USSR’s collapse.

Nuclear propulsion causes a US-Russo space race

Hakola 10 (Christine Brown, writer @ NASA Watch, 12/29/10, http://sites.google.com/site/thevirtualresidency/nasa-or-should-we-start-saying-starfleet-watch/russiachallengesearthscountriestonuclearspacerace) JPG

Russia plans to send a revolutionary nuclear rocket engine into the skies sometime after 2012 to begin exploring the deepest parts of space in our galaxy, and in a global challenge, they offer a Space Race unmatched since the 1960s to Mars. "Chernobyl in the sky?" one reporter stated the obvious risks, and what everyone must be thinking to themselves. Although risks are high, the United States has their own nuclear rocket engine design as well. How will we get supplies and people to planets like Mars for "Terra-Forming" as is already being planned for one day in the future?

Developing nuclear propulsion reinvigorates the space race

Vieru 9 (Tudor, science writer @ softpedia, 11/5/9, http://news.softpedia.com/news/Russia-To-Dominate-Nuclear-Space-Race-126245.shtml) JPG

Top officials in the Russian Federation announced on Thursday that they gave their acceptance to a proposal stating that the country should pursue the development of a nuclear-powered spacecraft, which is currently set to fly as early as 2012. This would essentially leave the former Communist nation in charge of the nuclear space race, as the United States continue to lose their role as the dominating force in space today. According to Russian scientists, building the new spacecraft could cost as much as $600 million, Wired reports. “The idea [of nuclear-powered spaceflight] has bright prospects, and if Russia could stage a breakthrough it could become our main contribution to any future international program of deep space exploration,” independent, Moscow-based space expert Andrei Ionin told the Christian Science Monitor newspaper. The Co-director of the University of New Mexico (UNM) Institute for Space and Nuclear Power Studies, nuclear engineer Patrick McDaniel, says that the idea is definitely feasible, but that there are numerous obstacles still to be tackled.

Space Race Bad – Russia

Plan kills US Russia relations – causes prolif and a space race

Krepon 4 (Michael – Politics prof @ Virginia U, Nov. 2004, http://www.armscontrol.org/act/2004\_11/Krepon) JPG

Weaponizing space would poison relations with China and Russia, whose help is essential to stop and reverse proliferation. ASAT weapon tests and deployments would surely reinforce Russia’s hair-trigger nuclear posture, and China would likely feel compelled to alter its relaxed nuclear posture, which would then have negative repercussions on India and Pakistan. The Bush administration’s plans would also further alienate America’s friends and allies, which, with the possible exception of Israel, strongly oppose the weaponization of space. The fabric of international controls over weapons of mass destruction, which is being severely challenged by Iran’s and North Korea’s nuclear ambitions, could rip apart if the Bush administration’s interest in testing space and nuclear weapons is realized.

Space race kills relations with Russia and China – causes space and terrestrial prolif

Clary and Krepon 3 (Christopher Clary – south asian defense specialist @ Council on Foreign Relations, and Michael Krepon – Politics prof @ Virginia U, 4/2/3, http://www.stimson.org/images/uploads/research-pdfs/spacefront.pdf) JPG

The likely consequences of a dynamic, but uneven, space warfare competition are not hard to envision. Potential adversaries are likely to perceive American initiatives to weaponize space as adjuncts to a U.S. military doctrine of preemption and preventive war. Depending on the scope and nature of U.S. space warfare preparations, they could also add to Chinese and Russian concerns over the viability of their nuclear deterrents. U.S. initiatives to extend military dominance into space are therefore likely to raise tensions and impact negatively on U.S.-China and U.S.-Russia relations at a time when bilateral relations have some promising, but tenuous, elements. Cooperative relations with both countries will be needed to successfully combat proliferation, but Moscow and Beijing are unlikely to tender such cooperation if they perceive that U.S. strategic objectives include the negation of their deterrents. Under these circumstances, proliferation of weapons in space would be accompanied by terrestrial proliferation.

Developing nuclear propulsion causes a space race with Russia

Space-Travel 9 (1/11/9, http://www.space-travel.com/reports/Russia\_explores\_atomic\_space\_engine\_999.html) JPG

Russia is preparing to develop a nuclear-propelled spacecraft to maintain a competitive edge in the global space race, officials said. Nearly $17 million has been earmarked for research this year by Rosatom, the state nuclear corporation, and Roscosmos, the Russian space agency, RIA Novosti reported Monday. The design stage is to be completed by 2012 and at least another $580 million would be needed for further development in the coming decade, Roscosmos chief Anatoly Perminov said. Nuclear-propelled space ships could be used for flights to Mars and other planets and to establish a permanent base on the moon, something Russia's space industry is incapable of now, Perminov said. Nuclear propulsion and its high energy efficiency is key to maintaining a competitive edge in the space race, he said.

Space Race Bad – Russia – Weaponization

Weaponization creates space race with China and Russia

Beljac 8 (Marko, contributor @ Foreign Policy in Focus, teaches @ Melbourne U, 3/31/8, http://www.fpif.org/articles/arms\_race\_in\_space) JPG

Though the latest Russian and Chinese space arms control proposal is flawed, because of the clumsy definition of what constitutes a “space weapon,” this doesn’t mean that space arms control is not possible in principle. A global space arms control regime would protect U.S., Russian, Chinese, and even Australian space assets. An arms race in space will eventually lead other states to catch up with the United States and thereby placing Washington's commercial satellites at risk. Space weaponization may well have cataclysmic consequences given the link between space weapons and nuclear weapons strategy. This is because Russia, and the United States, to a certain extent rely on satellites for early warning of nuclear attack. As other space nations with nuclear weapons develop their space capacity it is expected that they will follow suit.

Space Race Bad – Russia UQ

Russia is ahead in the space race – we aren’t competing

The Daily Beast 7/7 (http://powerwall.msnbc.msn.com/politics/russians-win-the-space-race-1694348.story) JPG

When the space shuttle Atlantis blasts off from the Kennedy Space Center today on its final mission, it won't just be the 30-year history of the world's only reusable space shuttle that is coming to an end—it will be a whole chapter of the space race. After the shuttle returns to earth in a twelve days' time, the United States will no longer have a manned space flight program for the first time in five decades. More, for the foreseeable future it will be Russia, the U.S.'s old space rival, which will be the only country in the world regularly putting men and women into space. “It's in the DNA of our great country to reach for the stars and explore,” Mark Kelly, commander of the penultimate shuttle mission Endeavour, told reporters just before he blasted off in May, watched by his wife, Gabrielle Giffords, the congresswoman who was seriously wounded in a gun attack on Jan. 8 in Tucson, Ariz. “We must not stop.” But the reality is that the shuttle program has been a costly experiment that ultimately failed in its original intention—to create an easily reusable space vehicle that could travel into orbit weekly. Faced with mounting costs and criticism, NASA has pulled the plug after 135 missions and $192 billion. The demise of the shuttle leaves Russia's clunkier and more old-fashioned, but ultimately cheaper and more reliable, space technologies in the driver's seat. Back in its heyday in the 1960s, the space race was “really a proxy war of nuclear dominance,” says Piers Bizony, coauthor of Starman: The Truth Behind the Legend of Yuri Gagarin. “Russia and America flaunted their potentially destructive technologies in peaceful camouflage, with every successful mission leading to boasts of supremacy.” Soviet cosmonaut Yuri Gagarin's manned space flight in 1961 was widely touted as evidence of the superiority of Soviet science, for instance.

Space Race Bad – Russia I/L – Relations

Lack of cooperation prevents effective relations with China and Russia

Krepon 11 (Michael – politics prof @ Virginia, 1/18/11, http://krepon.armscontrolwonk.com/archive/3006/what-next) JPG

In contrast, certain actions in space can have profound implications for national security and deterrence, which depend on the ability of various satellites to perform as planned. A growing number of nations now have the ability to interfere with these satellites. Space is becoming, as the Pentagon likes to say, more congested, competitive, and contested. A competition in space characterized by thinly disguised or overt anti-satellite weapon tests, and a space environment with weak norms governing space traffic management and debris mitigation, will have far greater strategic significance than how many tactical nuclear weapons major powers possess, or how many theater missile defense interceptors they deploy. The way major powers relate to each other in space is intertwined with how they relate to each other here on earth. If the United States and Russia do not reach agreement on rules of the road for space, nuclear dangers will rise, and prospects for the next New START will become more remote. More importantly, behavior in space will shape U.S.-Chinese relations, especially since Beijing doesn’t talk very much about nuclear weapons.

Space cooperation is the last hope for positive US-Russo relations

Millar and Logsdon 1 (James R. – Director @ Inst. For Intl studies @ Elliot School of Intl Affairs, Georgetown U, and john M. – Director @ Space Policy Institute, Feb. 2001, http://www.gwu.edu/~spi/assets/docs/usrussia.pdf) JPG

Even though, this same participant noted, "Within this context of the evolution of US-Russian relations over the last eight years, what assessment can we make of US-Russian cooperation in manned space flight? First, as a high visibility program of cooperation, the program is only now reaching the point where it will enter the mass consciousness of the public in the United States and Russia and around the world. At a time of strained relations it may well be of greater value by suggesting long-range cooperation in space. That will, however, depend on the underlying nature of U.S.-Russian relations, and that is more likely to be defined and redefined by the dynamics of regional conflicts and crisis, where national interests will have primacy. . . . Cooperation in the area of manned space flight implies a long-term, on-going relationship. That it has continued while the hope for [strategic] partnership has largely disappeared should be seen as one of its strengths. Both governments view such cooperation as serving valuable national purposes with regard to the future of space and their bilateral relations. . . . Both would like to co-opt the manned space programs of other states into a program in which they define the policy goals and long-range design. Russia seems willing to accept the role of a senior partner in a consortium where the United States provides the strategic leadership." Another participant suggested that "Assessing U.S.-Russian cooperation in the ISS, and its impact on Russian behavior, is fraught with difficulty, yet some observations, however tentative and preliminary, may be possible. First, U.S.-Russian cooperation in manned space flight has been and can continue to be emblematic of a new, more cooperative U.S.-Russian relationship. It has signaled U.S. and Russian support for collaboration in a major, highly visible area of scientific, technological and commercial activity. This cooperation and commitment should not be overlooked or undervalued. . . . Overall, U.S.-Russian cooperation on manned space flight has been a cost-efficient, desirable development. It has fostered Russia's willingness to work with the United States, and it has helped the Russian leadership resist a more nationalistic approach to international affairs. U.S.-Russian space cooperation is building links between our military, scientific and commercial links and helping bind Russia to U.S. and Western-style economic principles. Despite numerous pitfalls and uncertainties, the ISS project has become a symbol of U.S.-Russian cooperation and Russia's integration in global space research and exploration.

Space Race ! – Russia Relations

Increasing US Russia Relations key to solve prolif, nuclear terrorism and nuclear use

Perry and Scowcroft 9 (William and brent, Chairs CFR, april, “US Nuclear Weapons Policy”)

Despite nearly universal opposition, North Korea has developed a small nuclear arsenal, and Iran appears to be following in its footsteps. Other states, particularly in the Middle East, are starting nuclear power programs modeled after that of Iran. The proliferation of nuclear weapons and fissile materials is thus dangerously close to a tipping point. Beyond this danger, there are still tens of thousands of nuclear weapons in the world. If just one of these thousands of weapons fell into the hands of terrorists, it could be detonated with catastrophic results. So, although the old danger of a massive nuclear exchange between great powers has declined, a new risk looms of a few nuclear detonations being set off by a terrorist group or a nuclear-capable rogue state, or of a nuclear power making a tragic mistake. The threat of nuclear terrorism is already serious, and, as more nations acquire nuclear weapons or the fissile material needed for nuclear weapons, it will increase. Of course, the detonation of a relatively primitive nuclear bomb in one American city would not be equivalent to the type of nuclear exchange that was feared during the Cold War. Nonetheless, the results would be catastrophic, with the devastation extending well beyond the staggering fatalities. The direct economic losses would amount to many hundreds of billions of dollars, but the indirect economic impact would be even greater. The social and political effects are incalculable, especially if the detonation were in Washington, DC, and disabled a significant part of the U.S. government. The terror and disruption would be beyond imagination. High priority should be accorded to policies that serve to prevent such a catastrophe, specifically programs that reduce and protect existing nuclear arsenals and that keep new arsenals from being created. All such preventive programs, by their nature, have international dimensions. Their success depends on the United States being able to work cooperatively with other countries, most notably Russia. That such international cooperation can be successful is illustrated by the Nunn-Lugar Cooperative Threat Reduction Program in the 1990s. U.S.-Russian efforts on that program led to thousands of nuclear weapons and their launchers being dismantled and thus made the world safer. But unless U.S.-Russia relations improve, it is difficult to imagine those two governments cooperating on future programs that require such a high level of mutual trust.

Relations key to hege

SIMES 3 (DMITRI, PRESIDENT OF THE NIXON CENTER, FDCH POLITICAL TESTIMONY, 9-30)

At the same time, U.S. leaders increasingly recognized the emerging, inter-related threats of terrorism and proliferation. Though policy makers and experts had devoted some attention to these issues earlier, the tragic events of September 11 rapidly crystallized American thinking about these threats and transformed the struggle to contain them into the principal aim of American foreign policy. Notwithstanding its diminished status and curtailed ambition, Russia has considerable influence in its neighborhood and a significant voice elsewhere as well. Moscow can contribute importantly to U.S. interests if it chooses to do so. Accordingly Russia can markedly decrease, or increase, the costs of exercising American leadership both directly (by assisting the United States, or not) and indirectly (by abetting those determined to resist, or not).

Space Race ! – Russia

Space competition kills relations and pushes Russia towards China

Englehart 8 (Alex B., Washington U Law School, January 2008,

http://findarticles.com/p/articles/mi\_7690/is\_200801/ai\_n32261927/) JPG

Even though Russia is now much weaker than the Soviet Union of the Cold War era, it still has thousands of ICBMs, and the United States should carefully consider the ramifications of its planned space weapons deployment in light of that reality. Russia’s opinion cannot be ignored. While it may not be capable of effectively deploying space-based weapons in the near to mid-term, it may well have an operational ASAT capability and, in any case, its ICBMs demand respect. Like China, Russia depends on its ICBM capability to maintain its international respect. By being able to threaten any potential adversary with nuclear annihilation, Russia maintains its strength and independence in a changing world. Also like China, Russia is understandably worried about the American pursuit of space weapons, which have the potential to undermine the effectiveness of ICBMs. Russia has long been a strategic player in the space weapons arena. In the late 1970s, the United States and the Soviet Union entered into negotiations on an ASAT ban, but the discussions fell apart before any agreement was reached. Ever since, the Soviet Union (later Russia) has been wary of American plans to deploy any kind of weapon in space or further pursue ASAT capabilities. The Strategic Defense Initiative under the Reagan administration—a predecessor to twenty-first century American space weapons programs—arguably hastened the collapse of the Iron Curtain. The actual deployment of satellite-based weapons in the coming decades is sure to inflame Russia and drive it further away from the United States. If Russia moves away from the United States, it will move towards China. Now that China has taken the geopolitical lead in opposing the United States—particularly with respect to space weapons development —a disillusioned Russia is sure to find a strong ally in its neighbor to the east. In fact, it already has. In 2002, Russia and China jointly submitted a working paper to the Conference on Disarmament on a treaty to completely ban space weapons. The preamble to this proposed treaty states that “for the benefit of mankind, outer space shall be used for peaceful purposes, and it shall never be allowed to become a sphere of military confrontation.” The basic obligations proposed include “[n]ot to place in orbit around the Earth any objects carrying any kinds of weapons, not to install such weapons on celestial bodies, or not to station such weapons in outer space in any other manner” and “not to resort to the threat or use of force against outer space objects.” This sweepingly broad language was too much for the United States. But even so, the proposal should serve as a strong warning to the United States of the close alignment between China and Russia on the space weapons issue. If the United States completely flouts the manifest wishes of China and Russia on this issue, those two countries will be driven more closely together—not just on space weapons, but generally. The United States would be wise to consider the significant long-term consequences of fortifying the Moscow-Beijing axis in this way. The combined geopolitical—and specifically, military—might of these two nations would pose a grave threat to U.S. interests all over the world. If a united Russia and China decided to support Iran or North Korea, the United States would be effectively blocked from pursuing its interests and security vis-à-vis those states. As China inevitably becomes more powerful economically and militarily, the United States must do its best to maintain good relations with Russia and prevent it from moving completely into the Chinese camp. Showing a willingness to negotiate on the space weapons issue would serve that goal well.

Russia space race causes accidental nuclear war

Christ and Zheutlin 1 (Michael – Exec Director @ International Physicians for the Prevention of Nuclear War and Peter – Assoc. Director @ IPPNW, 1985, Tikkun 16(3): 61, May/June 2001, http://www.tikkun.org/nextgen/stop-playing-the-nuclear-game) JPG

Yet the nuclear powers remain poised and ready, just as they were during the Cold War, to wage nuclear war, Hundreds of cities are targeted for destruction. The United States and Russian arsenals still total more than 30,000 nuclear weapons, with thousands of those on hair-trigger alert, ready to be launched at a moment's notice. Russia, which once maintained a pledge not to be the first to use nuclear weapons, has withdrawn that pledge, even as control over its nuclear arsenal has become a matter of global concern. In the United States, the Senate has rejected the Comprehensive Test Ban Treaty, and possible deployment of a National Missile Defense (NMD) system threatens to undo decades of efforts to control nuclear weapons. Indeed, the United States has ambitious plans for the militarization of space, even beyond NMD. Despite their promise, enshrined in the Nuclear Non-Proliferation Treaty (NPT) three decades ago and reiterated just last May, the five original nuclear weapons states (the U.S., the U.K., France, China, and Russia) have not, despite some reductions, moved meaningfully towards the elimination of their nuclear arsenals--a promise made in exchange for a commitment from the non-nuclear states not to acquire nuclear arms.

Space Race ! – Uq

No space race now

Siddiqi 8 (Asif, space historian, assistant professor of history at Fordham U, Feb 12, [www.pbs.org/wgbh/nova/space/space-race-today.html] AD: 7-8-11, jam)

Asif Siddiqi: Well, it certainly seems so if you look at the media these days. China and Japan launched probes to the moon recently, and India's planning to do so next year. But I would add the caveat that a lot of these missions were planned a long time ago. These particular nations' space agencies planned these missions independently and for their own national goals. There's somewhat of a coincidence here in terms of how they're coinciding. Of course, the outcome is that it does seem like a space race. But this space race is very different from the classic Cold War-related race right after Sputnik, when every mission was a symbolic representation of either nation [the United States or the Soviet Union] and its geopolitical competition with the other nation.

No space race – cooperation is the norm

Bodeen 7 (Christopher, Associated Press Writer, Nov 1, [www.space.com/4149-china-insists-asia-space-race.html] AD: 7-8-11, jam)

BEIJING (AP) - Over a few short months, Japan, China, and India will all have lunar probes orbiting the moon, sparking talk of a new space race in Asia. China, for one, takes exception at that characterization. On Thursday, a top official in its secretive military-backed lunar explorer program defended the probe launched last week as an innovation that is part of a future wave of cooperation, not competition, in outer space. "It's all peaceful,'' said Pei Zhaoyu, assistant director of the Lunar Exploration Program Center, when asked whether a space race was on. "The countries involved in lunar exploration are developing an understanding. They're evolving a mechanism for cooperation.''

Space Race ! – Uq

China and Russia are committed to peaceful space development

Rozoff 9 (Rick, writer @ Global Research, 6/19/9, http://usa.mediamonitors.net/content/view/full/63616) JPG

On June 17, immediately after the historical ninth heads of state summit of the Shanghai Cooperation Organization (SCO) in Yekaterinburg, Russia on the preceding two days, Russian President Dmitry Medvedev and Chinese President Hu Jintao announced that their nations were drafting a joint treaty to ban the deployment of weapons in outer space to be presented to the United Nations General Assembly. A statement by the presidents reflected a common purpose to avoid the militarization of space and said: "Russia and China advocate peaceful uses of outer space and oppose the prospect of it being turned into a new area for deploying weapons. "The sides will actively facilitate practical work on a draft treaty on the prevention of the deployment of weapons in outer space, and of the use of force or threats to use force against space facilities, and will continue an intensive coordination of efforts to guarantee the security of activities in outer space." [1] The statement also addressed the question of the North Atlantic Treaty Organization (NATO) and its global expansion as well as an integrally related danger, the US-led drive to development a worldwide - and more than worldwide - interceptor missile system aimed at neutralizing China's and Russia's deterrent and retaliation capacities in the event of a first strike attack on either or both. The section of the joint communiqué addressing the above stated, "Russia and China regard international security as integral and comprehensive. The security of some states cannot be ensured at the expense of others, including the expansion of military-political alliances or the creation of global or regional missile defense systems." [2]

Only US action will trigger a space race – outweighs nuclear war

Rozoff 9 (Rick, writer @ Global Research, 6/19/9, http://usa.mediamonitors.net/content/view/full/63616) JPG

A Russian analytical news site reported at the same time that the danger of space war was potentially catastrophic and was being pursued without regard to its consequences:"[T]he true reason behind the American plans for global anti-ballistic missile defense and space militarization [is that the] United States believes that over the next two to three decades, it can beat the others (Russia and China) in these spheres and gain a decisive strategic military advantage. "A frightening Cold-War-type arms race to counter the U.S. missile defense systems and militarization of space is about to take off in earnest....This arms race is perhaps as dangerous as the Cold War one. This time, however, the trigger is in the hands of only one party – the U.S. establishment. "Unfortunately, the signs are that the United States is already pulling the trigger." [31] The above echoed comparable concerns voiced by Chinese military experts three months before. In a book published by the government's China Arms Control and Disarmament Association, two armed forces experts stated that “Strategic confrontation in outer space is difficult to avoid. The development of outer space forces shows signs that a space arms race to seize the commanding heights is emerging. "Dominated by the idea of absolute domination of outer space, a major power is making a big fuss about space domination, creating rivals and provoking confrontation.” [32] In a stark warning last October, veteran Russian journalist Valentin Zorin said that "The new arms race will be incomplete without plans for the weaponization of outer space" and "U.S. attempts to turn outer space into a third field of combat operations may prove as dangerous as the American decision to use a nuclear device on August, 1945." [33] Remarking on the fact that in the United Nations General Assembly 166 nations had voted for the Russian and Chinese proposal to ban the militarization of space a week earlier, Russian analyst Alexei Arbatov was quoted as saying last winter that "Washington does plan to deploy its ABM system elements in near-Earth orbits, and it is only Russia that can counter such plans." [34] Late last November Russian ambassador to the UN, Vitaly Churkin, again urged "UN member-states to join the moratorium on the deployment of weapons in outer space" and "mentioned that it is on Russia’s initiative that the UN General Assembly has been adopting resolutions, for many years now, aimed at the prevention of the arms race in space. The only one who objected to the adoption of this resolution was the United States...." [35]

Space Race ! – UQ – Russia/China Alliance Down

No Russia-China alliance now

Weitz 3 (Richard, Senior Fellow and Director of the Center for Political-Military Analysis at Hudson Institute, [www.hudson.org/files/publications/china\_russia\_weitz.pdf] AD: 7-8-11, jam)

Anti-U.S. Cooperation: Rhetoric versus Reality Foreign policy cooperation between Russia and China has been much more visible in their joint approach to Central Asia than in other important areas— despite their leaders’ calls for foreign-policy “coordination.” Their genuine desire to counter what both consider excessive American power and influence in the post–Cold War era manifests itself mostly rhetorically. Since the early 1990s, the two governments have issued numerous joint communiqués in which they have denounced various U.S. policies and called for a multilateral rather than a unilateral (i.e., American-led) world. They also jointly sponsored resolutions in the United Nations urging respect for the 1972 Anti-Ballistic Missile (ABM) Treaty, which limited the U.S. ability to deploy defenses against Russian (and, by extension, Chinese) ballistic missiles. Most recently, they urged the United States and its allies not to intervene militarily in Iraq without UN (e.g., their) approval. Despite their common rhetoric, the two governments have taken no substantive, joint steps to counter American power or influence. For example, they have not pooled their military resources or expertise to overcome U.S. ballistic-missile defense programs. One Chinese official threatened such anti-BMD cooperation shortly after Yeltsin’s December 1999 visit to Beijing. The Director General for Arms Control of the Chinese Foreign Ministry, Sha Zukang, repeated the warning in May 2000. But such threats ended after Putin, on his July 2000 visit to Italy, proposed that Russia and NATO cooperate to defend Europe against missile strikes—despite prior acknowledgment that Chinese officials were “suspicious about Russian initiatives to create a non-strategic missile defence system in Europe.” When asked about the prospects of a joint Chinese-Russian response after the December 2001 U.S. decision to withdraw formally from the ABM Treaty, President Putin told journalists, “Russia is strong enough to respond on its own to any changes in the sphere of strategic stability.” An important indicator of the shallowness of Sino-Russian ties has been their failure, despite the Russia-China “partnership,” to adopt a mutual defense agreement such as the treaty of friendship, alliance, and mutual assistance that Moscow and Beijing signed in February 1950. Representatives of both governments have consistently dismissed the suggestions of such Russian analysts and politicians as Roman Popkovich, chairman of the Duma Committee for Defense, and A. V. Mitrofanov, chairman of the Duma Committee on Geopolitics, that a genuine military alliance be established. Although both governments agreed in July 2000 to begin drafting a Sino-Russian Treaty of Good Neighborliness, Friendship and Cooperation, and signed it in July 2001, they made clear that neither party had sought a military component in the accord. In addition, the Chinese and Russian militaries have neither trained together nor taken other steps that would allow them to conduct joint combat operations—even if their governments wanted them.

Space Race ! – Russia/China

Plan causes a militarized space race with China who would ally with Russia

Smith 3 (Wayne, journalist, Jan 28, [www.spacedaily.com/news/nuclearspace-03d.html] AD: 7-7-11, jam)

How will other nations react to this startlingly bold new objective? The nuclear initiative was first announced over a year ago with NASA requesting a billion dollar funding over five years for nuclear space research and development. Little response was generated overseas as nuclear power in the form of RTG's (Radioisotope Thermionic Generators) for space probes and satellites is nothing new. However, the latest announcement places nuclear power at the forefront of future space development. Spacefaring nations such as the European Union and Russia cannot ignore this challenge. In particular the newest emerging superpower, China, will closely watch how events unfurl. In just over three years, China has gone from Satellite launches to planning a human spaceflight in October of this year. This remarkably rapid advancement was spurred by the realization of the strategic importance of space. Space will be central to tomorrow's world order and national security dictates that a space presence is a sign of strength. Huang Chunping, commander-in-chief of the chinese Shenxhou space launch program has said, "Just imagine, there are outer space facilities of another country at the place very, very high above your head, and so others clearly see what you are doing, and what you are feeling. That's why we also need to develop space technology." Clearly the Chinese have more on their minds than national prestige in attempting to become the third nation to ever have launched a man into space. Manned aerospace is the epitome of space technology. National prestige is clearly an important consideration, and one which westerners can easily relate to as they fondly reminisce about the moon landings. However, the military implications are just as important, if not greater, a consideration. China has already invested too much money into developing a space launch capability to consider pulling back now. In past interviews, they have announced the intention to build space stations, reach the moon and build bases there, and even boasted they will beat the United States with a manned mission to Mars. Their Shenxhou launch system has been played down by critics as primitive but is probably level with 1990's US technology. The fact is we are still using 1990's US technology. The big Saturn V boosters America once used for moonshots are now all gone and funding for NASA's ailing programs such as the ISS have been diminishing annually. With Russia suffering economic problems and the ESA unsure of its future, China seems to be on an inside straight to success. However, Prometheus changes everything. NASA is "moving from windpower to steam" as Sean O'Keefe puts it and that may leave China suddenly out in the cold. Unless of course, they respond with their own nuclear space program. China and Russia have been increasing ties for a number of years now. Space and Arms technology trade in particular have increased due to new treaties. The Russians, who launched more nuclear reactors than the US, are no strangers to nuclear space technology having had their own shadowy nuclear propulsion program -- which no doubt compared very favourably to past US efforts. If pushed to develop their own nuclear space initiative, the Chinese will likely enquire of Russia for help. The Russians, in turn, will demand a high cost for such secret technology, just as they have done for all previously purchased space systems technologies. China will either pay or attempt to develop their own. China, also no stranger to nuclear power, has stated owned national nuclear facilities and a state owned space programme. Efforts at combining nuclear and space branches of Government will face very little red tape within a communist regime. A chinese INSPI or Los Alamos seems very possible. The China Daily reports that China has spent 2.3 billion US dollars toward putting a man into space in October of this year -- and that is only the beginning of their ambitions. The Chinese space program first began in 1956 with 30 young scientists and roughly 100 college graduates, some of whom didn't even know "exactly what missiles were," according to a Chinese government publication. On Monday, November 21, 1999, they launched their first unmanned Shenzhou space vehicle with a view to eventually launching men into space. China invented the first rocket almost 900 years ago and now they want to be at the forefront of modern development. A nuclear space race would see a return to the frenzied and visionary, if politically induced, days of Apollo.

Space race causes Sino-Russo cooperation

Smith 3 (Wayne, writer @ SpaceDaily, 1/28/3, http://www.spacedaily.com/news/nuclearspace-03d.html) JPG

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Space Race ! – Russia/China – Hegemony

Russia/China alliance kills U.S hegemony and causes war

Fraser 8 (Ian, journalist for The Sunday Herald, UK, Sep 6, [www.heraldscotland.com/leading-historian-issues-warning-of-a-new-cold-war-1.826378] AD: 7-9-11, jam)

THE SCOTTISH historian Niall Ferguson has warned that the strategic alliance between China and Russia is more of a threat to the West than the credit crunch. Ferguson, a best-selling author, broadcaster and professor of history at Harvard University, said that the development of the new Russia-China powerblock was set to put the two economic heavyweights on a path to confrontation with much of the rest of the world. Speaking at Making Sense Of The Future, a conference organised by the Institute of Chartered Accountants of Scotland (ICAS) at Gleneagles, Ferguson also warned that unless Iran suspends its nuclear weapons programme a full-scale war in the Middle East is inevitable. “I believe that Russia’s prime minister Vladimir Putin is about to have his Molotov-Ribbentrop moment,” said Ferguson, referring to the pre-second world war non-aggression pact between Nazi Germany and Soviet Russia. “He’s going to realise that Moscow and Beijing can have a new and meaningful partnership.” Ferguson also warned that the West had to sit up and take notice of the Shanghai Co-operation Organisation. The SCO was officially founded in 2001 as a counterpart to Nato and the European Union. Aside from China and Russia its members are Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Ferguson said that the SCO had sneaked “under the radar” of the West, and its activities should be carefully monitored. The group’s heads of state held an under-reported summit in Dushanbe, the capital of Tajikistan, on August 28 and 29, at which Russia was praised for its “active role in contributing to peace and co-operation”, despite its military action in Georgia. “The more Russia and China establish that they have common interests, which could include Iran, the more powerful the SCO is going to become,” Ferguson said. “The strengthening of the SCO has profound implications. If the countries which belong to that organisation decide they are going to defy the rules of the World Trade Organisation, then a fundamental shift has occurred in the nature of our international order, and that would have implications for all of us. The real threat to globalisation today is not the subprime crisis. The real threats are geopolitical.” Ferguson believes the biggest of all theats is the resurgence of both Russia – which he says is intent on recreating the USSR’s empire following its recent military success in Georgia – and China, which is “making a clearly calculated bid for Asian hegemony China’s ambitions extend far beyond winning more gold medals than the United States. Rather like the Berlin Olympics of 1936, that’s just phase one.” “Russia’s agenda of resuscitating the Soviet Union doesn’t stop with Georgia,” said Ferguson, who is also a senior research fellow at Jesus College, Oxford, and a historian who has been likened to the great scholar AJP Taylor. “They will now move on to the bigger prize of the Ukraine and specifically to the Crimean enclave. That’s the next card that Putin will play.” Ferguson also warned of a coming conflagration in the Middle East, which he said will be sparked by Iran’s determination to develop nuclear weapons. “If Iran continues in this vein,” he said, “then a major war in the Middle East is a racing certainty. There’s no way Israel is going to allow this to happen and there’s no way whoever takes over as US president will stand idly by.” Ferguson believes that Russia has an interest in stoking up such a confrontation at the expense of the West.

Space Race ! – Russia/China – Hegemony

A fully-fledged alliance would threaten hegemony

Cohen 1 (Ariel, Research Fellow for Russian and Eurasian Studies in the Kathryn and Shelby Cullom Davis Institute for International Studies at The Heritage Foundation, Jul 18, [www.heritage.org/research/reports/2001/07/the-russia-china-friendship-and-cooperation-treaty] AD: 7-9-11, jam)

The state-run media in Russia and China often point to "U.S. hegemonism" and "U.S. power politics," and call for the "establishment of a new international order" under United Nations tutelage.9 Some of the forms of cooperation that have followed such rhetoric clearly pose a threat to U.S. interests. For example, the Russian and Chinese navies began conducting joint military exercises in 1999.10 These maneuvers included the Russian Pacific Fleet missile cruisers and destroyers as well as warships from the Chinese Eastern Fleet.11 The Sino-Russian exercises this year allegedly included Russian TU-22 bombers equipped with long-range nuclear-capable cruise missiles flying attack missions against simulated U.S. forces in East Asia.12 In view of these actions, the assertions made by the Chinese and Russians that the new strategic relationship is not aimed at any one nation have a particularly hollow ring.13 More than the formalization of the new treaty, it is the massive Russian arms sales and WMD-related technology transfers to China that make the multipolar rhetoric of these new "friends" of particular concern to the United States and its allies in Asia. A world system that is not dominated by one country is attractive to both Moscow and Beijing for similar reasons: Economically, it offers them alternative sources of technology, financing, and markets for their raw materials, goods, and services. Moreover, an overburdened U.S. military would pose less of a risk to Russia and China in the regions where they assert their own power. Alternative poles of power in which there is a proliferation of weapons of mass destruction would force the United States to spread its resources thinly to deal with evolving crises in different regions simultaneously. The reason for Russia's willingness to support China's security interests and vice versa may lie in the fact that each country now views the other as its "strategic rear."14 Russian leaders have often stated that the threats to Russia are NATO enlargement to the East15 and radical Islamic forces active in Chechnya and among Moscow's Central Asian allies. Beijing views U.S. predominance in the post-Cold War world--from its success in the Gulf War to its support of Taiwan security--as important threats to China. Russia has stated that "there is only one China" and that Taiwan is China's "internal affair," while Beijing has expressed unequivocal support for Russia's strong-arm tactics in Chechnya.16

Space Race ! – China – Nuclear War

US-China space race causes nuclear war

Carroll 3 (Jamer, former Shorenstein Fellow @ Kennedy School of Gov @ Harvard , 10/28/3, http://www.commondreams.org/views03/1028-03.htm) JPG

Two weeks ago China put a man in space, a signal of China's arrival -and of the arrival of this grave question. Beijing has invested heavily in commercial development of space and will become a significant economic competitor in that sphere. But such peaceful competition presumes a framework of stability, and it is inconceivable that China can pursue a mainly nonmilitary space program while feeling vulnerable to American military dominance. China has constructed a minimal deterrent force with a few dozen nuclear-armed ICBMs, but US "global engagement" based on a missile defense, will quickly undercut the deterrence value of such a force. The Chinese nuclear arsenal will have to be hugely expanded. Meanwhile, America's "high frontier" weapons capacity will put Chinese commercial space investments at risk. No nation with the ability to alter it would tolerate such imbalance, and over the coming decades there is no doubt that China will have that capacity. Washington's refusal to negotiate rules while seeking permanent dominance and asserting the right of preemption is forcing China into an arms race it does not want. Here, potentially, is the beginning of a next cold war, with a nightmare repeat of open-ended nuclear escalation.

That draws in great powers – causes extinction

Straits Times (Singapore), 2000 (“Regional Fallout: No one gains in war over Taiwan,” June 25th, Available Online via Lexis-Nexis)

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 civilisation. There would be no victors in such a war. While the prospect of a nuclear Armaggedon over Taiwan might seem inconceivable, it cannot be ruled out entirely, for China puts sovereignty above everything else.

Space Race ! – China

Space race with China crushes cooperation and fuels rapid space militarization

UCS 8 (Union of Concerned Scientists, Spring 2008, Harvard Asia Pacific Review, http://www.ucsusa.org/nuclear\_weapons\_and\_global\_security/international\_information/us\_china\_relations/a-space-race-with-china.html) JPG

In the wake of the January 1999 Report of the Select Committee on US National Security and Military/Commercial Concerns with the People's Republic of China – commonly referred to as the Cox Report - the United States has enforced an increasingly restrictive set of controls governing scientific, commercial, and diplomatic contact with China on space-related matters. These restrictions are intended to prevent the transfer of technologies with military applications deemed threatening t o the United States and its allies in the region. Because many of these technologies also have non-military applications, the restrictions ended all commercial and scientific collaboration between China and the United States and locked the two communities into an adversarial relationship where every Chinese accomplishment is perceived as a threat to the United States. An ironic consequence of the concerted US effort to inhibit Chinese access to advanced space technologies is the acceleration of China's ability to produce these technologies on their own. China made significantly more progress in the eight years since the Cox Report than they did in the eight years prior. In addition to becoming the third nation to master human spaceflight, China's space industry is poised for rapid growth. Two massive research and production facilities—one in Beijing and the other near Shanghai—will establish China as a significant player in the international satellite industry as well as supply their growing domestic demand for military and civilian satellite applications. China is committed to launching its own global positioning system. They are expanding and upgrading their earth observation capabilities with a new generation of weather and oceanographic satellites, high-resolution imaging satellites, radar satellites and a constellation of low-cost microsatellites. China is also developing a new launch vehicle three times more powerful than the most powerful rocket currently in use.

Space Race ! – China – Modernization Module

Space competition causes China to rapidly develop its military capabilities – specifically ASATs – makes nuclear war more likely – plan is inevitably perceived as militarization

Zhang 11 (Baohui, Associate Professor of Political Science, Director of the Center for Asia Pacific Studies, Lingnan University; “The Security Dilemma in the U.S.-China Military Space Relationship: The Prospects for Arms Control” JSTOR; March/April 2011; <http://www.jstor.org/stable/10.1525/AS.2011.51.2.311>)

The second factor adding to the security dilemma in the U.S.-China military space relationship involves U.S. efforts to rewrite the established rule of nuclear deterrence, i.e., mutually assured destruction (MAD), that prevailed during the Cold War era. According to Glasner and Fetter, the U.S. has been pursuing a new deterrence posture that combines offensive and defensive capabilities. 25 Chinese strategists believe that the U.S. military space program, to a significant extent, is driven by missile defense. For example, in a study organized by the General Staff of the PLA, Major General Xu Hezhen charges that the U.S. is developing space-based laser weapons for missile defense. According to him, “A total of 14–24 satellites deployed on different orbits will constitute a defensive system. Relying on data from early warning systems, it can intercept ballistic missiles launched from anywhere in the world.” 26 In another study, Major General Ling Yongshun argues that the U.S. is implementing a coherent plan to neutralize other countries’ strategic deterrence through the deployment of space-based missile defense. As he observes: Using space weapons to attack ballistic targets is a major goal of space weapon development. The U.S. believes that others’ ballistic missiles pose significant threats to its security. To be immune from this threat, the U.S. is putting major efforts into ballistic missile defense, with space-based weapons being one of the important intercepting platforms. 27 In October 2008, the U.S. Congress approved $5 million for an independent study of possible space-based missile defense. This move gravely alarmed the Chinese military, which believed that the deployment of space-based missile defense could become inevitable. In fact, some PLA experts have claimed that “Star Wars has come back.” 28 Li Daguang even charged that this decision by the U.S. Congress amounted to “declaring a new Cold War against China.” 29 Chinese military strategists believe U.S. missile defense poses a real threat to China’s nuclear deterrent. Until recently, the Chinese military tended to believe that U.S. missile defense could not effectively deter a major nuclear power like China or Russia. It was thought that a range of countermeasures, such as deploying decoys and multiple warheads, could be employed to deceive and overwhelm U.S. missile defense. Now, however, with the maturing of a multilayered missile defense system by the U.S. and its allies, Chinese nuclear experts are losing confidence in China’s offensive capabilities. This pessimism was illustrated in a 2008 interview of Wang Wenchao in a Chinese military magazine. Wang, credited with being the chief designer of China’s sea-based strategic missiles, expressed grave pessimism about China’s offensive nuclear capability against U.S. missile defense. He said, “I have done research: Facing a multi-tiered missile defense system, if any single layer can achieve a success rate of 70%, then 100 single warhead missiles could all be intercepted even if they are mounting a simultaneous attack.” 30 This is why Wu Tianfu—arguably the most important deterrence strategist of the Second Artillery of the PLA, which runs China’s strategic nuclear forces—charges that the U.S. has “forced China to engage in a space arms race.” 31 More specifically, U.S. missile defense has forced China to integrate space war with its strategic nuclear deterrence. China must possess the ability to weaken American space-based assets such as early-warning satellites, to ensure the credibility of its own offensive nuclear forces. Thus, space war and nuclear war are now intertwined in Chinese strategic thinking. Indeed, China’s official media have credited Wu with establishing the PLA’s first space war research institute. 3 Shen Dingli, a prominent Chinese nuclear expert, also states that the January 2007 ASAT test was crucial for China’s nuclear deterrence: “When an America with both superior nuclear and conventional arsenals aspires to build missile defense, China’s response is first to oppose it verbally, then counter it with action if the U.S. refuses to stop. China cannot afford to lose the effectiveness of its still-limited nuclear deterrent.” 33 The result is China pursuing an emerging integrated space-nuclear strategy. As argued by Hou Xiaohe and Zhang Hui, strategists at the PLA National Defense University, space warfare will aim at the eyes and ears of missile defense, which are early-warning satellites and other sensors deployed in space. China’s ability to cripple these U.S. space assets will significantly weaken the effectiveness of American missile defense, allowing less time and providing less accurate information to guide ground-based interceptors toward the incoming missiles. The strategists also point out that this strategy is more cost-effective than merely expanding China’s nuclear missiles: “Using limited resources to develop anti-satellite weapons to attack enemy space assets that are costly and easily damaged will become an important choice for weaker countries.” 34 Lieutenant General Ge Dongsheng gives the most systematic elaboration of the new integrated space-nuclear strategy: “Developing space capability and creating a new type of integrated space-nuclear strategic force is the guarantee of effective deterrence and counter-strike.” According to General Ge, this strategy is now a necessity with the emerging link between space war and nuclear deterrence: With the development and integration of space and information technologies, we must recognize that early warning, surveillance, tracking, communication and guidance, which are all critical for nuclear war, are increasingly dependent on space systems. Thus, improving nuclear capability through space capability is now an unavoidable trend. We therefore must accelerate the development of space capability to create a new type of integrated space-nuclear strategic force. . . . Through anti-satellite weapons, we can clear a pathway for nuclear missiles so that our nuclear force can survive, effectively penetrate, and accurately hit targets. 35 The Chinese effort to integrate nuclear and space warfare capabilities is an inevitable response to the security dilemma created by U.S. missile defense. As Joan Johnson-Freese and Thomas Nicols point out, “It is unsurprising that other nations would logically view the same capability as a direct threat to the effectiveness of their own nuclear deterrent.” They argue that given the very limited size of the Chinese nuclear deterrent, U.S. missile defense has forced China to pursue space war capabilities as a countermeasure. 3

Space Race ! – China – Modernization Module

Modernization collapses the CCP – leads to adventurism

Krawitz 3 (Howard M., Assistant Secretary for East Asian and Pacific Affairs @ U.S. Department of State, “Modernizing China's military: a high-stakes gamble?”, Strategic Forum, December 2003, http://findarticles.com/p/articles/mi\_m0QZY/is\_203-204/ai\_n13803180/pg\_11/?tag=content;col1) JPG

China is committed to modernizing almost every aspect of the People's Liberation Army (PLA). But military modernization may be more of a high-stakes gamble than Beijing realizes. Politics and professionalism may not mix well. No matter how carefully crafted, modernization inevitably will alter the PLA sense of identity and change its relationship over time with the Chinese Communist Party (CCP). Modernization may foment friction between military and civilian authorities competing for political primacy and limited resources or create within the PLA divisive social issues similar to those dogging Chinese civil society generally. The CCP struggle to define its future in a changing society makes the problem more complex. The PLA could become a truly national army, unwilling to be a tool for enforcing party dicta or policing internal security. Or PLA factions could end up vying for power. The resulting instability, if not outright anarchy, could threaten all of Asia. The final nature of an empowered, modernized PLA is anyone's guess. In one worst-case scenario, the PLA is an aggressive, nationalistic entity fueled by radical Chinese militarism. In a positive scenario, a more professional PLA with enhanced capability and self-confidence might become a safer, less insular military that is cognizant of the need for disciplined action and measured responses, bound by well-understood rules of engagement and, overall, a more potent force for preserving regional stability. China's accelerated push to modernize the People's Liberation Army (PLA) raises two important questions: What impact will such change have upon the PLA image, status, and role in Chinese society? And how will Chinese military modernization affect the strategic interests and security concerns of the United States and China's neighbors in the region? Making the PLA into a more professional, technologically proficient force would certainly strengthen its capability to perform national defense, regional security, and other externally oriented missions more effectively. But modernization could also significantly change internal PLA demographics, resulting in a drastic alteration of the social contract that has traditionally existed between China's military and civilian society. The aftereffects of major changes in the historic social contract remain a large and potentially dangerous unknown. Conceivably, substantive change could create conditions leading to political competition between civilian and military authorities or wrangling over limited resources. It might promote within the PLA itself a rise in divisive issues similar to those now plaguing Chinese society in general as a result of two decades of uneven economic reform: intensified urban-rural distinctions, rifts between haves and have-nots, and increasing divisions between the educated and uneducated, the privileged and unprivileged. For the PLA parent entity, the Chinese Communist Party (CCP), modernization represents a double-edged sword. It promises the party a more effective mechanism for maintaining domestic primacy and enhancing international prestige. Conversely, the modernization process could equally well create a military increasingly unwilling to be seen as a tool for enforcing party dicta or policing internal security--in effect, working against party interests. The PLA could evolve into a national military with loyalties to the state as a whole rather than to one specific political element within the state (the CCP), as is the case today. Or the PLA itself could even develop into a distinct political element, brokering power and seeking organizational advantage at other political entities' expense. Changes wrought through PLA attempts to carry out a revolution in military affairs have potentially far-reaching implications for the Asia-Pacific region and especially for U.S. security interests. A more professional PLA could become a safer, less insular military that is cognizant of the need for disciplined action and measured responses, bound by well-understood rules of engagement and, overall, a more potent force for preserving regional stability. But a darker version of this picture also exists: the distinct possibility that enhanced capability and self-confidence will encourage the PLA to evolve into an aggressive, nationalistic entity fueled by a radical Chinese militarism that encourages risk-taking and adventurism, both in the region and in dealings with the United States. In a worst-case domestic scenario--unlikely but not inconceivable--PLA factions could end up vying for power. The resulting chaos could easily produce a dangerous state of instability, if not outright anarchy, that would threaten all of Asia. The party's ongoing struggle to define its future and control its evolution in a changing society makes the problem even more complex. For China, military modernization is as much (maybe even more) a political conundrum as it is a scientific and technological problem. Although they display the overt trappings of a pro-modernization mentality, the most senior PLA leadership remains basically politically inflexible, unimaginative, and probably ignorant of the actual requirements and effects of real change, even as younger generations of field-grade officers--who are likely to be the primary enactors and beneficiaries of modernization--have begun to exhibit nationalistic tendencies and interpretations of PLA roles in strategic deliberations and foreign policy increasingly at variance with those traditionally held by their elders.

Space Race ! – China – Modernization Module

Collapse of the CCP control triggers a nuclear civil war and regional conflicts

Yee and Storey 2 (Herbert – Politics and IR Prof @ Hong Kong Baptist U, and Ian – Lecturer in Defense Studies @ Deakin U, “The China Threat: Perceptions, Myths and Reality”, pg 5, InformaWorld) JPG

The fourth factor contributing to the perception of a China threat is the fear of political and economic collapse in the PRC, resulting in territorial fragmentation, civil war and waves of refugees pouring into neighbouring countries. Naturally, any or all of these scenarios would have a profoundly negative impact on regional stability. Today the Chinese leadership faces a raft of internal problems, including the increasing political demands of its citizens, a growing population, a shortage of natural resources and a deterioration in the natural environment caused by rapid industrialisation and pollution. These problems are putting a strain on the central government's ability to govern effectively. Political disintegration or a Chinese civil war might result in millions of Chinese refugees seeking asylum in neighbouring countries. Such an unprecedented exodus of refugees from a collapsed PRC would no doubt put a severe strain on the limited resources of China's neighbours. A fragmented China could also result in another nightmare scenario - nuclear weapons falling into the hands of irresponsible local provincial leaders or warlords.'2 From this perspective, a disintegrating China would also pose a threat to its neighbours and the world.

Space Race ! – China – Relations

Space race kills Chinese relations

Blazejewski 8 (Kenneth, MPA in Intl Affairs @ Princteon, Spring 08, Strategic studies quarerly, http://www.au.af.mil/au/ssq/2008/Spring/blazejewski.pdf) JPG

The issues surrounding the weaponization of outer space present difficult security and diplomatic challenges to the United States in its relationship with foreign states. Several features of space weaponization account for these dif- ficulties. First, many space technologies have dual-use capacity, making it dif- ficult for states to distinguish between defensive and offensive preparations or conventional and space weapons.1 Second, some defense analysts argue that space weapons are inherently better suited to offensive than defensive warfare since they are able to launch powerful attacks quickly but are vulnerable to attack.2 Third, due to insufficient situational awareness in space and poor “forensic” ability, the causes of satellite failures can be unclear, creating the potential for both anonymous attacks and groundless accusations of antisatellite (ASAT) attacks.3 Finally, as in many areas of foreign policy, states often send mixed signals regarding their true intentions in space. In considering the costs and benefits of space weaponization, the United States must consider the effects it will have on its security relationship with foreign states. The United States should pay particular attention to the effect on relations with China, a potential future superpower with nuclear, intercontinental ballistic missile (ICBM), and ASAT capability, along with growing space programs.

**US-China relations solve multiple scenarios for extinction**

Cohen 9 (William, former Secretary of Defense, chairman and CEO of Cohen Group, and Maurice – former CEO of AIG, 3/4/9, http://csis.org/publication/smart-power-us-china-relations) JPG

The evolution of Sino-U.S. relations over the next months, years, and decades has the potential to have a greater impact on global security and prosperity than any other bilateral or multilateral arrangement. In this sense, many analysts consider the US.-China diplomatic relationship to be the most influential in the world. Without question, strong and stable U.S. alliances provide the foundation for the protection and promotion of U.S. and global interests. Yet within that broad framework, the trajectory of U.S.-China relations will determine the success, or failure, of efforts to address the toughest global challenges: global financial stability, energy security and climate change, nonproliferation, and terrorism, among other pressing issues. Shepherding that trajectory in the most constructive direction possible must therefore be a priority for Washington and Beijing. Virtually no major global challenge can be met without U.S.-China cooperation. The uncertainty of that future trajectory and the "strategic mistrust" between leaders in Washington and Beijing necessarily concerns many experts and policymakers in both countries. Although some U.S. analysts see China as a strategic competitor—deliberately vying with the United States for energy resources, military superiority, and international political influence alike— analysis by the Center for Strategic and International Studies (CSIS) has generally found that China uses its soft power to pursue its own, largely economic, international agenda primarily to achieve its domestic objectives of economic growth and social stability.1 Although Beijing certainly has an eye on Washington, not all of its actions are undertaken as a counterpoint to the United States. In addition, CSIS research suggests that growing Chinese soft power in developing countries may have influenced recent U.S. decisions to engage more actively and reinvest in soft-power tools that have atrophied during the past decade. To the extent that there exists a competition between the United States and China, therefore, it may be mobilizing both countries to strengthen their ability to solve global problems. To be sure, U.S. and Chinese policy decisions toward the respective other power will be determined in large part by the choices that leaders make about their own nations interests at home and overseas, which in turn are shaped by their respective domestic contexts. Both parties must recognize—and accept—that the other will pursue a foreign policy approach that is in its own national interest. Yet, in a globalized world, challenges are increasingly transnational, and so too must be their solutions. As demonstrated by the rapid spread of SARS from China in 2003, pandemic flu can be spread rapidly through air and via international travel. Dust particulates from Asia settle in Lake Tahoe. An economic downturn in one country can and does trigger an economic slowdown in another. These challenges can no longer be addressed by either containment or isolation. What constitutes the national interest today necessarily encompasses a broader and more complex set of considerations than it did in the past As a general principle, the United States seeks to promote its national interest while it simultaneously pursues what the CSIS Commission on Smart Power called in its November 2007 report the "global good."3 This approach is not always practical or achievable, of course. But neither is it pure benevolence. Instead, a strategic pursuit of the global good accrues concrete benefits for the United States (and others) in the form of building confidence, legitimacy, and political influence in key countries and regions around the world in ways that enable the United States to better confront global and transnational challenges. In short, the global good comprises those things that all people and governments want but have traditionally not been able to attain in the absence of U.S. leadership. Despite historical, cultural, and political differences between the United States and China, Beijing's newfound ability, owing to its recent economic successes, to contribute to the global good is a matter for common ground between the two countries. Today there is increasing recognition that no major global challenge can be addressed effectively, much less resolved, without the active engagement of—and cooperation between—the United States and China. The United States and China—the worlds first- and third-largest economies—are inextricably linked, a fact made ever more evident in the midst of the current global financial crisis. Weak demand in both the United States and China, previously the twin engines of global growth, has contributed to the global economic downturn and threatens to ignite simmering trade tensions between the two countries. Nowhere is the interconnectedness of the United States and China more clear than in international finance. China has $2 trillion worth of largely U.S. dollar-denominated foreign exchange reserves and is the world's largest holder—by far—of U.S. government debt. Former treasury secretary Henry M. Paulson and others have suggested that the structural imbalances created by this dynamic fueled the current economic crisis. Yet. China will almost certainly be called on to purchase the lion's share of new U.S. debt instruments issued in connection with the U.S. stimulus and recovery package. Secretary of State Hillary Rodham Clinton's February 23.2009, reassurance to Beijing that U.S. markets remain safe and her call for continued Chinese investment in the U.S. bond market as a means to help both countries, and the world, emerge from

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Space Race ! – China – Relations

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global recession underscored the shared interest—and central role—that both countries have in turning around the global economy quickly. Although China's considerable holdings of U.S. debt have been seen as a troubling problem, they are now being perceived as a necessary part of a global solution. Similarly, as the worlds two largest emitters of greenhouse gases, China and the United States share not only the collateral damage of energy-inefficient economic growth, but a primary responsibility to shape any ultimate global solutions to climate change. To date, cooperation has been elusive, owing as much to Washington's reluctance as to Beijing's intransigence. Painting China as the environmental bogeyman as an excuse for foot-dragging in policymaking is no longer an option; for its part, China, as the world's top polluter, must cease playing the developing-economy card. Yet energy security and climate change remain an area of genuine opportunity for joint achievement. Indeed, U.S.-China cooperation in this field is a sine qua non of any response to the energy and climate challenges. The sheer size of the Chinese economy means that collaboration with the United States could set the de facto global standards for etficiency and emissions in key economic sectors such as industry and transportation. Climate change also provides an area for cooperation in previously uncharted policy waters, as in emerging Arctic navigational and energy exploration opportunities. Washington and Beijing also share a deep and urgent interest in international peace and stability. The resumption of U.S.-China military contacts is a positive development. As two nuclear powers with worldwide economic and strategic interests, both countries want to minimize instability and enhance maritime security, as seen by parallel antipiracy missions in the waters otT Somalia. Joint efforts in support of United Nations peacekeeping, nonproliferation, and counterterrorism offer critical areas for bilateral and multilateral cooperation. Certainly, regional and global security institutions such as the Six-Party Talks concerning North Korea or the UN Security Council require the active engagement of both Washington and Beijing. Even more broadly, crisis management in geographic regions of mutual strategic interest like the Korean peninsula, Iran, or Burma require much more Sino-U.S. communication if the two countries are to avoid miscalculation and maximize opportunities to minimize human sutfering. Increasing the number of mid-level military-to-military exchanges would help in this regard. The United States and China could do more to cooperate on law enforcement to combat drug trafficking and organized crime in Western China. Afghanistan is competing with Burma as the main provider of narcotics to China; Washington could use its influence with the International Security Assistance Force in Kabul to develop a joint antinarcotics program. This could potentially build networks and joint capabilities that might be useful for U.S.-China cooperation on the issue of Pakistan. In addition, Washington should also encourage NATO-China cooperation along the Afghan border. Collaborating under the auspices of the Shanghai Cooperation Organization (SCO) might provide an additional framework for Beijing and Washington to address Central Asian security issues in a cooperative manner. 1he SCO, which includes Pakistan as an observer and will convene a multinational conference on Afghanistan in March 2009, has long made curbing narcoterrorism in Afghanistan a priority. In addition, the VS. Drug Enforcement Agency and the Chinese Anti-Narcotics Bureau should expand cooperation on interdiction and prosecution of heroin and meth traffickers. To be sure, there are a number of areas of serious divergence between Washington and Beijing. This should surprise no one. The United States has disagreements with even its allies. Two large powers with vastly dilferent histories, cultures, and political systems are bound to have challenges. History has shown, however, that the most effective way of addressing issues is for the U.S. and Chinese governments to engage in quiet diplomacy rather than public recrimination. In the U.S.-China context, there is often little to be gained—and much to be lost in terms of trust and respect—by a polarizing debate. Any differences, moreover, must not necessarily impede Sino-U.S. cooperation when both sides share strong mutual interests. I;. Scott Fitzgerald wrote that "the test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function."3 Effective policy toward China by the United States, and vice versa, will require this kind of dual-minded intelligence. Moreover, working together on areas of mutual and global interest will help promote strategic trust between China and the United States, facilitating possible cooperation in other areas. Even limited cooperation on specific areas will help construct additional mechanisms for bilateral communication on issues of irreconcilable disagreement. In fact, many of the toughest challenges in U.S.-China relations in recent years have been the result of unforeseen events, such as the accidental bombing of the Chinese embassy in Belgrade in May 1999 and the EP-3 reconnaissance plane collision in April 2001. Building trust and finding workable solutions to tough problems is the premise behind the Obama administrations foreign policy of smart power, as articulated by Secretary of State Clinton. Smart power is based on, as Secretary Clinton outlined in her confirmation hearing, the fundamental belief that 'We must use... the full range of tools at our disposal—diplomatic, economic, military, political and cultural—picking the right tool, or combination of tools, for each situation."' As the CS1S Commission on Smart Power noted in November 2007, "Smart Power is neither hard nor soft—it is the skillful combination of bothIt is an approach that underscores the necessity of a strong military, but also invests heavily in alliances, partnerships and institutions at all levels... .°5 As such, smart power necessarily mandates a major investment in a U.S.-China partnership on key issues. 'The concept enjoys broad support among the Chinese and American people and, by promoting the global good, it reaps concrete results around the world. There should be no expectation that Washington and Beijing will or should agree on all, or even most, questions. But the American and Chinese people should expect their leaders to come together on those vital issues that require their cooperation. U.S.-China partnership, though not inevitable, is indispensable.

Space Race ! – China – ASATs Module

US-China Space race causes Chinese ASAT development

Blazejewski 8 (Kenneth, MPA in Intl Affairs @ Princteon, Spring 08, Strategic studies quarerly, http://www.au.af.mil/au/ssq/2008/Spring/blazejewski.pdf) JPG

A second interpretation, not wholly inconsistent with the first, is that China is concerned that the United States seeks to deny Chinese use of outer space. As China continues down the path of economic develop- ment and technological advancement, it seeks to grow its outer space pro- grams. China seeks to launch new satellites for commercial and military purposes.25 For instance, China has plans to launch a GPS-like satellite system called Beidou-2. From 2006 to 2010, China plans to launch up to 100 satellites.26 It also has an interest in developing a space science pro- gram much like NASA. Although the United States has officially stated that it supports the peaceful use of outer space by all space-faring nations, so-called US “space controllers” or “space hegemonists”27 argue the United States should carefully police the use of space to assure that no country uses it in a manner inconsistent with its interests. In response to such a US policy, China seeks to deny the US denial of outer space.28 One means of doing so would be through the ratification of an international treaty that precluded the United States from putting in place the instruments or means to control outer space. Since the diplomatic approach does not seem likely to produce any concrete results, China is moving forward with its ASAT program in order to hedge the risk of US space domination.

ASATs cause Taiwan war

Easton 9 (Ian, Research Fellow @ 2049 Project Inst., 2009,

http://www.project2049.net/documents/china\_asat\_weapons\_the\_great\_game\_in\_space.pdf) JPG

Any possible U.S. military contingency around the Taiwan Strait would require secure satellites as the U.S. becomes ever more reliant upon its space systems. Moreover, reconnaissance satellites are thought to limit the risk inherent in the build-up of forces that both the PRC and the U.S. could be expected to deploy to the region in the event of a crisis. However, if the U.S. was blinded as the result of a preemptive Chinese ASAT attack, the conflict could quickly escalate to a dangerous level. According to two experts on the subject, “if there is a great-power war in the twenty-first century, our crystal ball says that it will be between the United States and China over Taiwan, with a very serious potential for a horrible escalatory process.” 38 This underscores the gravity of the topic as well as the negative impact the Chinese shift towards fielding ASAT weapons could have.

Space Race ! – China – ASATs Link Ext.

Space race causes China to develop ASATs

Blazejewski 8 (Kenneth, MPA in Intl Affairs @ Princteon, Spring 08, Strategic studies quarerly, http://www.au.af.mil/au/ssq/2008/Spring/blazejewski.pdf) JPG

I recommend that the United States accept a commitment to forgo place- ment of weapons in outer space. The costs of space weaponization simply outweigh the benefits. Above, I argue that China would respond to US space weaponization with some level of military buildup. In the least, this response would include the deployment of a more robust ASAT system capable of attack- ing and potentially eliminating space weapons.52 After all, space weapons, like military satellites, make for vulnerable military targets.53 The use of space-based weapons in a conflict must be discounted by the likelihood that they would be eliminated by Chinese ASAT attack. More importantly, increased ASAT deployment would have the counterproductive effect of exposing US satel- lites to greater threat. Aside from ASAT issues, Chinese response to US space weaponization would include an increase in China’s ICBM fleet and nuclear arsenal. Vertical proliferation cannot be in the interests of the United States, if only for the increased peacetime risks of accidental launch or the terrorist risk associated with increased availability of weapons technology and components. Finally, the United States should not discount the possibility, often cited by opponents of space weaponization, that the deployment of US space weapons would instigate a space arms race.

Space Race ! – General

Causes nuclear war and turns case

Myers 8 (Steven, Times bureau chief in Moscow, Mar 9, [www.nytimes.com/2008/03/09/weekinreview/09myers.html] AD: 7-8-11, jam)

IT doesn’t take much imagination to realize how badly war in space could unfold. An enemy — say, China in a confrontation over Taiwan, or Iran staring down America over the Iranian nuclear program — could knock out the American satellite system in a barrage of antisatellite weapons, instantly paralyzing American troops, planes and ships around the world. Space itself could be polluted for decades to come, rendered unusable. The global economic system would probably collapse, along with air travel and communications. Your cellphone wouldn’t work. Nor would your A.T.M. and that dashboard navigational gizmo you got for Christmas. And preventing an accidental nuclear exchange could become much more difficult. “The fallout, if you will, could be tremendous,” said Daryl G. Kimball, executive director of the Arms Control Association in Washington.

Space race causes accidental nuclear war

Ross 9 (Sherwood, reporter @ Chicago Tribune, March 2009, Political Affairs, http://www.politicalaffairs.net/space-race-raises-risk-of-nuclear-war/) JPG

An unchecked race to militarize space is underway that is “increasing the risk of an accidental nuclear war while shortening the time for sanity and diplomacy to come into play to halt crises,” an authority on space warfare says. By 2025, the space capabilities of the leading space powers – the US, Russia, India and China – will be roughly equal “due to information sharing in a globalized economy,” says noted space researcher Matt Hoey in an exclusive interview. Hoey is international military space technology forecaster who provides analysis on issues related to technology proliferation and arms control. He is also a former senior research associate at the Institute for Defense and Disarmament Studies and has contributed to publications such as the Bulletin of Atomic Scientists and the Space Review. Through their military and commercial research facilities, the world’s military powers are pursuing development of a reusable, unmanned, hypersonic, space-strike delivery platform that “would permit rapid precision strikes worldwide in 120 minutes or less,” Hoey said. The strike platform could loiter in near-space or in low earth orbit and assault terrestrial targets at incredible speed “with a nuclear or conventional payload and then return to any base in the world on demand,” he explained. While “there will not be a dedicated ‘space war’ in our lifetimes or our children’s,” Hoey said, “we are likely to witness acts of space warfare being committed…in concert with other theatres of combat” on land, sea, and air and cyber space.” Hoey said his research analysis suggests, “Back and forth escalation regarding military space capabilities would fuel each nation’s respective space industries as would commercial space races driven by national pride.” “If these systems are deployed in space we will be tipping the nuclear balance between nations that has ensured the peace for decades,” Hoey continued. “The military space race will serve the defense industry much like the cold war and this is already being witnessed in relation to missile defense systems.” Hoey pointed out the arms control community “is still trying to put the nuclear genie from decades ago back in the bottle” and adds “once this new genie(space war) is out it is not going back in anytime soon, either.”

\*\*Accidents D/A

Accidents 1NC

Nuclear propulsion would destroy the ecosphere

Gagnon 3 (Bruce, coordinator of the Global Network Against Weapons & Nuclear Power in Space, Jan, [www.space4peace.org/articles/npowerexpansion.htm] AD: 7-7-11, jam)

Included in NASA plans are the nuclear rocket to Mars; a new generation of Radioisotope Thermo-electric Generators (RTGs) for interplanetary missions; nuclear-powered robotic Mars rovers to be launched in 2003 and 2009; and the nuclear powered mission called Pluto-Kuiper Belt scheduled for January, 2006. NASA envisions mining colonies on the Moon (for helium 3 and water), Mars (magnesium, cobalt, and uranium) and asteroids (gold) powered by nuclear reactors launched from the Kennedy Space Center in Florida on rockets with a historic 10% failure rate. By exponentially increasing the number of nuclear launches NASA also exponentially increases the chances of accident. During the 1950s and 1960s NASA spent over $10 billion to build the nuclear rocket program canceled in the end because a launch accident would contaminate major portions of Florida and beyond. By exponentially increasing the number of nuclear launches NASA also exponentially increases the chances of accident. NASA’s expanded focus on nuclear power in space “is not only dangerous but politically unwise,” says Dr. Michio Kaku, professor of nuclear physics at the City University of New York. “The only thing that can kill the US space program is a nuclear disaster…a Chernobyl in the sky.” “NASA hasn’t learned its lesson from its history,” says Kaku, “and a hallmark of science is that you learn from previous mistakes. NASA doggedly pursues its fantasy of nuclear power in space.” Since the 1960s there have been eight space nuclear power accidents by the US and the former Soviet Union, several of which released deadly plutonium. In April, 1964 a US military satellite with 2.1 pounds of plutonium-238 on board fell back to Earth and burned up as it hit the atmosphere, spreading the toxic plutonium globally as dust to be ingested by the people of the planet. In 1997 NASA launched the Cassini space probe carrying 72 pounds of plutonium that fortunately did not experience failure. Hundreds of thousands of people could have been contaminated. Last year the Department of Energy (DoE) and NASA announced that present facilities must be expanded. The DoE will spend over $35 million to renovate the Oak Ridge National Laboratory in Tennessee to help with space plutonium production. Oak Ridge workers would purify the plutonium, which then would be shipped to Los Alamos National Laboratory in New Mexico where it would be formed into pellets used in space power systems. Historically DoE has a bad track record when it comes to protecting workers and local water systems from radioactive contaminants. Serious questions need to be asked: How will workers be protected? Where will they test the nuclear rocket? How much will it cost? What would be the impacts of a launch accident? Critics of NASA have long stated that the NASA space nukes initiative represents the Bush administration’s covert move to develop power systems for space-based weapons. The military has often stated that their planned lasers in space will require enormous power projection capability and nuclear reactors in orbit would provide such power. In April, 1964 a US military satellite with 2.1 pounds of plutonium-238 on board fell back to Earth and burned up as it hit the atmosphere… “You can’t differentiate between…military application and those capabilities which are civil and commercial in nature.” The Global Network Against Weapons & Nuclear Power in Space maintains that missile defense is a Trojan horse for the Pentagon’s control and domination of space, and NASA’s nuclear rocket is a Trojan horse for the militarization of space. NASA’s new chief, former Navy Secretary Sean O’Keefe said, “I think it’s imperative we have a more direct association between the Defense Department and NASA. … You can’t differentiate between…military application and those capabilities which are civil and commercial in nature.” In the end hundreds and hundreds of billions of dollars will be wasted on plans for the nuclearization and weaponization of space. In order to fund these missions Bush and Congress will cut programs like social security, education, health care, child care, public transit and environmental protection. The lives of future generations will become more insecure. For the third year in a row the Global Network (GN) will organize two days of protests on February 3–4, 2003 in Albuquerque, N.M. at the 20th Annual Symposium on Space Nuclear Power & Propulsion. This event draws the top players from NASA, DoE, DoD, nuclear academia and nuclear aerospace each year to plan the push of nuclear power into space. Hundreds of middle and high school students are brought to the symposium for indoctrination and the GN has been able to speak to many of these young people at our protests. NASA, DoE, and the Pentagon are not asking the public if we want to suffer the risk and costs of nuclear power in space. Their corporate and military interests make it necessary to push ahead without public debate. Their plans threaten the life of the entire planetary ecosystem. The time has come for vigorous organizing around the space nuclear power issue.

Accidents Link

There is a ten percent chance of nuclear rocket accidents – the plan only increases that number

Gagnon 3 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, 1/27/3, http://www.spacedaily.com/news/nuclearspace-03b.html) JPG

Included in NASA plans are the nuclear rocket to Mars; a new generation of Radioisotope Thermoelectric Generators (RTGs) for interplanetary missions; nuclear-powered robotic Mars rovers to be launched in 2003 and 2009; and the nuclear powered mission called Pluto-Kuiper Belt scheduled for January, 2006. Ultimately NASA envisions mining colonies on the Moon, Mars, and asteroids that would be powered by nuclear reactors. All of the above missions would be launched from the Kennedy Space Center in Florida on rockets with a historic 10% failure rate. By dramatically increasing the numbers of nuclear launches NASA also dramatically increases the chances of accident. During the 1950s and 1960s NASA spent over $10 billion to build the nuclear rocket program which was cancelled in the end because of the fear that a launch accident would contaminate major portions of Florida and beyond.

Nuclear propulsion inevitably causes accidents – empirically proven

Grossman 97 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 2/3/97, http://www.flybynews.com/archives/karl/kg9105we.htm) JPG

.The record of nuclear power in space is poor. The United States has launched 24 nuclear-fueled space devices, including a navigational satellite with plutonium aboard that disintegrated in the atmosphere as it plunged to Earth in 1964. The U.S. failure rate for nuclear-powered space devices has been about 15 percent. The Soviet Union has the same failure rate. The Soviets have sent up more than 30 nuclear-fueled devices, including the Kosmos 954, which littered a broad swath of Canada with radioactive debris when it crashed in 1978. The United States spent some $2 billion of taxpayer money on developing nuclear-powered rockets from 1955 to 1973, but none ever got off the ground. That effort was finally canceled because of the concern that a rocket might crash to Earth. Now we're turning to nuclear power in space -- with its inevitable mishaps -- again. Last year the United States launched the Ulysses plutonium-fueled probe to survey the sun. A December Associated Press dispatch noted, "The Ulysses spacecraft is wobbling like an off-balance washing machine, threatening to cripple the $760-million mission." Fortunately, the probe is not coming back for an Earth flyby.

Other types of propulsion are comparatively better – captures solvency with no risk of accidents

Grossman 3 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, February 2003, http://www.envirovideo.com/nuclearspacestory.html) JPG

"NASA hasn’t learned its lesson from its history involving space nuclear power," says Kaku, "and a hallmark of science is that you learn from previous mistakes. NASA doggedly pursues its fantasy of nuclear power in space. We have to save NASA from itself." He cites "alternatives" space nuclear power. "Some of these alternatives may delay the space program a bit. But the planets are not going to go away. What’s the rush? I’d rather explore the universe slower than not at all if there is a nuclear disaster." Dr. Ross McCluney, a former NASA scientist now principal research scientist at the Florida Solar Energy Center, says NASA’s push for the use of nuclear power in space is "an example of tunnel vision, focusing too narrowly on what appears to be a good engineering solution but not on the longer-term human and environmental risks and the law of unintended consequences. You think you’re in control of everything and then things happen beyond your control. If your project is inherently benign, an unexpected error can be tolerated. But when you have at your project’s core something inherently dangerous, then the consequences of unexpected failures can be great."

Accidents Link

Accidents are inevitable

Aftergood 11 (Steven, directs the Project on Government Secrecy @ Federation of American Scientists, Jun 28, [www.fas.org/blog/secrecy/2011/06/space\_nuclear\_power.html] AD: 7-7-11, jam)

Unfortunately, the plutonium 238 power sources that are used to power these missions are not only expensive, they are dirty and dangerous to produce and to launch. The first launch accident (pdf) involving an RTG occurred as early as 1964 and distributed 17,000 curies of plutonium-238 around the globe, a 4% increase in the total environmental burden (measured in curies) from all plutonium isotopes (mostly fallout from atmospheric nuclear weapons testing). A plutonium fueled RTG that was deployed in 1965 by the CIA not in space but on a mountaintop in the Himalayas (to help monitor Chinese nuclear tests) continues to generate anxiety, not electricity, more than four decades after it was lost in place. See, most recently, “River Deep Mountain High” by Vinod K. Jose, The Caravan magazine, December 1, 2010. A good deal of effort has been invested to make today’s RTGs more or less impervious to the most likely launch accident scenarios. But they will be never be perfectly safe. In order to minimize the health and safety risks involved in space nuclear power while still taking advantage of the benefits it can offer for space exploration, the Federation of American Scientists years ago proposed (pdf) that nuclear power — both plutonium-fueled RTGs and uranium-fueled reactors — be used only for deep space missions and not in Earth orbit. Although this proposal was never officially adopted, it represents the de facto policy of spacefaring nations today.

Accidents are likely – any NASA risk assessment is flawed

Davidson 3 (Keay, science writer @ San Francisco Chronicle, won the AAAS and NASW science journalism awards, Apr 29, [www.seattlepi.com/national/article/Despite-protests-NASA-continues-nuclear-use-1113541.php] AD: 7-8-11, jam)

NASA says the probability of a life-threatening nuclear accident -- one that would eject cancer-causing bits of plutonium into the atmosphere -- is extremely low. But skeptics doubt that such probabilities can be realistically calculated. The debate over nuclear space launches is a case study of a larger phenomenon: the growing use of "probabilistic risk assessments," or PRAs, to estimate technological risks. PRAs are increasingly used by engineers, ecologists, environmental officials, food-safety analysts, officials at nuclear reactors, structural safety experts and other experts to estimate the likelihood of a technological disaster, from the collapse of a bridge in high winds to lung cancer cases caused by a nuclear plant accident. Even advocates caution that PRAs' seemingly reliable statistical estimates -- say, one chance in a million of an accident -- depend on many fuzzy assumptions. They don't include unexpected factors, ranging from terrorists' cunning to one technician's unbelievable stupidity. Nuclear-powered generators have provided electricity for more than two dozen U.S. space missions since the early 1960s. As part of Project Prometheus, NASA scientists hope to launch a robot with a nuclear-driven ion engine into orbit around three moons of Jupiter, perhaps as early as 2011. The orbiter will require nuclear power to support its energy-gobbling instruments, including radar powerful enough to view oceans beneath the moons' icy crusts. For safety reasons, the nuclear engine will not be switched on until it is far from Earth. But anti-nuclear activists aren't reassured. They say the recent Columbia space shuttle disaster, which killed seven astronauts, reinforces their belief that launching nuclear payloads is too risky -- and that NASA's confidence in such missions is foolish. NASA estimates a 1-in-31 chance of a launch accident involving the unmanned Mars-bound spaceship scheduled for launch late next month. Thanks partly to the "rugged design" of the nuclear heater units, NASA says, the chance that an accident will actually release any radioactivity into Earth's environment is even lower -- 1 in 230. If an accident occurred during launch, spectators and people downwind could inhale small quantities of radionuclides, NASA acknowledges. But even then, the health threat is minuscule, said Edward Weiler, associate administrator for space science, in a Jan. 31 report. Critics say those numbers are numerical nonsense. Even before the Columbia catastrophe, NASA officials knew PRAs weren't perfect. A little-noticed report by the NASA inspector general, published eight months before the Columbia tragedy, acknowledged critics' charge that "sole reliance on (PRAs) can lead to an unsafe spacecraft." That's partly because it encourages engineers to concentrate on improving individual spacecraft components, thereby lowering each component's risk of failure, without concentrating on improving the overall shuttle design.

Accidents – ! Helper

The plan creates a Chernobyl in the sky – spreads radiation across the globe

Grossman 4 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, Earth First Journal, March-April 2004, http://westgatehouse.com/art154.html) JPG

Opponents of using nuclear power in space warn of serious accidents from Project Prometheus. And it's not a matter of the sky falling--accidents have already happened in the use of nuclear power in space. In 1964, there was an accident in which a SNAP-9A, plutonium-powered US satellite fell back to Earth, disintegrating and spreading plutonium over every continent at every latitude. Dr. John Gofman, professor emeritus of medical physics at the University of California-Berkeley, has long linked the SNAP-9A accident to an increased level of lung cancer. Warning of a "Chernobyl in the sky," Dr. Michio Kaku, professor of nuclear physics at the City University of New York, points to alternatives to atomic power in space--among them solar power and long-lived fuel cells. "Some of these alternatives may delay the space program a bit. But the planets are not going to go away." Indeed, as a result of the SNAP-9A accident, NASA intensified its work on solar energy systems, and its satellites are now powered by solar energy, as is the International Space Station. NASA has a division working on the additional uses of space solar power.

More ev

Grossman 3 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, February 2003, http://www.envirovideo.com/nuclearspacestory.html) JPG

The Transit 4A’s plutonium system was manufactured by General Electric. Then, in 1964, there was a serious accident involving a plutonium-energized satellite. On April 24, 1964, the GE-built Transit 5BN with a the SNAP-9A (SNAP for Systems Nuclear Auxiliary Power) board failed to achieve orbit and fell from the sky and disintegrating as it burned in the atmosphere. The 2.1 pounds of Plutonium-238 (an isotope of plutonium 280 times "hotter" with radioactivity than the Plutonium-239 which is used in atomic and hydrogen bombs) in the SNAP-9A dispersed widely over the Earth. A study titled Emergency Preparedness for Nuclear-Powered Satellites done by a grouping of European health and radiation protection agencies later reported that "a worldwide soil sampling program carried out in 1970 showed SNAP-9A debris present at all continents and at all latitudes." Long connecting the SNAP-9A accident and an increase of lung cancer on Earth has been Dr. John Gofman, professor emeritus of medical physics at the University of California at Berkeley, an M.D. and Ph.D. who was involved in isolating plutonium for the Manhattan Project and co-discovered several radioisotopes.

Accidents !

A nuclear propulsion accident would spread radiation across the entire planet

Grossman 10 (Karl, prof of journalism at the State U of New York, Jun 25, [www.space4peace.org/articles/obama\_revives\_space\_nukes.htm] AD: 7-7-11, jam)

Plutonium-238 has been used to generate electricity on space probes and rovers and also satellites. But in 1964 a satellite with a plutonium-fueled generator, after failing to achieve orbit, fell to Earth, breaking up as it hit the atmosphere and dispersing 2.1 pounds of Pu-238 from its SNAP -- (for Systems Nuclear Auxiliary Power) 9A system. A study by a group of European health and radiation protection agencies reported that "a worldwide soil sampling program in 1970 showed SNAP-9A debris present at all continents and at all latitudes." Dr. John Gofman, professor of medical physics at the University of California at Berkeley, long linked that fall-out to an increase of lung cancer on Earth. The accident caused NASA to pioneer the use of solar panels on satellites. NASA still used Pu-238 for space probes claiming there was no alternative -- even when there was. For example, NASA and the Department of Energy (DOE) insisted, including in court testimony, that there was no choice but plutonium power on the Galileo mission to Jupiter launched in 1989. Subsequently, through the Freedom of Information Act, I obtained a study done by NASA's Jet Propulsion Laboratory finding that solar panels could have worked. Currently, NASA is preparing to send its Juno space probe to Jupiter next year -- and it's to get all its on board electricity from solar panels. Rovers have also used solar panels. Still, in a report titled "Start-up Plan for Plutonium-238 Production for Radioisotope Power Systems" just sent to Congress, the DOE, noting it was acting "consistent with the President's request," is calling for a return of Pu-238 production by the U.S. Nine space missions which DOE says need Pu-238-generated electricity are listed. This includes the Mars Science Laboratory, the name given to a rover to be launched in November, and other missions to the Moon, Mars and other planets through 2030. The report proposes that Pu-238 be produced at Oak Ridge National Laboratory and Idaho National Laboratory. "DOE's preliminary cost range estimate to implement this Pu-238 production scheme is $75-90 million," it says. The total for the fiscal year 2011 is $30 million. Facilities in the U.S. for making plutonium-238 have been closed and the nation since 1992 has been purchasing it from Russia. The processing of plutonium-238, an especially hot variant of plutonium, itself the most toxic radioactive substance known, led to worker contamination and environmental pollution here.

The plan causes nuclear accidents to be inevitable – isn’t necessary and kills thousands

Grossman 97 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 2/3/97, http://www.flybynews.com/archives/karl/kg9105we.htm) JPG

While getting into position to make a low-level (186-mile high), high-speed (33,000 miles an hour) "flyby" of the Earth, the Galileo plutonium-fueled space probe has gone out of whack. The probe, which is supposed to send us information about Jupiter and its moons, unexpectedly shut down all but in essential functions in late March. It took the National Aeronautics and Space Administration 13 days to fix that. Then NASA ordered the probe to unfurl its main communications antenna. But the antenna wouldn't unfurl. Next, on May 2, all but essential functions were lost again. NASA blames the March and May malfunctions on a "stray electronic signal." It still can't figure out why the antenna isn't working. Galileo, with its 50 pounds of plutonium aboard - theoretically enough to give a lethal dose of lung cancer to everyone on Earth - will be buzzing our planet in December, 1992. This "slingshot maneuver" is designed to use the Earth's gravity to give Galileo the velocity to get to Jupiter. It is to be hoped that there will be no foul-ups in Galileo'a functioning then, causing it to make what is called an "Earth-impacting trajectory." With the probe just above the Earth's atmosphere on the flyby, it would take only a small malfunction to cause it to drop and disintegrate, showering plutonium down on Earth. The United States is proceeding rapidly with the nuclearization of space, and the threat we face from Galileo is the kind of danger we will be undergoing constantly if we allow the government to continue to send nuclear hardware into space. If we tolerate Chernobyls in the sky, deadly accidents will be inevitable. Yet this risk is unnecessary. The potential catastrophes are avoidable. After Galileo was launched in 1989, I received, under the Freedom of Information Act, NASA-funded studies declaring that nuclear power was not necessary to generate electricity on the Galileo mission; solar energy would do. The plutonium on board Galileo is being used not for propulsion but as fuel in generators providing a mere 560 watts of electricity for the probe's instruments - electricity that could be produced instead by solar energy. A decade ago NASA's Jet Propulsion Laboratory concluded: "A Galileo Jupiter-orbiting mission could be performed with a concentrated photovoltaic solar array [panels converting sunlight to electricity] power source without changing the mission sequence or impacting science objectives." Five years ago, another JPL study said that it would take only two to three years to build the alternative solar-power source. Still another JPL report stressed that using the sun for power would cost less than using plutonium. It is humanity's destiny to explore the heavens, but what a folly it will be if in doing this, we needlessly cause the deaths of tens of thousands of people and contaminate the Earth with deadly plutonium.

Accidents !

The plutonium-238 used is dangerous and would kill millions

Grossman 5 (Karl, prof of journalism at the State U of New York, Jul 11, [www.space4peace.org/articles/fire\_in\_the\_sky.htm] AD: 7-7-11, jam)

Twenty years ago, I began to learn about plutonium-238, the isotope of plutonium used in space. I was familiar with plutonium-239, built up in nuclear power plants and used in nuclear weapons. My first book on nuclear technology, Cover Up: What You ARE NOT Supposed to Know About Nuclear Power, was published in 1980. I was reading, in 1985, a Department of Energy publication about plans by NASA, working with the DOE and several national laboratories, to launch two space shuttles carrying plutonium-fueled space probes the following year. One of the shuttles was to be the Challenger. The publication, DOE Insider, stated that DOE had considered "postulated accidents" including "launch vehicle aborts, reentry, and impact and post-impact situations." Knowing about the lethality of plutonium—long described as the most toxic radioactive substance, with a particle less than a millionth of a gram lodged in a lung capable of being a fatal dose—I filed a Freedom of Information Act request with NASA, DOE and the national labs. The DOE Insider said "postulated accidents" on the shuttle shots were studied—what were the results? I met a wall of resistance. Finally, after protesting the apparent cover-up, I was sent information in late 1985. There would be serious impacts, it was acknowledged, if the plutonium was released in an accident—although NASA and/or DOE personnel had spent considerable time and Liquid Paper censoring the numbers of people who would be affected. The agencies maintained there was "a very small risk of releasing plutonium-238" because of the "high reliability inherent in the design of the space shuttle." They gave 1-in-100,000 odds for a catastrophic shuttle accident. On Jan. 28, 1986, driving to teach my Investigative Reporting course at the State University at New York, I heard over the car radio that the Challenger had blown up soon after launch. Stopping at an appliance store, I viewed the terrible image on scores of TV screens and thought about what would have happened if this accident had occurred on the next mission of the Challenger, in May 1986, when 24.2 pounds of plutonium-238 were to be on board. "Far more than seven people could have died if the explosion that destroyed Challenger had occurred during the next launch," I wrote in a front-page editorial for The Nation. And I've been deeply involved doing investigative reporting on the space nuclear issue ever since. NASA, incidentally, changed the odds of a catastrophic shuttle accident soon afterward—from the 1-in-100,000, concocted out of whole cloth, to 1-in-76, about right in light of the subsequent Columbia shuttle accident. And consider if Columbia had had plutonium on board: Radioactive debris would have splattered over Texas and Louisiana. I soon learned the accident record in the use of nuclear power in space was not good. Of the then two dozen U.S. space nuclear shots, three involved mishaps. The most serious: In 1964, a satellite with a SNAP-9A plutonium-238 power system on board failed to attain orbit and fell to Earth. It broke up, dispersing its 2.1 pounds of plutonium-238 fuel as fine particles. The release caused an increase in global lung cancer rates, according to Dr. John Gofman, professor emeritus of medical physics at the University of California at Berkeley. It was relatively easy to identify where the plutonium-238 spread, for plutonium-238 is rare compared to plutonium-239. "A worldwide sampling program carried out in 1970 showed SNAP-9A debris to be present at all continents and at all latitudes," determined a report done by Europe's Organization for Economic Cooperation and Swedish National Institute of Radiation Protection. All continents and all latitudes! The good news is that plutonium-238 is not fissile like plutonium-239; it won't explode. The bad news is that because it has a half-life of 87.8 years compared to 24,500 years for plutonium-239, it is radioactively hotter. That's why it's used in space: The intense heat of it breaking down is coupled in what's called a radioisotope thermoelectric generator (RTG) to produce electricity. "Plutonium-238 is about 270 times more radioactive than plutonium-239 per unit of weight," notes Dr. Arjun Makhijani, the physicist who heads the Institute for Energy and Environmental Research. A factor of 270 to 280 is cited by physicists. As a result of the SNAP-9A accident, NASA began doing pioneering solar energy development. Now all satellites are powered by solar energy, as is the International Space Station. But NASA and the DOE insist that to send space devices out into the solar system, plutonium-238 is needed to provide electricity. The danger in this program is getting more severe. In 1997, NASA launched the Cassini space probe with the most plutonium-238 ever used on a space device—72.3 pounds. Moreover, it had Cassini do two "slingshot maneuvers" around the Earth—coming back from space and flying in low and fast and taking advantage of the Earth's gravity to increase its velocity so it could reach Saturn. If on either of these Earth "flybys" Cassini had dipped into the atmosphere, it would have disintegrated and the plutonium-238 released and "5 billion... of the world population... could receive 99 percent or more of the radiation exposure," acknowledged the NASA's Final Environmental Impact Statement for the Cassini Mission. The possible death toll was estimated by independent scientists as anywhere between 950,000 to 40 million. Is this kind of enormous risk necessary? Not at all.

Accidents !

An accident would destroy global agriculture and the environment

Grossman 2 (Karl, prof of journalism at the State U of New York, Summer, [www.space4peace.org/articles/morenukesinspace.htm] AD: 7-7-11, jam)

"Firing nuclear material into space on the top of rockets subject to frequent failures is just asking for trouble," says Webb. "How long will it be before the residents of central Florida are subjected to a shower of nuclear debris from a launch that goes wrong? Historically there is about a 1-in-10 chance of a catastrophic accident during satellite launches. Who will cover the costs including the medical costs if things like that happen to a nuclear payload?" Webb, principal lecturer at the United Kingdoms Leeds Metropolitan University’s School of Engineering, also points to the solar option and stresses the use of solar energy on Rosetta by ESA of which the UK is part. 19 A branch of NASA its Photovoltaics and Space Environment Branch headquartered at the John Glenn Research Center in Cleveland has, like ESA, been working at the cutting-edge of space solar energy development. The silicon solar cells "developed decades ago" which now power the International Space Station, notes NASA’s website, have 14.5% efficiency, and the branch is "exploring new ways to harness the Suns power - including more efficient solar cells, laser-beaming energy to distant spacecraft and solar power systems for the Moon and Mars." This includes solar systems for exploring and powering bases on Moon and Mars. 20 NASA’s website includes detailed NASA plans such as "Photovoltaic Power for the Moon," 21 "Power Systems for Bases and Rovers on Mars" 22 and "A Solar Power System for an Early Mars Expedition." 23 There is no "edge" or limit to solar power, says a solar scientist at the NASA branch, Dr. Geoffrey A. Landis. "In the long term, solar arrays wont have to rely on the Sun. We're investigating the concept of using lasers to beam photons to solar arrays. If you make a powerful-enough laser and can aim the beam, there really isn’t any edge of sunshine." 24 Solar is also being developed to propel spacecraft. In solar electric propulsion, electricity collected by panels is concentrated and used to accelerate the movement of propellant out of a thrust chamber. NASA’s Deep Space 1 probe, launched in 1998, is the first space probe to be propelled with solar electric propulsion. 25 Then there are "solar sails" making use of the ionized particles emitted by the Sun which constitute a force in space. 26 They can be utilized just like wind by a sailboat on Earth. NASA’s Jet Propulsion Laboratory in California is considering a launch at the end of the decade of a space probe to Pluto using either solar sails or solar electric propulsion. 27 A space device with solar sails built in Russia for the International Planetary Society, based in California and founded by the late astronomer Carl Sagan, was launched last year. Russia's Interfax news service noted that the "objective of the mission is to test the system for opening the paddles of an experimental transport vehicle, which looks like a giant windmill, using for the first time in space exploration solar wind for propulsion." 28 Jack Dixon, for 30 years an aerospace engineer, takes issue with those against nuclear power in space for being critical of it for "politically correct," anti-nuclear reasons. His criticism is cost - what he says is an enormous cost. The solar sail system "may be implemented at about 10% of the cost of nuclear and quickly." It is "simple and relatively low tech." 29 The Transit 4A's plutonium system was manufactured by General Electric. The plutonium system - SNAP-9A for Systems Nuclear Auxiliary Power - aboard Transit 5BN-3, launched on April 24, 1964, also was built by GE. But this nuclear satellite failed to achieve orbit, falling from the sky and disintegrating as it burned in the atmosphere. 32 The 2.1 pounds of Plutonium-238 (an isotope of plutonium, 280 times radioactively "hotter" than the Plutonium-239 that is used in nuclear weapons) in the SNAP-9A dispersed widely over the Earth. A study titled Emergency Preparedness for Nuclear-Powered Satellites done by a grouping of European health and radiation protection agencies reported that "a worldwide soil sampling program carried out in 1970 showed SNAP-9A debris present at all continents and at all latitudes." 33 Long connecting the SNAP-9A accident and an increase of lung cancer on Earth has been Dr. John Gofman, professor emeritus of medical physics at the University of California at Berkeley, an M.D. and Ph.D. who was involved in isolating plutonium for the Manhattan Project and co-discovered several radioisotopes. 34 The SNAP9-A accident caused NASA to become a pioneer in developing solar photovoltaic energy technology. And in recent decades, all U.S. satellites have been solar-powered. But NASA continued to use plutonium-powered systems for a series of space probe missions, claiming that solar power could not be gathered on them. The ill-fated shuttle Challenger was to launch a plutonium-fueled space probe in its next planned mission in 1986. The nuclear probe was to generate on-board electricity for the Ulysses space probe mission to study the Sun. A postponed Ulysses shot was launched in 1990. The most recent nuclear space probe mission was called Cassini. It was launched in 1997 with more plutonium fuel - 72.3 pounds - than on any space device ever. NASA conceded the serious dangers of a Cassini accident in its Final Environmental Impact Statement for the Cassini Mission. It stated that if an "inadvertent reentry occurred" and Cassini fell back into the Earths atmosphere, it would break up (it had no heat shield) and "5 billion of the . . . world population . . . could receive 99 percent or more of the radiation exposure." 35 NASA said the "estimated size of the footprint" of radioactive contamination could be as high as 50,000 square kilometers. As for "decontamination methods," NASA listed as planned remedies: "Remove and dispose all vegetation, Remove and dispose topsoil. Relocate animals . . . Ban future agricultural land uses." And for urban environments, "Demolish some or all structures. Relocate affected population permanently." 36 Dr. Gofman estimated the death toll from cancer in the event of the plutonium on Cassini being released at 950,000. 37 The U.S. nuclear-propelled rocket program began at Los Alamos National Laboratory in the 1950s with building of the Kiwi reactor for what became known as the NERVA - for Nuclear Engine for Rocket Vehicle Application - program. Projects Pluto, Rover and Poodle to build nuclear-powered rockets followed. Westinghouse was a major contractor in the original U.S. nuclear rocket efforts. A former Westinghouse president, John W. Simpson, related how to get the contracts "we pulled out all the stops - not only technical effort but also marketing and political savvy." 38 Ground tests of nuclear rocket components were conducted. No nuclear-propelled rocket ever flew. By the early 1970s, the catastrophe that could result if a nuclear-powered rocket crashed to Earth had been recognized and the program ended. But in the 1980s and the first incarnation of a U.S. Star Wars program under President Ronald Reagan, consideration of a nuclear-propelled rocket resumed - for use to loft heavy Star Wars equipment into space. The project was named "Timberwind" and plans were made for both ground and flight tests. To avoid heavily populated parts of the Earth, the plan was to fly a prototype atomic rocket around Antarctica but the rocket was also to pass over New Zealand and an analysis by Sandia National Laboratories projected the probability of the nuclear rocket crashing on New Zealand at 1-in-2,325. 39 Babcock and Wilcox, builder of the ill-fated Three Mile Island nuclear plant, was selected by the government to build the atomic engine for the Timberwind rocket. The reactor design was based on work done at Brookhaven National Laboratory on Long Island, New York. The late Dr. Henry Kendall, chairman of the Union of Concerned Scientists and a Nobel Laureate, said of the Timberwind rocket that for such a vehicle "the needle just goes up to the end of the [danger] scale and stays there." Such a rocket would "release a stream of radiation" as it flew, he said, and if it underwent an accident and broke up, "you've got radioactive material spraying all over the place . . . the risks are extremely great." 40 With President Bill Clinton taking office, the Timberwind endeavor was renamed the Space Nuclear Thermal Propulsion Program and the aim changed to using the atomic rocket for voyages to Mars. The project was cancelled in 1993. The new nuclear-propelled rocket push is seen by Bruce Gagnon, coordinator of the Global Network Against Weapons and Nuclear Power in Space, as "the foot in the door, the Trojan horse, for the militarization of space" in the Star Wars plans of the George W. Bush administration. "Control and domination of the space program by the Pentagon proceeds apace," he says. Also, he warns that beyond accidents impacting people, "the production process at Department of Energy laboratories making space nukes will lead to significant numbers of workers and communities being contaminated." He says: "Serious questions need to be asked: Where will they test the nuclear rocket? How much will it cost? What would be the impacts of a launch accident? These nuclearization of space plans are getting dangerous and out of control." 41 Gagnon also notes that the U.S. government agency in charge of the production of the radioisotope power systems used on space probes is the Department of Energy's Office of Space & Defense Power Systems and the devices have long had a military dual use. 42 "The U.S.," says Green activist Lorna Salzman, a founder of the New York Green Party, "is now allocating billions of taxpayer's dollars, mobilizing all its police, military, investigative and spy powers to head off potential bio- and nuclear-terrorism - not to mention suicide bombers, airplane hijackers and makers of chemical weapons - to protect American citizens while preparing to invest a fortune on space nukes that could inundate those same citizens with radiation . . . Is NASA trying to tell us that terrorism inflicted by religious fanatics is bad but self-inflicted nuclear terrorism is OK? Or is NASA itself so infected by fatal hubris that it refuses to entertain the possibility of rocket failure. There are viable alternatives that do not put lives at risk." 43 "Why on Earth," asks Alice Slater, president of the New York-based Global Resource Action Center for the Environment, "would any sane person propose to take nuclear poisons to a whole new level?" 44 "Nuclear power," says Sally Light, executive director of the anti-nuclear Nevada Desert Experience, "whether in space or on Earth is a risky business. Why is the U.S. blindly plunging ahead with such a potentially disastrous and outmoded concept? We should use solar-powered technologies as they are clean, safe and feasible. Committing $1 billion for NASAs Nuclear Systems Initiative is unconscionable. Did the people of Earth have a voice in this? One of the basic principles of democracy is that those affected have a determinative role in the decision-making process. We in the U.S. and people worldwide are faced with a dangerous, high-risk situation being forced on us and on our descendents." 45

\*\*Production D/As

Uq – Plutonium Production

NASA’s plutonium reserves are running low – plan causes production

Berger 8 (Brian, Space News Staff Writer, Mar 6, [www.space.com/5054-plutonium-shortage-thwart-future-nasa-missions-outer-planets.html] AD: 7-8-11, jam)

NASA’s Pluto-bound New Horizons spacecraft, for example, is powered by a radioisotope power system fueled by Russian plutonium, as will be the system that powers the Mars Science Laboratory. Though Griffin did not mention it, the U.S. Department of Energy over the winter quietly shelved long-standing plans to resume domestic production of plutonium-238. In 2005, the Department of Energy (DOE) gave public notice of its intent to consolidate the nation’s radioisotope power system activities at Idaho National Laboratory and start producing plutonium-238 there by 2011. Restarting production was projected at the time to cost $250 million and take five years. Griffin said during the hearing that the DOE’s latest estimate is that a restart would take seven years. Angela Hill, an Energy Department spokeswoman, told Space News in an e-mail that those plans are now on hold. “DOE did not request funding in 2009 for [Plutonium-238] production, since NASA has been directed to fund any new production capabilities,” Hill wrote. “Production may or may not resume based on NASA’s decision. Based on current mission plans, DOE will only continue to provide new Radioisotope Power Systems until 2015.” NASA’s 2009 budget request includes no money for re-establishing the Department of Energy’s long dormant plutonium-238 production capability. Meanwhile, how much of the plutonium-238 the United States has at its disposal was not immediately clear. DOE reported in 2005 that its inventory stood at 39.5 kilograms, with U.S. national security customers and NASA expected to consume all but 6.5 kilograms by 2010. The same report said an additional 20 kilograms of weakened plutonium-238 could be harvested by 2011 from milliwatt power systems aboard old nuclear missiles slated to be decommissioned. However, the reclaimed material would have to be mixed with fresher stock to be useable. U.S. industry sources said they had been told that the United States has a total of just over 11 kilograms on order to meet NASA’s projected demand through the middle of the next decade. Hill said only that the United States has received an additional 5 kilograms of plutonium-238 from Russia since 2005 and has another 4.9 kilograms on order for delivery this year. Alan Stern, NASA associate administrator for science, testifying before the House Appropriations commerce, justice, science subcommittee alongside Griffin, said he believed the United States had sufficient plutonium-238 on hand or on order to fuel next year’s Mars Science Lab, an outer planets flagship mission targeted for 2017 and a Discovery-class mission slated to fly a couple years earlier to test a more efficient radioisotope power system that NASA and the Energy Department have in development. To help ensure there is enough plutonium-238 for those missions, NASA notified scientists in January that its next New Frontiers solicitation, due out in June, will seek only missions that do not require a nuclear power source. Industry sources said that limitation will put scientists wishing to propose outer-planet destinations including Jupiter and Saturn for the 2016 New Frontiers flight opportunity at a decided disadvantage.

We’ll have enough plutonium now but supply is short

Berger 8 (Brian, Space News Staff Writer, Apr 7, [www.spacenews.com/archive/archive08/Nukes\_040708.html] AD: 7-8-11, jam)

NASA's worries about running out of plutonium by the middle of the next decade are premature, according to a senior U.S. Department of Energy (DOE) official. The U.S. space agency has three missions planned between 2009 and 2017 that call for long-lasting spacecraft batteries that convert heat from decaying plutonium-238 into electricity that is used to power instruments and other electronics. The batteries, known as radioisotope power systems, are considered critical for space missions bound for the outer planets of the solar system where sunlight is insufficient for solar arrays to provide a spacecraft with sufficient power. NASA Administrator Mike Griffin told the House Appropriations commerce, justice, science subcommittee in March that the United States could find its outer planets program hamstrung by the middle of the next decade unless the Department of Energy resumes production of plutonium-238. "Looking ahead, plutonium is in short supply," he said. Dennis Miotla, DOE deputy assistant secretary for nuclear power development, does not dispute that there is only so much plutonium to go around. But he said in a March 27 interview that the United States could wait until as late as 2012 to begin bringing a plutonium-238 production capability back on line and still be able to meet NASA's projected future demand for the material. "I don't think it an imminent danger that we will run out in their time frame," Miotla said. "They're looking at their most optimistic budget projections and their most optimistic mission deployment timelines.

Contamination D/A

Plutonium production process necessary for fuel contaminants workers

Gagnon 3 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, 1/27/3, http://www.spacedaily.com/news/nuclearspace-03b.html) JPG

Beyond accidents impacting the planet, the space nuclear production process at the DoE labs will lead to significant numbers of workers and communities being contaminated. Historically DoE has a bad track record when it comes to protecting workers and local water systems from radioactive contaminants. During the Cassini RTG fabrication process at Los Alamos 244 cases of worker contamination were reported to the DoE. Serious questions need to be asked: How will workers be protected? Where will they test the nuclear rocket? How much will it cost? What would be the impacts of a launch accidents?

Orion causes massive nuclear contamination – their evidence is a gross underestimate

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

The biggest environmental problem associated with Orion is radioactive contamination from a ground launch. The people working on Orion produced some very rosy estimates of atmospheric contamination, roughly 1% of that produced by all atmospheric nuclear testing. Unfortunately, they based these figures on fission-free fusion bombs, a technology that they expected was just around the corner but which turned out not to be. Nuclear fission releases quite a lot of contamination compared to nuclear fusion. Since fusion bombs need a fission bomb to start their explosion, this means that actual nuclear weapons all tend to be fairly dirty. A fission bomb is nearly as dirty as a fusion bomb because most of a fusion bomb's contamination comes from its fission "trigger". The people working on Orion assumed that it would be able to use fusion bombs without a fission trigger, which would be extremely clean. Such a technology did not, however, arrive like they expected it would. This means that their original estimates of Orion contamination were off by an extraordinary amount. The launch of an actual Orion based on fission bombs would involve more than a megaton of fission explosions in the atmosphere, from perhaps 350 fission bombs (many would have an artificially reduced yield, but that doesn't reduce the amount of radioactive plutonium needed for them). While most of the explosions would not be near the ground and thus would not create direct fallout, the radioactive remains of the bombs themselves would be spread across the Earth. The radiation release from this would actually be very high. It was high enough that the US government of the 50s and 60s, which was conducting regular atmospheric nuclear testing, had serious misgivings about the amount of contamination Orion would produce. We are not talking about some stereotypical 90s "tree huggers" here, we are talking about the US government in the 50s and early 60s and even it was willing to concede that there was a limit to the amount of radiation that should be spewed into the atmosphere.

Plan would cause cancer

MacAvoy 4 (JJ, staff member of the William and Mary Environmental Law and Policy Review, "Nuclear Space and the Earth Environment: The Benefits, Danagers, and Legality of Nuclear Power and Propulsion in Outer Space," p. 216-217 jam)

In its risk assessment for the Cassini mission, NASA estimated that the likelihood of cancer fatalities due to the launch were one in one hundred thousand.18 2 It also estimated that the likelihood of cancer fatalities due to an accidental re-entry was one in one million. However, these statistics have been disputed by critics. "'I find that NASA bureaucrats in some sense are living in Fantasyland', says Michio Kaku, a physics professor at City University of New York. 'Pure guesswork has replaced rigorous physics. Many of these numbers are simply made up."8 4 Bruce Gagnon of the Global Network Against Weapons and Nuclear Power in Space noted that "[w]hen you look at the average failure rate for rockets, eventually, you are going to have a problem."8 5 Others have used the space shuttle Columbia tragedy in Texas to illustrate the strong possibility of an accident.86 "I think the [Columbia] tragedy definitely raises legitimate questions about the technical risks associated with the current space program," said Edwin Lyman, the head of the Nuclear Control Institute, "and should give anyone pause before we continue to expand nuclear capabilities in space."

Natives D/A

Nuclear production and weapons testing are conducted on Native American settlements – violates environmental justice

Kamps 1 (Kevin, Nuclear Waste Specialist, 2/15/1, http://www.nirs.org/factsheets/pfsejfactsheet.htm) JPG

Nevadans and Utahans living downwind and downstream from nuclear weapons testing, uranium mining, and radioactive waste dumping have suffered immensely during the Nuclear Age. But even in the "nuclear sacrifice zones" of the desert Southwest, it is Native Americans--from Navajo uranium miners to tribal communities targeted with atomic waste dumps-- who have borne the brunt of both the front and back ends of the nuclear fuel cycle. The tiny Skull Valley Band of Goshute Indians Reservation in Utah is targeted for a very big nuclear waste dump. Private Fuel Storage (PFS), a limited liability corporation representing eight powerful nuclear utilities, wants to "temporarily" store 40,000 tons of commercial high-level radioactive waste (nearly the total amount that presently exists in the U.S.) next to the two-dozen tribal members who live on the small reservation. The PFS proposal is the latest in a long tradition of targeting Native American communities for such dumps. But there is another tradition on the targeted reservations as well–fighting back against blatant environmental racism, and winning. Skull Valley Goshute tribal member Margene Bullcreek leads Ohngo Gaudadeh Devia (or OGD, Goshute for "Mountain Community"), a grassroots group of tribal members opposed to the dump. In addition to many other activities, OGD has filed an environmental justice contention before the Nuclear Regulatory Commission’s (NRC) Atomic Safety Licensing Board (ASLB). Both the federal government and the commercial nuclear power industry have targeted Native American reservations for such dumps for many years. In 1987, the U.S. Congress created the Office of the Nuclear Waste Negotiator in an effort to open a federal "monitored retrievable storage site" for high-level nuclear waste. The Negotiator sent letters to every federally recognized tribe in the country, offering hundreds of thousands and even millions of dollars to tribal council governments for first considering and then ultimately hosting the dump. Out of the hundreds of tribes approached, the Negotiator eventually courted about two dozen tribal councils in particular. Resistance from members within the targeted tribes, however, prevented the proposed dumps from opening. Grace Thorpe, founder of the National Environmental Coalition of Native Americans and an emeritus member of the Nuclear Information & Resource Service board of directors, rallied her fellow tribal members and defeated the dump targeted at her own Sauk and Fox reservation in Oklahoma. Tribal members on other targeted reservations turned to Thorpe, and to such Native-led groups as Indigenous Environmental Network (IEN) and Honor the Earth, to learn how to organize their community to resist the federal nuclear waste dump. The Negotiator eventually set his sights on the Mescalero Apache Reservation in New Mexico. But tribal member Rufina Marie Laws spearheaded her community’s resistance against her own tribal council and the Negotiator, thwarting the dump. After having failed to open the intended dump, Congress defunded and dissolved the Office of the Nuclear Waste Negotiator in 1994. The commercial nuclear power industry, however, picked up where the Negotiator had left off. Led by Northern States Power (now Xcel Energy), 8 nuclear utility companies formed a coalition that attempted to overcome the resistance at Mescalero. A tribal referendum, however, doomed the dump to eventual failure. The utility coalition regrouped as Private Fuel Storage, and then turned to the Skull Valley Goshutes in Utah, another community that had been on the Negotiator’s target list. At the same time, the nuclear power industry contributed large sums to Congressional and Presidential campaigns, and lobbied hard on Capitol Hill to establish a "temporary storage site" at the Nevada nuclear weapons test site, not far from the proposed federal permanent underground dump for high-level atomic waste at Yucca Mountain, Nevada. Both these proposed "temporary" and permanent dump sites would be on Western Shoshone land, as affirmed by the 1863 Treaty of Ruby Valley. Yucca Mountain is sacred to the Western Shoshone, and their National Council has long campaigned to prevent nuclear dumping there. Several incarnations of the nuclear power industry-backed "Mobile Chernobyl" bill appeared between 1995 and 2000. They were so dubbed because, if enacted, they would have launched the beginning of tens of thousands of dangerous irradiated nuclear fuel shipments to Nevada. Grassroots efforts across the country, combined with Nevadan leadership in Congress and an unwavering veto pledge by President Clinton, has successfully stopped "Mobile Chernobyl" in its tracks on Capitol Hill for the past five years. Having lost its bid to "temporarily" store its deadly wastes on Western Shoshone land near Yucca Mountain, nuclear utilities have re-focused their hopes for "interim" relief on Nevada’s neighbor, Utah. PFS must have done its homework: it would be hard to find a community more economically and politically vulnerable than the Skull Valley Goshutes to the Faustian bargain of getting "big bucks" in exchange for hosting the nation’s deadliest poisons. Just 25 tribal members live on the tiny Skull Valley Band of Goshute Indians Reservation, an hour’s drive west and south from Salt Lake City in Tooele County, Utah. The remaining 100 Band members live in surrounding towns in Tooele County, in Salt Lake City, and elsewhere. The reservation is already surrounded by toxic industries. Magnesium Corporation is the nation’s worst air polluter, belching voluminous chlorine gas and hydrochloric acid clouds; hazardous waste landfills and incinerators dot the map; with a name straight out of Orwell’s 1984, Envirocare dumps "low level" nuclear waste in the next valley and is applying to accept atomic trash hundreds of times more radioactive than its present license allows. Dugway Proving Ground has tested VX nerve gas, leading in 1968 to the "accidental" killing of 6,400 sheep grazing in Skull Valley, whose toxic carcasses were then buried on the reservation without the tribe’s knowledge, let alone approval. The U.S. Army stores half its chemical weapon stockpile nearby, and is burning it in an incinerator prone to leaks; jets from Hill Air Force Base drop bombs on Wendover Bombing Range, and fighter crashes and misfired missiles have struck nearby. Tribal members’ health is undoubtedly adversely impacted by this alphabet soup of toxins. Now PFS wants to add high-level nuclear waste to the mix. This toxic trend in Tooele County has left the reservation with almost no alternative economy. Pro-dump tribal chairman Leon Bear summed up his feelings: "We can’t do anything here that’s green or environmental. Would you buy a tomato from us if you knew what’s out here? Of course not. In order to attract any kind of development, we have to be consistent with what surrounds us." Targeting a tiny, impoverished Native American community, already so disproportionately overburdened with toxic exposures, to host the United States’ nuclear waste dump would seem a textbook violation of environmental justice. But the nuclear utilities did not let such considerations slow down their push for the PFS dump on the Skull Valley Reservation.

Natives D/A

Environmental injustice is a continuation of the legacy of slavery, and entrenches racism

Bullard 2 (Joseph, Director of the Environmental Justice Resource Center at Clark Atlanta University, http://209.85.173.104/search?q=cache:S0SkCJTUZKoJ:www.ejrc.cau.edu/PovpolEj.html+environmental+racism+impact&hl=en&ct=clnk&cd=1&gl=us)

People of color around the world must contend with dirty air and drinking water, and the location of noxious facilities such as municipal landfills, incinerators, hazardous waste treatment, storage, and disposal facilities owned by private industry, government, and even the military.[[3](http://www.ejrc.cau.edu/PovpolEj.html%22%20%5Cl%20%223end%22%20%5Ct%20%22_blank)] These environmental problems are exacerbated by racism. Environmental racism refers to environmental policy, practice, or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups, or communities based on race or color. Environmental racism is reinforced by government, legal, economic, political, and military institutions. Environmental racism combines with public policies and industry practices to provide benefits for the countries in the North while shifting costs to countries in the South. [[4](http://www.ejrc.cau.edu/PovpolEj.html%22%20%5Cl%20%224end%22%20%5Ct%20%22_blank)] Environmental racism is a form of institutionalized discrimination. Institutional discrimination is defined as "actions or practices carried out by members of dominant (racial or ethnic) groups that have differential and negative impact on members of subordinate (racial and ethnic) groups." [[5](http://www.ejrc.cau.edu/PovpolEj.html%22%20%5Cl%20%225end%22%20%5Ct%20%22_blank)] The United States is grounded in white racism. The nation was founded on the principles of "free land" (stolen from Native Americans and Mexicans), "free labor" (African slaves brought to this land in chains), and "free men" (only white men with property had the right to vote). From the outset, racism shaped the economic, political and ecological landscape of this new nation.  Environmental racism buttressed the exploitation of land, people, and the natural environment. It operates as an intra-nation power arrangement--especially where ethnic or racial groups form a political and or numerical minority. For example, blacks in the U.S. form both a political and numerical racial minority. On the other hand, blacks in South Africa, under apartheid, constituted a political minority and numerical majority. American and South African apartheid had devastating environmental impacts on blacks.

Racism must be rejected

Barndt, Pastor and Co-director of Crossroads 91 –– Ministry working to dismantle racism (Joseph, Dismantling Racism: The Continuing Challenge to White America 155-6,)

To study racism is to study walls. We have looked at barriers and fences, restraints and limitations, ghettos and prisons. The prison of racism confines us all, people of color and white people alike. It shackles the victimizer as well as the victim. The walls forcibly keep people of color and white people separate from each other; in our separate prisons we are all prevented from achieving the human potential that God intends for us. The limitations im­posed on people of color by poverty, subservience, and power­lessness are cruel, inhuman, and unjust; the effects of uncontrolled power, privilege, and greed, which are the marks of our white prison, will inevitably destroy us as well.     But we have also seen that the walls of racism can be dis­mantled. We are not condemned to an inexorable fate, but are of­fered the vision and the possibility of freedom . Brick by brick, stone by stone, the prison of individual, institutional, and cul­tural racism can be destroyed. You and I are urgently called to join the efforts of those who know it is time to tear down, once and for all, the walls of racism.     The danger point of self-destruction seems to be drawing ever more near . The results of centuries of national and worldwide conquest and colonialism, of military buildups and violent aggres­sion, of overconsumption and environmental destruction may be reaching a point of no return . A small and predominantly white mi­nority of the global population derives its power and privilege from the sufferings of the vast majority of peoples of color. For the sake of the world and ourselves, we dare not allow it to continue.

Natives D/A Ext.

Uranium production contaminates the land of Natives

Gerritsen 9 (Jeff, Medicine Resident at Albert Einstein Medical Center, 2/25/9, http://www.culturechange.org/cms/content/view/336/1/) JPG

“In Situ Leach Mining” is presently happening in Crawford, Nebraska at the Crow Butte Resources, Inc. Uranium Mine, which is owned by Cameco, Inc., the multinational energy corporation headquartered in Saskatchewan, Canada. Cameco, Inc. is the worlds’ largest Uranium producer. This Crow Butte Uranium Mine has spilled or leaked thousands of gallons of contaminated water into our land, air, and ground water. The High Plains Aquifer that is under the Crow Butte Resources (CBR) Uranium Mine also flows under the Eastern portion of the Pine Ridge Reservation. The High Plains Aquifer contains portions of the Arikaree Aquifer. The Crow Butte Uranium Mine is auhtorized to use 5,000 to 9,000 gallons of Aquifer water per minute the “In Situ Leach” method. The CBR has at least three “evaporation ponds” where they store the contaminated water. The ponds are as big as a football field, lined with plastic and vinyl. And filled with radioactive sludge. The “monitoring wells” where CBR stores contaminated water after the Uranium has been leached out are actually underground cement containers which hold the water for a period of time before it is placed in the “evaporation pond”. The CBR Uranium Mine produces one million pounds of “Yellow Cake” per year at its processing plant onsite. This “Yellow Cake” is stored in 55-gallon steel drums until transported. “Yellow Cake” is used to power Nuclear Power Plants and to make Nuclear Bombs through production of the world’s most powerful and most dangerous element: Plutonium. Crow Butte Resources well soon seek renewal of their existing license and is proposing to expand their Uranium Mine north of Crawford, Nebraska, to an area near Whitney Lake and Dam, and the White River. The names of these two satellite ISL mines are the North Trend Area and the Three Crow area. The existing mine currently has 4,000-8,000 wells at Crow Butte. There is more information regarding the proposed North Trend Satellite Mine, which Owe Aku and others have filed, in November 2007, an intervention asking for a hearing from the Nuclear Regulatory Commission. ISL Uranium Mining is also planned to occur in the Black Hills area near Edgemont, SD by the Powertech Uranium Company which is now drilling exploratory wells for their proposed In Situ Leach Uranium Mine, and at the Wild Horse Sanctuary near Hot Springs, SD by the Newtron Energy Corporation. **Impacts of Mining on Humans and the Environment** The scientific community has conclusively determined that Inorganic Arsenic and Alpha Emitters are cancer causing to humans. Arsenic and Alpha Emitters are pulled out of the ground during the mining process, entering the groundwater, people drink the groundwater and become contaminated. There can be a 5, 10, or 20-year latency period of exposure to Arsenic and Alpha Emitters before cancer develops. CBR proposes 20 more years of Uranium Mining near Crawford, Nebraska. The Cameco, Inc. website states they have “a proven reserve of 60 million pounds of Uranium to extract”. How much water is that at 9,000 gallons per minute? 24 hours per day, 365 days per year for 20 more years… What will the number of gallons increase to once the two new Uranium Mines are developed and running? There are about 321 people diagnosed with Diabetes each year on Pine Ridge. Currently, of our 25,000 residents, 10% of our Tribal Members have Diabetes. What will that number be after 20 more years of mining which has the potential of contamination of our groundwater? Our people who are Diabetic patients seem to move to the Dialysis stage of the disease quickly, can this be a result of kidney damage sustained over many, many years of contamination of ingesting even low doses of Arsenic and Alpha Emitters? The homes across the Pine Ridge whose test results revealed an illegal MCL of Arsenic now have filters provided by the Indian Health Service to filter Arsenic out of the water as it comes out of our kitchen faucet to purify the water we drink and cook with, but the water we bath our children in, wash our clothes with, water our lawns with, and shower with is not filtered. The Arsenic is still pouring into our homes. According to the Indian Health Service official at the Aug 15, 2007 Environmental Health Tech Team meeting, “this shouldn’t be a concern because you have to drink it to be effected by it”. I wonder what scientists from other parts of the world say about that? Western Science is not the only science who studies such matters, a German scientist states he has proof that a low dose over time can have a more dramatic result than previously understood. With the Crow Butte Resources’ existing mine and two new proposed mines 38 miles to the southeast of Pine Ridge, and the proposed Powertech Uranium Mine 60 miles to the Northwest of Pine Ridge, In Situ Leach Mining for Uranium has the potential to contaminate all of the groundwater our people depend on for drinking water.

Natives D/A Ext.

Nuclear mining creates unintended pollution that impacts Native Americans

Gerritsen 9 (Jeff, Medicine Resident at Albert Einstein Medical Center, 2/25/9, http://www.culturechange.org/cms/content/view/336/1/) JPG

Nuclear power is often billed as clean base-load electrical energy. However, few if any nuclear power proponents mention the unintended consequences or the externalized costs associated with this technology to support the unsustainable U.S. lifestyle. A crucial part of this story is told by Native Americans. I have included three shocking, detailed articles outlining these unintended consequences impacting the Native Americans in South Dakota and neighboring states -- in particular the Cheyenne River radiation poisoning from nearby uranium mining impacting the Pine Ridge Indian Reservation.

Testing = Radiation

Nuclear rocket testing causes radiation – cancer

Rutschman 6 (Avi, writer @ The Acorn, 10/16/6, http://www.calisafe.org/\_disc1/40000016.htm) JPG

The Santa Susana Field Laboratory Panel, an independent team of researchers and health experts, released a report last week concluding that toxins and radiation released from the Rocketdyne research facility near Simi Valley could be responsible for hundreds of cancers in the surrounding areas. The Santa Susana Field Laboratory was built in 1948 by North American Aviation and consists of 2,850 acres in eastern Ventura County. Over the years, it has been used as a test site for experiments involving nuclear reactors, high-powered lasers and rockets. The report was completed by experts in the fields of reactor accident analysis, atmospheric transport of contaminants, hydrology and geology. The study took five years to complete and was funded by the California Environmental Protection Agency. "We want to thank the many legislatures that have attended meetings, provided funds and pressured public agencies into action," said Marie Mason, a community activist and longtime resident of the Santa Susana Knolls area in Simi Valley, who helped to form the advisory panel. The panel originally formed 15 years ago after a 1959 nuclear meltdown that occurred at the Santa Susana Field Laboratory was made public. Concerned about the possibility of facing adverse health affects due to the meltdown, area residents pressured legislators into funding a panel to study the impact of the incident. "We were fearful of what our families and communities may have been exposed to," said Holly Huff, another community member who pushed for the formation of the panel. The first study conducted by the panel was performed by UCLA researchers and focused on the adverse health effects the meltdown had on Rocketdyne employees. Completed in 1997, that report indicated workers did indeed suffer a higher rate of lymph system and lung cancers. Boeing, the current owner of the Santa Susana Field Laboratory, has challenged the validity of the studies, calling into question the scientific methods used by researchers. "We received a summary of the report Thursday, and we were not given an advance copy to look through and prepare with," said Blythe Jameson, a Boeing spokesperson. "Based on our preliminary assessment," Jameson said, "we found that the report has significant flaws and that the claims are baseless without scientific merit and a grave disservice to our employees and the community." After the UCLA study concluding that laboratory workers had faced adverse health effects because of the meltdown, the panel was given federal and state funds to conduct another study of potential impacts on neighboring communities and their residents. According to the panel, Boeing was unwilling to disclose a large amount of data concerning the accident and certain operations. This forced the researchers to base some of their studies on models of similar accidents. "One simply does not know with confidence what accidents and releases have not been disclosed, nor what information about the ones we do know of also has not been revealed," the panel stated in its report. After five years of research, the panel concluded that between 260 and 1,800 cancer cases were caused by the field laboratory's contamination of surrounding communities. The incident released levels of cesium-137 and iodine-131, radio nucleotides that act as carcinogens that surpass the amount of contaminants released during the Three Mile Island incident. The report also stated that other contaminants have escaped, and still could, from the Boeing-owned laboratory through groundwater and surface runoff.

Radiation ! – Extinction

Radiation will cause extinction

Grossman 11 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 4/25/11 http://karlgrossman.blogspot.com/search?updated-min=2011-01-01T00%3A00%3A00-08%3A00&updated-max=2012-01-01T00%3A00%3A00-08%3A00&max-results=13) JPG

The answer is no. Nuclear power can never be made safe. This was clearly explained by Admiral Hyman Rickover, the “father” of the U.S. nuclear navy and in charge of construction of the first nuclear power plant in the nation, Shippingport in Pennsylvania. Before a committee of Congress, as he retired from the navy in 1982, Rickover warned of the inherent lethality of nuclear power—and urged that “we outlaw nuclear reactors.” The basic problem: radioactivity. “I’ll be philosophical,” testified Rickover. “Until about two billion years ago, it was impossible to have any life on Earth; that is, there was so much radiation on earth you couldn’t have any life—fish or anything.” This was from naturally-occurring cosmic radiation when the Earth was in the process of formation. “Gradually,” said Rickover, “about two billion years ago, the amount of radiation on this planet…reduced and made it possible for some form of life to begin.” “Now, when we go back to using nuclear power, we are creating something which nature tried to destroy to make life possible,” he said. “Every time you produce radiation” a “horrible force” is unleashed. By splitting the atom, people are recreating the poisons that precluded life from existing. “And I think there the human race is going to wreck itself,” Rickover stated.

Any radiation has the potential to kill

Vines and Petty 5 (Vanee Senior Media Relations Officer @ National Academy of Sciences and Megan – Media Relations Asst, @ NAS, 6/29/5, http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11340) JPG

A preponderance of scientific evidence shows that even low doses of ionizing radiation, such as gamma rays and X-rays, are likely to pose some risk of adverse health effects, says a new report from the National Academies' National Research Council. The report's focus is low-dose, low-LET -- "linear energy transfer" -- ionizing radiation that is energetic enough to break biomolecular bonds. In living organisms, such radiation can cause DNA damage that eventually leads to cancers. However, more research is needed to determine whether low doses of radiation may also cause other health problems, such as heart disease and stroke, which are now seen with high doses of low-LET radiation. The study committee defined low doses as those ranging from nearly zero to about 100 millisievert (mSv) -- units that measure radiation energy deposited in living tissue. The radiation dose from a chest X-ray is about 0.1 mSv. In the United States, people are exposed on average to about 3 mSv of natural "background" radiation annually. The committee's report develops the most up-to-date and comprehensive risk estimates for cancer and other health effects from exposure to low-level ionizing radiation. In general, the report supports previously reported risk estimates for solid cancer and leukemia, but the availability of new and more extensive data have strengthened confidence in these estimates. Specifically, the committee's thorough review of available biological and biophysical data supports a "linear, no-threshold" (LNT) risk model, which says that the smallest dose of low-level ionizing radiation has the potential to cause an increase in health risks to humans. In the past, some researchers have argued that the LNT model exaggerates adverse health effects, while others have said that it underestimates the harm. The preponderance of evidence supports the LNT model, this new report says. "The scientific research base shows that there is no threshold of exposure below which low levels of ionizing radiation can be demonstrated to be harmless or beneficial," said committee chair Richard R. Monson, associate dean for professional education and professor of epidemiology, Harvard School of Public Health, Boston. "The health risks – particularly the development of solid cancers in organs – rise proportionally with exposure. At low doses of radiation, the risk of inducing solid cancers is very small. As the overall lifetime exposure increases, so does the risk." The report is the seventh in a series on the biological effects of ionizing radiation.

\*\*PTBT/CTBT D/A

CTBT 1NC

CTCT will be ratified – multiple warrants

Gottemoeller 6/14 (Rose, Asst. Secretary, Bureau of Arms Control, http://www.state.gov/t/avc/rls/166086.htm) JPG

Before addressing some of the programmatic and budgetary issues before this Commission, I would like to assure you of President Obama’s unshakeable commitment to ratification of the CTBT by the United States and its entry into force at the earliest possible date. Entry into force of the CTBT is an essential step toward the peace and security of a world without nuclear weapons, a vision articulated by the President when he spoke in Prague in 2009. Secretary Clinton reaffirmed our commitment to the CTBT at both the Conference on Facilitating Entry into Force of the CTBT in September 2009 and at the Nuclear Non-Proliferation Treaty Review Conference in May 2010. More recently, the President’s National Security Advisor, Thomas Donilon, said in March that “We are committed to working with members of both parties in the Senate to ratify the CTBT, just as we did for New START,” a commitment that was echoed last month by Under Secretary of State Ellen Tauscher at the annual meeting of the Arms Control Association in Washington. Our recent experience working with the U.S. Senate to gain their advice and consent to ratification of the New Strategic Arms Reduction Treaty – New START – with the Russian Federation has prepared us for what is expected to be an equally thorough and robust debate over the CTBT. We do not expect it will be easy or happen quickly, but we will work hard to make it happen. In anticipation of the ratification effort, the Administration commissioned a number of reports, including an updated National Intelligence Estimate and an independent National Academy of Sciences (NAS) report to assess the ability of the United States to monitor compliance with the Treaty and the ability of the United States to maintain, in the absence of nuclear explosive testing, a safe, secure and effective nuclear arsenal so long as these weapons exist. A public version of the NAS report is expected to be released soon. These authoritative reports, together with others, will give the U.S. Senate a wealth of information to assist them in making a determination on the merits of ratification of the CTBT. In addition, we have begun a process of engaging the Senate and the American public on the national security benefits of the CTBT. While we have no date in mind for a ratification vote, we will work to engage members of the Senate on the national security rationale behind our support for the CTBT. Mr. Chairman, as you are well aware, the U.S. Senate declined to provide its consent to ratification of the CTBT in 1999. At that time, the Senate expressed concerns about whether the Treaty could be effectively verified. Today, we have a much stronger case in that regard. It is thanks to the hard work of this Commission, its member States, and the staff of the Provisional Technical Secretariat that great progress toward establishing the Treaty’s verification regime has been made in the last decade.

Plan causes withdrawal from PTBT and ends the push for CTBT

Dinkin 5 (Sam, writer @ the space review, 1/14/5, http://www.thespacereview.com/article/309/1) JPG

If Bush decided to revive the Orion project, he would also need to withdraw from the Comprehensive Test Ban Treaty of 1996 and the Partial Test Ban Treaty of 1963. Bush has got NERVA, but is that enough? Internal combustion nuclear engines have an inherent limit. If the exhaust is too hot, it melts the rocket nozzles. This is an inherent limit in all non-pulsed designs. By using external combustion, fantastic temperatures hotter than the surface of the sun can be achieved, yet the plasma will cool sufficiently as it expands so as not to melt the pusher plate of the Orion. Orion’s fantastic engineering is not good enough if the rocket kills people. Freeman Dyson, one of the great contributors to Orion, feels that he was decisive in getting the Orion project nixed in the 1963 Partial Test Ban Treaty. He was making the decision based on the fallout. He calculated that there would be enough fallout to kill one to ten people globally with each launch.

CTBT 1NC

CTBT key to prevent proliferation, US hegemony collapse, and nuclear terrorism

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

Obama has assumed office at a time when the nuclear nonproliferation regime is seriously tattered. Iran is making significant progress on an ostensibly civilian uranium enrichment program that can be quickly converted into a weapons program. North Korea has quadrupled the size of its fissile material stockpile since 2002 and joined the nuclear club in 2006 with a nuclear weapons test. The Nuclear Non-Proliferation Treaty (NPT), the lynchpin of global efforts to halt the spread of nuclear weapons, is under heavy strain. Revitalizing the nonproliferation regime, and reducing the odds that a terrorist group can seize a nuclear weapon for use in a terrorist attack, must be at the top of any president’s to-do list. During his presidential campaign, Obama often spoke of changing the U.S. approach to national security challenges by not being aggressively unilateral or overly reliant on the use of military force as the first option, calling upon the United States ‘‘to rebuild and construct the alliances and partnerships necessary to meet common challenges and confront common threats.’’1 He described the prospect of a terrorist group detonating a nuclear weapon in a U.S. city as ‘‘the gravest danger we face.’’2 For that reason, following in the footsteps of such statesmen like Sam Nunn and Henry Kissinger, Obama explicitly endorsed the vision of a world free of nuclear weapons, achieved in a comprehensive and verifiable manner.3 A concrete means to that goal, as well as the opportunity to repair the image of the United States around the world, is for Obama to call upon the Senate this year to make another effort to ratify the CTBT by the end of his first term in office.

Prolif leads to extinction

Utgoff 2 (Victor Utgoff, Deputy Director of the Strategy, Forces, and Resources Division of the Institute for Defense Analysis, Survival, Fall,2002, 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.

Heg key to prevent nuclear war

Khalilzad 95 (Zalmay Khalilzad, Spring 1995. RAND Corporation. “Losing the Moment?” The Washington Quarterly 18.2, Lexis.)

Under the third option, the United States would seek to retain global leadership and to preclude the rise of a global rival or a return to multipolarity for the indefinite future. On balance, this is the best long-term guiding principle and vision. Such a vision is desirable not as an end in itself, but because a world in which the United States exercises leadership would have tremendous advantages. First, the global environment would be more open and more receptive to American values -- democracy, free markets, and the rule of law. Second, such a world would have a better chance of dealing cooperatively with the world's major problems, such as nuclear proliferation, threats of regional hegemony by renegade states, and low-level conflicts. Finally, U.S. leadership would help preclude the rise of another hostile global rival, enabling the United States and the world to avoid another global cold or hot war and all the attendant dangers, including a global nuclear exchange. U.S. leadership would therefore be more conducive to global stability than a bipolar or a multipolar balance of power system.

Nuclear Terrorism Causes Extinction

Sid-Ahmed 4 (Mohamed, Managing Editor for Al-Ahali, “Extinction!” August 26-September 1, Issue no. 705, http://weekly.ahram.org.eg/2004/705/op5.htm)

What would be the consequences of a nuclear attack by terrorists? Even if it fails, it would further exacerbate the negative features of the new and frightening world in which we are now living. Societies would close in on themselves, police measures would be stepped up at the expense of human rights, tensions between civilisations and religions would rise and ethnic conflicts would proliferate. It would also speed up the arms race and develop the awareness that a different type of world order is imperative if humankind is to survive. But the still more critical scenario is if the attack succeeds. This could lead to a third world war, from which no one will emerge victorious. Unlike a conventional war which ends when one side triumphs over another, this war will be without winners and losers. When nuclear pollution infects the whole planet, we will all be losers.

CTBT Uq

CTBT ratification now – Obama

White 6/22 (K.E., writer @ proliferation press, http://proliferationpress.com/2011/06/22/ratifying-the-1996-comprehensive-nuclear-test-ban-treaty-arms-control-association-vs-the-national-review/) JPG

The 1996 Comprehensive Nuclear Test Ban Treaty is back in the news, with some hoping the Obama administration—preferably before possibly losing re-election and thus losing a good arms-control partner—will push the Senate to ratify the treaty.

CTBT will be ratified – START proves

Robinson 7/4 (Tony, Intl spokesperson for Organisation World without Wars and Violence, 7/4/11, http://www.indepthnews.net/news/news.php?key1=2011-07-04%2021:00:22&key2=1) JPG

President Barrack Obama made the ratification of the CTBT a campaign promise in the 2008 U.S. presidential election. Given that the ratification of the new START treaty – to reduce the number of deployed nuclear warheads – cost him $185 billion dollars as the price tag for the nuclear weapons modernisation programme that was a condition of ratification by a Republican-majority Senate, one can rightly wonder how much it will cost the President to get the CTBT ratified if he tries, as expected, in a second term as President.

PTBT Link

Plan violates the partial test ban treaty

Schweitzer 9 (Curtis, freelance writer, 4/27/9, http://curtisschweitzer.net/blog/?page\_id=1438) JPG

In 1963, the United States, the USSR, and the United Kingdom signed the Partial Test Ban Treaty– an international agreement to ban completely the test detonation of nuclear weapons above ground. The treaty has gone on to be signed and ratified by a majority of the world’s countries: as of 2008, 123 nations are signatories, a fact which has effectively ended nuclear-weapons testing above ground. As a critical component of global diplomatic efforts to soften the threat of worldwide nuclear holocaust, the broad provisions made no distinction between the detonation of nuclear weapons and the detonation of nuclear devices with non-military uses. All non-underground detonations are considered clear violations of the treaty, no matter their intended purpose.

More ev

Schweitzer 9 (Curtis, freelance writer, 4/27/9, http://curtisschweitzer.net/blog/?page\_id=1438) JPG

So what will it take to resurrect Orion? What are the primary obstacles for getting mankind into space? To begin, the primary concerns and problems facing Orion are diplomatic in nature. The partial test-ban treaty makes any launch using nuclear weapons illegal under international law, and the tremendous diplomatic bias against any nuclear detonations (a bias that is founded mostly in ignorance and fear) means that even were it legal, there would be great pressure against it. Furthermore, the rise of the “green movement” has made nuclear technology in general, and weaponized nuclear technology in particular extremely unpopular, despite the fact that 1) nuclear energy is the only practical means of significantly reducing global carbon emissions and b) there remain rational and safe ways of detonating nuclear weapons for many reasons, military or peaceful.

The plan necessitates testing – forces the US to withdraw from PTBT – spills over to other countries

Schweitzer 9 (Curtis, freelance writer, 4/27/9, http://curtisschweitzer.net/blog/?page\_id=1438) JPG

Amending the partial test-ban treaty is the most logical first step. The treaty must be re-written to except peaceful nuclear detonations from the ban. The failure to make the distinction between weapons testing and peaceful means (ala Operation Plowshare) of using nuclear detonations is both irrational and a hindrance to scientific progress. Orion-like usage of nuclear weapons is not without risk, and countries that wish to develop Orion-like programs must be allowed to test in order to fully understand the risks. (It is worth noting that Freeman Dyson’s original studies on nuclear-pulse propulsion predicted some life-threatening dangers, but that further progress on the program promised to reduce these risks significantly). Computer models and modern methods of researching the effects of nuclear blasts can only go so far– if humankind ever wants to move forward on serious intrasolar exploration, at some point, we will need to detonate at least some nuclear devices in order to launch a nuclear-pulse propelled vehicle. Making this a reality first means amending international law to allow it. 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.

Plan violates the PTBT

Urfer and LaForge 5 (Bonnie – anti-nuclear activist and John – writer @ NukeWatch, Summer 2005, www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf) JPG

Some NASA/DOE reports say Prometheus could use conventional rockets for launch with reactor propulsion not kicking in until high altitude is attained. Never mind the 1963 Partial Test-Ban Treaty which commits the U.S. “to prohibit, to prevent, and not to carry out any nuclear weapon test, or any other nuclear explosion ... in ... outer space. ...”

PTBT 🡪 CTBT I/L

The PTBT is key to an effective CTBT

CICD No Date (Campaign for Intl Cooperation and Disarmament, http://www.cicd.org.au/?category=treaties&page=PTBT-summary) JPG

The "Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water", of 1963 (signed by original parties on 5th of August 1963, opened for signature on 8th of August 1968, entered into force on 10th of March, 1963), more commonly known as the Partial Test Ban Treaty (PTBT) is the precursor to the much later Comprehensive Test Ban Treaty (CTBT). The PTBT essentially seeks to limit the testing of nuclear weapons to being underground, so as to limit the environmental effects of such testing. Unlike the CTBT it does not seek to completely do away with nuclear weapons testing and development. It was, however, an important first step along the way towards an end to the armaments race, and towards complete internationally supervised disarmament, the goals of which are mentioned in the preamble to the PTBT. The preamble also mentions the desire to conclude an agreement for the complete ban of nuclear testing. The PTBT is an extremely short treaty, but it is as meaningful as it is brief. The bulk of the treaty is contained in one important article. In article one, each party to the treaty agrees not to test, or to cause, participate in, or encourage, the testing of nuclear weapons in the atmosphere, in outer space, or in its territorial waters or the high seas. Article one also reaffirms the desirability, as agreed to in the preamble, of the conclusion of a treaty to ban underground testing also. The remaining articles of the PTBT relate to organisational matters, such as the treaty's amendment, entry into force, and validity etc. Important to note is article four's mention of the treaty's unlimited duration. The partial test ban treaty was not intended to be a temporary solution to the problem of nuclear weapons, rather, it was an important first step. The PTBT went into creating the international political momentum out of which the Nuclear Non-Proliferation Treaty arose. Many years later, the Comprehensive Test Ban Treaty (CTBT), which went one step further than the PTBT and banned underground testing of nuclear weapons, was drafted. Even though, to date, the CTBT has not entered into force, the mere fact that it has been written, and supported by a great number of the world's countries, owes its truth to the adoption in 1963 of the Partial Test Ban Treaty.

PTBT ! – Prolif

Banning testing solves proliferation

Ghose 6 (Arundhati,, India’s UN rep, 2006, www.unidir.org/pdf/articles/pdf-art2490.pdf) JPG

The objective of a comprehensive ban on nuclear testing had originally been truly comprehensive. As early as 1954, Jawaharlal Nehru had proposed a “standstill” on testing—something between a multilaterally negotiated verifiable treaty and a unilateral moratorium—pending the elimination of nuclear weapons. Speaking to the Lok Sabha (India’s lower house in parliament), he said: “...Pending progress towards some solution, full or partial, in respect of the prohibition and elimination of these weapons of mass destruction, the Government would consider, some sort of what may be called ‘standstill agreement’ in respect, at least, of these actual explosions, even if agreements about the discontinuance of production and stockpiling must await more substantial agreements amongst those principally concerned.”3 Clearly, all weapon testing was to be halted, as a step toward total nuclear disarmament. Non- nuclear-weapon states perceived the danger as coming from the existence of the weapons themselves, and the exhortations were addressed to those countries that possessed the weapons, “before which, our normal weapons were completely useless”.4 A ban or standstill on testing was seen as a possible step toward the elimination of the weapons and therefore the security of all countries.

CTBT ! – Prolif

CTBT prevents nuclear arms race and proliferation

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

As Obama himself recognizes, the road to a world free of nuclear weapons must include the entry into force of the nuclear test ban treaty. A global ban on nuclear weapons tests is an essential step to halting the entry of new states into the nuclear club: without the ability to demonstrate its mastery of nuclear weapons by detonating one, no proliferator can lay claim to a credible nuclear arsenal. Likewise, a test ban promises to halt destabilizing nuclear arms races between existing weapons states by ceasing the development and deployment of new types of nuclear weapons. Without the option of tests to verify their effectiveness and reliability, a nuclear power will be hard pressed to introduce new advanced weapons into their deterrent. Instead, an effective nuclear test ban will more or less freeze existing nuclear arsenals at their current levels and prevent future improvements to their explosive power or miniaturization of warheads for missile deployment. For that reason alone, the United States, which possesses the most advanced nuclear arsenal in the world, should be a strong supporter of a treaty that promises to lock in the nuclear weapons status quo. Furthermore, the CTBT entry into force would prevent China from further advances in fielding multiple warhead ballistic missiles.10

CTBT is key to global non-proliferation leverage

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

The 1999 vote fell short of an absolute majority, much less the two-thirds majority required for treaty ratification under the U.S. Constitution. This failure undercut traditional U.S. leadership on nuclear nonproliferation issues, and offered an easy justification for China to continue to refuse to ratify the CTBT, as well as for India and Pakistan to avoid signing the treaty altogether. An announcement in Obama’s first year in office that he will call on the Senate to initiate the consideration of the CTBT by holding the appropriate hearings over the next year, with the goal of scheduling a ratification vote prior to the end of his first term in 2012, will send an unmistakable signal that the United States is once again committed to multilateral, rules-based cooperation with the international community to advance mutual interests. It will reenergize a flagging nonproliferation regime and offer the United States important leverage on key challenges like Iran and North Korea. With a healthy majority of Democratic senators in place, and close relationships with key moderate Republicans, Obama is within reach of the 67 votes necessary to secure ratification, and accomplish a significant foreign policy and national security goal.

CTBT ! – Multilat

CTBT is key to renewed multilateralism

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

First, a pledge to work toward CTBT ratification would help demonstrate the administration’s commitment to multilateral cooperation. The election of Obama as the United States’ forty-fourth president ignited celebrations around the world in part because it was expected to end the era of U.S. unilateralism and ‘‘cowboy diplomacy.’’ To his credit, Bush pursued a largely diplomatic course during his second term, especially toward the nonproliferation challenges posed by Iran and North Korea, but it was too late to repair the image of U.S. unilateralism. Obama offers the United States a fresh start on redefining its international image. Even though the international community is extending a friendly hand toward Obama and his team, the new administration may well find that budgetary constraints or differing conceptions of shared interests will limit other avenues of multilateral cooperation on issues like global warming or a renewed focus on Afghanistan. It is for that reason that a concrete pledge to work with the Senate on CTBT ratification carries so much promise.

CTBT ! – Iran/NK Nuclearization

CTBT is key to disarmament of Iran and North Korea

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

Senate ratification of the CTBT matters because it would be hailed as a renewed U.S. commitment to the essential pact at the heart of the NPT. Much of the international community, especially leading nonnuclear weapons states like Brazil, Japan, South Africa, and Sweden, believe that the United States has backtracked on the NPT’s basic bargain contained in Article VI: in exchange for the pledge by nonnuclear weapons states to not acquire nuclear weapons, the United States and the four other recognized nuclear weapons powers\_China, France, Russia, and the United Kingdom\_would pursue measures ‘‘in good faith’’ to cease the nuclear arms race and achieve eventual nuclear disarmament. Under the Clinton administration, the United States explicitly reaffirmed its commitment to eventual nuclear disarmament at the 1995 NPT Review Conference in exchange for the agreement of other States Parties to indefinitely extend the NPT. Without this compromise, the NPT could have been allowed to expire or, more likely, extended only for a fixed period. The 2000 NPT Review Conference followed up with the adoption by all States Parties of a thirteen-step plan to pave the path for eventual general nuclear disarmament, with the first step calling for the CTBT’s early entry into force.4 In the years following the 2000 conference, however, the United States was viewed as diverging from, and in some cases repudiating, many of those agreed upon measures. Bush exercised the right of the United States to withdraw from the 1972 ABM Treaty, viewed by many nations as a pillar of strategic stability. The administration’s 2002 Nuclear Posture Review explicitly discussed the circumstances under which a first use of nuclear weapons could be contemplated, and referred to possible target nations.5 Administration officials discussed renewed efforts on research and development of new nuclear weapons, including so-called bunker buster bombs and miniaturized nuclear warheads, that could lend themselves to more accessible use in a conflict. Finally, the administration withheld some key funding from the Comprehensive Test Ban Treaty Organization (CTBTO), the international secretariat responsible for all relevant preparations for the CTBT’s entry into force, and sought congressional approval to shorten the timeline for required preparations before a nuclear weapons test. In light of this recent discouraging history, an unmistakable commitment from Obama that he will seek Senate ratification of the CTBT during his first term in office may do more than any other single measure to indicate to the world that the United States is not only listening to, but also respects, the views of the international community. While it will do little to directly convince rogue states like Iran or North Korea to halt their nuclear weapons programs, it will strengthen the hand of the United States as it seeks to build international coalitions to squeeze those hostile states. Indeed, a recent survey of sixteen key nonnuclear weapons states reached the conclusion that ratification of the CTBT ‘‘would send a very strong signal’’ to demonstrate the U.S. commitment to disarmament.6

CTBT ! – Disarm

CTBT is key to global disarmament

Joseph 9 (Jofi, Sen. Dem. Foreign Policy Staffer, April 2009, http://www.twq.com/09april/docs/09apr\_Joseph.pdf) JPG

Second, CTBT ratification represents a down payment on the Obama pledge to work toward a nuclear-free world. The movement to ultimately rid the world of the most destructive weapons ever known to man has taken on renewed vigor in recent years. A landmark op-ed published in January 2007 by the so-called ‘‘Four Horsemen’’\_Henry Kissinger, Sam Nunn, William Perry, and George Schultz\_set forth a bold vision of a renewed commitment to a world free of nuclear weapons, achieved in a comprehensive and verifiable manner.7 This bipartisan endorsement by such respected figures provided the political space for this issue to enter the presidential campaign. During the presidential campaign, both Obama and his rival, Senator John McCain, issued explicit statements supporting the vision of a world free of nuclear weapons.8 After securing the nomination, Obama reaffirmed that pledge in a national security speech in July at Purdue University: It’s time to send a clear message to the world: America seeks a world with no nuclear weapons. As long as nuclear weapons exist, we’ll retain a strong deterrent. But we’ll make the goal of eliminating all nuclear weapons a central element in our nuclear policy. We’ll negotiate with Russia to achieve deep reductions in both our nuclear arsenals and we’ll work with other nuclear powers to reduce global stockpiles dramatically. We’ll seek a verifiable global ban on the production of fissile material for weapons. And we’ll work with the Senate to ratify the Comprehensive Test Ban Treaty and then seek its earliest possible entry into force.9

CTBT ! – Heg

Ratification key to heg – maintains nuclear primacy

Rauf 4 (Tariq, Director of Intl Org and Nonprolif Project @ Monterey Inst of Intl Studies, 10/14/4, http://cns.miis.edu/treaty\_testban/rauf.htm) JPG

A CTBT will guarantee the US' clear superiority in nuclear weapon designs and technologies. This Treaty would help reduce the role of nuclear weapons in international security and bring additional pressure on NPT hold-outs to refrain from weapon development and to join the regime. A CTBT would prevent countries such as India, Israel, and Pakistan from validating theoretical designs and calculations for nuclear warheads, and raise the political costs for so-called "rogue" states in violating global non-proliferation norms. It would also prevent Russia from modernizing its nuclear warhead designs. And a CTBT would stand in the way of China validating or proving reverse engineered warhead designs or technologies that it may have illegally acquired from the US.

CTBT ! – A2 – ! Turns

We don’t test now – only risk of our impacts based on perception

NYT 9 (5/24/9, http://www.nytimes.com/2009/05/25/opinion/25mon1.html) JPG

Nearly 17 years ago, after more than 1,000 explosions, the United States conducted its last underground nuclear test. President George H. W. Bush, following Russia and France, announced a voluntary moratorium and the other major nuclear powers — Britain and China — made the same pledge with more or less enthusiasm. Since then, 180 countries have signed the Comprehensive Test Ban Treaty. That’s all very good news. The bad news is that the test ban treaty, which would go beyond the voluntary moratorium and legally bind states to not test, has never come into force. That is because the United States and eight other nuclear-capable states whose participation is required — China, North Korea, India, Pakistan, Indonesia, Iran, Israel and Egypt — have not ratified it. A formal ban on testing would make it harder for nuclear-armed states to build new weapons, and place another hurdle in the way of any country — Iran comes immediately to mind — thinking of starting an arsenal. North Korea’s announcement that it had tested a nuclear device on Monday is a stark reminder of the many dangers out there.

Their authors are hack neo-cons – their arguments are based on false evidence

Berrigan 9 (Frida, Senior Assoc. @ New America Foundation’s Arms and Security Initiative, 7/28/9, http://www.huffingtonpost.com/frida-berrigan/pro-nuclear-pundits-debun\_b\_246335.htmlPresident) JPG

Obama's efforts to reduce and eventually eliminate nuclear weapons have drawn praise and encouragement from a wide range of individuals and organizations, from the arms control community, to retired diplomats and military officials, to the broader public. But they have also drawn harsh criticism -- misleading at best and outright deceptive at worst -- from a chorus of unreconstructed neo-conservatives and nuclear war theorists who are intent on scaring the public into opposing the president's disarmament agenda. The leaders of this informal network include John Bolton, Richard Perle, Frank Gaffney, and Keith Payne. Sensible steps that will make the world a safer place -- from pursuing nuclear reductions with Russia, to advocating for ratification of the Comprehensive Test Ban Treaty, and engaging in smart, effective diplomacy to curb the nuclear programs of Iran and North Korea -- have been denounced at every turn by Bolton and company. Loud though they may be -- shouting their criticism from the pages of the Wall Street Journal, the New York Times, the Washington Post and other smaller outlets -- the pro-nuclear pundits lack credibility. The media should not be treating them as learned experts with contributions to make to the discourse on U.S. national security. They have been wrong repeatedly and flagrantly: wrong on the war on terror, wrong on the war in Iraq, and wrong on arms control. They accuse the Obama administration of compromising (or worse) U.S. national security by promoting arms control, while trumpeting a collection of Bush administration policies like preemptive war, regime change and unilateralism that have created or seriously inflamed threats to U.S. national security and the U.S. image throughout the world. To add insult to injury, pundits like Gaffney and Perle are also beholden to the defense industry -- one of the few sectors of the economy that has been doing well, in part due to the war policies they helped to set into motion.

Testing !

Nuclear testing causes extinction

Vetrano 60 (Virginia, Doctorate of Science @ City U of LA, July 1960, http://www.rawfoodexplained.com/solar-energy-and-your-health/a-new-pathway-to-extinction.html) JPG

The only way to stop the threat of an atomic war is to ban the use of all nuclear weapons and cease manufacturing fission products by the use of atomic power plants. Power plants are contributing heavily to the pollution of our streams, rivers, seas, and our atmosphere. If this rate of pollution continues, soon there will be no food, no water, or air which is safe to eat, drink, and breathe respectively. We are destroying our planet and working for the extinction of mankind. We must stop all nuclear explosions and all atomic power plants. There is no need to be cowards and let ourselves be pushed around from now to eternity, which won't be far off if this testing of nuclear weapons is not stopped and atomic power plants abolished. With increased bomb testing, we have nothing to look forward to but showers of invisible radioactive dust pouring down upon us and penetrating out bodies by means of our air, food, and water for the next five to seven years or more. The most ominous threat, however, is to our children. They are the ones who will reap most of the harvest of this madness called "preparedness for peace," and the younger the child the more sensitive and more easily damaged are his cells from radiation. Dr. Linus Pauling most forcibly says, "The only safe amount of strontium 90 in the bones of children is zero." Unfortunately atom and hydrogen bombs never yield this safe amount. He further emphasizes that if testing of atomic bombs continues, about 100,000 children of the next generation in the United States will die. He also stated, and this was before the French tests in the Sahara, that "these bomb tests will also cause the birth of 200,000 seriously defective children in the next generation of human beings, children with serious mental deficiency or serious physical defects." Can we afford to "relax and enjoy life" when the very essence of life is being destroyed? The pool of human germ plasm is being greatly damaged, our mental capacities are diminishing, our physical capacities deteriorating and yet we do nothing. A national revolt is no longer adequate; what we need is a world revolt. Billions of yet unborn children will come into this world with diminished mental capacities and serious physical defects because we, the thinking portion of the population, have not made ourselves heard. It is we who are to blame for this gross crime committed against the future human race. In the history of the United States, no unwanted thing continued to exist when the whole population stood together and rebelled. Unfortunately, rebellion and singularity seems to have been knocked out of all Americans.

\*\*Politics

Obama Pushing Nukez Now

Obama is pushing for nuclear propulsion

Grossman 10 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 6/11/10, http://nuclearfreeplanet.org/articles/obama-and-the-nuclear-rocket.html) JPG

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 decades-old 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 itseditorial on March 1praising the administration for its space nuclear thrust. Space New 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 that “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.”

Politics Link

Bipartisan consensus against nuclear power – Japan meltdowns

Broder 11 (John, writer @ NYT, 3/13/11, http://www.nytimes.com/2011/03/14/science/earth/14politics.html) JPG

The fragile bipartisan consensus that nuclear power offers a big piece of the answer to America’s energy and global warming challenges may have evaporated as quickly as confidence in Japan’s crippled nuclear reactors. President Obama is seeking tens of billions of dollars in government insurance for new nuclear reactor construction. Senator Joseph I. Lieberman wants to “put the brakes” on nuclear construction for now while studying what happened in Japan. Until this weekend, President Obama, mainstream environmental groups and large numbers of Republicans and Democrats in Congress agreed that nuclear power offered a steady energy source and part of the solution to climate change, even as they disagreed on virtually every other aspect of energy policy. Mr. Obama is seeking tens of billions of dollars in government insurance for new nuclear construction, and the nuclear industry in the United States, all but paralyzed for decades after the Three Mile Island accident in 1979, was poised for a comeback. Now, that is all in question as the world watches the unfolding crisis in Japan’s nuclear reactors and the widespread terror it has spawned.

Opponents wont fight

Broder 11 (John, writer @ NYT, 3/13/11, http://www.nytimes.com/2011/03/14/science/earth/14politics.html) JPG

But even staunch supporters of nuclear power are now advocating a pause in licensing and building new reactors in the United States to make sure that proper safety and evacuation measures are in place. Environmental groups are reassessing their willingness to see nuclear power as a linchpin of any future climate change legislation. Mr. Obama still sees nuclear power as a major element of future American energy policy, but he is injecting a new tone of caution into his endorsement.

Nuclear power in space is politically and publicly unpopular

Gagnon 3 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, 1/27/3, http://www.spacedaily.com/news/nuclearspace-03b.html) JPG

NASA's expanded focus on nuclear power in space "is not only dangerous but politically unwise," says Dr. Michio Kaku, professor of nuclear physics at the City University of New York. "The only thing that can kill the U.S. space program is a nuclear disaster. The American people will not tolerate a Chernobyl in the sky." "NASA hasn't learned its lesson from its history involving space nuclear power," says Kaku, "and a hallmark of science is that you learn from previous mistakes. NASA doggedly pursues its fantasy of nuclear power in space." Since the 1960s there have been eight space nuclear power accidents by the U.S. and the former Soviet Union, several of which released deadly plutonium into the Earth's atmosphere. In April, 1964 a U.S. military satellite with 2.1 pounds of plutonium-238 on-board fell back to Earth and burned up as it hit the atmosphere spreading the toxic plutonium globally as dust to be ingested by the people of the planet. In 1997 NASA launched the Cassini space probe carrying 72 pounds of plutonium that fortunately did not experience failure. If it had, hundreds of thousands of people around the world could have been contaminated.

Politics Link

Plan is unpopular with the public and congress

Lemos 7 (Robert, writer @ wired, 9/20/7, http://www.wired.com/science/space/news/2007/09/space\_nukes) JPG

Yet, concerns that an accident at launch would expose people to radioactivity have caused some citizens to staunchly oppose the technology. In 1997, public outcry over the use of 73 pounds of plutonium almost scrapped the Cassini mission, a probe which is now delivering stunning vistas and scientific data from Saturn. In 2006, NASA launched the New Horizons mission to Pluto and the outer solar system, but the radioactive material required to power the probe resulted in a lot of political hand-wringing, said Todd May, deputy associate administrator for NASA's Science Mission Directorate, who worked on the New Horizons mission. "The stack of documents that it took to launch that small amount of plutonium on the New Horizons mission was enormous," May said.

Plan is politically unpalatable – high costs, publicly unpopular – upcoming elections magnify the links

Pizarro-Chong et. al. 10 (Ary, researcher @ McGill space flight dynamics lab, 11/11/10, “Development of space nuclear reactors for lunar purposes: overview of technical and non-technical issues”, 1339-1344, Systems and Control in Aeronautics and Astronautics (ISSCAA), IEEE) JPG

NASA has not been interested in developing nuclear tech- nology to the point of flight testing, and current US policy restricting live tests of a fueled core prevents the advance of critical technologies for the required high power (40-50 to l00+ kWe) long-lifetime (5-10+ years) Space Nuclear Power (SNP) systems. It is worthwhile to note that public nuclear risk concerns become political risk in an election year, and they could kill a politically unstable and expensive program. Extensive Congressional support to develop a next- generation Radioisotope Thermal Generator (RTG) or to space-qualify a nuclear reactor is unlikely under current budgetary philosophy because of the significant up-front R&D costs. In the present moment and in the near-term future, the use of nuclear reactors and advanced RTGs is inhibited by the status of their development, by inadequate mission cost estimates, and by public perception of the risks associated with nuclear-based technologies. Moreover, the recent cost-cutting initiatives by Congress have placed the entire nuclear-research infrastructure at risk. If there are no hard mission requirements for SNP, there will be no reason to support the existence of facilities dedicated to its development. Congressional action in reducing DOE’s budgets have forced that agency to consider closing facilities it considers redundant. Facilities for the production of Plutonium-238 (Pu-238) for use in the RTG have been targeted for closure. These facilities have not received needed upgrades and improvements and would need these before beginning to manufacture the amount of fuel needed for the RTGs and reactors proposed for a new Mars program. These facilities often stand empty and waiting between orders for nuclear fuel and are a significant drain on DOE’s budget. However, without these facilities, no fuel can be manufactured for this critical technology.

Politics Link – Public

Massive public resistance to the plan

Grossman 10 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 6/11/10, http://nuclearfreeplanet.org/articles/obama-and-the-nuclear-rocket.html) JPG

Obama’s choice to head NASA, Charles Bolden, favors nuclear-powered rockets—but he acknowledges public resistance. In a recent presentation before the Council on Foreign Relations, he opened the door to having a nuclear-powered rocket launched conventionally and moving in space with nuclear power. Bolden, a former astronaut and U.S. Marine Corps major general, spoke in the May 24th address, of work by another ex-astronaut, Franklin Chang-Diaz, on a nuclear-propelled rocket. “Chang-Diaz is developing what’s called a VASIMIR rocket,” said Bolden. “It’s an ion engine, very gentle impulse that just pushes you forever, constantly accelerating. And this, theoretically, is something that would enable us to go from Earth to Mars in a matter of some time significantly less than it takes us now.” But, he said, “most people…in the United States are never going to agree to allow nuclear rockets to launch things from Earth.” Yet “once you get into space, you know, if we can convince people that we can contain it and not put masses of people in jeopardy, nuclear propulsion for in-space propulsion” would enable a faster trip to Mars. He said, “You don’t want to have to take eight months to go from Earth orbit to Mars.”

Politics Link – Public

Plan’s unpopular with the public and the government

Lemos 7 (Robert, award-winning technology journalist of more than 13 years, Sep 20, [http://www.wired.com/science/space/news/2007/09/space\_nukes] AD: 7-6-11, jam)

LONG BEACH, California -- The public will have to overcome its squeamishness about nuclear power, if current plans for space missions and manned outposts are ever to become reality, industry experts told attendees at the Space 2007 conference this week. The public's fear of fallout and the government's worries about losing nuclear material have led to onerous requirements in using radioactive sources of power for space probes and to funding cuts for nuclear propulsion research, executives said. Future missions and the creation of outposts on the moon and other planets will require the technology, they added. "We need to restart development into nuclear propulsion," said Maureen Heath, vice president of Northrup Grumman's Civil Space division. "This is an area where we need to spend more resources to enable the next era of exploration." Nuclear power and propulsion for spacecraft are nothing new. Since the 1960s, the United States has had the capabilities to launch vehicles powered by radioactive materials. Experiment packages on many of the Apollo missions used nuclear power systems as well. In 2006, NASA shut down most of its research into nuclear propulsion technologies, a project the agency had dubbed Prometheus. The agency had contracted with Northrup Grumman, Boeing and Lockheed Martin to propose future propulsion systems based on nuclear power.

Plan’s universally unpopular

Lemos 7 (Robert, award-winning technology journalist of more than 13 years, Sep 20, [http://www.wired.com/science/space/news/2007/09/space\_nukes] AD: 7-6-11, jam)

Yet, concerns that an accident at launch would expose people to radioactivity have caused some citizens to staunchly oppose the technology. In 1997, public outcry over the use of 73 pounds of plutonium almost scrapped the Cassini mission, a probe which is now delivering stunning vistas and scientific data from Saturn. In 2006, NASA launched the New Horizons mission to Pluto and the outer solar system, but the radioactive material required to power the probe resulted in a lot of political hand-wringing, said Todd May, deputy associate administrator for NASA's Science Mission Directorate, who worked on the New Horizons mission.

Orion is empirically unpopular

Space News Staff 9 (Space News, online space news publisher, Oct 5, [www.spacenews.com/policy/congress-denies-funds-for-plutonium-238-production.html] AD: 7-7-11, jam)

U.S. lawmakers ironing out the differences between the House and Senate versions of the Department of Energy’s 2010 spending bill denied President Barack Obama’s request for $30 million to restart domestic production of plutonium-238 (pu-238), a critical material used by NASA in long-lasting nuclear batteries for deep space missions.

Politics Internal – Anti-Nuclear Lobby

The anti-nuclear movement dictates government policies

The Local 11 (German news, 4/19/11, http://www.thelocal.de/national/20110419-34483.html) JPG

Yellow and red badges bearing the slogan "Nuclear Power? No Thanks" have again become ubiquitous in Germany since Japan's nuclear disaster.But anti-nuclear activist Wolfram Scheffbuch has taken to removing his whenever he comes to the small village of Neckarwestheim in the southwest of the country. "It's not the done thing here," the 40-something said. Neckarwestheim is home not just to one nuclear reactor, but two - Germany's oldest, in service since 1976, and its newest, up and running since 1989. The villagers are vehemently opposed to shutting them down. The spewing of radiation by Japan's stricken Fukushima plant since March 11's earthquake and tsunami has shaken faith in nuclear power in Germany perhaps more than other European countries. Recent weeks have seen huge demonstrations calling for Germany to stop using nuclear power, culminating on March 26 in a mass demonstration in towns around the country which organisers said involved a quarter of a million people. The next day, Chancellor Angela Merkel's conservatives were turfed out of power in the southwestern state of Baden-Württemberg, home to Neckarwestheim, after 58 years in charge. The main reason for the political upset was opposition to nuclear power, which helped the Greens to hugely improve their performance, not only in Baden-Württemberg, but also in other state elections. Merkel is reconsidering the decision she took last year to postpone by more than a decade - until the mid-2030s - the date when Germany goes nuclear-free. The country's seven oldest reactors have already been shut down pending a safety review.

Anti-nuclear lobby is powerful – nuclear storage proves

Brosersons 11 (Mark, M.A. in Comm and Culture @ Ryerson and York U, 3/22/11, http://www.tvo.org/cfmx/tvoorg/theagenda/index.cfm?page\_id=3&action=blog&subaction=viewpost&blog\_id=323&post\_id=14369) JPG

To play the devil's advocate: Does nuclear waste and the ecological consequences of nuclear accidents (no matter how rare they may be) lessen nuclear power's environmental credentials?........ On the matter of nuclear waste - the politicisation is verging on the criminal. Even though much science/engineering and site preparation has been executed ( e.g. Yucca Mountain facility, salt mines etc. ) the anti nuclear lobby has managed to obstruct any actual use thereof. The consequence is that such radioactive byproducts continue to be stored under less than optimal conditions, e.g. at nuclear generating sites ( as per current Japan diseaster ) where they endanger civilian populations and encourage hysterical fear mongering. Most of the early nuclear facilities were in fact established under the understanding that waste would be stored in remote off site properly engineered facilities. This has not happened, thanks to the anti-nuclear lobby. So we allow such waste to be stored under the worst possible conditions - in turn providing fodder for fear mongering publicity. There are in fact many stable remote geological formations which could safely and easily accomodate all the worlds radioactive byproducts for very long time frames. Regrettably not happening.

The anti-nuclear movement is effective – has more influence than its counterpart

Brook 11 (Barry, writer @ BraveNewClimate, 7/9/11, http://bravenewclimate.com/2011/07/09/pro-nuclear-environmentalism/) JPG

There is no point denying it. The anti-nuclear movement in Australia has been remarkably effective. Combined with abundant cheap coal, Australia’s anti –nuclear movement has kept us the only one of the world’s top 16 economies not to employ nuclear power. It made people like me grow up anti-nuclear without ever really being asked to think about it. The result is some of the highest per capita greenhouse gas emissions in the world; in South Australia around 720g CO2-e/kWh (which is one of the lowest levels in the country I might add. NSW, Victoria and Queensland are all much higher), compared to a mere 90g CO2-e/kWh in nuclear dominated France. Meanwhile, the pro-nuclear position has, to my observation, failed to ever really gain much traction, and has evidently failed to deliver change. This is said with all respect to the many smart and passionate people who have worked on the issue for much longer than I.

Politics Internal – Anti-Nuclear Lobby – A2 – Turns

Pro-nuclear clout is weak

Brook 11 (Barry, writer @ BraveNewClimate, 7/9/11, http://bravenewclimate.com/2011/07/09/pro-nuclear-environmentalism/) JPG

Yet despite all this, plus the fact that the need for zero-carbon energy has never been greater, the pro-nuclear position is still way off the pace. So surely the better question is: What positive things helped the anti-nuclear movement succeed that we should replicate? I believe the reason the anti-nuclear movement has basically succeeded in Australia where pro-nuclear has basically failed is simple. It’s staring you in the face, written into my text. One is a movement. The other isn’t. Movements are incredibly effective things, and the anti-nuclear movement has been an incredibly effective example. The only way to compete is to turn pro-nuclear from a position and a shared interest into a movement. That, dear readers, is what Decarbonise SA is all about.

Politics Link – Spin

The plan will be negatively spun

Grossman 11 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 6/29/11 http://karlgrossman.blogspot.com/search?updated-min=2011-01-01T00%3A00%3A00-08%3A00&updated-max=2012-01-01T00%3A00%3A00-08%3A00&max-results=13) JPG

Nuclear power requires “perfection” and “no acts of God,” we were warned years ago. This has been brought home by the ongoing disaster caused by the earthquake and tsunami that struck the Fukushimi Daiichi nuclear plant complex, the flooding along the Missouri River in Nebraska now threatening two nuclear plants, and the wildfire laying siege to Los Alamos National Laboratory, the birthplace of atomic energy. Earthquakes, tsunamis, floods, fire—these and other disasters will inevitably occur. Add nuclear power with its potential to release massive amounts of deadly radioactive poisons when impacted by such a disaster, and it is clear that atomic energy is incompatible with the real world.

Politics Link – Appropriations

NASA has no more plutonium – producing more is unpopular in the House and Senate

Smith 9 (Marcia, writer @ Space Policy Online, 8/8/9, http://www.spacepolicyonline.com/pages/index.php?option=com\_content&view=article&id=305:house-and-senate-cut-plutonium-production-funding-imperling-nasa-space-science-mission-plans&catid=67:news&Itemid=27) JPG

The House and Senate have cut the funding requested by the Department of Energy (DOE) to restart production of plutonium-238 (Pu-238) that is needed to power some NASA space science and lunar exploration spacecraft. Pu-238 is needed to fuel radioisotope power sources (RPSs) that supply power for systems and instruments on spacecraft that cannot rely on solar energy because they travel too far from the Sun or land on surfaces with long "nights" or other characteristics that make solar energy a poor or impossible choice. Under the Atomic Energy Act of 1954, only DOE is allowed to possess, use and produce nuclear materials and facilities. Thus, NASA must rely on DOE to produce these power sources and the fuel. The National Research Council (NRC) issued a report on Pu-238 production for NASA missions in May 2009. It urged the government to restart Pu-238 production immediately or imperil NASA's lunar and planetary exploration plans. The NRC report emphasized that "the day of reckoning has arrived" and immediate action is required, estimating that it would cost at least $150 million to reestablish production. "Previous proposals to make this investment have not been enacted, and cost seems to be the major impediment. However, regardless of why these proposals have been rejected, the day of reckoning has arrived. NASA is already making mission limiting decisions based on the short supply of 238Pu. NASA is stretching out the pace of RPS-powered missions by eliminating RPSs as an option for some missions and delaying other missions that require RPSs until more 238Pu becomes available." Pu-238 does not occur in nature, and the United States has not produced any since the late 1980s. It purchased Pu-238 for NASA missions from Russia during the 1990s, but those supplies reportedly are now exhausted. The NRC based its estimate of NASA's Pu-238 requirements on a letter NASA sent to DOE on April 29, 2008 detailing space science and lunar exploration missions planned for the next 20 years.

Appropriations committee specifically doesn’t want more production

Smith 9 (Marcia, writer @ Space Policy Online, 8/8/9, http://www.spacepolicyonline.com/pages/index.php?option=com\_content&view=article&id=305:house-and-senate-cut-plutonium-production-funding-imperling-nasa-space-science-mission-plans&catid=67:news&Itemid=27) JPG

The Senate Appropriations Committee report (S. Rept. 111-45) expressed similar reservations. "The Committee recommends no funding for this program at this time. The Committee understands the importance of this mission and the capability provided to other Federal agencies. However, the Department's proposed plutonium reprocessing program is poorly defined and lacks an overall mission justification as well as a credible project cost estimate. Sustaining the plutonium mission is a costly but an important responsibility. The Committee expects the Department to work with other Federal agency customers to develop an equitable and appropriate cost sharing strategy to sustain this mission into the future."

Appropriations committee controls congress – specifically discretionary spending like the plan

Alarkon 10 (Walter, writer @ The Hill, 5/14/10, http://thehill.com/homenews/house/97995-cbc-could-see-its-spending-clout-increase-next-congress) JPG

By having clout on the Appropriations Committee, the CBC would have a greater voice to be able to push their priorities, said CBC Chairwoman Barbara Lee (D-Calif.). "It's about equity in our federal resources," she told The Hill. Seniority on the Appropriations Committee is a sought-after commodity because of the power the panel wields over the federal budget. Discretionary spending measures -- including those funding wars and each government agency -- are typically considered by the House and Senate Appropriations Committees before they come up for full votes on either chamber. Each federal agency's budget request is first considered by a subcommittee, making the subcommittee chairmen -- known on Capitol Hill as "cardinals" -- far more powerful than junior appropriators. Federal discretionary spending for 2010, excluding the $33 billion in Iraq and Afghanistan war funding expected to pass this month, is expected to be $1.4 trillion. The influence of appropriations can be seen by looking at the list of congressional leaders; Speaker Nancy Pelosi (D-Calif.), Senate Majority Leader Harry Reid (D-Nev.), Senate Majority Whip Dick Durbin (D-lll.) and Senate Minority Leader Mitch McConnell (R-Ky.) have all been appropriators.

Politics Internal – Appropriations Powerful

Appropriations dictates the house – controls the budget of every other committee

O’Toole 10 (James, writer @ Pittsburgh Gazette, 11/14/10, http://www.post-gazette.com/pg/10318/1103188-454.stm) JPG

Among the casualties in the Republican debacle of 2006 was Rep. Rick Santorum, the No. 3 member of the Republican caucus. In the House, that defeat was accompanied by the losses of Rep. Melissa Hart, R-McCandless, a member of the Ways and Means Committee, and Rep. Don Sherwood, R-Luzerne, who sat on the Appropriations Committee. Most of the 21 committees of the House can play important, high-profile roles in shaping legislation. The Transportation Committees of the two chambers, for example, will be in particular focus this year, and the nation's omnibus transportation legislation is due to be reauthorized. But in the House, the most coveted seats are on Appropriations, Ways and Means, and Energy and Commerce. Ways and Means has jurisdiction over tax policy. As its name suggests, Energy and Commerce has perhaps the most wide-ranging jurisdiction of any House panel. And Appropriations has the final say over spending levels for programs authorized in legislation shaped by other committees. Appropriations is also the traditional arbiter of the congressional earmarks, the target of criticism from sources as varied as the tea party movement and the co-chairs of the president's deficit commission. The prospect of the scaling back or complete elimination of earmarks raises the possibility that the prestigious panel may lose some of its traditional luster.

Appropriations is powerful – controls the budget

Mulligan 11 (John, writer of Providence Journal Washington Bureau, 2/4/11, http://newsblog.projo.com/2011/02/reeds-new-post-gives-him-added.html) JPG

Sen. Jack Reed has secured another plum assignment, with happy implications for Rhode Island's defense industry. The Senate Appropriations Committee announced its new lineup Friday, with Reed assigned to the powerful spending panel's subcommittee on defense. Rhode Island Democrat Reed, a longtime member of the full committee, had already been slated to win his first chairmanship of one of its subcommittees -- on the interior, environment and other federal agencies. That became official with Friday's announcement of appropriations assignments. Now Reed has also joined the 19-member defense spending panel. That significantly elevates his clout in the military sector because the appropriations subcommittees are where most of the crucial detail work is done every year on affixing dollar sums to the myriad programs in the federal government.

Link Turn – Politics – Nuclear Lobby

Nuclear lobby ensures support for the plan

Grossman 8 (Karl, prof of journalism at the State U of New York, Jan-Feb, [www.karlgrossman.com/Articles.htm] AD: 7-7-11, jam)

The atomic power corporations are beating on the doors in Washington to make you guarantee their financing for more giant nuclear plants. They are pouring money and applying political muscle to Congress for up to $50 billion in loan guarantees to persuade an uninterested Wall Street that Uncle Sam will pay for any defaults on industry construction loans. . . . The atomic power industry does not give up. Not as long as Uncle Sam can be dragooned to be its subsidizing, immunizing partner. Ever since the first of 100 plants opened in 1957, corporate socialism has fed this insatiable atomic goliath with many types of subsidies.

Massive support from nuclear lobbies

Grossman 5 (Karl, prof of journalism at the State U of New York, Jul 11, [www.space4peace.org/articles/fire\_in\_the\_sky.htm] AD: 7-7-11, jam)

Then why the push for space nuclear power? It's coming from a combination of interests. As "Deep Throat" instructed Bob Woodward in the Watergate investigation: "Follow the money." Lockheed Martin, the manufacturer of the plutonium-238 space systems, lobbies heavily for them. Both Lockheed Martin and Boeing want the business of building nuclear-propelled rockets under Project Prometheus and push hard for them. Then there are the national laboratories—including Idaho National Laboratory—promoting space nuclear power. It's a way to increase their budgets.

Politics Internal – Nuclear Lobbies Key

The nuclear lobby controls key members of congress – assumes their link turns

Samuelsohn 11 (Darren, writer @ politico, 3/16/11, http://www.politico.com/news/stories/0311/51367\_Page2.html#ixzz1Re4oFWBx) JPG

Facing its biggest crisis in 25 years, the U.S. nuclear power industry can count on plenty of Democratic and Republican friends in both high and low places. During the past election cycle alone, the Nuclear Energy Institute and more than a dozen companies with big nuclear portfolios have spent tens of millions of dollars on lobbying and campaign contributions to lawmakers in key leadership slots and across influential state delegations. The donations and lobbying funds came at a critical moment for the nuclear industry as its largest trade group and major companies pushed for passage of a cap-and-trade bill. While that effort failed, the money is sure to keep doors open on Capitol Hill as lawmakers consider any response to the safety issues highlighted by multiple nuclear reactor meltdowns in Japan in the aftermath of last week’s monster earthquake and tsunami. “The bottom line is you’ve got a variety of industrial interests that care about nuclear power and have a heck of a lot of money to spend if their business and their bottom line is put in political jeopardy,” said Dave Levinthal, communications director at the Center for Responsive Politics. “As Congress is talking about potentially diving deeper, these companies bring a lot of resources and a heck of a lot of cash to bear if this fight goes forward.” NEI, the industry’s biggest voice in Washington, for example, spent $3.76 million to lobby the federal government and an additional $323,000 through its political action committee on a bipartisan congressional slate, including 134 House and 30 Senate candidates, according to data compiled by the CRP. Alex Flint, NEI’s senior vice president for government affairs, said the spending is a byproduct of record high demand for his industry. “The fact that the day after the election, both the president and [House Speaker John Boehner] said nuclear was an area where it’s something they can agree, it’s made us that much more in demand,” Flint said. “Our lobbying expenses have gone up more in large part because we have more people talking to more members of Congress.” Nearly all of the investor-owned power companies that operate U.S. nuclear reactors play in the donation game. Exelon, the owner of the nation’s largest nuclear fleet, gave nearly $515,000 during the 2009-10 election cycle. The company contributed to more Democrats than Republicans (58 percent to 40 percent), though it made sure to cover all of the key bases. House Minority Whip Steny Hoyer (D-Md.) and Energy and Commerce Committee Chairman Fred Upton (R-Mich.) got the $10,000 limit from Exelon for primary and general election fights, while California Rep. Henry Waxman’s campaign account received $5,000.

Pro-nuclear lobbysists control the Chairman of the energy and power sub-committee

Samuelsohn 11 (Darren, writer @ politico, 3/16/11, http://www.politico.com/news/stories/0311/51367\_Page2.html#ixzz1Re4oFWBx) JPG

“I can’t even name the companies I’ve received checks from, but, in my view, nuclear power is essential; we have to have it to meet our demand, that it’s an industry that over time has been safe,” said House Energy and Power Subcommittee Chairman Ed Whitfield (R-Ky.), who took $4,000 from Duke, $2,000 from Southern Co. and $2,000 from Exelon. Brown said he wasn’t aware of his donations from Duke. “I’ve never been pro-nuke anyway,” he said. “I think we need to look at what our nuclear power plants are able to withstand and where they are. I think this does make us think again about how safe nuclear power is.”

Nuclear lobbysist control Obama and capitol hill – they’ve got the bucks

Jungjohann 11 (Arne, program director for Environment and Global Dialogue with the Heinrich Boll Foundation, 6/1/11, http://www.grist.org/nuclear/2011-06-01-nuclear-industry-has-powerful-backers-weak-opponents) JPG

The Nuclear Energy Institute (NEI) is the lobby association for the entire process chain of the nuclear industry in the U.S., from uranium mining to the manufacture of the reactors and the supply of nuclear fuel, all the way to nuclear power production. Its lobbyists are well-connected in the Obama administration and on Capitol Hill. In the last midterm and off-year election campaign cycle, politicians of both parties received approximately $4 million from the NEI. In order to boost public acceptance, shiny ad campaigns, such as those of the Clean and Safe Energy Coalition, filled the airwaves. This greenwashing by the NEI has repeatedly crossed the border of the permissible, and has been criticized by environmental and social organizations. The NEI PR staff even drafts opinion pieces which are sent to nuclear engineers across the country, to be signed and submitted to local newspapers. In addition to the umbrella lobby, the major nuclear power plant operators and corporations to which they belong also play an important role. In the last election campaign, they, together with the NEI, spent sums for lobbying and campaign contributions that went into the double-digit millions. Chief beneficiaries of this largess were Congress members from the states where their corporate headquarters are located, as well as committee heads and members of the caucus leaderships. Contributions of up to $10,000 to each individual Congress member are legal.

Politics Internal – Nuclear Lobbies

The nuclear lobby is influential

Farsetta 8 (Diane, the Center for Media and Democracy's senior researcher, Jul 1, [www.prwatch.org/node/7506] AD: 7-9-11, jam)

Accordingly, NEI has ramped up its already-substantial lobbying operations. In addition to the sixteen NEI employees registered as federal lobbyists, the group currently retains fifteen outside lobbying firms and consultants. Last year, NEI lobbyists visited thirteen federal agencies, as well as both houses of Congress. NEI's lobbying disclosure forms show that the organization helped shape more than twenty bills in 2007, from the Nuclear Fuel Management and Disposal Act to the Tax Technical Corrections Act to the Energy Independence and Security Act. All in all, NEI spent nearly $45 million on industry coordination, policy development, communications, and "governmental affairs" in 2006, according to its most recent financial report.

The nuclear lobby owns politicians on Capitol Hill

JungJohann 11 (Arne, Masters in Political Science from the Free University Berlin, Director for the Environment and Global Dialogue Program of the Washington office, Jun 1, [www.grist.org/nuclear/2011-06-01-nuclear-industry-has-powerful-backers-weak-opponents] AD: 7-9-11, jam)

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Politics Internal – Nuclear Lobbies – A2 – Turns

The anti-nuke movement is weak

Jungjohann 11 (Arne, program director for Environment and Global Dialogue with the Heinrich Boll Foundation, 6/1/11, http://www.grist.org/nuclear/2011-06-01-nuclear-industry-has-powerful-backers-weak-opponents) JPG

The anti-nuke movement is as weak as the nuclear lobby is strong. In the weeks after Fukushima, it fought like a lion, but it is still too small and its resources too few. Experts from NGOs such as Beyond Nuclear, Physicians for Social Responsibility, and the Union of Concerned Scientists trot from one TV channel to the next and try to explain to puzzled moderators that nuclear power is not clean energy, that it is much more expensive than generally assumed. Their attempts at an explanation are good, but they don't strike home. All this leaves us a long way from any basic change in direction for America's energy policy. The U.S. is still the land of nuclear power madness. The nuclear revival in the United States won't come to an end because of any fear of a meltdown, but simply because of financial necessity.

Link Turn – Politics – Defense Lobby

Defense lobbies support the plan

Grossman 5 (Karl, prof of journalism at the State U of New York, Jul 11, [www.space4peace.org/articles/fire\_in\_the\_sky.htm] AD: 7-7-11, jam)

Then there is the military connection. The U.S. military has long been interested in space-based weapons and considers atomic power the ideal way to power them. "The fielding of space-based weapons of devastating effectiveness to be used to deliver energy and mass as force projection" is projected in a U.S. Air Force Board report, "New World Vistas: Air and Space Power for the 21st Century." As to energizing these weapons, it states, "A natural technology to enable high power is nuclear power in space."

Groups who support the plan are key

The Global Network 11 (The Global Network Against Weapons & Nuclear Power in Space, advocacy organization, Apr 8, [www.grass-roots-press.com/2011/04/08/global-network-statement-on-japanese-nuclear-disaster/] AD: 7-7-11, jam)

The issue of switching to safe, clean energy is not technological — it’s political. The problem involves vested interests: the government agencies which push nuclear power, notably in the United States the national nuclear laboratories and the entity that owns them, the Department of Energy (headed currently by a former national nuclear laboratory director), and the nuclear industry as it seeks to profit from selling nuclear technology despite the cost in people’s lives. These same entities are pushing nuclear power world-wide as evidenced by GE’s involvement in the construction of Japanese reactors and the recent U.S.-India Nuclear deal. China and other emerging nations are also expanding plans for nuclear power despite the horrific memories of Chernobyl and now Fukushima. A disgrace in demanding nuclear power on earth and space has been President Barack Obama. As president, he has reversed the critical position he espoused as a candidate and now, even in the wake of the Fukushima disaster in Japan, is seeking to “revive” the nuclear industry with the building of new nuclear plants using billions of taxpayer dollars. Meanwhile, his administration has been pushing to also “revive” the use of nuclear power in space by restarting U.S. production of Plutonium-238 for use on space devices.

Link Turn – Politics – Defense Lobby Key

The defense lobby is the most powerful in Congress

AFP 9 (Agence France-Presse, French news agency, Mar 24, [http://www.spacewar.com/reports/Taking\_on\_US\_defense\_lobby\_will\_be\_tough\_Obama\_999.html] AD: 7-9-11, jam)

US President Barack Obama on Tuesday renewed his vow to cut spending on costly weapons programs but acknowledged taking on influential defense contractors would be politically "tough." Obama said that there was wide agreement in both political parties that the way the government purchased weapons was plagued by waste, but that defense firms were influential in Congress and had ensured industry jobs were spread across the country. "I think everybody in this town knows that the politics of changing procurement is tough," Obama told a prime-time news conference. "Because you know, lobbyists are very active in this area. Contractors are very good at dispersing the jobs and plants in the Defense Department widely," the US president said.

The defense lobby is hugely influential

Stein 10 (Sam, masters from the Columbia U Graduate School of Journalism, Jan 21, [www.huffingtonpost.com/2010/01/21/top-defense-contractors-s\_n\_431542.html] AD: 7-9-11, jam)

The ten largest defense contractors in the nation spent more than $27 million lobbying the federal government in the last quarter of 2009, according to a review of recently-filed lobbying records. The massive amount of money used to influence the legislative process came as the White House announced it would ramp up military activity in Afghanistan and Congress considered appropriations bills to pay for that buildup. All told, these ten companies, the largest revenue earners in the industry, spent roughly $7.2 million more lobbying in the fourth quarter of 2009 (October through December) than in the three months prior. Such an increase in lobbying expenditures is partly a reflection of just how profitable the business of waging war can be. Each of these companies earned billions of dollars in defense contracts this past year. As the U.S. ramps up its military activities overseas, and the army is stretched thin by other ventures, it stands to reason that the contracts won't dry up any time soon. In mid-December, Congress passed a defense appropriations bill that totaled more than $635 billion. Shortly thereafter, the firm Northrop Grumman moved its corporate office to the Washington D.C. region to be closer to the heart of legislative action. Among the issues on which these ten firms lobbied, "appropriations" was the most frequently cited in lobbying forms. "We've built Rome," one longtime good-government official said of the symbiosis between contractors and the government.

\*\*Spending/Trade-Off

Spending Link

Orion costs billions – multiple warrants – link turns are strictly long term
Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

In general, I would expect the cost of building a single ground-launched Orion in the suggested range of 20,000 tons loaded weight to be quite high. First, a substantial amount of R&D would be required to produce an actual design, and confidence that the design would in fact work. Beyond the work done up to the point when the project was historically cancelled, this would take several years and cost hundreds of millions of dollars just for the propulsion technologies and hull design. Then you have to actually build and launch the ship, which would probably take as much as a decade (definitely at least five years even at a very rushed pace). Construction of the ship itself, especially the first ship, would range into the billions of dollars. Plus the fuel, which would easily reach one or two billion. Plus the payload. The payload is the big thing. Orion has a low cost per unit of mass to orbit, but you can only get that low cost by doing a lot of research and construction. Developing and building the first few Orions would easily match the time and cost requirements for the entire Apollo program, and possibly even exceed them. And that's before you've paid for actually doing anything with the ship(s). What if you want to do some interplanetary exploration with them? Well, as mentioned above you are going to be spending many billions of dollars to develop and build additional equipment. You need to navigate the ship, support the crew in space, carry scientific instrumentation, develop and build landers to explore planets with, develop equipment for living on and exploring the surfaces of other planets, and more. In that case you aren't just developing a propulsion system, you're also developing an entire space program to wrap around the propulsion system. That costs a lot of money. Even ignoring the other problems with the Orion technology, actually building (for example) one or more large exploration Orions in the 70s would cost substantially more than has ever been spent on any program of space exploration. The general point is that whatever you are building an Orion for, it's payload is not going to be cheap in absolute terms. You have to fill the ship up with thousands of tons of useful stuff in order for it to be worthwhile to build the ship in the first place. Building Orions is thus a de facto commitment to a large space program. Financially speaking, their launch cost advantages don't start to exist until you've already decided that what you want to do in space involves launching a substantial amount of stuff, and spending a substantial amount of money.

Only way to get to the planets is via secondary vehicles – costs billions in R&D and production

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Next, there are secondary vehicles. One of the problems with the Orion propulsion system is that it cannot land. Once launched, it can come no closer than orbit to any planet. Using it to explore the solar systems thus requires a seperate means of getting to and from planets. Something which is, at a minimum, functionally equivalent to the lunar module (which could carry a crew of two to the surface of the moon along with minimal scientific equipment for a short stay, and then return to lunar orbit). An Orion planning serious exploration would need multiple landers, capable of carrying more stuff down to planets, supporting a longer stay, and preferably having more powerful engines to escape the gravity of bodies larger than the moon. While the Orion weight advantage allows a lot of landers to be carried, it wouldn't make them significantly cheaper. The landers themselves can't be built like battleships, because they have to be able to escape planetary gravity wells under their own chemical power. Development of the lunar lander was actually quite an expensive component of the Apollo program, and an Orion exploration program would tend to require even more expensive developments. We are talking about many billions of dollars in research, development, and production. Of course you can't really use the same lander for any arbitrary planet, as they have differing conditions, and you may need additional secondary vehicles to shuttle crew between Earth and the ship, and if desired to refuel it in Earth orbit.

Spending Link

Equipment also consumes times and money

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Another difficulty is the exploration equipment itself. The crew would need equipment to explore planets with, and to survive on planetary surfaces with. This would also require a significant and expensive program of development. Again, the Orion's carrying capacity allows a lot of this equipment to be transported, but it does not reduce the cost of the equipment itself to triviality. The equipment must still be taken down to planetary surfaces by lander vehicles, and must still contain some fairly advanced scientific instrumentation and survival equipment. Regardless of how much lift capacity is available, the solar system cannot be explored with compasses and binoculars. This would all require significant time and money outside of the costs for developing the propulsion system. Whatever you put in the ship, if it was build in the early days of space exploration it would require lots of research and development to be of much use.

A manned nuclear rocket costs tens of billions and takes decades

Moomaw 3 (Bruce, writer @ SpaceDaily, 1/21/3, http://www.spacedaily.com/news/rocketscience-03a1.html) JPG

Such a huge nuclear-powered manned ship would certainly take tens of billions of dollars to develop, and it is utterly ridiculous to say that there is any chance that NASA could develop a manned Mars ship (nuclear-powered or not) quickly enough to launch it within a decade.

Plan necessitates testing facilities – costs billions

Urfer and LaForge 5 (Bonnie – anti-nuclear activist and John – writer @ NukeWatch, Summer 2005, www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf) JPG

Prometheus’s production plan now includes yet-to-be- built facilities for testing nuclear reactors. The website Space.com reports that the plan requires a giant chamber capable of mimicking the vacuum of outer space. Prometheus could cost $2 billion over the next five years — on top of the $1 billion Nuclear Systems Initiative NASA received in 2002. NASA has even included in its budget the cost of dealing with anti-nuclear campaigns.

Orion is unproven – the only test used chemical propulsion at an extremely small scale

David 5 (Leonard, senior space writer @ space.com, Ad Astra Vol 17, No 2, Summer 05, http://www.nss.org/adastra/volume17/david.html) JPG

The quest for harnessing nuclear energy to carry out deep-diving assaults into space has a long history. In the 1950s into the 1960s, classified work was conducted to study a pulsed nuclear fission propulsion system. (Some of it remains classified today.) Tagged Project Orion, the idea was to expel nuclear bombs from the back end of a large passenger-carrying space vehicle. Each specially shaped bomb blast would kick against a shock absorber-like system that kept the crew safe while pushing the spacecraft forward. Those working on Orion wrestled with many engineering issues. A scale model of the Orion propulsion idea even flew successfully. Using chemical explosives, the mini test model flew for 23 seconds, to nearly 200 feet from a makeshift launch area in the Point Loma area of San Diego, California. Nevertheless, the test shot was a far cry from a 40,000-ton, crew-carrying spaceship propelled by nuclear bombs screaming across interplanetary distances, as well as setting the stage for eventual stellar jaunts. Orion's promising future was abandoned due to issues of public safety, as well as the prospect of fallout resulting from a ground-launched spaceship. An international nuclear weapon test ban on detonating such bombs in space also put an end to Orion.

Spending Link

Costs would be enormous – R&D, construction, fuel, payload

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

Of course, there are two factors worthy of note. First, that the Saturn V was quite expensive as chemical rockets go. Someone willing to develop something as big and dirty as an Orion could put that sort of effort into developing chemical rockets that, while requiring lots of risk, investment, and technological development could put payloads into orbit for many times less money than Saturn Vs. The Orion would also cost more than just its fuel, from a standpoint of lifting stuff into orbit. Since the ship cannot land, it is "expendable" in the context of a launch vehicle, and in general would have associated costs much more significant than just its fuel. It should be noted that these concerns apply to an even greater extent if you don't launch the Orion from the surface. Their big cost advantage would be as a launch system with an unusually low cost per unit of mass lifted to orbit. If you remove that, then Orion just becomes an interplanetary vehicle that is quite speedy but does not scale down well at all. While chemical rockets are still the only main alternatives for launching from Earth, because of their high thrust, there are plenty of non-chemical alternatives to Orion for interstellar flight. Ion drives for example, which as of now have been successfully tested in interplanetary space, are more fuel efficient than all but the largest Orions. An Orion interplanetary vehicle would inevitably cost a lot because it has to be fairly large, and would have to be launched by chemical rockets. The chemical launch phase would cost over a billion dollars (1960 dollars) even for the most modest space-launched Orion. It would have cost several billion dollars to launch the larger thousand-ton design. The ship itself wouldn't be all that cheap either, in absolute terms. Orion advocates are quick to claim that it could be built like a battleship, but that doesn't mean exactly what the average person might think. Battleships were, by the middle of the twentieth century, a highly refined technology which the world had an extraordinary amount of experience building and using. They were about as well established as a technology could get, they were heavily refined so that the designs were highly effective, and they were produced by industries which had experience in churning out many battleships effectively and for a reasonable cost. Despite all of this, the average battleship took three to four years to build even under the urgency of wartime conditions, and cost quite a bit of money. Structurally speaking, there is an analogy between building an Orion hull and a battleship. Both of them would be heavily reinforced metal structures, very large and designed to take a fair amount of stress. The analogy between Orions and battleships ends there, though. Orion's hull structure would be a fundamentally new design that would require new construction facilities, new techniques, and a cautious approach. An Orion would be filled with advanced technologies and equipment to allow it to travel in space and conduct its mission. This technology would be new, to a significant extent it would be untried, and it would be in general much more expensive and difficult to construct than anything put in a battleship. The Orion design would be anything but the cheap kludge some advocates insist it could be. While it would not have to be weight-optimized like a conventional spaceship, its components would be finely crafted and of the highest reasonable quality. For a project with the high absolute cost of an Orion (which really is a "put all or most of your eggs in one basket" approach to launch capacity), and with all the detrimental side-effects and risks of an Orion, its backers would not be willing to risk cutting too many corners in the construction. In general, I would expect the cost of building a single ground-launched Orion in the suggested range of 20,000 tons loaded weight to be quite high. First, a substantial amount of R&D would be required to produce an actual design, and confidence that the design would in fact work. Beyond the work done up to the point when the project was historically cancelled, this would take several years and cost hundreds of millions of dollars just for the propulsion technologies and hull design. Then you have to actually build and launch the ship, which would probably take as much as a decade (definitely at least five years even at a very rushed pace). Construction of the ship itself, especially the first ship, would range into the billions of dollars. Plus the fuel, which would easily reach one or two billion. Plus the payload.

Spending Link

Disregard the aff’s evidence – their spending estimates are extremely optimistic

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

Another concern is, of course, cost. For any Orion mission, a significant amount of research and development would be required as outlined above. In addition to this, there would be the time and money required to actually build the ships themselves, plus whatever payload they were to carry. Orion advocates (then and now) tended to tout extreme cheapness of the system as the overriding reason to adopt it. Orion would supposedly allow space travel on a budget. First, let us note for historical purposes that the Apollo program is generally reported to have cost in excess of 25 billion 1960 dollars. The main work on the project itself took under a decade, and it put a man on the moon less than twelve years after the US launched its first craft into space. Also note the Orion project's own estimates for its requirements - twelve years, and total funding of about 1.2 billion dollars. Both of these estimates were referred to as extremely optimistic by outside reviewers who examined the project. One of the major things to note about Orion is the cost of the fuel. The designers at one point estimated that they could get each "pulse unit" for at most 500,000 dollars, and at some point that they could probably be had for less than a tenth of that. They are noteworthy, however, for grossly overestimating the development of nuclear technology in at least one respect, when they assumed that small fusion bombs would be developed that did not require a fission trigger. If we went with the estimate of 500,000 1960 dollars, which was probably based at least loosely on how much it actually cost the military to construct fission bombs, the 2000 pulse units of the ground-launched Orion design would cost one billion dollars. This already takes us roughly to the estimated budget limit for the entire project, just for buying the fuel for one craft. It is worth noting that fission bombs really are quite expensive devices, and that there were not much more than 20,000 such devices in the US arsenal at its peak. Launching even a few Orions would require a significant increase in US bomb production (and because off-the-shelf bombs weren't suitable for the Orion mission profile, they'd couldn't just roll off an existing assembly line). This does not, in itself, make Orion tremendously expensive. A few billion dollars for fuel is not that big a deal if you can launch thousands of tons of payload into space. This is mainly intended to illustrate how dramatic the difference was between the cost estimates often quoted for Orion, and what a plausible minimum cost would actually have been (given our hindsight in regard to technological development). It does mean that Orion wouldn't save as much as some people think, though. A Saturn V rocket, costing several hundred million dollars at the time, could lift roughly 100 tons into orbit (it varied depending on where in orbit you wanted the payload). An Orion that could lift 10,000 tons into orbit would probably pay a minimum of a billion dollars for fuel and other launch-related costs. This is still, however, as much as 50 times less than the cost for the Saturn V.

Orion would be the most expensive space program ever

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

The payload is the big thing. Orion has a low cost per unit of mass to orbit, but you can only get that low cost by doing a lot of research and construction. Developing and building the first few Orions would easily match the time and cost requirements for the entire Apollo program, and possibly even exceed them. And that's before you've paid for actually doing anything with the ship(s). What if you want to do some interplanetary exploration with them? Well, as mentioned above you are going to be spending many billions of dollars to develop and build additional equipment. You need to navigate the ship, support the crew in space, carry scientific instrumentation, develop and build landers to explore planets with, develop equipment for living on and exploring the surfaces of other planets, and more. In that case you aren't just developing a propulsion system, you're also developing an entire space program to wrap around the propulsion system. That costs a lot of money. Even ignoring the other problems with the Orion technology, actually building (for example) one or more large exploration Orions in the 70s would cost substantially more than has ever been spent on any program of space exploration. The general point is that whatever you are building an Orion for, it's payload is not going to be cheap in absolute terms. You have to fill the ship up with thousands of tons of useful stuff in order for it to be worthwhile to build the ship in the first place. Building Orions is thus a de facto commitment to a large space program. Financially speaking, their launch cost advantages don't start to exist until you've already decided that what you want to do in space involves launching a substantial amount of stuff, and spending a substantial amount of money.

Spending Link

The plan is new deficit spending

Berger 8 (Brian, Space News Staff Writer, Mar 6, [www.space.com/5054-plutonium-shortage-thwart-future-nasa-missions-outer-planets.html] AD: 7-9-11, jam)

NASA’s Pluto-bound New Horizons spacecraft, for example, is powered by a radioisotope power system fueled by Russian plutonium, as will be the system that powers the Mars Science Laboratory. Though Griffin did not mention it, the U.S. Department of Energy over the winter quietly shelved long-standing plans to resume domestic production of plutonium-238. In 2005, the Department of Energy (DOE) gave public notice of its intent to consolidate the nation’s radioisotope power system activities at Idaho National Laboratory and start producing plutonium-238 there by 2011. Restarting production was projected at the time to cost $250 million and take five years. Griffin said during the hearing that the DOE’s latest estimate is that a restart would take seven years. Angela Hill, an Energy Department spokeswoman, told Space News in an e-mail that those plans are now on hold. “DOE did not request funding in 2009 for [Plutonium-238] production, since NASA has been directed to fund any new production capabilities,” Hill wrote. “Production may or may not resume based on NASA’s decision. Based on current mission plans, DOE will only continue to provide new Radioisotope Power Systems until 2015.” NASA’s 2009 budget request includes no money for re-establishing the Department of Energy’s long dormant plutonium-238 production capability.

AT: Spending Link Turn

Orion’s very expensive even if it’s cheaper than other alternatives

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

So the question is, what is that much launch capacity good for? Especially considering that Orion's main attraction is that you can fly all over the place with it - it's not just a glorified booster to orbit, especially since it can't land once it has taken off. You could do it purely for exploration, in which case you would get a lot of exploration done - but in a fairly expensive manner. It's not all that urgent to do scientific exploration of the Solar System, and few people would argue that getting lots of exploration done ASAP would be worth spending lots of time and effort on an Orion, and risking the negative side-effects. Orion is basically nothing more than a cheap per unit weight, but high in absolute cost, option that is best used to get lots of stuff off Earth with a lot of nasty side effects. It is a propulsion system, nothing more - it puts stuff into space, and into places around the solar system. Granted this would be nice, but you still have to research and then build the useful stuff, and for any continued operations in space, you have to get more stuff up there somehow to supply it. And in most applications it helps to have a lot of experience before you actually ship all the stuff into space. Orion can't carry a space program by itself - in fact the only real sense of using it is as the major lift component of a \_much\_ larger and more extensive space program, which has very concrete long term plans and is very prepared, in which case costs of lifting to Earth orbit aren't so high a proportion anyway, and the budget is big enough that better propulsion systems than Orion could be researched. Orion isn't a "magic bullet" that produces a cheaper better space program. It would have to be part of a space program with much greater funding than our space program historically had, within which it could save money or expand capability in very large-scale operations. Many people have suggested that the cheap (per unit weight) launch costs of an Orion could pay for themselves by spurring early commercialization of space. Unfortunately, in the 50s through 70s, the technology did not really exist to get financial return from a permanent manned presence in space. Even with the cheap launch costs of a working Orion system.

There are four methods, in general, with which a presence in space might generate financial return with known technology.

It would fail to spur satellite tech

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

Let's take a look at these, and which of them could be satisfied by an Orion program in the 70s or before. #1 is unlikely. Not only does Orion make a bad satellite launching platform (they're not the sort of thing it's best to take tens of thousands of tons of to a single orbit, all at once), but it tends to fry all unshielded satellites already in space, and the technology of the time isn't really up to making lots of profits from satellites. Satellite technology itself is simply very primitive at this point. In order to be useful as a satellite launch platform, you have to use ground-launched Orions, the biggest and dirtiest kind.

Space manufacturing is expensive

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

#2 is likewise unlikely. It would require substantial technology to be able to produce goods in space, and they would have to be returned to Earth via a non-Orion means of propulsion (Orion cannot land). This would be a very long-term project, relying mostly on non-Orion technology anyway. Technology isn't really up to it by the 70s, at least not without a huge initial investment other than Orion. As an addendum, it's historically been found to be cheaper to develop newer, better manufacturing techniques on Earth than it would have been to simply move likely-looking processes into space.

AT: Spending Link Turn

It wouldn’t cause economic stimulus

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

#3 can be rejected out of hand. The entire point of Orion is to be a cheap heavy-lift vehicle without requiring very long term, ultra-intense research programs. Most of the money spent on any large-scale Orion program would be in capital investment, not research and development. In general, Orion's money would be spent taking known technologies and integrating them into a complex working whole, rather than by developing entirely knew technologies. The spinoff potential of such an approach is low.

Orion wouldn’t attract private investment – alternatives are cheaper

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

#4 is possible but again, the problem is that while Orion would provide lift system and in-space propulsion, everything else would have to be developed (for example technology to mine an asteroid in space in the first place). There would be a substantial investment beyond Orion, and in the 70s it would be fairly unlikely that enough revenue could be produced to make a competitive profit from all the required investments. The essential problem is that if a space investment doesn't produce an average 10% annual return, then it isn't competitive with investment here on Earth. It would be quite difficult for something like space mining to provide that level of returns with the technology of the era. Like it or not, even with a cheap ultra-heavy lift system, the space technology of the 70s is not really up to making enough profit in space to pay for Orions. Massive Orion launches are not something that could continue indefinitely, and the 70s is just not an ideal time to establish one's primary space infrastructure. The only real uses are military and exploratory. Militarily, Orion really isn't all that great, and as far as exploration goes... sure Orion could do much more than the major programs of the time (probably for at least the same cost, though), but it'd be cheaper still to wait a few decades and use robotic probes.

Intra NASA T/O D/A

No room in the budget for nuclear propulsion – forces intra-nasa tradeoffs

Lemos 7 (Robert, writer @ wired, 9/20/7, http://www.wired.com/science/space/news/2007/09/space\_nukes) JPG

Because of the concerns, as well as funding cutbacks, NASA has refocused its Prometheus nuclear program to concentrate on creating a power generator that would satisfy the needs of the first lunar outpost. Advancing the technology of nuclear propulsion will have to wait, said NASA's Horowitz. "Right now, it's not in the budget, because we don't have the budget to do it," he said. "But they (the scientists) are working on an important piece, so they are still engaged."

Trade Off Link

Plan’s costly and trades off with other projects

The Planetary Society 5 (The Planetary Society, founded in 1980 by Carl Sagan, Bruce Murray, and Louis Friedman, May, [http://planetary.org/action/opinions/nuclear\_propulsion.pdf] AD: 7-6-11, jam)

Risks of long- term technology developments: New technologies have almost always appeared more attractive and less costly when started, than a few years down the road. As costs grow, the program stretches out, the performance is not as great as originally thought, priorities change and programs get canceled. An example is the multi-agency, ill-fated SP-100 space nuclear power program that ran for nearly ten years, consumed about $1 billion and was ultimately terminated well short of a working product. Looking back, that money, talent and time would have produced far greater scientific advances had it been applied directly to flight missions than invested in an unsuccessful technology development program. Few decade-long technology development programs have ended up where they were pointed at the outset; our perceptions change, the political/technical/fiscal environment changes, and the technical challenges are more formidable when engaged than in the conceptual phase. Might Prometheus suffer the same fate? It is fate. Then NASA Administrator, Mr. O’Keefe, had great confidence in this program, based partially on the success of the U.S. Navy in employing nuclear power. But a successful space reactor culminating in flight missions is far from a sure thing, and letting go a small bird in the hand to reach for a more attractive bird deep in the bush is always risky. The JIMO proposal was a huge one – the reactor was based on Navy experience where weight is not a major concern. More efficient reactors would take advanced technology and more years to develop – and NASA was in a rush to tie the technology to a near term mission objective. But the mission was so large (it would have taken at least 3 or 4 of America’s largest rockets just to launch it) and expensive, that it now raises the question whether more advanced, higher efficiency and lighter weight reactors should be developed for space applications.

Nuclear propulsion trades off with other investments

The Planetary Society 5 (The Planetary Society, founded in 1980 by Carl Sagan, Bruce Murray, and Louis Friedman, May, [http://planetary.org/action/opinions/nuclear\_propulsion.pdf] AD: 7-6-11, jam)

Delaying exploration that can be done now: Introduction of an initiative to develop new technology inevitably slows the current pace; better is the enemy of good. NASA deleted plans for near-term missions to Pluto, the Kuiper Belt, and Europa and delayed a very capable Mars lander with the expectation that a successful nuclear power and propulsion system will enable better missions later. But what if it isn’t successful? The opportunities to search out these bodies will be delayed many years at best, and, in the case of Pluto and the Kuiper Belt totally lost for generations. In 2003 a New Horizons mission to Pluto and the Kuiper Belt was finally approved by Congress, over NASA’s objections, in part, because of strong Planetary Society member support. But a Europa mission, which was receiving study as a conventional, chemical propulsion mission, was dropped from consideration and its objectives organized into a proposal for a large, Prometheus-based Jupiter Icy Moons Orbiter. The subsequent delay of JIMO proved the prescience of our concern about delaying exploration.

It trades off with the rest of NASA’s projects

Morris 5 (Jefferson, quals, Aug 31, [www.aviationweek.com/aw/generic/story\_generic.jsp?channel=aerospacedaily&id=news/NASAP08315.xml&headline=Research%20Council%20Report%20Questions%20NASA%20Nuclear%20Propulsion%20Program] AD: 7-7-11, jam)

The committee also fears that the introduction of "super-flagship-class" nuclear-enabled spacecraft may crowd out other smaller missions, causing the agency to lose its current "diverse and healthy mix" of space science missions. NASA asked the NRC to identify high-priority space science missions that could be "uniquely enabled or greatly enhanced" by nuclear power and propulsion systems. "Particularly promising" missions include nuclear-powered probes deployed to the inner heliosphere to study space weather, a long-lived Venus lander, a probe to study Neptune and Triton, and an interstellar probe. "Spacecraft using nuclear propulsion systems, irrespective of the exact technologies employed, will be very large, very heavy, very complex, and, almost certainly, very expensive," the report says. "But it is difficult to imagine that space science goals for the period beyond 2015 will still be addressed with the power and propulsion technologies of the Mariners, Pioneers and Voyagers."

Trade Off Link

Plan would have to trade-off

McKee 5 (Maggie, journalist at NewScientist.com, cites Gary Bernstein, astronomer @ U of Pennsylvania, Aug 31, [www.space4peace.org/articles/nuclear\_poor\_for\_astronomy.htm] AD: 7-7-11, jam)

While reactors would definitely boost a mission's power level, the technology does come at a heavy financial cost. NASA projects Prometheus will cost $3 billion between now and 2010. In the agency's 2006 budget request, the money was scheduled to come from "exploration systems" - and not the science budget. But Bernstein says he is worried about the effect of the cost on NASA's other missions. "If you're going to make this a priority, then what gets deprioritised?" he asked New Scientist. "It's not free."

\*\*Solvency

Solvency – General

Nuclear propulsion fails – can’t take the stress of sustained nuclear launches and no components work together – there evidence is optimistic self serving analysis done by Orion’s creators

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

The ship's structure itself would take some design work. It has to be able to take the stress of sitting next to a bunch of exploding nuclear bombs. Even with shock absorbers, it would be under repeated stress of a type not experienced by any vehicle we have ever built. The ability of a battleship to survive the strain of firing its own guns was the subject of a considerable amount of development efforts in the early 20th century, and that strain would be dramatically less than the strain experienced by an Orion. Building such a ship would be more than just welding together big hunks of steel. One of the big problems would be the repeated nature of the stress. Certainly an Orion could be built that would withstand a dozen explosions, even a hundred. But it has to withstand thousands of shocks over the course of a significant period of operation in space. It would take a non-trivial amount of work to design a structure to do this, especially without the benefit of modern CAD techniques. It would be an essentially new area of development, because nobody has ever built such a thing before. None of our knowledge about building vehicles and structures would easily translate into building such a ship. In short, Orion was not proven technology. It's not even something that we could be entirely confident of getting working in the near future. While many of the individual components had been developed, the problem of ensuring that they would all actually work together as a system to produce an effective spaceship was not solved. The closest the designers came to any sort of test was a proof-of-concept test of pulse propulsion in general, involving a small model which flew a short distance using conventional explosives. Various accounts of Orion have stated that there was substantial work still to be done on the design of the pulse units, with special bomb designs being called for. Even in the early research, significant effort was directed toward research in this area, although it is mostly still classified so we don't know exactly what was being developed. The project's advocates said that integrating all of these components into a fully working design would be straightforward and cheap, but outside reviews were done on the project and they invariably said that major technical problems remained unsolved. They also said that the estimates of the time and money necessary to develop the project seemed extremely optimistic.

Nuclear propulsion fails – unreliable, and cant withstand environmental threats in space

Zampino and Cataldo 4 (Edward and Robert – researchers @ Glenn Research Center (NASA), “The Challenge of Space Nuclear Propulsion and Power Systems Reliability”, Reliability and Maintainability Annual Symposium, Jan. 2004, pp. 431-436, IEEE) JPG

One of the greatest challenges of Space Nuclear Propulsion and Power Systems Reliability Engineering and systems engineering will be to attain the extremely high reliability required for safety and mission critical functions. This must be achieved with limited resources over a mission time that could be as high as 15 years. The Hybrid Bimodal Nuclear Thermal and Electric rocket will have to contend with the environmental threats that were encountered by the Voyager, Galileo, and Cassini missions. Nuclear power systems subjected to the planetary surface environment such as the Martian surface will have to survive. NASA has learned from JPL interplanetary missions that a major design strategy for high reliability and long life missions must be to design a system that withstands all of the deep space, orbital, and planetary surface environments. This is a major challenge since nuclear systems will be complex and there are many environmental threats such as ionizing radiation, space charging effects, micro-meteoroids, space debris, planetary surface erosion, contamination, and temperature extremes. There are many other challenges within system design that must be met for Nuclear Thermal and Nuclear Electric engines. Loss of thrust or thrust control is safety critical for manned missions. In particular, the exposure of system control electronics and critical engine components to external radiation or to residual reactor radiation must be a key consideration in the design.

Solvency – General

Nuclear propulsion fails and causes massive radiation – empirically proven by US and Russia

Grossman and Long 96 (Karl – Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, and Judith – space writer @ The Nation, 12/16/96, Nuclear Roulette, Questia) JPG

On November 17 a Russian Mars space probe malfunctioned, hurtling to Earth with a half-pound of plutonium--the most toxic substance known--aboard. The plutonium may finally have landed off the coast of Chile, where it will remain hotly radioactive for 2,000 years, or it may have dispersed in the atmosphere to become airborne poison (no one knows for sure). The crash of the nuclear probe is another siren in the night warning of the folly of using nuclear power in space, or anywhere. So far, six Russian nuclear missions have failed--including the Cosmos 954 satellite, which scattered hundreds of pounds of radioactive debris over northwest Canada--and three U.S. nuclear missions have had accidents, including the crash of a SNAP-9A satellite carrying 2.1 pounds of plutonium, which, according to European nuclear agencies, "vaporized" and "dispersed widely" over the planet. (Medical physicist Dr. John Gofman connects this crash with elevated levels of lung cancer worldwide.) But despite these warnings, the push to deploy nuclear technology in space continues. On September 19, the White House unveiled its new national space policy, under which the Pentagon and NASA will be working on "multiple nuclear propulsion concepts" with the Defense Special Weapons Agency. In other words Son of Star Wars is on the drawing board. What next? October 1997 brings the Cassini mission to Saturn (with the largest plutonium payload--72.3 pounds--ever) atop a Titan rocket, known to blow up on launch. "Inadvertent reentry" to Earth's atmosphere would mean "approximately 5 billion of the estimated 7 to 8 billion world population...could receive 99 percent or more of the radiation exposure," says NASA's environmental impact statement. What else? "Bi-modal" nuclear spacecraft to provide power and propulsion to military satellites; nuclear-powered satellites to transmit high-definition TV signals; two plutonium-fueled probes for a 1999 mission to Pluto; nuclear-powered rockets to Mars and colonies there. On the program for the Fourteenth Symposium on Space Nuclear Power and Propulsion at the Energy Department's Brookhaven National Laboratory in January is its plan to rocket "long-lived fission products [nuclear waste] into outer space." The failed Russian mission has had one success. "The danger of a disaster involving a plutonium space project is now real and imaginable to people," says Bruce Gagnon of Global Network Against Weapons and Nuclear Power in Space, which will convene an international meeting in Europe in March. "It's sheer and utter madness," he adds. At the very least, it's Russian roulette.

We don’t have the tech for Orion

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Most importantly, there are two aspects to any space program - the propulsion technology, and what that technology is used to propel. Ignoring for now the expense or difficulty of developing the Orion propulsion system, what of the craft's mission payload? If you can send thousands of tons into orbit, what are those thousands of tons going to be and how much will they cost? Let's take, as an example, the common proposal of using surfaced-launched Orions as interplanetary explorers in the 60s or 70s as an alternative to the Apollo program. It turns out that there are some fundamental technology and cost obstacles to doing this. First, you have to support a significant human crew in space for long periods of time. Even an Orion would take months of travel to get to nearby planets like Mars, and a mission to the outer solar system would take years. The crew would also want to spend significant periods of time at the destination planets, so as to conduct exploration. This doesn't sound like such a big deal today - after all, we've had people in space for over a year, we've landed on the moon, and we've done a great deal of study of conditions on other planets. It was a much bigger deal back in the 60s and to some extent the early 70s. Until the mid to late 70s, nobody had ever lived in space for any extended period of time. Mission durations were measured in weeks on a space capsule, not months on a space station. Humans had never set foot on another planet till 1969, and at that point even robotic probes were quite primitive.

High risk of mission failure – having no back up puts too much stress on the one reactor

Powell et. al. 4 (James – principal @ Plus Ultra Technology (PUT), Aerospace America, January 2004,

www.aiaa.org/aerospace/images/articleimages/pdf/maisejanuary04.pdf) JPG

Technical risk is another factor to consider in assessing nuclear propulsion systems. Unlike sensors and electronics, nuclear propulsion does not allow use of a redundant or back-up nuclear propulsion system. There is only one reac- tor, and it, together with the associated hard- ware, must function reliably during the entire mission. Going ahead with missions without having fully demonstrated propulsion system reliability, and without extensive long-term test- ing, risks mission failure. Because of the much shorter integrated operating time of NTP, its re- liability can be demonstrated much sooner than that of NEP.

Solvency – Technology

No solvency – EMP from the reactor destroys critical tech

Nichols 9 (Matthew, Bachelors of Science in Applied Physics and Mathematics from Western Kentucky U, [www.wku.edu/~matthew.nichols/Orion%20rev%20PCW.doc] AD: 7-9-11, jam)

However, a nuclear detonation will ionize matter that is not initially consumed in the reaction. These resultant free electrons can produce an extraordinarily fluctuating magnetic field known as an electromagnetic pulse (EMP).[3] This, in turn, produces an intense electric field that can induce massive amounts of voltage within electrical conductors and can destroy any electrical circuit in its wake. Disabling communications, navigation or life support in space would certainly present severe complications to any mission. This effect is greatly amplified on Earth: the presence of Earth’s magnetic field seizes these free electrons and accelerates them along the magnetic field lines while Earth’s atmosphere presents more matter to be ionized and thus creates more free electrons. In deep space, however, the EMP from nuclear pulse propulsion would primarily be propagated by the material within the craft itself as there will be no atmospheric material present, nor will there be a large, external magnetic field.

Solvency – Propulsion = Inefficient

Nuclear propulsion is ineffective – low energy output rate

Lehman 3 (Jennifer, Prof of stats @ UT, 12/7/3, http://www.ae.utexas.edu/courses/ase333t/past\_projects/03fall/antimatter/antimatter\_final.doc) JPG

With the growing desire to push past our boundaries in space, it has become necessary to look towards a new means of propulsion. Currently used propulsion systems, such as chemicals propellants, are too heavy and bulky for a long distance missions. The remaining alternatives, ion and nuclear propulsion, are also ineffective in terms of the ratio of energy output to quantity required Current research in the field of antimatter propulsion, more specifically antiproton annihilation, shows the energy output of antimatter is significantly greater than that of other leading propellants. Antimatter propulsion has a near 1 to 1 ratio of mass to energy transfer; hence, a spacecraft powered by antimatter requires less storage volume than the typical spacecraft. Research also shows that compared to other systems, antimatter propulsion has fewer hazardous byproducts and waste materials. In theory, the use of an antimatter propulsion system would allow for deep space missions and lighter spacecrafts.

Nuclear propulsion is inefficient – in practice its less useful than chemical propulsion

Jessa 9 (Tega, writer @ universetoday, 6/17/9, http://www.universetoday.com/32722/nuclear-propulsion/) JPG

NASA first researched a nuclear powered engine in the 1960s and the early 70s. The project for this research was called the NERV rocket. This project’s goal was to make a nuclear reactor powered propulsion system for a Saturn V rocket. However problems quickly arose from political pressure, environmental concerns, and design flaws. America was still in the throes of a nuclear arms race and cold war, so nuclear power was strongly lobbied against. Also, the environmental concerns about radioactive waste played a big part in killing the project. The final nail in the coffin was the effectiveness of the NERV rockets in comparison to conventional rockets already in use. The main problem was that the rockets were not able to efficiently convert the energy of the nuclear reactions. This made them only as or less powerful than rockets already used. The project eventually ended in 1972.

Orion is inefficient – multiple technical barriers make it unfeasible

Gilster 5 (Paul, writer @ Centauri Dreams, 11/24/5, http://www.centauri-dreams.org/?p=440) JPG

Consider two hypothetical spacecraft. The Orion vehicle would have worked by setting off low-yield nuclear devices behind a massive pusher plate, driving forward a payload attached at a safe distance from the pusher (and protected by mind-boggling shock absorbers). Even if we had the nuclear devices at our disposal, agreed to use them for such a purpose, and found the political will to construct an Orion craft for deep space exploration, a problem still remains: most of the energy from the nuclear blasts is dissipated into space, and the craft thus requires a huge critical mass of fission explosives. Orion, in short, is not efficient in using its energies. Now consider Project Daedalus, the hypothetical mission to Barnard’s Star designed by members of the British Interplanetary Society back in the 1970s. Daedalus was designed to use fusion microexplosions instead of fission. One of the reasons the Daedalus craft demanded as much fuel as it did is that the ignition apparatus, whether laser or particle beam, to ignite fusion is massive, adding unwanted heft to the vehicle. Daedalus would have massed an overwhelming 54,000 tons.

Orion is ineffective and cant handle the stress crated by nukez

McNutt et al. 2k (Ralph L., Chief scientist in the Space Department @ Johns Hopkins U Applied Physics Lab, 6/6/00, www.niac.usra.edu/files/library/meetings/annual/jun00/393McNutt.pdf) JPG

Nuclear Pulse Propulsion (“Orion”) • Fission may provide the key element for the perihelion propulsion, but only in a pulsed mode with low fission yields per pulse; we need the fission energy of ~1.3 g of uranium–a total of about 13 tons of TNT equivalent. • The problem is the coupling of the momentum into the ship over short time scales, ~10–8s. Transferring this impulse over such short times typically causes stress to exceed the yield strengths of all known materials. • The Orion concept requires large masses for dealing with the release of ~1 to 10 kT explosions; however, the spacecraft masses tend to be large due to the power plant overhead.

Solvency – Empirics

Their evidence is government propaganda – Orion doesn’t work

Urfer and LaForge 5 (Bonnie, anti-nuclear activist, and John, staff member of Nukewatch, a nuclear watchdog group, Summer, [www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf] AD: 7-8-11, jam)

But it’s all completely theoretical at this point. The most favored space propulsion scheme is a “nuclear- [low-thrust] electric option” or “high-efficiency electric propulsion thrusters.” The theory involves propelling electricallycharged particles — produced in a nuclear reactor — out the rear of the craft. One launch design could be the “nuclear-enhanced-airbreathing rocket.” A uranium dioxide fission reactor would heat hydrogen to 2500 degrees and mix it with a little air to produce combustion and lift-off at 4000 degrees. The boondoggle has been tried before, but failed nuclear rocket programs — NERVA and Projects Orion, Pluto, Rover and Poodle — were abandoned in the ‘50s and ‘60s due to technical problems, political opposition (1963 Nuclear TestBan Treaty) and exorbitant cost. Some NASA/DOE reports say Prometheus could use conventional rockets for launch with reactor propulsion not kicking in until high altitude is attained. Never mind the 1963 Partial Test-Ban Treaty which commits the U.S. “to prohibit, to prevent, and not to carry out any nuclear weapon test, or any other nuclear explosion ... in ... outer space. ...” Prometheus appears so outlandish on its face, there’s no wonder the White House and NASA kept it quiet in the wake of the Columbia disaster and worldwide protest over the 72 pounds of plutonium aboard the Cassini mission in 1997. Leonard David, of Albuquerque, a senior space writer for Space.com, reports that, “Those attending [a 2003 Space Technology & Applications International Forum] ... were a s k e d b y N A S A n o t t o o p e n l y d i s c u s s d e t a i l s o f [Prometheus] given the Columbia catastrophe.” The administration agreed to an intentional outing last year only after perception spin doctors were in place. A new PR effort emerged, spouting articles and web sites in support of the program’s Nuclear Systems & Technology Project — all with slick and appealing pictures. Project managers decided that openness would go over better with the public, so lots of facts, figures and “benefits” are listed. Glossy PR rationales for the mission include: long-term stays on the moon to test exploration systems and extract resources; exploring the solar system; speeding up expeditions to Mars (two months instead of six) for human study of potential life; and travel to Pluto. One enthusiast even mentioned “settlements” in space. Project literature says nuclear fission for propulsion and electricity is necessary to enable these applications.

Plan is based on false theories – practical application proves it’s unfeasible and costs too much

Urfer and LaForge 5 (Bonnie – anti-nuclear activist and John – writer @ NukeWatch, Summer 2005, www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf) JPG

But it’s all completely theoretical at this point. The most favored space propulsion scheme is a “nuclear- [low-thrust] electric option” or “high-efficiency electric propulsion thrusters.” The theory involves propelling electrically- charged particles — produced in a nuclear reactor — out the rear of the craft. One launch design could be the “nuclear-enhanced-air- breathing rocket.” A uranium dioxide fission reactor would heat hydrogen to 2500 degrees and mix it with a little air to produce combustion and lift-off at 4000 degrees. The boondoggle has been tried before, but failed nuclear rocket programs — NERVA and Projects Orion, Pluto, Rover and Poodle — were abandoned in the ‘50s and ‘60s due to technical problems, political opposition (1963 Nuclear Test- Ban Treaty) and exorbitant cost.

Solvency – Weight

Orion fails – too heavy and not powerful

David 3 (Leonard, Senior Space Writer, Feb 7, [www.sps.aero/Key\_ComSpace\_Articles/CSA-016\_NASA%92S\_Nuclear\_Prometheus\_Project.pdf] AD: 7-8-11, jam)

As for the name, Newhouse said that NASA Administrator, Sean O’Keefe, picked Project Prometheus. Last year, a number of possible flagship missions were considered, to showcase nuclear space technology. One favored candidate was lofting a high-powered telecommunications satellite into Mars orbit. Eventually, the JIMO mission moved to center stage. Development work is clearly needed, Newhouse said. The nuclear reactor itself must be a lightweight design. Ion engines, akin to those used in NASA’s Deep Space 1, need to be far more powerful. Longerlived equipment is also necessary, he said. "We schemed around for a while and came up with a spacecraft that, quite frankly, we can barely launch because it’s so heavy. Obviously, we’ve got work to do," Newhouse said.

Solvency – Pusher Plate

Nuclear propulsion fails – pusher plates can’t sustain nuclear blows and energy particles kill the crew

Dickinson 11 (David, writer @ Astro Guys, 6/2/11, http://astroguyz.com/2011/06/02/declassified-the-true-tale-of-project-orion/) JPG

It all started with a proposal made by Stanislaw Ulam and Fredrick Reines in 1947 for an atomic pulse engine. The idea was primitive but effective; a large city-sized spacecraft would be propelled by shooting atomic bombs aft and gaining continuous momentum as the blasts pushed the gigantic craft forward. The idea gained steam around 1958 and the dawn of the Space Age (remember, it was the birth of NASA and the time of Sputnik) and interest was sufficient that Princeton’s own Freedman Dyson (he of the Dyson sphere) took about a year to draft a proposal on the project. Even today, it’s a fascinating read; it shows just how ambitious some of those early ideas really were, and all in an era prior to even sub-orbital space flight! Dubbed Project Orion, (Not to be confused with the Orion capsule of the modern day Constellation Program) the system would provide both high thrust and high specific impulse and would have been one heck of a ride. Scaled plans would have ranged from an interplanetary “Orion-lite,” a 4,000 ton spacecraft equipped with 800 0.14 kiloton bombs, to massive interstellar versions capable of accelerating at 1 G for a sustained period of 10 days up to about a cruise velocity of about 3.3% the speed of light. Of course, such ships would be generational, as even a one way trip to Alpha Centauri would take about 100 years. And you would need to decelerate on the other end… and you’d have to take all of your nuclear fuel with you for all of this. Probably one of the biggest issues would be designing large shock absorbers to sustain repeated blows against the pusher plate; few spares could be towed along, and if they were damaged, there would be little hope of replacements. Then there’s the threat of high energy particles zipping right though the craft and your DNA at relativistic speeds… there are certainly many problems to solve with long term interstellar travel.

Empirically proven – pusher plates will fail

Dickinson 11 (David, writer @ Astro Guys, 6/2/11, http://astroguyz.com/2011/06/02/declassified-the-true-tale-of-project-orion/) JPG

Still, some tentative earthbound tests were in fact done to see if a pusher plate could survive an atomic explosion. One of the early tests involved the suspension of two graphite encased steel spheres near an explosion during the 1954 Operation Castle nuclear test series in the South Pacific. The spheres were recovered intact, suggesting that it was possible to construct materials capable of surviving a nuclear blast. One of the more bizarre tales of the Cold War involves Operation Plumbbob. Amidst trials involving pigs and troops exposed to atomic testing was a test on August 27, 1957 entitled Pascal B in which a 900 kg capping plate was set to be expelled by the blast at a calculated 6 times escape velocity. The plate was never found and only appears in the first few frames shot by high speed camera; the plate either A. vaporized entirely, or B. Is now a reluctant orbiting citizen of our solar system! Such are the tales of the Cold War…

Solvency – Exaggeration

Advantages to Orion were exaggerated by its designers

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Unfortunately, the reality of the situation was rather different. Not only did the Orion propulsion system have a great many flaws, but its advocates have tended to dramatically overstate its potential benefits. First, let's look at what some of the actual Orion proposals promised. There were actually several different proposals throughout the lifetime of the Orion project, but they fall into two classes. Note that the Orion project was originally classified, and some of the specifics of the research into some Orion technologies remain classified to this day. The proposals and the estimates of their capabilities, however, are now publicly available. Before we look at the proposals I should mention that one way to define the efficiency of a rocket is a value called its ISP. ISP is essentially a measure of the efficiency of a rocket. A higher ISP means that the engine can produce more acceleration for a given amount of fuel. Thus a higher ISP rocket can take the same payload from point A to point B using less fuel, or (typically) in less time. Orion engines also have a high thrust, which means they can produce a lot of acceleration quickly rather than just over a long period of time. This is useful for escaping the Earth's gravity.

Solvency – Heat

Orion will fail – fission creates exhaust that melts the rocket

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

One possibility was to use a reactor to generate electrical power to run the ion rockets conceived by Goddard and actually built on a small scale by Soviet researchers between the world wars. But ion rockets could only be used in a vacuum and with their small thrust were not likely to be practical and useful until humankind was well established in space. To be of value in the near future, nuclear reactors had to be used to heat a propellant (or, more exactly, working fluid) that would be expelled through a rocket nozzle. The higher the temperatures the reactor developed, the greater the exhaust velocity. Potentially, the most potent reactors would run so hot that their cores were molten or even gaseous. Gaseouscore reactors might attain a specific impulse (the measure of the effectiveness of a rocket fuel or engine) as high as 3,000 to 7,000 seconds. (The absolute limit of chemical propulsion was under 600 seconds.) But such reactors were technically far distant, and it would be hard to prevent the costly and dangerous loss of fissioning reactor fuels through the rocket exhausts; the contamination problem meant that they could only be used well out in space. Although the so-called light-bulb or closed-cycle type of gaseous-core reactor might avoid that problem, even studying the problems inherent in this sort of reactor was difficult. 3 Only solid-core reactors, running at much lower temperatures, were likely to be practical in the near future; but since they developed a specific impulse as high as 1,300 seconds, they still offered higher performance than chemical combustion.

Nuclear propulsion causes the rocket to melt – its also inefficient

Jessa 9 (Tega, writer @ universetoday, 6/17/9, http://www.universetoday.com/32722/nuclear-propulsion/) JPG

So how does each of the present concepts for nuclear propulsion work? The principals are simple but the execution can be complicated. NTP works on the same concept as a hydrogen rocket. The material that makes thrust is heated by a heat source. In this case it is a nuclear reactor. The sheer energy this system can produce when properly managed can exceed that of normal rocket systems. Unfortunately this type of propulsion is highly inefficient as the temperatures needed to make it truly effective would actually melt any known material now used to make rockets. To prevent this, the engine would have to lose 40% of its efficiency. The other approach is Nuclear Electric Propulsion. This works on the concept of using electrical power to heat the rocket propellant. The main design concept now in use for this type of propulsion is the Radioisotope Thermoelectric Generator. The generator is powered by the decay of radioactive isotopes. The heat generated by the isotopes is captured by thermocouples which convert this heat to the electricity need to heat rocket propellants. This technology is currently being used by NASA deep space probes like Voyager and Cassini.

Nuclear propulsion melts the rocket – causes failure

Stern 5 (David P., MA in physics @ Hebrew U in Jerusalem, 4/29/5, http://www-istp.gsfc.nasa.gov/stargaze/Sstern.htm) JPG

Heavy elements such as the uranium used in generating nuclear power are extremely concentrated sources of energy. A few pounds of nuclear fuel can produce as much as thousands of tons of coal or oil--or of high explosives, in the case of nuclear bombs. Harnessing nuclear energy for spaceflight therefore seemed a natural direction to explore. But nuclear spaceflight is not easily accomplished. Space rockets require not just energy, but also mass, matter ejected backwards, of which nuclear fuel provides very little. The limiting factor in the operation of rockets is not a shortage of energy but the high temperature at which they operate. Ordinary rocket nozzles already run red-hot: adding extra energy to the fuel would raise the temperature, perhaps beyond what the metal can take.

Solvency – NASA = Bad

NASA fails in nuclear propulsion – multiple warrants

Kadak 8 (Andrew, PhD in nuclear engineering @ MIT, 3/10/8, http://web.mit.edu/biyeun/Public/papers/NASAprop.doc) JPG

Although NASA's nuclear space program has launched several nuclear-propelled rockets in the past, it remains under the public radar and has not been a part of any space mission for the last few decades. Now, with NASA’s focus on the solar-powered moon base, one must ask whether NASA is still investing any effort into its nuclear energy program. Our objective is to identify why NASA has made so little progress on its nuclear program by identifying possible problems in communication, management, funding, and feasibility, as well as problems relating to public and government perception of the program. With this analysis in mind, we hope to elucidate the problems which might be inhibiting NASA from actually deploying a nuclear-powered interplanetary mission.

Empirically proven that NASA isn’t effective

Abrams 8 (Avi, owner of Ian Media, 10/10/8, http://www.darkroastedblend.com/2008/10/project-orion-powered-by-atomic-bomb.html) JPG

Parts of this project still seem to be classified today. George Dyson recollects: "NASA had no interest, they tried to kill the project. The people who supported it were the Air Force, so they made it top secret..." It is still very dangerous and touchy subject, mostly because of the heart of the project - controlled ways to get directed energy explosions, and directing nuclear explosions at the ship.

Nuclear power wont work – technical challenges

David 3 (Leonard, senior writer @ Space.com, 2/7/3, http://www.marsnews.com/archives/2003/02/07/nasas\_nuclear\_prometheus\_project\_viewed\_as\_major\_paradigm\_shift.html) JPG

Enthusiasm towards Project Prometheus, a major new initiative to reactivate nuclear space power and propulsion work under NASA, has been muted due to the space shuttle Columbia tragedy. NASA is undertaking Prometheus in partnership with the Department of Energy. At stake is moving forward nuclear technology in the hope of enabling an unprecedented science data return from future robotic missions, making use of high-power science instruments and advanced communications technology. Project Prometheus faces a number of technical challenges, not the least of which is to produce a space reactor system that is safe to launch and function for years on end as it cruises toward deep space targets.

No scientists to work on the plan – aging work force and no recruits

Pizarro-Chong et. al. 10 (Ary, researcher @ McGill space flight dynamics lab, 11/11/10, “Development of space nuclear reactors for lunar purposes: overview of technical and non-technical issues”, 1339-1344, Systems and Control in Aeronautics and Astronautics (ISSCAA), IEEE) JPG

There are other significant concerns that could effectively stop the space program: the loss of a capable workforce and the lack of a central repository of SNP experience, information and technologies. The reduction and aging of the space nuclear power workforce is reaching a critical point. The number of students entering the field is almost zero and there has not been enough interest (or need) to bring a mature second generation up to the level of significant expertise.

Solvency – Launch Failure

Nuclear propulsion fails – high likelihood of accidents which result in extinction – NASA officials concede there’s no cleanup plan

Gagnon 11 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, 7/1/11, http://www.space4peace.org/articles/plutonium\_space\_launch.htm) JPG

NASA sadly appears committed to maintaining their dangerous alliance with the nuclear industry. Both entities view space as a new market for the deadly plutonium fuel. Back in 1997 we organized an international campaign against NASA and the Department of Energy's launch of 72 pounds of plutonium on the Cassini mission. A man by the name of Alan Kohn volunteered to help us with that campaign. Alan had been the Emergency Preparedness Officer at NASA during the Galileo (1989) and Ulysses (1990) plutonium launches at the space center in Florida. By the time Cassini was to be launched Alan had retired from NASA and felt free to speak out. He told the New York Times, just prior to the launch, that NASA had no plan to contain and clean-up after an accident on or near the launch pad that released plutonium into the environment. He said the operating plan he had worked with during the two previous nuclear launches was a joke and was only intended to serve as a reassurance to the public. Alan told us that a long-time family friend, working in the White House, had informed him that more people contacted Washington opposing Cassini than any other issue in U.S. history. While NASA maintains that they are "searching for the origins of life" on Mars, in reality they are mapping the red planet and doing soil sampling which is all intended to serve the ultimate goal of establishing a nuclear powered mining colony there in the future. The Haliburton Corporation, known for their connections to the Bush-Cheney administration and fraud in Iraq, has been working on a drilling mechanism for Mars exploration for some time. The taxpayers are being asked once again to pay for nuclear missions that could endanger the life of all the people on the planet. As we saw in Louisiana, following the Hurricane Katrina debacle, the federal government is not prepared to do disaster relief and clean-up. A plutonium release over Florida could devastate a 60-mile radius - from the space center to Disney World. It would only take one pound of plutonium-238 released as dust in the atmosphere to give everyone on the Earth a lethal dose of the toxic fuel. Have we not learned anything from Chernobyl and Fukushima? We don't need to be launching nukes into space. It's not a gamble we can afford to take.

Plan has a high likelihood of failing on launch

Urfer and LaForge 5 (Bonnie – anti-nuclear activist and John – writer @ NukeWatch, Summer 2005, www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf) JPG

Additional launches of radioactive devices increase the risk of a deadly accident. Space shuttle fatalities and the 1- in-20 failure rate of NASA’s Titan-IV booster rocket highlight the downside of NASA nuclearism. Facilities producing reactors and plutonium batteries, like the Los Alamos National Lab in New Mexico and the Idaho National Engineering Lab, will spread even more radioactive contamination to workers and nearby communities. The New Mexican reported that when Cassini’s RTGs were being processed between 1993 and 1995, the 241 cases of isotope contamination that occurred at Los Alamos were initially covered-up.

Solvency – Misc

Solar storms guarantee astronauts cant fly with nuclear propulsion

Kleinberg 3 (Eliot, writer @ Palm Beach Post, 3/15/3, http://www.space4peace.org/articles/groupsfear.htm) JPG

Robert L. Park, Washington director of the American Physical Society, agrees that nuclear power is mandatory for any Mars or beyond missions. Solar power won't cut it; ships in deep space are just too far from the sun. But Park, who's also a professor of physics at the University of Maryland, says any nuclear-related space flight should not include people. "My guess is we'll never send them," Park said. "The radiation levels between here and Mars are very high and, if there's a solar (radiation) storm while you're on your way, you're toast." Engineers agree a nuclear reactor is many times more deadly after it's powered up. The Mars Society's Zubrin says a Mars mission should use a conventional rocket with a nuclear reactor that would activate only after a spacecraft is successfully orbiting Earth.

No return flights – nuclear power doesn’t provide enough fuel

Kleinberg 3 (Eliot, writer @ Palm Beach Post, 3/15/3, http://www.space4peace.org/articles/groupsfear.htm) JPG

Park, doubts a reactor could make enough fuel for a return trip and wouldn't gamble lives on it. He said there's still no proof astronauts would be able to harvest hydrogen in large enough quantities and in convenient enough places -- if at all. Whether used for propulsion, on-board power, or as a Mars-based generator, any nuclear reactor would not be coming back, Zubrin said.

Solvency – Timeframe

Their solvency advocates concede developments take a decade – outside reports say that’s optomistic

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Next, there is the issue of the propulsion system itself. The concept is simple to describe, but not necessarily simple to implement. In fact, Orion advocates often gloss over how much research the people running the actual project felt was necessary. Remember, their plans called for over a decade to get things going, and even then outside observers invariably reported that their projections seemed overly optimistic. Some of the fundamental research was done when the project itself was going, but much was not completed. Much of the stuff that would be necessary for an Orion interplanetary ship, such as guidance systems, did not exist at the time though it has been developed and refined since then by the conventional space program. Guidance at the time was primarily the responsibility of ground control, even for space probes. A manned Orion on an extensive journey would have to be responsible for its own navigation and piloting without having timely assistance from ground control (due to communications delay imposed by light speed). Independent spacecraft navigation would not have been trivial to develop back then, as they lacked our advanced computer technology and decades of experience with interplanetary robot probes.

Development of the necessary tech takes at least 10 years

Moomaw 3 (Bruce, writer @ SpaceDaily, 1/21/3, http://www.spacedaily.com/news/rocketscience-03a1.html) JPG

However, this -- to put it mildly -- is not the same thing as saying that NASA plans to try to develop a very large nuclear rocket engine capable of launching a manned ship to Mars within a decade. Pae quotes O'Keefe as saying: "We're talking about doing something on a very aggressive schedule to not only develop the capabilities for nuclear propulsion and power generation but to have a mission using the new technology within a decade." But O'Keefe has spent the past year talking constantly about his hopes for a deep space mission using nuclear-powered propulsion within a decade or so -- while making it clear that he is talking about an unmanned, relatively small probe. NASA's Nuclear Electric Propulsion program -- for which it included $46.5 million in its FY 2003 budget request -- would have been just such a system.

Orion’s timeframe is long – massive R&D projects

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

In short, Orion was not proven technology. It's not even something that we could be entirely confident of getting working in the near future. While many of the individual components had been developed, the problem of ensuring that they would all actually work together as a system to produce an effective spaceship was not solved. The closest the designers came to any sort of test was a proof-of-concept test of pulse propulsion in general, involving a small model which flew a short distance using conventional explosives. Various accounts of Orion have stated that there was substantial work still to be done on the design of the pulse units, with special bomb designs being called for. Even in the early research, significant effort was directed toward research in this area, although it is mostly still classified so we don't know exactly what was being developed. The project's advocates said that integrating all of these components into a fully working design would be straightforward and cheap, but outside reviews were done on the project and they invariably said that major technical problems remained unsolved. They also said that the estimates of the time and money necessary to develop the project seemed extremely optimistic.

It would be decades until launch

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

In general, I would expect the cost of building a single ground-launched Orion in the suggested range of 20,000 tons loaded weight to be quite high. First, a substantial amount of R&D would be required to produce an actual design, and confidence that the design would in fact work. Beyond the work done up to the point when the project was historically cancelled, this would take several years and cost hundreds of millions of dollars just for the propulsion technologies and hull design. Then you have to actually build and launch the ship, which would probably take as much as a decade (definitely at least five years even at a very rushed pace). Construction of the ship itself, especially the first ship, would range into the billions of dollars. Plus the fuel, which would easily reach one or two billion. Plus the payload.

Solvency – Timeframe

Timeframe is atleast a decade for the tech to be available

Darling 11 (David, writer @ Encyclopedia of Science, 6/21/11, http://www.daviddarling.info/encyclopedia/P/PrometheusProj.html) JPG

A NASA program, announced in January 2003, to develop nuclear propulsion and nuclear power generating systems that could ultimately be used to take a manned mission to Mars and to power other ambitious deep space vehicles. Supporters of the concept argue that nuclear power could change the nature of space exploration, but add that it will take many years and significant resources to develop into a mature form. The technology was studied in the 1950s and 1960s in initiatives such as NERVA and Project Orion, but was subsequently dropped, partly for political (1963 nuclear test-ban treaty) and partly for financial reasons. Central to the new approach is NASA's Nuclear Systems Initiative (NSI), which was launched in 2002 following comments made by NASA's Administrator, Sean O'Keefe, that nuclear propulsion was the most efficient way to explore deep space and send astronauts to Mars. The Bush Administration has proposed a five-year $3 billion budget for Prometheus, though how this will be affected by the loss of the Space Shuttle Columbia remains to be seen. O'Keefe told the Los Angeles Times in mid-January 2003: "We're talking about doing something on a very aggressive schedule to not only develop the capabilities for nuclear propulsion and power generation but to have a mission using the new technology within this decade." A spokesperson for the Planetary Society has backed the idea: "In the long run, nuclear power and propulsion will likely be needed for missions to carry humans to Mars and back."

Solvency – Turn Magnifier

Takes years to develop a working model – the plan calls for 10 million nukes – magnifies all of our turns

Stern 5 (David P., MA in physics @ Hebrew U in Jerusalem, 4/29/5, http://www-istp.gsfc.nasa.gov/stargaze/Sstern.htm) JPG

Over the seven years that followed, at the cost of about 10 million dollars, plans for a bomb-propelled spaceship were developed. Small models of such a ship were actually built, and in one successful experiment a model was propelled upwards by a series of conventional explosive charges, ejected from its rear. Although the detailed design remains classified (it involved a great deal of bomb technology), the designers have claimed that no technical problem posed a stumbling block--neither the wearing-down of the "pusher plate" exposed to the explosions, nor the radiation hazard to the spaceship passengers, nor any other details."Orion" called for huge spaceships, weighing thousands of tons. One design proposed a flight to distant stars using a "conservatively designed" spaceship of 40 million tons, powered by 10 million bombs! But in the end, the project was abandoned, because the prospect of exploding a large number of nuclear bombs in the atmosphere or close to it seemed too frightening. The world woke up to realize the extent to which radioactive debris contaminated the atmosphere, and signed in 1963 a treaty banning nuclear tests, which also spelled the end of "Orion".

Solvency – Plutonium

Plutonium creates accidents and is expensive

Aftergood 11 (Steven, director @ federation of American scientists, 6/28/11, http://www.fas.org/blog/secrecy/2011/06/space\_nuclear\_power.html) JPG

Unfortunately, the plutonium 238 power sources that are used to power these missions are not only expensive, they are dirty and dangerous to produce and to launch. The first launch accident (pdf) involving an RTG occurred as early as 1964 and distributed 17,000 curies of plutonium-238 around the globe, a 4% increase in the total environmental burden (measured in curies) from all plutonium isotopes (mostly fallout from atmospheric nuclear weapons testing). A plutonium fueled RTG that was deployed in 1965 by the CIA not in space but on a mountaintop in the Himalayas (to help monitor Chinese nuclear tests) continues to generate anxiety, not electricity, more than four decades after it was lost in place. See, most recently, “River Deep Mountain High” by Vinod K. Jose, The Caravan magazine, December 1, 2010.

Plutonium kills – disrupts cells and DNA

Cole 97 (K.C, LA Times science writer, 9/22/7, http://articles.latimes.com/1997/sep/22/news/mn-35079) JPG

However, Pu 238 spits out radiation at least 250 times faster than bomb-grade plutonium. As the atom falls apart, it emits alpha particles--small clumps of nuclear particles--with enormous energy. That energy provides heat and electricity for the instruments on Cassini, as well as the Mars Pathfinder, the Apollo moon flights and other NASA missions. Cassini carries more plutonium than NASA has ever lofted into space. But although Pu 238 is the "workhorse of the space program," as its discoverer, Glenn Seaborg, calls it, the alpha particles it emits are extremely dangerous to living tissue and DNA. Lodged in the lungs or bone, Pu 238 continues to emit alpha particles for decades, wrecking havoc with the delicate machinery within cells. Earth's atmosphere already holds as much as five tons of plutonium, a legacy of the nuclear bomb testing of the 1950s. "I don't think there's any obvious signs of damage," said physicist Philip Morrison of the Massachusetts Institute of Technology. Dozens of atomic bomb workers ingested plutonium during World War II, said the 85-year-old Seaborg, including himself. And many are still walking around to tell the tale, he said. However, pediatrician Helen Caldicott, who founded Physicians for Social Responsibility, points out that most cancers don't appear for many decades after exposure to a carcinogen, and the delayed effects are only now beginning to surface among the general population exposed to the nuclear fallout from tests. "We are seeing increased cancer, particularly testicular cancer in men," she said. The medical profession, she said, should take the link between nuclear fallout and increased cancer more seriously. "[They aren't] putting one and one together," she said. Meanwhile, she said, the plutonium from the 1950s' tests continues to circulate in the atmosphere. "Do we want to add more to it?" she asked.

Solvency – A2 – Foust

Foust’s arguments for nuclear use are a fantasy – we’re no where near having the tech

Space Review 7 (10/22/7, http://www.thespacereview.com/article/983/1) JPG

The authors note near the end of Living Off the Land in Space, with some disappointment, that the schedules and budgets proposed for NASA’s Vision for Space Exploration initiative prevent the agency from utilizing much in the way of new technology, like the propulsion systems proposed in the book. “NASA had to begin designing flight hardware now—using mostly existing technologies—and innovation would have to wait,” they write (emphasis in original). This book offers a look at what might be possible when—and if—schedules and budgets permit the use of more advanced technologies that could allow future explorers to loosen their bonds to the Earth

Solvency – A2 – Freeman Dyson

Dyson goes neg – he opposes Orion

Dinkin 5 (Sam, writer @ the space review, 1/14/5, http://www.thespacereview.com/article/309/1) JPG

Orion’s fantastic engineering is not good enough if the rocket kills people. Freeman Dyson, one of the great contributors to Orion, feels that he was decisive in getting the Orion project nixed in the 1963 Partial Test Ban Treaty. He was making the decision based on the fallout. He calculated that there would be enough fallout to kill one to ten people globally with each launch.

\*\*EMP D/A

EMP Shell (1/2)

Nuclear propulsion causes EMPs – crushes electricity outages for the continental US

Pearson 3 (Ben, science degree @ Central Arizona College, writer @ SpaceDaily, 1/22/3, http://www.spacedaily.com/news/nuclearspace-03a.html) JPG

However, if you were to look at the patent of Dr. Stanislaw Ulam filled by the AEC in 1959, you would see perhaps the strangest idea of them all, to launch a spaceship by launching nuclear bombs out of it's back end repeatedly. The idea was called at that time Project Orion. I came to study Orion in the year 2001. At first I just looked at existing research, studying its pros and cons. Soon I came to one big problem. There was nothing that I studied that had anything to do with Electromagnetic Pulse shockwaves that would result from the use of so many nuclear bombs. Electromagnetic Pulse is the affect of nuclear weapons that has a tendency to destroy electronics in a large area. It is caused by radiation ionizing the atoms in a band around the earth approximately 20-30 km high. It can be extremely damaging. A 1.4 Megaton bomb launched about 400 kilometers above Kansas would destroy most of the unprotected electronics in the entire Continental United States. However, Electromagnetic Pulse remains almost untested for small nuclear bombs.

**Small outages have a cascading effect throughout the grid**

**Glauthier 3** (T. J., President & CEO of the Electricity Innovation Institute, 9/21/3, "LIGHTING UP THE BLACKOUT**:** TECHNOLOGY UPGRADES TO AMERICA'S ELECTRICAL SYSTEM" lexis/nexis) JPG

I sincerely appreciate the opportunity to address this distinguished Committee on a subject about which we are all concerned. The electric power system represents the fundamental national infrastructure, upon which all other infrastructures depend for their daily operations. As we learned from the recent Northeast blackout, without electricity, municipal water pumps don't work, vehicular traffic grinds to a halt at intersections, subway trains stop between stations, and elevators stop between floors. The August 14th blackout also illustrated how vulnerable a regional power network can be to cascading outages caused by initially small--and still not fully understood--local problems. In response to the Committee's request, my testimony today provides some of EPRI's and E2I's views on technology issues that require further attention to improve the effectiveness and reliability of the nation's interconnected power systems. This testimony will be supplemented with a matrix table as requested by the Committee. Context for power reliability Power system reliability is the product of many activities--planning, maintenance, operations, regulatory and reliability standards--all of which must be considered as the nation makes the transition over the longer term to a more efficient and effective power delivery system. While there are specific technologies that can be more widely applied to improve reliability both in the near- and intermediate-term, the inescapable reality is that there must be more than simply sufficient capacity in both generation and transmission in order for the system to operate reliably. The emergence of a competitive market in wholesale power transactions over the past decade has consumed much of the operating margin in transmission capacity that traditionally existed and helped to avert outages. Moreover, a lack of incentives for continuing investment in both new generating capacity and power delivery infrastructure has left the overall system much more vulnerable to the weakening effects of what would normally be low-level, isolated events and disturbances.

Blackouts cost the economy 30 Billion Dollars PER DAY. Just a few days of outage brings economic growth down to ZERO

Bryan 3 (Jay, writer @ The Gazette, “Power grids vital in information age: "Just a few days could theoretically take economic growth ... right down to zero", lexis/nexis)

This worsened the already-anemic state of a U.S. economy that had been hammered by a massive stock-market meltdown and a series of confidence- sapping corporate scandals. It hurt Canada, too, weakening our biggest market. So now, just when there are signs of healthy growth in both countries, is the last time you'd want to see a large part of the continent's electric-power network collapse. We can be grateful that the immediate impacts look modest. David Rosenberg, chief North American economist with Merrill Lynch, estimates that the U.S. impact could amount to as much as $30 billion for each day of interrupted activity. That's roughly one percentage point of quarterly economic growth, which means that just a few days could theoretically take economic growth in the third quarter right down to zero. But this is just the first step in his analysis. In reality, most activity was returning to something close to normal by yesterday. More important, Rosenberg says, any losses in August are likely to be recouped in September, much as economic activity rebounds to wipe out most losses after a severe winter storm. But even if we do look back on the great blackout of '03 as a mere hiccup for the economy, there will be little reason for complacency. As Royal Bank economist John Anania notes, the reliability of the power grid is absolutely indispensable in an information-age economy.

EMP Shell (2/2)

US economy is key to global economy

News Ratings 6 (Staff, 6/23/6, http://www.newratings.com/analyst\_news/article\_1304298.html) JPG

Analysts at Dresdner Kleinwort Wasserstein say that the US economic slowdown is likely to have a significant impact on the global economy. In a research note published this morning, the analysts mention that exports continue to be the key growth driver in major economies, such as Japan and the Eurozone. Any deceleration in the US economy would impact exports and adversely affect domestic demand, the analysts say. Moreover, the reversal of interest rate expectations, triggered by a US slowdown, is likely to weaken the US dollar, maybe very substantially, Dresdner Kleinwort Wasserstein adds. A slowdown in demand from the US, combined with a weaker dollar, has historically exerted pressure on global economic growth, the analysts point out.

Economic collapse causes nuclear war- extinction

Broward 9 ((Member of Triond) http://newsflavor.com/opinions/will-an-economic-collapse-kill-you/ AD: 7-7-09 )ET

Now its time to look at the consequences of a failing world economy. With five offical nations having nuclear weapons, and four more likely to have them there could be major consequences of another world war. The first thing that will happen after an economic collapse will be war over resources. The United States currency will become useless and will have no way of securing reserves. The United States has little to no capacity to produce oil, it is totatlly dependent on foreign oil. If the United States stopped getting foreign oil, the government would go to no ends to secure more, if there were a war with any other major power over oil, like Russia or China, these wars would most likely involve nuclear weapons. Once one nation launches a nuclear weapon, there would of course be retaliation, and with five or more countries with nuclear weapons there would most likely be a world nuclear war. The risk is so high that acting to save the economy is the most important issue facing us in the 21st century.

EMP Link

Orion creates massive EMPs – guts solvency

Nichols 3 (Matthew E., physics and astronomy prof @ Western Kentucky U, www.wku.edu/~matthew.nichols/Orion%20rev%20PCW.doc) JPG

When a nuclear explosion occurs, several types of radiation are released including gamma rays and neutrons. These two forms of radiation are highly penetrating and are capable of ionizing and destroying both electrical systems and human tissue. Semiconductor materials such as integrated circuits or microprocessors are especially susceptible to these forms of radiation as the lattice structure of these devices will be damaged and will fail over time. In principle, the only way to reduce or eliminate such radiation is to increase the distance between the target and the source or place dense materials between them as a form of radiation shielding. With the design of the Orion the distance cannot be reduced as the spacecraft is considered a rigid body that requires proximity to the source to maximize the impulse, and thus materials must be selected to best shield a human crew and semiconductor electronics between the blast and the craft. However, a nuclear detonation will ionize matter that is not initially consumed in the reaction. These resultant free electrons can produce an extraordinarily fluctuating magnetic field known as an electromagnetic pulse (EMP).[3] This, in turn, produces an intense electric field that can induce massive amounts of voltage within electrical conductors and can destroy any electrical circuit in its wake. Disabling communications, navigation or life support in space would certainly present severe complications to any mission. This effect is greatly amplified on Earth: the presence of Earth’s magnetic field seizes these free electrons and accelerates them along the magnetic field lines while Earth’s atmosphere presents more matter to be ionized and thus creates more free electrons. In deep space, however, the EMP from nuclear pulse propulsion would primarily be propagated by the material within the craft itself as there will be no atmospheric material present, nor will there be a large, external magnetic field.

Orion creates EMPs

Nichols 3 (Matthew E., physics and astronomy prof @ Western Kentucky U, www.wku.edu/~matthew.nichols/Orion%20rev%20PCW.doc) JPG

In the late 1950’s, General Atomics began work on a manned external pulsed plasma propulsion spacecraft named Project Orion. The particular method of propulsion investigated incorporated the detonation of nuclear weapons to produce external thrust and drive the rocket, and several experiments during Cold War weapons testing proved that the project was mechanically feasible. However, electromagnetic pulses are produced during nuclear blasts and can damage computers and communications devices regardless of shielding. By utilizing MCNP and Comsol Multiphysics computer models to study the ionizing and electromagnetic effects on such a spacecraft, it was calculated that a 1.4 Mt nuclear charge at a distance of 10 m would induce a surface potential of approximately 0.7 V across the surface of the spacecraft in deep space. By selecting certain neutron-reflective materials for spacecraft construction, the effects of shielding on internal electrical systems were modeled. Furthermore, the effects of Earth’s magnetic field while initially launching the spacecraft were investigated.

Project Orion lets off destructive EMP and X-rays which destroys satellites

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

Orion's side-effects would not be limited to fallout, they would also include EMP and X-rays. EMP, or Electro-Magnetic Pulse, is essentially a powerful charge differential that will destroy nearby electronics (unless they are specially shielded). It is produced by explosions at ground level and in the stratosphere. While Orion's small fission bombs would not produce large amounts of EMP, they would produce some of it especially while passing through the stratosphere. X-rays are even more destructive. They are absorbed effectively in the atmosphere, but travel long distances in space. The nuclear explosions in space created by an Orion spacecraft would release large amounts of X-rays. The effect of those X-rays would be to cause severe damage, even destruction, to the electronics of anything else in space within a significant distance of the spacecraft (up to thousands of miles or more). When Orion was originally proposed, there was very little in space. Within a decade, however, satellites were already beginning to appear. Many of those satellites would be destroyed by operating an Orion in Earth orbit. If an Orion was launched today, it would cause tens of billions of dollars in damage to commercial and military satellites from many countries.

EMP Link

Nuclear radiation in space destroys satellites and the economy

Sieff 5 (Martin, UPI Senior News Analyst, Jun 20, [www.spacedaily.com/news/milspace-05zp.html] AD: 7-9-11, jam)

The easiest way to paralyze the entire U.S. space satellite system in so-called Low Earth Orbit, or LEO, they warn, is by detonating a nuclear weapon above the Earth to produce a radiation belt at the altitude where the satellites orbit. Satellites built to function for 10 years will then all die a slow death over just a few weeks as they pass through the most irradiated areas. "Given the inherent vulnerability of space-based weapons systems (such as space-based interceptors or space-based lasers) to more cost-effective anti-satellite, or ASAT, attacks, China could resort to ASAT weapons as an asymmetrical (defense) measure," Hui Zhang, an expert on space weaponization and China's nuclear policy at the John F, Kennedy School of Government at Harvard University told United Press International in a recent interview. Also, if China, Russia or even North Korea were to detonate a single nuclear weapon in the upper atmosphere it would produce an electric magnetic pulse, or EMP. One nuclear weapon detonated in near space would therefore melt down the entire electronic communications network of the United States. That could ruin the U.S. economy and utterly disrupt society China has repeatedly made clear that it would vastly increase the size of its intercontinental ballistic missile force, building hundreds more nuclear armed ICBMs if necessary to swamp America's new ABM defenses.

EMP Link – Fission

Fission is more powerful than thermonuclear bombs

Pearson 3 (Ben, science degree @ Central Arizona College, writer @ SpaceDaily, 1/22/3, http://www.spacedaily.com/news/nuclearspace-03a.html) JPG

This one was really stretching the truth; in all actuality fission bombs create more radiation, and thus do more damage, than thermonuclear bombs. And lastly, I took no consideration at all of the Earth's magnetic field lines, which can potentially greatly influence the sphere of influence of Electromagnetic Pulse.

EMP ! – Econ

EMPs collapse the economy even if it only affects one region

SPG 7 (Sage Policy Group, 9/10/7, http://www.survive-emp.com/fileadmin/White-Papers/EMP-Resources/EMP-Econ-Study.pdf) JPG

By studying a regional EMP event, we can focus on what would be a simpler attack that many more organizations could afford to do without any state sponsorship. Since many more could afford this type of an EMP assault, it represents the more likely scenarios. Within this range of regional EMP scenarios, the most likely scenarios may well be in the mid-range of impact or half-way to the low impact range. In the Richmond to Baltimore region, the impact to financial output ranges from $34B to $770B. Being conservative, I would normally think of the most likely range being somewhere between $100 and $300B. Extrapolating to the East Coast area as a whole would mean a ten times larger loss of one to three trillion dollars. However, those with mission critical facilities, and those who are responsible for all- hazards planning must also consider the worst case scenario and have a plan to deal with it even if the worst case is not the most likely. For that reason, we have outlined the entire range of scenarios. Those who have to consider worst case scenarios should also work through the implications of more serious scenarios this study did not address, namely continental- wide EMP scenarios. For example, in a continental-wide EMP event, all areas of the country will be similarly impacted and unable to provide as much assistance to neighboring regions. A continental scenario could also suggest dire consequences including the inability of the country to feed much of its population. Again, I mention this so that readers can see the many steps we have taken to avoid painting an extreme picture while acknowledging more severe worst case scenarios that should not be ignored.

EMP collases the economy

SPG 7 (Sage Policy Group, 9/10/7, http://www.survive-emp.com/fileadmin/White-Papers/EMP-Resources/EMP-Econ-Study.pdf) JPG

These include not only the obvious—computers and telephones—but also the electronic devices that are embedded in virtually every aspect of a productive economy. These include electronic components in automobiles, the communications and control equipment embedded in electrical power transmission systems, communications systems themselves, pipelines that deliver fuel, and electronic components integrated into ATMs. Heating and air conditioning systems, elevators, and lighting systems that enable us to work in large buildings are typically dependent on electronic controls that would be disrupted or damaged by EMP, compromising use of such buildings until those systems are restored. As mentioned, the first of several pulses acting within nanoseconds is faster than surge protectors and lightening arrestors are able to act. Equipment connected to conductive wires such as power or phone lines (even water lines) are especially vulnerable since the long lines effectively serve as huge receiving antennae. For that reason, EMP can also disrupt or even damage basic electrical distribution equipment. Long electrical transmission lines are highly susceptible to attracting and conveying the electrical energy released by EMP. Not only are longer lines more likely to receive the EMP, the energy collected can increase along the length of the lines (according to some estimates to as much as 3,000,000 volts). Consequently, EMP is likely to cause short circuits and damage major components of the electrical power transmission and distribution system. Because the economy is so interconnected and so dependent on electricity to power that interconnectedness, very little of the electrical, communications, or electronic infrastructure would escape unaffected. Smaller devices, unplugged from the grid, have a higher likelihood of being unaffected. However, only equipment that is shielded from both radiated and conducted pulses that meet military specifications such as the series 188-125 could be counted upon to survive without disruption or damage. Civilian critical infrastructure is largely unprotected at this time.

EMP ! – Econ

EMP hastily collapses the economy – triggers a chain reaction

Martin 8 (Stephen, President of the Philemon Foundation, 11/30/8, http://www.counterpunch.org/smartin11282008.html) JPG

When the decision was taken to allow Lehman Bros (7.1 trillion in derivatives – all figures taken from OCC’s Quarterly Report on Bank Trading and Derivatives activities, June 30 2008) to go under, unlike that as with Freddie Mac and Fannie Mae, AIG and now Citigroup (37.1 trillion in derivatives), the full nature of consequences were as unseen. The first factor was that the Europeans elected not to buy up the ‘toxic’ debt as had been circulated as a weapon of financial mass destruction, but to take equity in ‘their’ banks. The second factor is that the system of ‘Global Finance’ is not just something that can be switched on or off at will, like a light bulb, change of name ‘overnight’ of supplier on power station courtesy of corporate takeover, new terms as applied, normal service resumed - and apologies for any inconvenience issued. The third factor that there is always the unknown when one is dealing with ‘mass destruction’ – and this particularly the case in dealing with ‘psychological’ aspect;  as in consequence of ‘Shock and Awe’ - and the chain reaction of a derivatives market unfolding. This small article examines the parallel which exists in the ‘dropping’ of a financial weapon of mass destruction with the explosion of a nuclear device, and in particular the EMP or ‘electromagnetic pulse’ as psychological counterpart in economic warfare to the paralysis of electronic circuitry caused by EMP in conventional thermonuclear warfare, parallel being as of ‘circuitry’ neurophysiological in economic warfare. The ‘scorched earth’ of economic warfare is that of belief destroyed; buildings may be left intact, environment habitable and ripe for ‘invasion’ - but still there be ‘debris’; form of belief, ruination psycho political, and  requirement  of currency transfusion in the invasion or defense? As figurehead, but an important one at that, Henry Paulson has much to answer for,  but less than the organ grinders behind same. It still wide open to speculation as to the nature of the machinations surrounding the creation and circulation of CDO’s and CDS’s as financial weapons of mass destruction, and the rationale underlying the selectivity of allowing certain  institutions to fail while ‘rescuing’ others, results still to be seen thereof - courtesy of psychology in form of ‘shock and awe’? The opinion represented herein this small article is that drawing heavily upon insight Jeffersonian concerning financiers as those who prefer ‘demoralizing pursuit’, rather than  the insight of those inclined to interpret the current financial meltdown in progress as but product of lack of regulation and the action of a few reckless, albeit powerful individuals under ignorant greed. Call  the latter the ‘lone gunmen’ account of assassinations financial as opposed to the ‘scheming and co-ordinated warfare’ theory concerning same; or madness pure and simple, as opposed to there being method in the madness; and scheming gone agley. Regardless of how called this much holds, this much verifiable; as a result of meltdown financial power in America has been consolidated into fewer hands. There has been a further concentration of wealth which is anathema to Democracy. Let us be clear about this one demonstrable fact. JP Morgan Chase (91.3 trillion in derivatives), and Bank of America (39.7 trillion in derivatives) now have more control of Finance in America than ever before, and it was unprecedented that the American Government was held to ransom by such as Henry Paulson in his demand for release of funds from the public coffers, and complete control over same; issues of transparency aside.

EMP ! – Satellites Module (1/2)

EMPs kill products that use electricity – specifically satellites

SPG 7 (Sage Policy Group, 9/10/7, http://www.survive-emp.com/fileadmin/White-Papers/EMP-Resources/EMP-Econ-Study.pdf) JPG

At the extreme, the type of EMP considered here delivers a burst of energy to any metallic surface within a direct line of EMP origin, particularly those exceeding one meter in length. These metal objects act like antennae and conduct a surge of energy along their span. The types of objects that act like antennae in these situations include electrical power and telephone lines, pipelines, airplanes, cars, and trucks. Because EMP bursts are typically associated with high altitudes, they are also likely to affect satellites within a direct line of EMP origin.

Satellites key to solve warming

Lewis 10 (James Andrew, Dir. and Sen. Fellow of Tech @ CSIS, PhD @ Chicago U, 6/9/10, http://csis.org/publication/climate-change-and-earth-observation-executive-summary) JPG

Until this year, America’s civil space policies—and the budgets that derive from it—were shaped to a considerable degree by the political imperatives of the past and by the romantic fiction of spaceflight. We believe there is a new imperative—climate change—that should take precedence in our national plans for space and that the goal for space spending in the next decade should be to create a robust and adequate earth observation architecture. There is unequivocal evidence, despite careless mistakes and noisy protests, that the earth’s climate is warming. While the effects and implications of this are subject to speculation, there should be no doubt that the world faces a major challenge. There are important shortfalls in data and analysis needed to manage this challenge. Inadequate data mean that we cannot determine the scope or nature of change in some key areas, such as the extent of Antarctic sea ice. Long-term changes in daily temperature are not well understood, in part because of limited observations of atmospheric changes. An understanding of how some anthropogenic (man-made) influences affect climate change is still incomplete.1 These shortfalls must be remedied, if only to overcome skepticism and doubt.Climate change now occupies a central place on the global political agenda, and the United States should adjust its space policies to reflect this. Assessing and managing climate change will require taking what has largely been a scientific enterprise and “operationalizing” it. Operationalization means creating processes to provide the data and analysis that governments will need if they are to implement policies and regulations to soften the effects of climate change. Operationalization requires the right kind of data and adequate tools for collecting, analyzing, and disseminating that data in ways that inform decisionmaking at many levels of society. Satellites play a central role in assessing climate change because they can provide a consistent global view, better data, and an understanding of change in important but remote areas. Yet there are relatively few climate satellites—a total of 19, many of which are well past their expected service life. Accidents or failures would expose the fragility of the earth observation system.2 We lack all the required sensors and instruments for the kinds of measurement that would make predictions more accurate and solutions more acceptable. Scientists have made do by using weather satellites, which take low-resolution pictures of clouds, forests, and ice caps, but the data these satellites provide are not adequate to the task.Climate change poses a dilemma for space policy. The space programs needed to manage climate change are woefully underfunded. The normal practice is to call uncritically for more money for civil space and its three components—planetary exploration, earth observation, and manned spaceflight. In fact, civil space has been lavishly funded. Since 1989, NASA has received $385 billion, with $189 billion in the last decade.

EMP ! – Satellites Module (2/2)

Warming is real & anthropogenic – causes extinction and outweighs nuclear war
Deibel 7 (Terry L, Professor of IR @ National War College, “Foreign Affairs Strategy: Logic for American Statecraft”, Conclusion: American Foreign Affairs Strategy Today)

Finally, there is one major existential threat to American security (as well as prosperity) of a nonviolent nature, which, though far in the future, demands urgent action. It is the threat of global warming to the stability of the climate upon which all earthly life depends. Scientists worldwide have been observing the gathering of this threat for three decades now, and what was once a mere possibility has passed through probability to near certainty. Indeed not one of more than 900 articles on climate change published in refereed scientific journals from 1993 to 2003 doubted that anthropogenic warming is occurring. “In legitimate scientific circles,” writes Elizabeth Kolbert, “it is virtually impossible to find evidence of disagreement over the fundamentals of global warming.” Evidence from a vast international scientific monitoring effort accumulates almost weekly, as this sample of newspaper reports shows: an international panel predicts “brutal droughts, floods and violent storms across the planet over the next century”; climate change could “literally alter ocean currents, wipe away huge portions of Alpine Snowcaps and aid the spread of cholera and malaria”; “glaciers in the Antarctic and in Greenland are melting much faster than expected, and…worldwide, plants are blooming several days earlier than a decade ago”; “rising sea temperatures have been accompanied by a significant global increase in the most destructive hurricanes”; “NASA scientists have concluded from direct temperature measurements that 2005 was the hottest year on record, with 1998 a close second”; “Earth’s warming climate is estimated to contribute to more than 150,000 deaths and 5 million illnesses each year” as disease spreads; “widespread bleaching from Texas to Trinidad…killed broad swaths of corals” due to a 2-degree rise in sea temperatures. “The world is slowly disintegrating,” concluded Inuit hunter Noah Metuq, who lives 30 miles from the Arctic Circle. “They call it climate change…but we just call it breaking up.” From the founding of the first cities some 6,000 years ago until the beginning of the industrial revolution, carbon dioxide levels in the atmosphere remained relatively constant at about 280 parts per million (ppm). At present they are accelerating toward 400 ppm, and by 2050 they will reach 500 ppm, about double pre-industrial levels. Unfortunately, atmospheric CO2 lasts about a century, so there is no way immediately to reduce levels, only to slow their increase, we are thus in for significant global warming; the only debate is how much and how serious the effects will be. As the newspaper stories quoted above show, we are already experiencing the effects of 1-2 degree warming in more violent storms, spread of disease, mass die offs of plants and animals, species extinction, and threatened inundation of low-lying countries like the Pacific nation of Kiribati and the Netherlands at a warming of 5 degrees or less the Greenland and West Antarctic ice sheets could disintegrate, leading to a sea level of rise of 20 feet that would cover North Carolina’s outer banks, swamp the southern third of Florida, and inundate Manhattan up to the middle of Greenwich Village. Another catastrophic effect would be the collapse of the Atlantic thermohaline circulation that keeps the winter weather in Europe far warmer than its latitude would otherwise allow. Economist William Cline once estimated the damage to the United States alone from moderate levels of warming at 1-6 percent of GDP annually; severe warming could cost 13-26 percent of GDP. But the most frightening scenario is runaway greenhouse warming, based on positive feedback from the buildup of water vapor in the atmosphere that is both caused by and causes hotter surface temperatures. Past ice age transitions, associated with only 5-10 degree changes in average global temperatures, took place in just decades, even though no one was then pouring ever-increasing amounts of carbon into the atmosphere. Faced with this specter, the best one can conclude is that “humankind’s continuing enhancement of the natural greenhouse effect is akin to playing Russian roulette with the earth’s climate and humanity’s life support system. At worst, says physics professor Marty Hoffert of New York University, “we’re just going to burn everything up; we’re going to heat the atmosphere to the temperature it was in the Cretaceous when there were crocodiles at the poles, and then everything will collapse.” During the Cold War, astronomer Carl Sagan popularized a theory of nuclear winter to describe how a thermonuclear war between the Untied States and the Soviet Union would not only destroy both countries but possibly end life on this planet. Global warming is the post-Cold War era’s equivalent of nuclear winter at least as serious and considerably better supported scientifically. Over the long run it puts dangers from terrorism and traditional military challenges to shame. It is a threat not only to the security and prosperity to the United States, but potentially to the continued existence of life on this planet.

EMP ! – Sats Impacts – Heg & Econ

Satellites are key to hegemony and the economy

Dickens 10 (Peter, Affiliated Lecturer in the Department of Sociology, Faculty of Politics, Psychology, Sociology and International Studies , University of Cambridge, "The Humanization of the Cosmos—To What End?," [https://monthlyreview.org/2010/11/01/the-humanization-of-the-cosmos-to-what-end] AD: 6-29-11, jam)

Society is increasingly humanizing the cosmos. Satellites have for some time been central to the flow of information, to surveillance, and to the conduct of warfare. As these examples suggest, however, the humanization of the cosmos is primarily benefiting the powerful. These include major economic and military institutions. Furthermore, the forthcoming commodification and colonization of the cosmos is again likely to enhance the interests of the powerful, the major aerospace companies in particular. The time has come to consider alternative forms of cosmic humanization. These would enhance the prospects of the socially marginalized. They would also allow humanity to develop a better understanding of the cosmos and our relationship to it.1 Humanizing Outer Space The 1969 Apollo 11 moon landing is often seen as the high point of society’s relationship with outer space. Nothing quite so dramatic or exotic seems to have happened in outer space since. But nearby, parts of the solar system (including the moon, some asteroids, and Mars) are now being routinely circled and explored and analyzed by robots. Furthermore, President Obama has recently made important announcements regarding a new U.S. space program that involves manned missions to Mars by the mid-2030s. But the NASA-based Constellation program to the moon and Mars has been cancelled. Instead, NASA will undertake a long-term research and development program aimed at supporting future forms of propulsion and exploration programs. Even more significant in the short-term is a proposed $25 billion being allocated to NASA to kick-start commercial manned spaceflight over the next five years. New forms of transport to the International Space Station will be funded, this time using innovative forms of “space taxis” designed by private sector space companies.2 These plans entail new relations between the private and public sectors in the United States. Meanwhile, a presence in outer space is being developed by other societies. This is partly because such a presence is seen as an important symbol of modernization, progress, and social unity. The Indian government has announced a manned mission to the moon in 2013, the European Space Agency envisages projects to the moon and beyond, and the Chinese government is planning a similar project for 2020. This last development has caused some consternation over Obama’s plans. One suggestion is that the United States may after all be the next to send manned missions to the moon, because China’s space project is seen by some as a military threat that needs forestalling.3 Yet among these plans and proposals, it is easy to forget that outer space is already being increasingly humanized. It has now been made an integral part of the way global capitalist society is organized and extended. Satellites, for example, are extremely important elements of contemporary communications systems. These have enabled an increasing number of people to become part of the labor market. Teleworking is the best known example. Satellite-based communications have also facilitated new forms of consumption such as teleshopping. Without satellite-based communications, the global economy in its present form would grind to a halt. Satellites have also been made central to modern warfare. Combined with pilotless Predator drones, they are now being used to observe and attack Taliban and Al-Qaida operatives in Afghanistan and elsewhere. This action is done by remote control from Creech Air Force Base at Indian Springs, Nevada. The 1980s Strategic Defense Initiative, or “Star Wars” program, aimed to intercept incoming missiles while facilitating devastating attacks on supposed enemies. A version of the program is still being developed, with the citizens of the Czech Republic and Poland now under pressure to accept parts of a U.S.-designed “missile defense shield.” This is part of a wider strategy of “Full Spectrum Dominance,” which has for some time been official U.S. Defense Policy.4 Using surveillance and military equipment located in outer space is now seen as the prime means of protecting U.S. economic and military assets both on Earth and in outer space.

Economic collapse causes nuclear war.

Mead 92 (Walter Russell, James Clarke Chace Professor of Foreign Affairs and Humanities at Bard College, *New Perspectives Quarterly*, Summer, jam)

If so, this new failure—the failure to develop an international system to hedge against the possibility of worldwide depression—will open their eyes to their folly. Hundreds of millions—billions—of people around the world have pinned their hopes on the international market economy. They and their leaders have embraced market principles—and drawn closer to the West—because they believe that our system can work for them. But what if it can’t? What if the global economy stagnates—or even shrinks? In that case, we will face a new period of international conflict: South against North, rich against poor. Russia, China, India—these countries with their billions of people and their nuclear weapons will pose a much greater danger to world order than Germany and Japan did in the ‘30s.

EMP ! – Sats Impacts – Heg & Econ

Heg collapse causes nuclear war

Khalilzad 95 (Zalmay, Ambassador to the U.N., Spring, *The Washington Quarterly*, “Losing the Moment? The United States and the World After the Cold War,” jam)

Under the third option, the United States would seek to retain global leadership and to preclude the rise of a global rival or a return to multipolarity for the indefinite future. On balance, this is the best long-term guiding principle and vision. Such a vision is desirable not as an end in itself, but because a world in which the United States exercises leadership would have tremendous advantages. First, the global environment would be more open and more receptive to American values -- democracy, free markets, and the rule of law. Second, such a world would have a better chance of dealing cooperatively with the world’s major problems, such as nuclear proliferation, threats of regional hegemony by renegade states, and low-level conflicts. Finally, U.S. leadership would help preclude the rise of another hostile global rival, enabling the United States and the world to avoid another global cold or hot war and all the attendant dangers, including a global nuclear exchange. U.S. leadership would therefore be more conducive to global stability than a bipolar or a multipolar balance of power system.

EMP ! – Hegemony

EMP kills hegemony

Schneider 8 (Mark, National Institute for Public Policy, “The Future of the U.S. nuclear deterrent,” Comparative Strategy 27.4, July, EBSCO)

Why can’t the United States deter WMD (nuclear, chemical, biological) attack with conventional weapons? The short answer is that conventional weapons can’t deter a WMD attack because of their minuscule destructiveness compared with WMD, which are thousands to millions of times as lethal as conventional weapons. Existing WMD can kill millions to hundreds of millions of people in an hour, and there are national leaders who would use them against us if all they had to fear was a conventional response. The threat of nuclear electromagnetic pulse (EMP) attack, as assessed by a Congressional Commission in 2004, is so severe that one or at most a handful of EMP attacks could demolish industrial civilization in the United States.3 The view that conventional weapons can replace nuclear weapons in deterrence or warfighting against a state using WMD is not technically supportable. Precision-guided conventional weapons are fine substitutes for non-precision weapons, but they do not remotely possess the lethality of WMD warheads. Moreover, their effectiveness in some cases can be seriously degraded by counter-measures and they clearly are not effective against most hard and deeply buried facilities that are associated with WMD threats and national leadership protection. If deterrence of WMD attack fails, conventional weapons are unlikely to terminate adversary WMD attacks upon us and our allies or to deter escalation. Are there actual existing threats to the survival of the United States? The answer is unquestionably “yes.” Both Russia and China have the nuclear potential to destroy the United States (and our allies) and are modernizing their forces with the objective of targeting the United States.4 China is also increasing the number of its nuclear weapons.5 Russia is moving away from democracy, and China remains a Communist dictatorship. A number of hostile dictatorships—North Korea, Iran, and possibly Syria—have or are developing longer-range missiles, as well as chemical, biological, and nuclear weapons.6 They already have the ability to launch devastating WMD attacks against our allies and our forward deployed forces, and in time may acquire capabilities against the United States. Iran will probably have nuclear weapons within approximately 2 to 5 years.7

EMP ! – General – Biological Weapons Module

EMP kills millions, causes economic collapses, and invites biological weapon attacks

Naegele 10 (Tim, ret. Capt in US Army, counsel to the U.S. Senate Banking Committee, Law degrees @ Berkely and Georgetown, 1/19/10, http://seekingalpha.com/instablog/522421-timothy-d-naegele/44369-emp-attack-only-30-million-americans-survive) JPG

Launched from a barge off the U.S. coast, an EMP attack consisting of one nuclear warhead attached to a single missile might shut down much of the country and kill all except 30 million Americans.[2] Such an attack has been described as “a ‘giant continental time machine’ that would move us back more than a century in technology to the late 1800s”—and effectively destroy our great nation.[3] Yet, President Obama seems oblivious to this fact, and is doing nothing to protect us from perhaps the greatest threat faced by the United States.[4][5] Reporting to Congress, an EMP commission concluded that little in the private sector is hardened to withstand such an attack, and the American military has only limited protection. According to a Wall Street Journal editorial, “China and Russia have the capability to launch an EMP weapon—and have let us know it.”[6] However, imagine if such a weapon falls into the hands of al-Qaeda or other terrorists who are willing to commit suicide to destroy America. What has really scared the commission members is a relatively unsophisticated EMP weapon in the hands of these terrorists. As frightening as such a possibility seems, it is very real and likely unless we take action now. According to the Journal’s editorial, “Mother of All Blackouts,” an EMP or “Electromagnetic Pulse” attack occurs “when an enemy sets off a nuclear explosion high in the Earth's atmosphere. The electromagnetic pulse generated by the blast destroys the electronics and satellites in its field of vision. For a detonation above the Midwest, that could mean the entire continental U.S.”[7] The editorial continues: No American would necessarily die in the initial attack, but what comes next is potentially catastrophic. The pulse would wipe out most electronics and telecommunications, including the power grid. Millions could die for want of modern medical care or even of starvation since farmers wouldn't be able to harvest crops and distributors wouldn't be able to get food to supermarkets. The editorial adds: “[I]magine a blackout that lasts for months, or years.” Also, “[a]fter an EMP assault, the nation would be highly vulnerable to secondary attack by conventional forces or a biological weapon.”[8]

Bioweapons cause extinction

Ochs 2 [Richard, MA in Natural Resource Management @ Rutgers, Jun 9, http://www.freefromterror.net/other\_articles/abolish.html]

Of all the weapons of mass destruction, the genetically engineered biological weapons, many without a known cure or vaccine, are an extreme danger to the continued survival of life on earth. Any perceived military value or deterrence pales in comparison to the great risk these weapons pose just sitting in vials in laboratories. While a "nuclear winter," resulting from a massive exchange of nuclear weapons, could also kill off most of life on earth and severely compromise the health of future generations, they are easier to control. Biological weapons, on the other hand, can get out of control very easily, as the recent anthrax attacks has demonstrated. There is no way to guarantee the security of these doomsday weapons because very tiny amounts can be stolen or accidentally released and then grow or be grown to horrendous proportions. The Black Death of the Middle Ages would be small in comparison to the potential damage bioweapons could cause. Abolition of chemical weapons is less of a priority because, while they can also kill millions of people outright, their persistence in the environment would be less than nuclear or biological agents or more localized. Hence, chemical weapons would have a lesser effect on future generations of innocent people and the natural environment. Like the Holocaust, once a localized chemical extermination is over, it is over. With nuclear and biological weapons, the killing will probably never end. Radioactive elements last tens of thousands of years and will keep causing cancers virtually forever. Potentially worse than that, bio-engineered agents by the hundreds with no known cure could wreck even greater calamity on the human race than could persistent radiation. AIDS and ebola viruses are just a small example of recently emerging plagues with no known cure or vaccine. Can we imagine hundreds of such plagues? HUMAN EXTINCTION IS NOW POSSIBLE. Ironically, the Bush administration has just changed the U.S. nuclear doctrine to allow nuclear retaliation against threats upon allies by conventional weapons. The past doctrine allowed such use only as a last resort when our nation’s survival was at stake. Will the new policy also allow easier use of US bioweapons? How slippery is this slope? Against this tendency can be posed a rational alternative policy. To preclude possibilities of human extinction, "patriotism" needs to be redefined to make humanity’s survival primary and absolute. Even if we lose our cherished freedom, our sovereignty, our government or ourConstitution, where there is life, there is hope. What good is anything else if humanity is extinguished? This concept should be promoted to the center of national debate.. For example, for sake of argument, suppose the ancient Israelites developed defensive bioweapons of mass destruction when they were enslaved by Egypt. Then suppose these weapons were released by design or accident and wiped everybody out? As bad as slavery is, extinction is worse. Our generation, our century, our epoch needs to take the long view. We truly hold in our hands the precious gift of all future life. Empires may come and go, but who are the honored custodians of life on earth? Temporal politicians? Corporate competitors? Strategic brinksmen? Military gamers? Inflated egos dripping with testosterone? How can any sane person believe that national sovereignty is more important than survival of the species? Now that extinction is possible, our slogan should be "Where there is life, there is hope." No government, no economic system, no national pride, no religion, no political system can be placed above human survival. The egos of leaders must not blind us. The adrenaline and vengeance of a fight must not blind us. The game is over. If patriotism would extinguish humanity, then patriotism is the highest of all crimes

EMP ! – General

EMP kills millions – its impacts on infrastructure are irreversible

Carafano 9 (James, senior research fellow for national security @ Heritage, 7/27/9,

http://washingtonexaminer.com/op-eds/2009/07/james-carafano-emp-attack-thinking-unthinkable) JPG

Last year, a congressional commission studied how a high-altitude EMP strike would affect the nation's infrastructure. The answer was simple: It would be devastating. The entire U.S. electrical grid might be gone and all the instruments of daily life that depend on electrical power useless. Life in United States, concluded the commission's chair, scientist William Graham, "would be a lot like life in the 1800s," except with a significantly bigger population. Just keeping modern-day America fed would be virtually impossible without working transportation or communications systems. Water pumping and sewage treatment plants would be off-line. Modern medical care would be virtually non-existent. Even if the rest of the world mustered the largest humanitarian mission in human history, the suffering would be unprecedented. EMP attacks are often thought off of as attacks against the U.S. infrastructure. But the truth is a large-scale EMP attack would be an instrument of genocide. Shockingly, some dismiss the threat out of hand. Michael Crowley, writing in The New Republic, dismissed the "Newt Bomb" as science fiction. That seems a real stretch, especially given the report handed to Congress.

EMPs turn the case – causes the power-delivery system to fail

Butt 10 (Yousaf, staff scientist @ Center for Astrophysics @ Harvard, PhD in experimental nuclear astrophysics from Yale, 1/25/10, http://www.thespacereview.com/article/1549/2) JPG

In particular, lower-yield weapons—such as those feared by EMP commission from small adversarial states and/or, possibly, terrorists cells—will have a substantially smaller E3 component than the megaton yield weapons simply because of the size of their ionized fireball is much smaller. This means that the effect of smaller (~kiloton) weapons on long-line power and telephone cables, which couple most effectively to E3, will also be much less than in the megaton cases; however, the E1 fields from such weapons may still be sufficient to disrupt and/or destroy the electronic controls of the power-delivery systems, as well as computers, Blackberrys, cell phones, etc., located within or close to the peak-field region.

EMP ! – General

EMPs are the biggest threat to national security – collapse the economy

Vergano 10 (Dan, writer @ USA Today, 10/27/10, http://www.usatoday.com/tech/science/2010-10-26-emp\_N.htm) JPG

The sky erupts. Cities darken, food spoils and homes fall silent. Civilization collapses. End-of-the-world novel? A video game? Or could such a scenario loom in America's future? There is talk of catastrophe ahead, depending on whom you believe, because of the threat of an electromagnetic pulse triggered by either a supersized solar storm or terrorist A-bomb, both capable of disabling the electric grid that powers modern life. Electromagnetic pulses (EMP) are oversized outbursts of atmospheric electricity. Whether powered by geomagnetic storms or by nuclear blasts, their resultant intense magnetic fields can induce ground currents strong enough to burn out power lines and electrical equipment across state lines. The threat has even become political fodder, drawing warnings from former House speaker Newt Gingrich, a likely presidential contender. "We are not today hardened against this," he told a Heritage Foundation audience last year. "It is an enormous catastrophic threat." Meanwhile, in Congress, a "Grid Act" bill aimed at the threat awaits Senate action, having passed in the House of Representatives. Fear is evident. With the sun's 11-year solar cycle ramping up for its stormy maximum in 2012, and nuclear concerns swirling about Iran and North Korea, a drumbeat of reports and blue-ribbon panels center on electromagnetic pulse scenarios. "We're taking this seriously," says Ed Legge of the Edison Electric Institute in Washington, which represents utilities. He points to a North American Electric Reliability Corp. (NERC) report in June, conducted with the Energy Department, that found pulse threats to the grid "may be much greater than anticipated." There are "some important reasons for concern," says physicist Yousaf Butt of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. "But there is also a lot of fluff." At risk are the more than 200,000 miles of high-voltage transmission lines that cross North America, supplying 1,800 utilities the power for TVs, lights, refrigerators and air conditioners in homes, and for the businesses, hospitals and police stations that take care of us all. "The electric grid's vulnerability to cyber and to other attacks is one of the single greatest threats to our national security," Rep. Ed Markey, D-Mass., said in June as he introduced the bill to the House of Representatives. Markey and others point to the August 2003 blackout that struck states from Michigan to Massachusetts, and southeastern Canada, as a sign of the grid's vulnerability. Triggered by high-voltage lines stretched by heat until they sagged onto overgrown tree branches, the two-day blackout shut down 100 power plants, cut juice to about 55 million people and cost $6 billion, says the 2004 U.S.-Canada Power System Outage Task Force.

EMP ! – General

EMP collapses America’s economy and kills hundreds of millions

Gaines 9 (Kathryn, journalism and philosophy @ Washingtion U, St. Louis, 6/29/9, http://www.humanevents.com/article.php?id=32480) JPG

An electromagnetic pulse (EMP) attack is as instantaneous as an atomic bomb blast. It moves like a wall of energy overloading, and destroying all computer based technology. Such an attack would shut down the power grid.  Air traffic would be grounded, telephone, internet and other communications would be shut down. America would be reduced to the agricultural economy we had in the 1800s.  Despite having developed the technology to protect our infrastructure in the event of an EMP attack, this technology has not been integrated into our infrastructure – our infrastructure has not been hardened: backed up by non-computerized components yet. EMP is not a sci-fi *War of the Worlds* theory. EMP is a legitimate weapon, and a legitimate threat to the security of our nation. Brief analysis shows that our computerized, electronically-dependent society offers any rogue nation a perfect target: an EMP-vulnerable power grid susceptible of a sucker punch to the heart of our infrastructure. On the floor of the House, Rep. Roscoe Barlett (R-Md) recounted a story of a Russian, who, prior to the G-8 meeting said “If we really wanted to hurt you, with no fear of retaliation, we'd launch an SLBM, submarine launch missile. We wouldn't know where it came from; it came from the sea. And we'd detonate a nuclear weapon high above your country, and it would shut down your power grid and your communications for 6 months or so.” Our enemies are well aware of what an EMP attack is, and just what precisely it would do. The incentive to attack America through EMP is high because the cost to America would be catastrophic. As the 2004 commission report said “The current vulnerability of our critical infrastructures can both invite and reward attack if not corrected. Correction is feasible and well within the Nation's means and resources to accomplish.” Our electric grid systems, communication networks, financial system, fuel/energy infrastructure, transportation infrastructure, food infrastructure, and most importantly water supply would be corrupted to an un-workable extent in the event of an attack, because we have yet to make the vital corrections. If America were hit with an EMP over the course of one year 90% of Americans would be dead. America would be reduced to third world status.

EMP ! – Helpers

EMPs create a damage radius of hundreds of miles – kills the economy

SPG 7 (Sage Policy Group, 9/10/7, http://www.survive-emp.com/fileadmin/White-Papers/EMP-Resources/EMP-Econ-Study.pdf) JPG

Various government reports, such as the one by the US Congressional EMP Commission and the Congressional Research Service, have confirmed the growing likelihood of EMP events of various kinds. These reports and related Congressional testimony support the contention that relatively available and inexpensive SCUD type missiles are capable of carrying the required payload that could be launched from a small ship 200 or more miles off the East Coast of the United States and detonated between thirty and eighty miles high. Any EMP-inflicted damage delivered from this altitude would extend out hundreds of miles beyond the region considered in this study, significantly complicating the recovery process and the restoration of economic activity while producing economic consequences roughly ten times greater than those impacting the Baltimore-Washington- Richmond region.

EMP makes recovery impossible – shuts down communication

SPG 7 (Sage Policy Group, 9/10/7, http://www.survive-emp.com/fileadmin/White-Papers/EMP-Resources/EMP-Econ-Study.pdf) JPG

The discussion above assumes a fairly orderly effort to restore economic capacity. It is certainly possible that chaos would complicate the restoration process, at least during early stages. Disaster response is highly dependent on communications and coordination, but EMP would likely destroy the telecommunications system or at least render it unreliable. Unlike hurricanes and other natural disasters, there is no reason to believe that EMP could be anticipated. Thus, opportunities to pre-position materials and supplies may not exist for EMP. There is also at least some historic precedence for civil disorder when electric power systems fail. A lightning strike on July 13, 1977, led to a blackout in New York City and citywide looting and disorder, including arson. The economic impact estimates above are based on the primary impacts of EMP on the electrical system and electrical and electronic infrastructure. No consideration is given to secondary or tertiary impacts. For example, overloaded electrical circuits can give rise to fires. Under any circumstance, firefighting after EMP could be difficult as the lack of power to maintain water pressure could severely limit firefighting efforts. Disabled telecommunications systems would cripple the ability of police or other emergency personnel to respond. Widespread damage to computer and electronic equipment would presumably result in the loss of substantial quantities of electronically stored data. At a minimum, these lost data would be a temporary inconvenience, but could also be a significant source of long-term economic loss.

The timeframe is immediate – no infrastructure is protected

Martin 8 (Stephen, President of the Philemon Foundation, 11/30/8, http://www.counterpunch.org/smartin11282008.html) JPG

Images of Lehman Bros office buildings being ‘evacuated’, and shocked employees leaving carrying boxes,  played around the world. The shock precipitated was indeed immense, and further exacerbated mistrust between Financial Institutions unprecedented. Here today, gone tomorrow. No one knew exactly how bad their own books were, let alone how bad that of their competitors. Correspondingly, no one wanted to lend. In course of just three days, the London Interchange Bank Office Rate (LIBOR) doubled; it’s biggest jump in at least seven years. Share prices tumbled further.  In parallel terms the EMP pulse (timed in billionths of a second, much more rapid than lightning) can render unshielded electrical equipment inoperative. In financial warfare parallel, EMP as a consideration is as aspect of ‘shock and awe’, destroying trust, destroying confidence - with just as devastating results concerning functional operability, and the extension of damage collateral – few of us being ‘shielded’.

Modern tech is extremely susceptible

Butt 10 (Yousaf, staff scientist @ Center for Astrophysics @ Harvard, PhD in experimental nuclear astrophysics from Yale, 1/25/10, http://www.thespacereview.com/article/1549/2) JPG

The advent of modern solid-state circuitry (ICs) as compared to the vacuum-tube technology of 1962, has dramatically increased the susceptibility of electronic equipment to the E1 pulse. Modern ICs are about a million times more sensitive to prompt E1 pulses than the early-1960s era electronics.

EMP ! – Grid Failure

EMPs cause cascading grid failure

Butt 10 (Yousaf, staff scientist @ Center for Astrophysics @ Harvard, PhD in experimental nuclear astrophysics from Yale, 1/25/10, http://www.thespacereview.com/article/1549/2) JPG

Electronic control systems are effectively, according to the EMP commission, the Achilles’ heel of our power delivery network. While it is uncertain what the exact implications of losing such control systems would be on the major hardware (e.g. transformers, turbines, etc.), it is best to be prudent and assume substantial damage may result, at least in the peak E1 field region, for a large nuclear device. (The spatial extent of this peak-field region, for the types of the threats most feared by the EMP commission, see Fig 1.) Outside the region exposed to a substantial E1 pulse cascading grid failure may well occur, but since the associated hardware damage would not be expected there, it would reasonable to assume that that portion of the grid could be resuscitated after a short outage.

Collapse of the power grid kills the global economy

Whitman 7 (Christine Todd, writer @ Business Week, 9/17/7, http://www.businessweek.com/magazine/content/07\_38/b4050098.htm) JPG

The cost of failing to meet these needs will be steep. The global economy relies on world-class power grids to trade stocks, to communicate instantly, and to buy and sell around the clock. If anything points to the frustrating effect that a failed power grid can have on profits, it's the San Francisco power outage that took down Silicon Valley enterprises like Craigslist and Netflix (NFLX ) in July. Although it only cost them two hours of online business, that minor power blip illustrates how a lack of electricity can render even a tech-savvy company impotent.

\*\*HEU Trade-Off D/A

HEU – 1NC

There’s just enough highly enriched uranium for medical isotope protection – increased demand forces shortages

Johnston 10 (Hamish, editor @ physicsworld.com, 12/3/10, http://physicsworld.com/cws/article/news/44527) JPG

Currently, all of the world's nine major isotope-producing reactors are running – one each in Canada, South Africa, Australia and Argentina and five in Europe. However, the HLG-MR report cautions that shortages could be expected as demand continues to grow, some reactors are shut down and constraints remain on regional processing capacity. Molybdenum-99 has a half-life of 66 h, which is not long enough for the isotope to be stockpiled. It is produced by irradiating a target containing uranium-235 inside a nuclear reactor. The molybdenum-99 is then extracted from the target in a processing facility. The uranium targets cannot be transported by air, which means that processing should be located less than 1000 km from the reactor. There are currently six major processing centres worldwide – all near major reactors. The report points out that the processing capacity in some regions is not enough to support increased target irradiation in those locales. Indeed, during a recent global isotope shortage, reactors in Europe could not crank out targets at full capacity due to a lack of processing facilities. As a result, the HLG-MR recommends that production and processing capacities should be coordinated on a regional level.

No Space nuclear reactors are set to launch now – plan shifts HEUs from other priorities

Kuperman 11 (Alan, Assoc. Prof of Global Policy Studies @ U Texas, 4/22/11, http://www.heuphaseout.org/wp-content/uploads/2011/04/Messer.pdf) JPG

No SNR projects have been launched since 1988, nor are any being seriously considered for the near future in the U.S. or elsewhere. Right now policymakers have a unique opportunity to set SNR policy to align with the international norm of HEU phase-out both in the U.S. and internationally. Policy changes will become much more politically and financially costly once governments start seriously considering SNR projects again. SNRs are not yet the highest priority for the HEU phase-out mission, but the use of HEU in SNRs is still a real proliferation concern. Even if SNRs can be relied on to safely launch, operate, and retire in outer space, the substantive policy issue is that HEU phase-out must be nondiscriminatory to be successful. Non-weapon states will have stronger diplomatic grounds to resist global nonproliferation norms if the weapon states fail to reinforce them concretely and by example. Seemingly benign exceptions could compromise the global phase-out of HEU. In short, security policies that are not adopted domestically will be difficult to push internationally. There are also domestic political barriers to eliminating HEU from use in SNRs. SNRs present the most sophisticated technical challenge to the global HEU phase-out mission because HEU’s high energy density and low radioactivity make it a uniquely attractive fuel for space power and propulsion. Further, the tenuous nature of Congressional commitments to space exploration and research makes government scientists resistant to policy mandates that increase the funding or time required to bring projects to completion. Both factors can make a project vulnerable to discretionary spending cuts in the Congressional budget process. HEU also has tradition on its side, because all SNRs ever launched (35 by the Soviet Union and one by the United States) have used weapons-grade HEU (90% enriched or higher) as reactor fuel.1 Policy solutions that phase out HEU from use in SNRs could be expensive and therefore provoke resistance from government researchers and scientists, especially mandates that would require the use of LEU. The higher mass of uranium associated with any conversion from HEU to LEU would increase the cost of space reactors more than any other application due to the premium on minimizing weight for space research projects.

HEU – 1NC

Stable supply of medical isotopes prevents mass heart disease and cancer deaths – diagnoses 200,000 deadly illnesses each day

Ruth et. al. No Date (Thomas – Senior Research Scientist, TRIUMF and BC Cancer Agency, http://www.triumf.ca/chemistry/chemistry-medical-isotopes) JPG

Around the world each day, doctors use radiochemistry and medical isotopes for several hundred thousand patients to diagnose illness and study disease. Heart disease and cancer are the leading causes of death for North Americans, so early and accurate diagnoses can help tremendously in mitigating the impact of these common killers both on the individual and on the costs to society. So how does radiochemistry fit into the healthcare system? In a sense, the field of "medicine using radiation for imaging and/or treatment" (now called nuclear medicine) had its start with the discovery of radioactivity by Henri Becquerel in Paris in 1896. Becquerel had accidentally left photographic plates used for X-rays in a drawer next to some natural Uranium salts and discovered they were highly exposed a week later . It was later realized that this exposure was due to "alpha particles" (α) emitted in the radioactive decay of the Uranium and detected by the photographic plates. Of the common forms of radioactivity, α-decay (the nuclei of He atoms), β-decay (e+ or e-) and γ-decay (from nuclear excited states), it is only the β/γ- decay sequence that is presently important in nuclear imaging techniques, since it is only γ-rays that are penetrating enough to be detected outside the body. In the future, the use of alpha emitters internally for therapeutic applications could also be important. Every organ in our body acts differently from a chemical point of view. Each organ also has its own biochemical specificity which provides the basis for various radioisotopes to be incorporated into biologically active molecules to create '"radio-pharmaceuticals" --- targeted drugs which will preferentially be used by certain organs in the body or certain chemical pathways in the body. To be of use for imaging, the radioisotope that is attached to the pharmaceutical (thereby "labeling it") must satisfy two important criteria: (1) Its half-life must be long enough for easy handling but not too long to leave residual activity in the patient; and, (2) Its emitted γ-decay energy must be high enough to be easily detected outside the body, but not too high as to overpower the imaging camera. The main radioisotope that matches these requirements almost perfectly is Technetium-99m (Tc-99m, where "m" means "metastable"), with a half-life of 6 hrs and a γ energy of 140 keV (kilo-electron volts). It is for these reasons that something like 80% of all nuclear medicine procedures utilize Tc-99m world wide, which translates into something like 200,000 procedures every day. Tc-99m has traditionally been made available from the β-decay of Molybdenum-99 (Mo-99), half-life of 66 hours, from a "generator" or "cow," a concept that was developed in the late 1950s by scientists at Brookhaven National Laboratory in New York. The Mo-99 parent is usually produced from a nuclear reactor in one of two ways: either from thermal neutron capture on stable Mo-98 in an (n, γ) reaction, or from neutron-induced fission of Uranium-235, the latter being the basis of most commercially produced Tc-99m. The fission yield of Mo-99 is much higher and can give specific activities of >5000 Ci/g (Curies/g where 1 Ci= 3.7 x 10^10 disintegrations per second). Another key aspect of this generator concept is in the loading of an ion-exchange column with Mo-99 as a molybdate ion (Na2MoO4) in solution, where it is held securely. Following a decay period to allow growth of the Tc-99m daughter, a saline solution is used to rinse the column, specifically releasing the Tc-99m where it is available for preparing the requisite radiopharmaceutical. This process can be repeated many times as the Tc-99m is again built up from Mo-99 decay after milking." Typically a Mo-99/Tc-99m generator is used for about a week with daily elutions before it is necessary to reload the column. For decades radio-chemists have worked to develop better approaches for attaching the Tc-99m to organ-specific radiopharmacueticals in order to facilitate the utility of nuclear imaging in diagnosing disease. This important contribution to the field of medicine, resulting from the synergistic overlap of the disciplines of biology, radiochemistry, nuclear physics and engineering, has functioned smoothly for half a century now, relying on the relatively inexpensive and reliable supply of Mo-99.

HEU – Uq

Worldwide shortage of medical isotopes coming now – causes doctors to delay treatments

Ponto and Guiberteau 9 (James – M.S., B.N.C.P @ University of Iowa & Milton J – M.D. @ University of Texas Medical School, June 2009, http://www.rsna.org/Publications/rsnanews/June-2009/Medical\_Isotope\_feature.cfm) JPG

A combination of factors must be addressed in order to solve an ongoing, worldwide medical isotope shortage, according to nuclear medicine physicians and radiation oncologists who are being forced to delay or cancel elective—and occasionally even emergency— procedures. Those factors include a virtual halt in U.S. production of medical isotopes, the aging of international reactors with no replacements planned and concerns about the use of highly enriched uranium (HEU) in light of terrorism. "It takes a nuclear reactor to make the medical isotopes in the amounts needed," said James Ponto, M.S., B.N.C.P, a clinical professor of pharmacy and chief nuclear pharmacist at the University of Iowa Hospitals and Clinics in Iowa City. "In nuclear medicine, 80 percent of all imaging uses technetium-99m (Tc99m), which is produced from the decay of the radioisotope molybdenum 99 (Mo-99). Nuclear medicine society SNM estimates that at least 80 percent of the nearly 20 million nuclear medicine procedures each year in the U.S. use Tc-99. The medical isotope can be labeled to a variety of substances that localize in various organs and tissues or otherwise act as tracers of biologic function. Common diagnostic imaging procedures include myocardial perfusion imaging for coronary artery disease and bone imaging to detect spread of cancer to the bones. Other procedures include evaluation of diseases of the kidney, liver and biliary system, lungs, brain and gastrointestinal tract. Since Mo-99 decays with a half-life of 66 hours, pharmacies and hospitals can't stockpile it—once it's gone, it's gone. "A shortage is inevitable if nuclear reactors are shut down," said Ponto.

The supply chain of medical isotopes isn’t stable

Ponto and Guiberteau 9 (James – M.S., B.N.C.P @ University of Iowa & Milton J – M.D. @ University of Texas Medical School, June 2009, http://www.rsna.org/Publications/rsnanews/June-2009/Medical\_Isotope\_feature.cfm) JPG

There is no reliable domestic supply of Mo-99, said Homer A. Macapinlac, M.D., a professor and chair of the Department of Nuclear Medicine at the University of Texas M.D. Anderson Cancer Center. Instead, five commercial nuclear reactors—located in Canada, The Netherlands, Belgium, France and South Africa—produce 95 percent of the world's supply. 1990 saw the closure of the last U.S. reactor producing Mo-99. Plans to build a new facility in New Mexico were dismissed due to cost concerns, with the thought that Canada could produce medical isotopes at much lower cost—in fact, two reactors had been operating at Chalk River Laboratories in Canada since 1947 and 1957. The 1947 reactor closed in 1992. The other continues to make medical isotopes today; however, the reactor was shutdown in late May due to a water leak and was not expected to be running again for a month. In 2000, Canada built two new facilities to replace the older ones at Chalk River. Technical issues arose, however, as officials sought to fully commission the new reactors and development was halted in May 2008. "The plan that everyone depended upon went away," said Ponto. "It's scary. It's a very fragile system." Both the remaining Chalk River reactor and the Petten reactor in The Netherlands have been shut down several times in the past year for regular maintenance and emergency repairs. "The reactors in Canada and The Netherlands are 40 to 50 years old, said Milton J. Guiberteau, M.D., a professor of clinical radiology at the University of Texas Medical School in Houston. Dr. Guiberteau chairs the Nuclear Medicine Subcommittee of the RSNA Scientific Program Committee. "The reactors are at the outer limits of their useful lives."

Global medical isotope supply is dwindling – increased demand causes shortages

Kramer 11 (David, MD, specializes in cardiology and internal medicine, February 2011, http://physicstoday.org/resource/1/phtoad/v64/i2/p17\_s1) JPG

Pressure from the US to eliminate all commercial uses of HEU is occurring against a backdrop of severe shortages in the supply of 99Mo in recent years. There are only five reactors in the world—each around 50 years old—producing material for four processors. A prolonged shutdown of one reactor, as occurred for 15 months at Canada’s National Research Universal (NRU) facility, is sufficient to create havoc with nuclear medicine worldwide (see PHYSICS TODAY, May 2008, page 22 ). The NRU routinely produces 30% of the world’s 99Mo, but it’s capable of generating as much as 80% if necessary, says Jill Chitra, senior vice president for quality and regulatory affairs at Nordion, an Ottawa company that purifies and distributes the NRU’s 99Mo. “There is no reactor in the world that can replace NRU’s capacity,” Chitra asserts. The NRU shutdown was followed by the idling of the second largest reactor source, the High Flux Reactor in Petten, the Netherlands, for more than half of 2010 for scheduled maintenance and repairs. Taken together, the NRU and the HFR account for more than half of the global supply. During their outages, two of Nordion’s competitors, Covidien, which processes 99Mo in the Netherlands, and Belgium’s Institute for Radioelements, found research reactors in Poland and the Czech Republic willing to supply some of the lost isotope. Necsa also stepped up its output during the supply crunch, and at times it was the only producer operating, Robertson says.

HEU – Uq

Medical isotope supply is dwindling – stable supply key to diagnostic medicine

Ruth 9 (Thomas J. – senior research scientist @ TRIUMF and senior scientist @ British Columbia Cancer Research Centre, Oct. 2009, http://www.aps.org/units/fps/newsletters/200910/ruth.cfm) JPG

With the most recent shut down of the NRU reactor in Chalk River, Canada, the supply of medical isotopes has dwindled to the point that it is impacting medical diagnoses worldwide. How did we reach a situation with supply so fragile and prospects for solutions so bleak? As with most stories the answer is complex and convoluted. In some respects the medical isotopes community is a victim of its own success. Technetium-99m is the most widely used radionuclide in diagnostic medicine. Its use for imaging human disease has its roots in the US Atomic Energy Commission, the predecessor of today’s Department of Energy. Research at Brookhaven National Laboratory in the early 1960s resulted in the development of the generator for producing Tc-99m. The parent element, molybdenum-99, can be produced through a number of nuclear reactions, but the fission of 235U with thermal neutrons provides for the most efficient, high-yield product with very high specific activity. Six per cent of the fission process results in the production of Mo-99. After it is produced, Mo-99 is sequestered on an inert column matrix to which the decay product, Tc-99m, is loosely bound and can be washed off with saline. With half-lives of 66 hours and 6 hours, respectively, the 99Mo/99mTc pair can be separated repeatedly over a week, with the Tc-99m fraction growing due to radioactive decay of the parent after each separation. Tc-99m is subsequently used for imaging studies such as bone scans or cardiac profusion. These scans are made possible by bonding the Tc-99m to an appropriate radiopharmaceutical that has the in vivo biological activity to be monitored. The gamma camera found in nearly every nuclear medicine department around the world has been designed for high efficiency for the 140 keV gamma ray emissions from the decay of Tc-99m to its ground state. Thus for more than 40 years Tc-99m has been the primary radionuclide used in nuclear medicine. Figure 1 shows a whole-body Tc-99m-based bone scan.

Medical isotope supplies are dwindling – causes procedures to be cancelled – alternatives fail

Ruth 9 (Thomas J. – senior research scientist @ TRIUMF and senior scientist @ British Columbia Cancer Research Centre, Oct. 2009, http://www.aps.org/units/fps/newsletters/200910/ruth.cfm) JPG

With the NRU shut down that left the remaining reactors to try and fill the gap; however the capacity is not there and thus the patient community has been severely affected by these shortages. Many procedures have been delayed or cancelled. While there are some alternatives such as using PET scanning or CT scanning with contrast agents, these measures cannot match the demand. To compound the situation further, the HFR will be off line for at least a month during the August/September 2009 period. In addition, the HFR is due for a major maintenance period lasting six months in early 2010.

Supplies of medical isotopes are finite – its used in 30 million medical imaging procedures

Johnston 10 (Hamish, editor @ physicsworld.com, 12/3/10, http://physicsworld.com/cws/article/news/44527) JPG

Supply shortages of molybdenum-99 could become commonplace over the next decade unless longer-term actions are taken. That is the main conclusion of a report from the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development. Published by the NEA's High-level Group on the Security of Supply of Medical Radioisotopes (HLG-MR), the report points out that more than 90% of the world's molybdenum-99 is produced by just five research reactors. These facilities are all 43–50 years old and two – NRU in Canada and OSIRIS in France – are expected to stop production by 2016. Molybdenum-99 is used to produce technetium-99m, which is used in 30 million medical imaging procedures every year. Technetium-99m is bound into radiopharmaceuticals, which are injected into the body and target specific tissues or biological processes. Technetium-99m decays producing just a gamma ray, which can easily leave the body and be detected. The isotope is well suited for this application because it does not emit harmful charged particles and has a relatively long half-life (6 h) for a gamma emitter. The HLG-MR was set up in April 2009 in the wake of short-term isotope shortages caused by scheduled and unscheduled shutdowns of several reactors worldwide. The most significant disruption occurred in 2009–2010 when a leak put the NRU reactor in Canada out of commission for more than 13 months.

HEU – Uq

Were on the brink – the only isotope supplier in north America is inconsistent

Austen 9 (Ian, writer @ NYT, 7/9/9, http://green.blogs.nytimes.com/2009/07/09/medical-isotope-shortage-looming/) JPG

A leaky Canadian reactor which supplies the United States with about half of its medical isotopes will be shut for much longer than first anticipated. Atomic Energy of Canada, a government-owned reactor maker and operator, said on Wednesday that it will likely take until late this year to repair the device in Chalk River, Ontario. Speaking on a conference call with reporters, Hugh MacDiarmid, the company’s president, did not rule out longer delays. The 52-year-old reactor, which has been plagued with problems in recent years, closed on May 15 after a leak of heavy water, which it uses as a moderator, was discovered. At the time, Atomic Energy estimated that repairs would take three months. The reactor is the only one in North America that produces isotopes used medical imaging and treatments. Sourcing isotopes from other reactors is difficult because Chalk River is the world’s largest isotope maker. Medical isotopes also have a relatively short shelf life, making it impossible to build up stockpiles to cover periods when the reactor is out of order. Some medical imaging and nuclear physics experts have speculated that Chalk River may never reopen, a possibility that Mr. MacDiarmid rejected. In a joint statement, Leona Aglukkaq, Canada’s health minister, and Lisa Raitt, the natural resources minister, said the continued reactor shutdown “will result in a significant shortage of medical isotopes in Canada and in the world this summer.”

Shutdowns of that reactor create critical shortages – cuts off 16 million people in the US alone

USA Today 9 (8/14/9, http://www.usatoday.com/news/health/2009-08-14-isotope-shortage\_N.htm) JPG

The shutdown of a nuclear reactor in Canada has caused a shortage of a radioactive isotope used to detect cancers and heart disease, forcing doctors into costlier procedures that can be less effective and expose patients to more radioactivity. Some 16 million people in the United States — 40,000 patients each day — undergo medical imaging procedures using the isotope, technetium-99. Eighty percent of nuclear medicine scans use it. Ninety-one percent of hospitals, pharmacies and commercial imaging groups that answered a June survey by the Society of Nuclear Medicine said the shortage had affected them. "You already have a vulnerable population with cancer, so it's not trivial," said Dr. Jeffrey Norenberg, who heads the National Association of Nuclear Pharmacies and directs radiopharmaceutical sciences at the University of New Mexico. Technetium-99 is processed from molybdenum-99 and used in body scans for cancer, heart disease or kidney illness. It's combined with a substance to target a specific organ or tumor, then that tracer is injected and a gamma camera looks at the distribution of radioactivity to spot problems. The shortage began with the shutdown of a Canadian nuclear reactor in Chalk River, Ontario, that produces half the U.S. supply of molydenum-99. Technetium-99 must be made daily because it lasts just six to 12 hours. The Canadian reactor and another in the Netherlands produce most of the U.S. and European supply. The Dutch reactor is down for maintenance for several weeks, then will be offline for up to six months next year. "With both of them offline, it's very perilous," Norenberg said. In the meantime, the U.S. is getting a smaller supply from South Africa. Past shutdowns have left similar problems; a month-long shutdown of the Canadian reactor in 2007 created a critical shortage.

Effects the entire globe – its used for 80 % of medical procedures

Zakzouk 9 (Mohamed, Analyst in Industry, Infrastructure and Resources Division in Canadian Govt, 9/1/9, http://www.parl.gc.ca/Content/LOP/researchpublications/prb0904-e.htm) JPG

The shutdown of the NRU reactor has triggered a global shortage in nuclear medical isotopes (mainly molybdenum-99 or Mo-99), which has made the situation particularly problematic from a medical standpoint. Technetium-99m (Tc-99m), which is derived from Mo-99, is used for the vast majority of nuclear medical procedures – primarily cardiac imaging, bone scans to detect cancers, and general organ scans.(13) Introducing radioisotopes into the body (as opposed to external imaging) allows an earlier and more complete diagnosis by tracking the location and movement of the isotopes into diseased tissues. In the case of cancer, radioisotopes can also be used for treatment by emitting energy that kills diseased cells.(14)

HEU – Link

Space propulsion uses highly enriched uranium – trades off with medical isotopes

NTI 9 (Nuclear Threat Initiative, May 2009, http://www.nti.org/db/heu/civilian.html) JPG

There are currently three principal uses of HEU (uranium with the proportion of the U-235 isotope over 20%) in the civilian nuclear sector: in research reactors, for medical isotope production, and as fuel in icebreaker propulsion reactors. In addition, HEU has been used in space propulsion reactors and in nuclear power reactors. The two most widespread uses of HEU are as research reactor fuel and as targets for the production of medical isotopes. While many experts believe that these uses could be replaced with LEU or other alternatives, some countries may be reluctant to agree to further restrictions on civilian HEU that would limit these current activities. [See more on conversion efforts, in "Past and Current Efforts to Reduce Civilian HEU Use"] Although there is no international agreement on banning the use of HEU in future research reactors, no new HEU-fueled civilian research reactors with a power level of more than 1 MW have been built in Western countries since the early 1980s, with the exception of Germany's FRM-II reactor. By contrast, seventeen new research reactors worldwide were built using LEU fuels.

Use of HEU fueled reactors is waning – plan causes a massive spike

NTI 9 (Nuclear Threat Initiative, May 2009, http://www.nti.org/db/heu/civilian.html) JPG

HEU has also been used by the Soviet Union and the United States for space propulsion. Fission reactors (with HEU cores) have been used to power satellites in earth orbit. Such reactors were used extensively during the Cold War by the USSR to power their Radar Ocean Reconnaissance Satellites (RORSATs). Notably, these reactors used 90% enriched HEU fuel. A second-generation TOPAZ reactor was also built (using 96% enriched fuel) and flown by the Soviet Union, although none are currently in operation. Almost all of the HEU material used in these reactors is still in orbit, although the reactors have been shut down. The U.S. also flew one satellite powered by a fission reactor. Interest in HEU-fuelled reactors for satellites appears to have waned.

HEU – Internal – Shortages = Delays

Shortages mean patients don’t get diagnosed

Daily Mail 8 (9/6/8, http://www.dailymail.co.uk/health/article-1052910/Cancer-heart-patients-warned-scan-delays-worldwide-shortage-isotopes.html#ixzz1RfYLxpu9) JPG

Hundreds of patients face delays in diagnosing cancer and other diseases because of a 'severe shortage' of materials needed for scans, experts have warned. A worldwide dearth of medical isotopes used in scans of hearts, bones, kidneys and some cancers will cause delays and cancellations across Britain in the coming weeks. The isotopes are used in more than 80 per cent of routine diagnostic nuclear imaging procedures. Hospitals are receiving less than 50 per cent of expected supplies and this figure is likely to drop even further because three of the five global nuclear reactors supplying them are currently shut down. The way isotopes behave makes them impossible to stockpile. Professor Alan Perkins, honorary secretary at the British Nuclear Medicine Society, said: 'The expected number of people who will be affected is quite difficult to determine. 'But we are certainly talking about hundreds of patients. 'The procedures include cardiac blood flow imaging, bone scanning looking for secondary tumours, lymph node detection in breast cancer, and renal function, which is commonly done in children. 'These patients are going to be facing delays. Clinicians will be addressing the issue on the basis of clinical need.'

HEU – Cancer !

Shortages mean cancer cant be diagnosed

Zakzouk 9 (Mohamed, Analyst in Industry, Infrastructure and Resources Division in Canadian Govt, 9/1/9, http://www.parl.gc.ca/Content/LOP/researchpublications/prb0904-e.htm) JPG

The current shortage limits diagnostic testing (as opposed to therapy), which particularly affects cancer patients, where early and reliable diagnosis is critical.(15) It is estimated that an overall 30% of the global supply is lacking due to the NRU shutdown, with variations across countries and regions. For example, North America, which depends largely on Canada’s Mo-99 supply, is experiencing higher shortages than Europe, where other suppliers are more prevalent.(16) The shortage also varies across Canada, since isotope supplies are managed by the provinces and territories.(17) The cost of a millicurie (a unit of measurement) of Tc-99m has risen from $0.19 to $0.54, which, for example, represents $5 million in added expenditures for Ontario.(18)

Isotopes solve cancer

CBC News 10 (12/23/10, http://www.cbc.ca/news/health/story/2009/05/19/f-medical-isotopes.html) JPG

Modern radiation therapy was pioneered in Canada in 1951 in hospitals in Ontario and Saskatchewan. Cobalt-60 was used in a treatment that allowed medical technicians to target a specific part of the body.The energy given off by medical isotopes is effective at destroying diseased cells. When cancer cells are targeted and destroyed, healthy tissue is left alone.

Cancer is the leading cause of death worldwide

Mulcahy 8 (Nick, writer @ MedScape today, 12/10/8, http://www.medscape.com/viewarticle/585098) JPG

Cancer is projected to become the leading cause of death worldwide in the year 2010, according to a new edition of the World Cancer Report from the International Agency for Research on Cancer. Low- and middle-income countries will experience the impact of higher cancer incidence and death rates more sharply than industrialized countries, according to the report. This news is in contrast with another recent report that shows that cancer incidence and death rates for men and women in the United States continue to decline, as reported by Medscape Oncology. The new report was discussed at an event in Atlanta, Georgia called Conquering Cancer: A Global Effort. Cases of cancer doubled globally between 1975 and 2000, will double again by 2020, and will nearly triple by 2030, says the report. There were an estimated 12 million new cancer diagnoses and more than 7 million deaths worldwide this year. The projected numbers for 2030 are 20 to 26 million new diagnoses and 13 to 17 million deaths. The global community can expect increases of incidence of about 1% each year, with larger increases in China, Russia, and India. According to the report, reasons for the increased rates include adoption of tobacco use and higher-fat diets in less-developed countries, and demographic changes, including a projected population increase of 38% in less-developed countries between 2008 and 2030. "The rapid increase in the global cancer burden represents a real challenge for health systems worldwide. However, there is a clear message of hope: Although cancer is a devastating disease, it is largely preventable. We know that preventive measures, such as tobacco control, reduction in alcohol consumption, increased physical activity, vaccinations for hepatitis B and human papillomavirus, and screening and awareness, could have a great impact on reducing the global cancer burden," said Peter Boyle, PhD, DSc, director of the International Agency for Research on Cancer in a statement.

HEU – A2 – X-Rays Solve

Isotopes are exponentially more effective than X-Rays

CBC News 10 (12/23/10, http://www.cbc.ca/news/health/story/2009/05/19/f-medical-isotopes.html) JPG

Put simply, medical isotopes give off energy that can be detected by imaging equipment. When isotopes are injected into your body, a doctor can — for example — get a clear picture of how your heart is working. The doctor can see whether you're a heart attack waiting to happen. They'll see enough to know whether you should go straight to the hospital for bypass surgery. The isotopes provide far more information than an ultrasound. They make bone scans far more effective than X-rays. In a bone scan, radioactive material is injected into a vein in the arm. The material travels through the bloodstream and eventually settles in the bones. This will give doctors information on cell activity from which they can tell if you have stress factures in your feet or whether the cancer in another part of your body has spread to the bones. Bone scans can detect problems days or even months before X-rays.

HEU – A2 – “Other Isotopes Solve”

Alternative approaches fail

Ruth 9 (Thomas J. – senior research scientist @ TRIUMF and senior scientist @ British Columbia Cancer Research Centre, Oct. 2009, http://www.aps.org/units/fps/newsletters/200910/ruth.cfm) JPG

This medical crisis is clearly a mix of technical and political issues. From this analysis, it appears that there are few viable alternative approaches to the supply of Mo-99 or Tc-99m for widespread distribution. In the meantime, production of research radionuclides has been transferred within the DOE from the Nuclear Energy program to the Nuclear Physics (NP) program. As part of that process NP organized a workshop and assembled an Advisory committee to help them outline a path forward. Obviously the Mo-99 was the elephant in the room because of its overriding consequences to the field of Nuclear Medicine. While no part of the charge to the committee dealt with options for producing Mo-99, the discussions for producing research radionuclides often included possible solutions for Mo-99 including some of the approaches discussed here. The report from NSAC Isotopes report is due to be published during the summer of 2009. With the termination of the Maple project, alternative approaches need to be explored in comparison to the cost of constructing and commissioning a new reactor facility, in particular the possibility of using photon-induced fission of U-238.

Other isotopes don’t solve – cant fill in gaps in US supply

Kramer 11 (David, MD, specializes in cardiology and internal medicine, February 2011, http://physicstoday.org/resource/1/phtoad/v64/i2/p17\_s1) JPG

With a half-life of 66 hours, 99Mo is used in 80% of all nuclear medical procedures. In the US, roughly 16 million patients a year undergo procedures that employ its decay product, metastable technetium-99m. With a six-hour half-life, 99mTc is the preferred radioactive tracer, or imaging agent, in most radiopharmaceuticals that are targeted to particular organs or specific kinds of cells. An imaging technique known as single-photon-emission computed tomography is used to assemble a three-dimensional image from the radiation collected by a rotating gamma camera. Although the US consumes half the world’s output of 99Mo, it has no domestic producer.

Alternatives to this isotope fail

USA Today 9 (8/14/9, http://www.usatoday.com/news/health/2009-08-14-isotope-shortage\_N.htm) JPG

Bone scans checking for the spread of cancer account for the next-highest use of the isotope. An alternative substance for bone scans is not widely available nor is the equipment to use it, Norenberg said. In addition, Medicaid, Medicare and other insurance won't reimburse for it. Graham said no reasonable alternatives exist for a number of studies, such as evaluating kidney function.

HEU – A2 – “You Don’t Use U-238”

Dwindling supply forces use of uranium 238

Ruth 9 (Thomas J. – senior research scientist @ TRIUMF and senior scientist @ British Columbia Cancer Research Centre, Oct. 2009, http://www.aps.org/units/fps/newsletters/200910/ruth.cfm) JPG

In the meantime, production of research radionuclides has been transferred within the DOE from the Nuclear Energy program to the Nuclear Physics (NP) program. As part of that process NP organized a workshop and assembled an Advisory committee to help them outline a path forward. Obviously the Mo-99 was the elephant in the room because of its overriding consequences to the field of Nuclear Medicine. While no part of the charge to the committee dealt with options for producing Mo-99, the discussions for producing research radionuclides often included possible solutions for Mo-99 including some of the approaches discussed here. The report from NSAC Isotopes report is due to be published during the summer of 2009. With the termination of the Maple project, alternative approaches need to be explored in comparison to the cost of constructing and commissioning a new reactor facility, in particular the possibility of using photon-induced fission of U-238.

HEU – A2 – New Facilities

New facilities wont be built – poor business model

Johnston 10 (Hamish, editor @ physicsworld.com, 12/3/10, http://physicsworld.com/cws/article/news/44527) JPG

According to Ronald Cameron, head of the NEA's Nuclear Development Division, many of the industry's woes are related to the fact that the current economic model of production is not sustainable. Molybdenum-99 production began as a sideline for research reactors and as a result many facilities were locked into long-term supply contracts at low prices, he says. In some cases, according to Cameron, the price of the isotopes does not cover the operating cost of the reactor. Indeed, the HLG-MR report says "current economic return on producing molybdenum-99 at the reactor is not sufficient to support the development of new infrastructure for the production of molybdenum-99; a new multi-purpose research reactor has been estimated to cost more than €400m". However, Cameron stresses that new facilities could be cost-effective if they pursued different business models.

\*\*Atmosphere DA

Atmosphere DA (1/2)

Project Orion would destroy the atmosphere

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

The biggest environmental problem associated with Orion is radioactive contamination from a ground launch. The people working on Orion produced some very rosy estimates of atmospheric contamination, roughly 1% of that produced by all atmospheric nuclear testing. Unfortunately, they based these figures on fission-free fusion bombs, a technology that they expected was just around the corner but which turned out not to be. Nuclear fission releases quite a lot of contamination compared to nuclear fusion. Since fusion bombs need a fission bomb to start their explosion, this means that actual nuclear weapons all tend to be fairly dirty. A fission bomb is nearly as dirty as a fusion bomb because most of a fusion bomb's contamination comes from its fission "trigger". The people working on Orion assumed that it would be able to use fusion bombs without a fission trigger, which would be extremely clean. Such a technology did not, however, arrive like they expected it would. This means that their original estimates of Orion contamination were off by an extraordinary amount. The launch of an actual Orion based on fission bombs would involve more than a megaton of fission explosions in the atmosphere, from perhaps 350 fission bombs (many would have an artificially reduced yield, but that doesn't reduce the amount of radioactive plutonium needed for them). While most of the explosions would not be near the ground and thus would not create direct fallout, the radioactive remains of the bombs themselves would be spread across the Earth. The radiation release from this would actually be very high. It was high enough that the US government of the 50s and 60s, which was conducting regular atmospheric nuclear testing, had serious misgivings about the amount of contamination Orion would produce. We are not talking about some stereotypical 90s "tree huggers" here, we are talking about the US government in the 50s and early 60s and even it was willing to concede that there was a limit to the amount of radiation that should be spewed into the atmosphere.

That kills the ozone layer

Garcia et al 8 (Rolando R., Atmospheric Chemistry Division @ National Center for Atmospheric Research (NCAR), Michael J. Mills, Owen B. Toon, Richard P. Turco, and Douglas E. Kinnison, Project Scientists @ NCAR, Apr 7, [www.ncbi.nlm.nih.gov/pmc/articles/PMC2291128/] AD: 7-6-11, jam)

We use a chemistry-climate model and new estimates of smoke produced by fires in contemporary cities to calculate the impact on stratospheric ozone of a regional nuclear war between developing nuclear states involving 100 Hiroshima-size bombs exploded in cities in the northern subtropics. We find column ozone losses in excess of 20% globally, 25–45% at midlatitudes, and 50–70% at northern high latitudes persisting for 5 years, with substantial losses continuing for 5 additional years. Column ozone amounts remain near or <220 Dobson units at all latitudes even after three years, constituting an extratropical “ozone hole.” The resulting increases in UV radiation could impact the biota significantly, including serious consequences for human health. The primary cause for the dramatic and persistent ozone depletion is heating of the stratosphere by smoke, which strongly absorbs solar radiation. The smoke-laden air rises to the upper stratosphere, where removal mechanisms are slow, so that much of the stratosphere is ultimately heated by the localized smoke injections. Higher stratospheric temperatures accelerate catalytic reaction cycles, particularly those of odd-nitrogen, which destroy ozone. In addition, the strong convection created by rising smoke plumes alters the stratospheric circulation, redistributing ozone and the sources of ozone-depleting gases, including N2O and chlorofluorocarbons. The ozone losses predicted here are significantly greater than previous “nuclear winter/UV spring” calculations, which did not adequately represent stratospheric plume rise. Our results point to previously unrecognized mechanisms for stratospheric ozone depletion.

Atmosphere DA (2/2)

Causes extinction

Busman and Belen 9 (Joelle and Cary, The U of Michigan, Department of Geological Sciences, Jan 4, [troubledgalaxydetroyeddreams.blogspot.com/2009/01/ozone-layer-important-components-of.html] AD: 7-6-11, jam)

The ozone layer is essential for human life. It is able to absorb much harmful ultraviolet radiation, preventing penetration to the earth’s surface. Ultraviolet radiation (UV) is defined as radiation with wavelengths between 290-320 nanometers, which are harmful to life because this radiation can enter cells and destroy the deoxyribonucleic acid (DNA) of many life forms on planet earth. In a sense, the ozone layer can be thought of as a UV filter or our planet’s built in sunscreen (Geocities.com, 1998). Without the ozone layer, UV radiation would not be filtered as it reached the surface of the earth. If this happened, cancer would break out and all of the living civilizations, and all species on earth would be in jeopardy (Geocities.com, 1998). Thus, the ozone layer essentially allows life, as we know it, to exist.

Atmosphere DA – UQ

Ozone strong and improving now

Revkin 3 (Andrew, Master's in Journalism from Columbia, degree in biology from Brown, Jul 30, [www.nytimes.com/2003/07/30/science/30OZON.html] AD: 7-9-11, jam)

Scientists monitoring the highest levels of the atmosphere say they have detected a slowing in the rate of destruction of Earth's protective veil of ozone, the first sign that the phasing out of chemicals that harm the ozone layer is having a restorative effect. The ozone layer blocks ultraviolet radiation from the sun that can cause skin cancer and harm ecosystems. It has deteriorated for decades, especially in Antarctica, under an assault from synthetic chemicals. The phasing out of the most important class of these chemicals — chlorofluorcarbons, or CFC's — began in 1989 with enactment of the Montreal Protocol, an international treaty. But the destructive substances take decades to decay, resulting in the long lag before any beneficial effects could be measured. The findings, from satellite measurements, are to be published in an edition of the American Geophysical Union's Journal of Geophysical Research. They were released publicly yesterday by that private scientific group and the authors.

Ozone quality is strong – the Montreal Protocol

AFP 10 (Agence France-Presse, French news agency, Sep 16, [www.terradaily.com/reports/UN\_scientists\_say\_ozone\_layer\_depletion\_has\_stopped\_999.html] AD: 7-9-11, jam)

The protective ozone layer in the earth's upper atmosphere has stopped thinning and should largely be restored by mid century thanks to a ban on harmful chemicals, UN scientists said on Thursday. The "Scientific Assessment of Ozone Depletion 2010" report said a 1987 international treaty that phased out chlorofluorocarbons (CFC) -- substances used in refrigerators, aerosol sprays and some packing foams --- had been successful. Ozone provides a natural protective filter against harmful ultra-violet rays from the sun, which can cause sunburn, cataracts and skin cancer as well as damage vegetation. First observations of a seasonal ozone hole appearing over the Antarctic occurred in the 1970s and the alarm was raised in the 1980s after it was found to be worsening under the onslaught of CFCs, prompting 196 countries to join the Montreal Protocol. "The Montreal Protocol signed in 1987 to control ozone depleting substances is working, it has protected us from further ozone depletion over the past decades," said World Meteorological Organisation head of research Len Barrie.

Atmosphere DA – Link

Plan kills ozone layer

Caldicott 2k (Helen, medical degree fom U of Adelaide, Apr 15, [www.space4peace.org/articles/madness.htm] AD: 7-7-11, jam)

And the blighters continue to lie to us. They lie to us. It's our money, it's our Pentagon, and they lie to us. And how dare they, and who do they think they are? Then there are plans to explore Mars and the Moon. And what NASA's doing, we all know, is sending up satellites to map the planets for rare minerals-the planets, the moon, and the asteroids. And then they are going to launch nuclear reactors, and put them on the planets, and mine them for the rare minerals. Who's paying for it? We are. But when they come back I suppose Lockheed Martin and all the rest, they get the profits from the rare minerals. So that's what they are actually doing. And then we discover that America has to dominate space because of this massive investment, so the US Air Force and the US Space Command and NASA have combined to work together in this military madness. That's a good title for my next book: military madness. Can I have a pen? Military madness. OK. I'm looking for a title. Now, you know, for years, we haven't needed a space shuttle. They have had computers that can do all of the work that the people in the space shuttle do. It's only a PR exercise. And they send up Russians, and women, and Asians, and black people, and old people, and oh, it's very exciting. And NASA's got a fantastic public relations department. But they don't need to launch manned space shuttles. But in reality NASA is busily destroying the ozone layer. Because each space shuttle releases 240 tons of concentrated HCl, hydrochloric acid, much of it in the stratosphere where the ozone layer is located. The chlorine atom then splits off from the HCL molecule and starts eating up the ozone layer. It was predicted a few years ago by a Russian scientist that if the space program continued as planned (though it's actually expanding), ten percent of the ozone would be depleted within ten years. NASA didn't contradict this prediction. I broke this story in the US, and instead of NASA trying to fix the problem they launched a satellite to measure the ozone depletion and the ozone holes in the southern hemisphere, and radioed back the results to high schools here, so the children could all do projects on the ozone depletion. That's called management control in PR language..

Atmosphere DA – Link

Orion would destroy the ozone layer – disrupts nitric oxide equilibrium

ACDA 75 (The U.S. Arms Control and Disarmament Agency, leads the interagency policy process on nonproliferation and manages global U.S. security policy, [www.atomicarchive.com/Docs/Effects/wenw\_chp3.shtml] AD: 7-9-11, jam)

More worrisome is the possible effect of nuclear explosions on ozone in the stratosphere. Not until the 20th century was the unique and paradoxical role of ozone fully recognized. On the other hand, in concentrations greater than I part per million in the air we breathe, ozone is toxic; one major American city, Los Angeles, has established a procedure for ozone alerts and warnings. On the other hand, ozone is a critically important feature of the stratosphere from the standpoint of maintaining life on the earth. The reason is that while oxygen and nitrogen in the upper reaches of the atmosphere can block out solar ultraviolet photons with wavelengths shorter than 2,420 angstroms (Å), ozone is the only effective shield in the atmosphere against solar ultraviolet radiation between 2,500 and 3,000 Å in wavelength. (See note 5.) Although ozone is extremely efficient at filtering out solar ultraviolet in 2,500-3,OOO Å region of the spectrum, some does get through at the higher end of the spectrum. Ultraviolet rays in the range of 2,800 to 3,200 Å which cause sunburn, prematurely age human skin and produce skin cancers. As early as 1840, arctic snow blindness was attributed to solar ultraviolet; and we have since found that intense ultraviolet radiation can inhibit photosynthesis in plants, stunt plant growth, damage bacteria, fungi, higher plants, insects and annuals, and produce genetic alterations. Despite the important role ozone plays in assuring a livable environment at the earth's surface, the total quantity of ozone in the atmosphere is quite small, only about 3 parts per million. Furthermore, ozone is not a durable or static constituent of the atmosphere. It is constantly created, destroyed, and recreated by natural processes, so that the amount of ozone present at any given time is a function of the equilibrium reached between the creative and destructive chemical reactions and the solar radiation reaching the upper stratosphere. The mechanism for the production of ozone is the absorption by oxygen molecules (O2) of relatively short-wavelength ultraviolet light. The oxygen molecule separates into two atoms of free oxygen, which immediately unite with other oxygen molecules on the surfaces of particles in the upper atmosphere. It is this union which forms ozone, or O3. The heat released by the ozone-forming process is the reason for the curious increase with altitude of the temperature of the stratosphere (the base of which is about 36,000 feet above the earth's surface). While the natural chemical reaction produces about 4,500 tons of ozone per second in the stratosphere, this is offset by other natural chemical reactions which break down the ozone. By far the most significant involves nitric oxide (NO) which breaks ozone (O3) into molecules. This effect was discovered only in the last few years in studies of the environmental problems which might be encountered if large fleets of supersonic transport aircraft operate routinely in the lower stratosphere. According to a report by Dr. Harold S. Johnston, University of California at Berkeley-- prepared for the Department of Transportation's Climatic Impact Assessment Program--it now appears that the NO reaction is normally responsible for 50 to 70 percent of the destruction of ozone. In the natural environment, there is a variety of means for the production of NO and its transport into the stratosphere. Soil bacteria produce nitrous oxide (N2O) which enters the lower atmosphere and slowly diffuses into the stratosphere, where it reacts with free oxygen (O) to form two NO molecules. Another mechanism for NO production in the lower atmosphere may be lightning discharges, and while NO is quickly washed out of the lower atmosphere by rain, some of it may reach the stratosphere. Additional amounts of NO are produced directly in the stratosphere by cosmic rays from the sun and interstellar sources. It is because of this catalytic role which nitric oxide plays in the destruction of ozone that it is important to consider the effects of high-yield nuclear explosions on the ozone layer. The nuclear fireball and the air entrained within it are subjected to great heat, followed by relatively rapid cooling. These conditions are ideal for the production of tremendous amounts of NO from the air. It has been estimated that as much as 5,000 tons of nitric oxide is produced for each megaton of nuclear explosive power.

Nuclear explosions in the atmosphere obviously damage the ozone layer

Ikle 75 (Fred, distinguished scholar at CSIS, held positions at the RAND corporation, Jan, "The Nether World of Nuclear Megatonnage," pubished in the Bulletin of the Atomic Scientists, jam)

The sixth and last example concerns a new uncertainty about what nuclear war might do to people and to the very environment on which life depends—an uncertainty that has gone unnoticed for 25 years. This is the possibility that a large number of nuclear explosions might bring about the destruction, or partial destruction, of the ozone layer in the stratosphere that helps protect all living things from ultraviolet radiation. I want to stress the accidental nature of this discovery. Not studies about thermonuclear war, but totally unrelated investigations of the supersonic transport aircraft surfaced the ozone problem. A few years ago, the public controversy surrounding supersonic aircraft led to inquiries into their possible effect on the stratosphere. This in turn led to a reexamination of measurements taken after a series of atmospheric nuclear weapons testa in the early 1960s. Based on this evidence, a few articles have started to appear in scientific journals, beginning to unfold the story.\* We do know that nuclear explosions in the Earths atmosphere would generate vast quantities of nitrogen oxides which would be injected into the stratosphere if the bomb cloud rises that high. The oxides of nitrogen can react with the Earth's ozone layer, depleting it without themselves being used up. Since the ozone layer has protected life on Earth from short wavelength ultraviolet radiation for millions of years, plants and animals have not evolved protection against such radiation. This is why there is a potential for great harm to life.

Atmosphere DA – Link

Orion would devastate the ozone layer

Sublette 97 (Carey, former weapon systems analyst, May, [nuclearweaponarchive.org/Nwfaq/Nfaq5.html] AD: 7-9-11, jam)

The high temperatures of the nuclear fireball, followed by rapid expansion and cooling, cause large amounts of nitrogen oxides to form from the oxygen and nitrogen in the atmosphere (very similar to what happens in combustion engines). Each megaton of yield will produce some 5000 tons of nitrogen oxides. The rising fireball of a high kiloton or megaton range warhead will carry these nitric oxides well up into the stratosphere, where they can reach the ozone layer. A series of large atmospheric explosions could significantly deplete the ozone layer. The high yield tests in the fifties and sixties probably did cause significant depletion, but the ozone measurements made at the time were too limited to pick up the expected changes out of natural variations.

Atmosphere DA – Link Magnifiers

Nitrous oxide uniquely destroys the now stable ozone layer

Dean 9 (Cornelia, fellow at the Shorenstein Center at the Kennedy School of Government at Harvard, Aug 27, [www.nytimes.com/2009/08/28/science/earth/28nox.html] AD: 7-9-11, jam)

They note that the health of the ozone layer has been improving since the adoption of the protocol and that nitrous oxide looms large today as an artificial destroyer of the ozone layer, in part because the emissions of other harmful chemicals have been so sharply reduced. But major chemical targets of the Montreal agreement, chlorofluorocarbons, inhibit the ozone-destroying actions of nitrous oxide, the researchers said. So as their levels fall, the harmful influence of nitrous oxide increases. The Environmental Protection Agency is already contemplating action on nitrous oxide because it is a heat-trapping gas linked to global warming. In April, the agency declared it and five other gases, including carbon dioxide, to be pollutants that endanger public health, making them subject to regulation under the Clean Air Act. In a statement, the agency said Thursday that work on a reporting system for emissions of nitrous oxide and the five gases was under way. John S. Daniel, one of the authors of the new report, said scientists had for some time known of the ozone-depleting potential of nitrous oxide. But, Mr. Daniel said in a telephone news conference, “there is a sort of gap between the scientific understanding and the policy.” The researchers did not make any policy recommendations in light of their finding. “It is not for us to gauge how much risk there is,” said A. R. Ravishankara, who led the work. In any event, he said, at the moment researchers could not say with confidence “how much nitrous oxide comes from where.” “The uncertainties are significant,”

Nitrous oxide devastates the ozone

CCEMR 11 (Climate Change Emergency Medical Response, an environmental advocacy group, May 24, [www.climate-change-emergency-medical-response.org/climate-change-solutions.html] AD: 7-9-11, jam)

NITROUS OXIDE lasts in the atmosphere for over 100 years, and is approximately 300 times more potent a greenhouse gas than CO2. Atmospheric levels of nitrous oxide have risen by more than 15 percent since 1750, and about a third of current N2O emissions are anthropogenic, stemming from synthetic nitrogen fertilizers, the chemical industry, the manure of cattle feedlots, fossil fuel burning, and fugitive emissions from the natural gas industry. Nitrous oxide also causes ozone depletion, and is now considered the single most important ozone-depleting substance.

Atmosphere ! – Warming

The ozone is strong but new damage causes warming

Bornman 10 (Janet F., Director of the International Global Change Institute, [ozone.unep.org/Assessment\_Panels/EEAP/eeap-report2010.pdf] AD: 7-9-11, jam)

There are strong interactions between ozone depletion and changes in climate induced by increasing greenhouse gases (GHGs). Ozone depletion affects climate, and climate change affects ozone. The successful implementation of the Montreal Protocol has had a marked effect on climate change. Calculations show that the phase-out of chlorofluorocarbons (CFCs) reduced Earth’s warming effect (i.e., radiative forcing) far more than the measures taken under the Kyoto protocol for the reduction of GHGs. The amount of stratospheric ozone can be affected by the increases in the concentration of GHGs, which lead to decreased temperatures in the stratosphere and accelerated circulation patterns, which tend to decrease total ozone in the tropics and increase total ozone at mid and high latitudes. Changes in circulation induced by changes in ozone can also affect patterns of surface wind and rainfall. The Montreal Protocol is working, but it will take several decades for ozone to return to 1980 levels. The concentrations of ozone depleting substances have been decreasing after reaching a peak in the 1990s, and ozone column amounts are no longer decreasing. Midlatitude ozone is expected to return to 1980 levels before mid-century, which is earlier than predicted previously. However, the recovery rate will be slower at high latitudes. Springtime ozone depletion is expected to continue to occur at polar latitudes, especially in Antarctica in the next few decades.

A strong ozone is key to prevent climate change

Bornman 10 (Janet F., Director of the International Global Change Institute, [ozone.unep.org/Assessment\_Panels/EEAP/eeap-report2010.pdf] AD: 7-9-11, jam)

UV radiation promotes the breakdown of dead plant material and consequently carbon loss to the atmosphere. Exposure of vegetation and soils to UV radiation may increase in the future at low to mid-latitudes due to reduced cloud cover or more intensive land use. The breakdown of dead plant material through the action of sunlight (photodegradation) is a very important ecosystem process in many environments, especially for those components that decay only very slowly by microbial action.

Ozone depletion causes warming

Rigdon 2 (Justin, student @ WAOL, cites Peter Bunyard, consultant editor for the United Nations Environment Programme review on Industry and the Environment, Spring, [dept.sccd.ctc.edu/libraries/dl/lib180/pf/spr02/Justin\_Rigdon\_pathfinder.html] AD: 7-9-11, jam)

Bunyard, Peter. “How Ozone-Depletion Increases Global Warming”. The Ecologist. 1999. P. 85. March 1999. The magazine says, “Scientists agree that the depletion of the ozone layer is exacerbating global warming”. The magazine conveys that this is because of an increasing amount of ultraviolet B, which is penetrating earth’s lower atmosphere with ease, causing additional heating which contributes to a rise in global temperatures. The increase in ultraviolet B penetration of the atmosphere has broad implications for phytoplankton, plant life on land and worse, for human wellbeing. The magazine really pushes the message that it is crucial to prevent the production and release of substances (gases mainly) that deplete the ozone layer to ease the catastrophic effects of global warming. I trust this to be a trustworthy source because it came out of a scholarly magazine.

Ozone depletion causes warming – plankton

Revere 5 (Jessica, Communications Director & Analyst @ Public Employees for Environmental Responsibility, Oct 12, [www.ips-dc.org/reports/ozone\_depletion\_global\_warming] AD: 7-9-11, jam)

There is also evidence that ozone depletion is masking global warming, because ozone depletion cools the stratosphere even though the earth’s surface temperatures are higher than historic averages. Global warming is predicted to cause rising ocean levels, lower plant productivity, and more frequent and dangerous weather patterns. Ozone depletion may also make it harder to combat global warming, because more UV light penetrates the world’s oceans and destroys plankton. Plankton plays a pivotal role in the ability of oceans to draw carbon dioxide (the primary global warming chemical) from the atmosphere, thereby making oceans (along with rainforests) important “carbon sinks.” Loss of these “sinks” further exacerbates global warming by accelerating the buildup of so-called greenhouse gases in the atmosphere.

Atmosphere ! – Warming

Causes extinction

Tickel 8 (Oliver, Climate Researcher @ The Guardian, Aug 11, [http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange] AD: 7-9-11, jam)

We need to get prepared for four degrees of global warming, Bob Watson told the Guardian last week. At first sight this looks like wise counsel from the climate science adviser to Defra. But the idea that we could adapt to a 4C rise is absurd and dangerous. Global warming on this scale would be a catastrophe that would mean, in the immortal words that Chief Seattle probably never spoke, "the end of living and the beginning of survival" for humankind. Or perhaps the beginning of our extinction. The collapse of the polar ice caps would become inevitable, bringing long-term sea level rises of 70-80 metres. All the world's coastal plains would be lost, complete with ports, cities, transport and industrial infrastructure, and much of the world's most productive farmland. The world's geography would be transformed much as it was at the end of the last ice age, when sea levels rose by about 120 metres to create the Channel, the North Sea and Cardigan Bay out of dry land. Weather would become extreme and unpredictable, with more frequent and severe droughts, floods and hurricanes. The Earth's carrying capacity would be hugely reduced. Billions would undoubtedly die. Watson's call was supported by the government's former chief scientific adviser, Sir David King, who warned that "if we get to a four-degree rise it is quite possible that we would begin to see a runaway increase". This is a remarkable understatement. The climate system is already experiencing significant feedbacks, notably the summer melting of the Arctic sea ice. The more the ice melts, the more sunshine is absorbed by the sea, and the more the Arctic warms. And as the Arctic warms, the release of billions of tonnes of methane – a greenhouse gas 70 times stronger than carbon dioxide over 20 years – captured under melting permafrost is already under way. To see how far this process could go, look 55.5m years to the Palaeocene-Eocene Thermal Maximum, when a global temperature increase of 6C coincided with the release of about 5,000 gigatonnes of carbon into the atmosphere, both as CO2 and as methane from bogs and seabed sediments. Lush subtropical forests grew in polar regions, and sea levels rose to 100m higher than today. It appears that an initial warming pulse triggered other warming processes. Many scientists warn that this historical event may be analogous to the present: the warming caused by human emissions could propel us towards a similar hothouse Earth.

Atmosphere ! – Pakistan

Ozone depletion threatens all life and causes Pakistan instability

Tecnozono 11 (Tecnozono, Global Warming, Environment, and Pollution news aggregator, Jan 3, [blog.tecnozono.com/?p=126] AD: 7-9-11, jam)

Ozone layer protection essential for life on earth, says minister ISLAMABAD: Minister for Environment Hameedullah Jan Afridi on Saturday said that Ozone layer depletion in the atmosphere had been a worldwide concern for the last more than two decades. He was addressing the ‘Workshop for Awareness on Ozone Layer and Montreal Protocol Activities in Pakistan’ organised with the collaboration of UNDP, UNIDO and UNEP. As many as 196 member countries of the world have signed the Montreal Protocol to tackle the problem of the depletion of ozone layer, which is essential for sustainable life on this Planet, he said. Afridi said that it was time to change the behaviour towards environment by creating awareness among the masses because Pakistan was the most vulnerably country and did not had adequate resources to over come the effects of environmental degradation.

Pakistani environmental degradation causes terrorism directed at the U.S. and Indo-Pak war

Vaughn et al 10 (Bruce, analyst in South-East Asian and South Asian Affairs with the Congressional Research Service (CRS), Nicole T. Carter and Pervaze A. Sheikh, Specialists in Natural Resources Policy with the CRS, and Renee Johnson, Specialist in Agricultural Policy with the CRS, Aug 3, [www.fas.org/sgp/crs/row/R41358.pdf] AD: 7-9-11, jam)

This report focuses on the nexus between security and environmental concerns in Pakistan that have the potential to affect American security and foreign policy interests. Environmental concerns include, but are not limited to, water and food scarcity, natural disasters, and the effects of climate change. Environmental stresses, when combined with the other socio-economic and political stresses on Pakistan, have the potential to further weaken an already weak Pakistani state. Such a scenario would make it more difficult to achieve the U.S. goal of neutralizing anti-Western terrorists in Pakistan. Some analysts argue that disagreements over water could also exacerbate existing tensions between India and Pakistan. Given the importance of this region to U.S. interests for many reasons, the report identifies an issue that may be of increasing concern for Congress in the years ahead. The report examines the potentially destabilizing effect that, when combined with Pakistan’s demographic trends and limited economic development, water scarcity, limited arable land, and food security may have on an already radicalized internal and destabilized international political security environment. The report considers the especially important hypothesis that the combination of these factors could contribute to Pakistan’s decline as a fully functioning state, creating new, or expanding existing, largely ungoverned areas. The creation, or expansion, of ungoverned areas, or areas of limited control by the government of Pakistan, is viewed as not in U.S. strategic interests given the recent history of such areas being used by the Taliban, Al Qaeda, and other terrorist groups as a base for operations against U.S. interests in the region. In this sense, environmental stress is viewed as a potential “threat multiplier” to existing sources of conflict. Environmental factors could also expand the ranks of the dispossessed in Pakistan, which could lead to greater recruitment for radical Islamist groups operating in Pakistan or Afghanistan. Larger numbers of dispossessed people in Pakistan could also destabilize the current political regime. This could add pressure on the Pakistani political system and possibly add impetus to a return to military rule or a more bellicose posture towards India. This issue has added significant importance to regional security and American interests in Afghanistan. The potential for environmental factors to stoke conflict between the nuclear armed states of India and Pakistan is also a concern. These two historical enemies have repeatedly fought across their international frontier and have yet to resolve their territorial dispute over Kashmir. Further, a longstanding dispute over cross-border water resource sharing between India and Pakistan has resurfaced, possibly exacerbating existing tensions between the two states. Should the two countries wish, however, this dispute also offers a renewed opportunity for cooperation, as has been seen in past negotiations. Preliminary findings by experts seem to indicate that existing environmental problems in Pakistan are sufficiently significant to warrant a close watch, especially when combined with Pakistan’s limited resilience due to mounting demographic stresses, internal political instability, security challenges, and limited economic resources. For more detailed information on Pakistan see the work of Alan Kronstadt and others including CRS Report RL33498, Pakistan-U.S. Relations, and CRS Report RL34763, Islamist Militancy in the Pakistan-Afghanistan Border Region and U.S. Policy.

Atmosphere ! – Pakistan

Indo-pak war causes nuclear winter

GSN 10 (Global Security Newswire, a subsidiary of the Nuclear Threat Initiative, a nonpartisan, nonprofit organization, Mar 16, [gsn.nti.org/gsn/nw\_20100315\_4193.php] AD: 7-9-11, jam)

Computer modeling suggests a nuclear exchange between India and Pakistan would block out the sun with large amounts of airborne debris, disrupting global agriculture and leading to the starvation of around 1 billion people, Scientific American reported in its January issue (see GSN, March 4). (Mar. 16) - A 1971 French nuclear test at Mururoa Atoll. Climatic changes caused by an Indian-Pakistani nuclear conflict could lead to the deaths of hundreds of millions of people, computer models suggest (Getty Images). The nuclear winter scenario assumes that cities and industrial zones in each nation would be hit by 50 bombs the size of the atomic bomb dropped on Hiroshima, Japan, in World War II. Although some analysts have suggested a nuclear exchange would involve fewer weapons, researchers who created the computer models contended that the panic from an initial nuclear exchange could cause a conflict to quickly escalate. Pakistan, especially, might attempt to fire all of its nuclear weapons in case India's conventional forces overtake the country's military sites, according to Peter Lavoy, an analyst with the Naval Postgraduate School. The nuclear blasts and subsequent blazes and radiation could kill more than 20 million people in India and Pakistan, according to the article. Assuming that each of the 100 bombs would burn an area equivalent to that seen at Hiroshima, U.S. researchers determined that the weapons used against Pakistan would generate 3 million metric tons of smoke and the bombs dropped on India would produce 4 million metric tons of smoke. Winds would blow the material around the world, covering the atmosphere over all continents within two weeks. The reduction in sunlight would cause temperatures to drop by 2.3 degrees Fahrenheit for several years and precipitation to drop by one-tenth. The climate changes and other environmental effects of the nuclear war would have a devastating affect on crop yields unless farmers prepared for such an occurrence in advance. The observed effects of volcano eruptions, smoke from forest fires and other events support the findings of the computer modeling, the researchers said. "A nuclear war could trigger declines in yield nearly everywhere at once, and a worldwide panic could bring the global agricultural trading system to a halt, with severe shortages in many places. Around 1 billion people worldwide who now live on marginal food supplies would be directly threatened with starvation by a nuclear war between India and Pakistan or between other regional nuclear powers," wrote Alan Robock, a climatology professor at Rutgers University in New Jersey, and Owen Brian Toon, head of the Atmospheric and Oceanic Sciences Department at the University of Colorado at Boulder. "The combination of nuclear proliferation, political instability and urban demographics may constitute one of the greatest dangers to the stability of society since the dawn of humans," they added. "Only abolition of nuclear weapons will prevent a potential nightmare. Immediate reduction of U.S. and Russian arsenals to the same levels as other nuclear powers (a few hundred) would maintain their deterrence, reduce the possibility of nuclear winter and encourage the rest of the world to continue to work toward the goal of elimination" (Robock/Toon, Scientific American/Rutgers University, January 2010).

Atmosphere ! – Pakistan

Ozone depletion uniquely hurts Pakistan

The Daily Times 11 (The Daily Times, Pakistani News Agency, Jan 30, [www.dailytimes.com.pk/default.asp?page=2011%5C01%5C30%5Cstory\_30-1-2011\_pg11\_9] AD: 7-9-11, jam)

ISLAMABAD: Ozone Layer is essential for life on earth, but unfortunately it is being depleted due to a few man-made chemicals. Pakistan is fully committed to its international obligations towards protecting the earth and its fragile atmosphere, Minister for Environment Hameedullah Jan Afridi said here on Saturday. Afridi stated this while addressing a ‘Workshop for Youth Awareness on Ozone Layer and Montreal Protocol Activities in Pakistan’. He said after adopting appropriate policy measures, Pakistan was making all-out efforts to achieve its target for phasing out the use of Ozone depleting substances and conversion of industries concerned into Ozone-friendly technology. Ministry of Environment Joint Secretary Administration and Coordination Iftikhar Rahim, Khyber Pakhtunkhwa EPA DG Bashir, International Cooperation Joint Secretary Abid Ali, Advisor on Climate Change Chaudhry Qamar Zaman, concerned stakeholders, representatives from different industries and students participated in the workshop. The minister said that Ozone Layer depletion in the atmosphere had been a worldwide concern for the last more than two decades. As many as 196 member countries of the world have signed the Montreal Protocol which shows the commitment from entire world to tackle this core issue. He said that environment today was on the top agenda of every country. The global warming and climate change have become a reality and “we in the developing countries are most vulnerable to these”. It is encouraging to see that world community has decided to face this menace, collectively. Several protocols like the Kyoto protocol have been signed to limit the emissions of green house gases and minimize the worse impacts of climate change, the minister added.

Environmental stability prevents terrorism and Indo-Pak conflict

Vaughn et al 10 (Bruce, analyst in South-East Asian and South Asian Affairs with the Congressional Research Service (CRS), Nicole T. Carter and Pervaze A. Sheikh, Specialists in Natural Resources Policy with the CRS, and Renee Johnson, Specialist in Agricultural Policy with the CRS, Aug 3, [www.fas.org/sgp/crs/row/R41358.pdf] AD: 7-9-11, jam)

Pakistan is of great interest to the national security of the United States. U.S. interests are primarily focused on Pakistan’s ability to control its territory to prevent it from being used as a haven for anti-American terrorists and prevent inter-state conflict with India that would be regionally destabilizing or worse, given their nuclear weapons. As a result, a stable Pakistan that can extend its full writ throughout the land in order to prevent various regions of Pakistan from becoming ungoverned areas from which anti-Western terrorists can operate is of direct national security importance. To this end, U.S. assistance may increasingly take into consideration the potential negative impact that environmental stress, particularly water shortages and its impact on food security, may have as a threat multiplier. There is a potential need to prevent these exacerbating environmental factors from becoming the tipping point leading to a more chaotic situation in Pakistan. In April 2010 Special Representative for Afghanistan and Pakistan Richard Holbrooke stated that the United States was indeed putting more emphasis on energy and water issues in its assistance programs with Pakistan. (For an indepth discussion of U.S. assistance to Pakistan see CRS Report RL33498, Pakistan-U.S. Relations, by K. Alan Kronstadt.) It has been argued by at least one source that because water shortages present the greatest future threat to the viability of Pakistan, U.S. development assistance would be best focused on the improvement of Pakistan’s water infrastructure.

Atmosphere ! – Impact

Nuclear power in space wreaks environmental havoc

The Planetary Society 5 (The Planetary Society, founded in 1980 by Carl Sagan, Bruce Murray, and Louis Friedman, May, [http://planetary.org/action/opinions/nuclear\_propulsion.pdf] AD: 7-6-11, jam)

Environmental concerns: Nuclear power has a unique handicap: It is categorically opposed by some. Their position is that nuclear material, in any form and in any place, is a danger to the population of the Earth and that no benefits are worth the risks that it imposes on mankind. They are particularly alarmed by employment of nuclear energy in space where, in principle, it might be diverted to weapons or other military systems, and where deadly radioactive material might be accidentally spread over large areas. Their position has been loudly articulated and lent some credence by the disasters at Chernobyl and Three Mile Island. NASA and the Department of Energy acknowledge that nuclear technology involves risks and therefore takes stringent steps to manage those risks, but those steps have been seen as inadequate by the critics ideologically opposed to nuclear power.

Atmosphere DA – Terminal Impact

Ozone depletion risks all life

Sagan & Turco 90 (Carl, David Duncan Prof of Astronomy and Space Sciences at Cornell U, and Richard, Prof of Atmospheric Sciences at UCLA, “A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race”, p. 58)

Ozone depletion threatens the food chains on which almost all life on Earth depends. In the oceans, there are tiny microscopic plants, called phytoplankton, which are highly vulnerable to increases in ultraviolet light; and which, directly or indirectly, other animals in the marine food chain including humans—eat . Land plants,including crops, are also vulnerable to increased ultraviolet light, as are most microbes, including those essential for the food chain. (Ultraviolet lamps were once used in hospital operating rooms tokill potential disease microorganisms.) We are far too ignorant of the global ecological interactions to understand fully what propagating biological consequences an assault on the ozone layer would entail (refs. 4.10, 6.3).But it doesn't take a great depth of understanding to recognize that if you rip up the base of the food chain, you may generate a disaster among the beings that totter precariously near the pinnacle. Recovery of the ozone shield would probably take several years. By then enormous damage would have been wrought.

\*\*CPs

Solar CP – General

Solar power solves every internal link, costs less and is less accident prone

Grossman 91 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 5/31/91, http://www.flybynews.com/archives/karl/kg9105we.htm) JPG

With the probe just above the Earth's atmosphere on the flyby, it would take only a small malfunction to cause it to drop and disintegrate, showering plutonium down on Earth. The United States is proceeding rapidly with the nuclearization of space, and the threat we face from Galileo is the kind of danger we will be undergoing constantly if we allow the government to continue to send nuclear hardware into space. If we tolerate Chernobyls in the sky, deadly accidents will be inevitable. Yet this risk is unnecessary. The potential catastrophes are avoidable. After Galileo was launched in 1989, I received, under the Freedom of Information Act, NASA-funded studies declaring that nuclear power was not necessary to generate electricity on the Galileo mission; solar energy would do. The plutonium on board Galileo is being used not for propulsion but as fuel in generators providing a mere 560 watts of electricity for the probe's instruments -Ä electricity that could be produced instead by solar energy. A decade ago NASA's Jet Propulsion Laboratory concluded: "A Galileo Jupiter-orbiting mission could be performed with a concentrated photovoltaic solar array [panels converting sunlight to electricity] power source without changing the mission sequence or impacting science objectives." Five years ago, another JPL study said that it would take only two to three years to build the alternative solar-power source. Still another JPL report stressed that using the sun for power would cost less than using plutonium. It is humanity's destiny to explore the heavens, but what a folly it will be if in doing this, we needlessly cause the deaths of tens of thousands of people and contaminate the Earth with deadly plutonium. The federal government and its national laboratories, zealous about nuclear power of all sorts, are pushing nuclear technology in space. So are space contractors such as General Electric, which produces nuclear space devices (including those on Galileo) and is having a hard time peddling nuclear power for use on Earth. Star Wars is contingent on the launching of 100 orbiting battle platforms, each with a large nuclear reactor to provide power for its laser weapons, hypervelocity guns and particle beams. GE is now busy manufacturing what is to be the main Star Wars space reactor, the SP-100. In coming days, the Synthesis Group, a panel established last year (1990) by NASA and the White House, is expected to recommend nuclear-powered rockets for the manned Moon-Mars missions proposed by President George Bush. And the Pentagon, amid great secrecy to avoid public objections (*not* for national defense reasons) is developing a nuclear-propelled rocket to haul Star Wars weaponry into space. To spread radioactivity, a nuclear-propelled rocket need not crash back to Earth. As they fly, these rockets would inevitably trail clouds of radioactivity in their exhaust. A flight test in space above Antarctica is being planned for the Star Wars nuclear rocket. It seems the location was chosen so that if there is a malfunction, the chief victims would be penguins. Unfortuntely, New Zealand also gets in the way. One U.S. government study says that the likelihood of the nuclear-powered rocket crashing into New Zealand is 1 in 2,325. This may sound like fairly good odds, but remember, NASA put the odds of a space shuttle crash at 1 in 100,000, before the Challenger exploded. The record of nuclear power in space is poor. The United States has launched 24 nuclear-fueled space devices, including a navigational satellite with plutonium aboard that disintegrated in the atmosphere as it plunged to Earth in 1964. The U.S. failure rate for nuclear-powered space devices has been about 15 percent. The Soviet Union has the same failure rate. The Soviets have sent up more than 30 nuclear-fueled devices, including the Kosmos 954, which littered a broad swath of Canada with radioactive debris when it crashed in 1978. The United States spent some $2 billion of taxpayer money on developing nuclear-powered rockets from 1955 to 1973, but none ever got off the ground. That effort was finally canceled because of the concern that a rocket might crash to Earth. Now we're turning to nuclear power in space -- with its inevitable mishaps -- again. Last year the United States launched the Ulysses plutonium-fueled probe to survey the sun. A December Associated Press dispatch noted, "The Ulysses spacecraft is wobbling like an off-balance washing machine, threatening to cripple the $760-million mission." Fortunately, the probe is not coming back for an Earth flyby. The U.S. government prefers nuclear power even when solar energy is an ideal alternative, as on Ulysses. For the 1996 Comet Rendezvous Asteroid Flyby mission, the Jet Propulsion Laboratory has said that solar energy could replace plutonium power. There is plenty of time to arrange the solar alternative. Nevertheless, NASA last year began contract negotiations with GE to build plutonium-fueled generators for this mission.

Solar power is light and effective

Kaku 97 (Michio, Henry Semat Professor of Theoretical Physics in the City College of New York, Jul 26, [www.lovearth.org/mkaku.htm] AD: 7-9-11, jam)

"Let me pose a riddle. What do oil company executives, vampires and NASA bureaucrats all have in common? They fear solar energy. They fear the power of the sun. There is only one paragraph in NASA's Environmental Impact Statement that states you can't equip the Cassini with solar panels because it is 130 pounds over weight. The pay load is 13,000 lbs. One percent overweight and they can't do it. Lose the weight! NASA admits they can downsize the mission. On Mars today, the Mars Rover is a by-product of a new strategy: smaller, better, faster, cheaper. The old probes were like the Mars Observer which blew up in '93 on its way to Mars, a leftover from the cold war. The new mission philosophy is downsize your space probes: make them half the size and send them twice as often. THAT is the future of Cassini. We should downsize all these leftovers from the cold war, make them half the size, send them twice as often and energize them with solar power. On the Cassini we're only talking about eight light bulbs worth of energy needs. The peaceful solution to this problem is for NASA to get with its own program: cheaper, smaller, faster...and go solar.

Solar CP – General

Solar is best – ESA proves

Grossman 2 (Karl, prof of journalism at the State U of New York, Summer, [www.space4peace.org/articles/morenukesinspace.htm] AD: 7-7-11, jam)

The Nuclear Systems Initiative comes as scientists in the European Space Agency - ESA, the European counterpart of NASA - in the space industry and at NASA itself have made breakthroughs in developing safer ways of propelling rockets and energizing space probes and planetary landers. This includes solar electric propulsion and the use of "solar sails" and other solar technologies that stress the generation of electricity with new high-efficiency solar cells. In fact, next year ESA is to launch a solar-powered space probe called Rosetta named after the Rosetta Stone which, notes ESA, "led to a revolution in our understanding of the past. By comparing the inscriptions on the Rosetta Stone, historians were able to decipher Egyptian hieroglyphics for the first time. Just as the Rosetta Stone provided the key to an ancient civilization, so the European Space Agency's Rosetta Spacecraft will allow scientists to unlock the mystery of the oldest building blocks of our solar system - the comets." 8 Rosetta's on-board electricity will come from solar cells with 25% efficiency - a quarter of the sunlight striking its panels will turn into electricity. "Until now, deep space probes had to use thermonuclear power generators," ESA explains in its informational material on Rosetta, but because such atomic "technology is not available in Europe, ESA attempted to develop a power source based on very high-efficiency solar cells." 9 The "25% mark represents the highest efficiency ever reached worldwide with silicon cells" and Rosetta will be drawing sunlight from far, far off. Its voyage is to include "two excursions" into the asteroid belt and it then will fly beyond Jupiter to rendezvous with a comet called Wirtanen. 10 "Rosetta," says ESA, "will be the first space mission to journey beyond the main asteroid belt and rely solely on solar cells for power generation, rather than traditional radioisotope thermal generators." 11 "After a 5.3 billion km space odyssey, Rosetta will make first contact with Wirtanen about 675 million km from the Sun", explains ESA on its website. "At this distance, sunlight is 20 times weaker than on Earth." 12 Despite the decline in available sunlight at such distances, current solar cell technology will be able to supply the needs of the Rosetta mission.

Solar propulsion is cheaper and more effective

Grossman 2 (Karl, prof of journalism at the State U of New York, Summer, [www.space4peace.org/articles/morenukesinspace.htm] AD: 7-7-11, jam)

A branch of NASA its Photovoltaics and Space Environment Branch headquartered at the John Glenn Research Center in Cleveland has, like ESA, been working at the cutting-edge of space solar energy development. The silicon solar cells "developed decades ago" which now power the International Space Station, notes NASA’s website, have 14.5% efficiency, and the branch is "exploring new ways to harness the Suns power - including more efficient solar cells, laser-beaming energy to distant spacecraft and solar power systems for the Moon and Mars." This includes solar systems for exploring and powering bases on Moon and Mars. 20 NASA’s website includes detailed NASA plans such as "Photovoltaic Power for the Moon," 21 "Power Systems for Bases and Rovers on Mars" 22 and "A Solar Power System for an Early Mars Expedition." 23 There is no "edge" or limit to solar power, says a solar scientist at the NASA branch, Dr. Geoffrey A. Landis. "In the long term, solar arrays wont have to rely on the Sun. We're investigating the concept of using lasers to beam photons to solar arrays. If you make a powerful-enough laser and can aim the beam, there really isn’t any edge of sunshine." 24 Solar is also being developed to propel spacecraft. In solar electric propulsion, electricity collected by panels is concentrated and used to accelerate the movement of propellant out of a thrust chamber. NASA’s Deep Space 1 probe, launched in 1998, is the first space probe to be propelled with solar electric propulsion. 25 Then there are "solar sails" making use of the ionized particles emitted by the Sun which constitute a force in space. 26 They can be utilized just like wind by a sailboat on Earth. NASA’s Jet Propulsion Laboratory in California is considering a launch at the end of the decade of a space probe to Pluto using either solar sails or solar electric propulsion. 27 A space device with solar sails built in Russia for the International Planetary Society, based in California and founded by the late astronomer Carl Sagan, was launched last year. Russia's Interfax news service noted that the "objective of the mission is to test the system for opening the paddles of an experimental transport vehicle, which looks like a giant windmill, using for the first time in space exploration solar wind for propulsion." 28 Jack Dixon, for 30 years an aerospace engineer, takes issue with those against nuclear power in space for being critical of it for "politically correct," anti-nuclear reasons. His criticism is cost - what he says is an enormous cost. The solar sail system "may be implemented at about 10% of the cost of nuclear and quickly." It is "simple and relatively low tech." 29

Solar CP – General

Solar power solves

Butler 1 (Amy, writer for the Federation of American Scientists, Mar 2, [www.fas.org/sgp/news/2001/03/iaf030201.html] AD: 7-7-11, jam)

Budget constraints and recent advances in solar cell technologies have ended what one industry analyst calls the Defense Department's longstanding flirtation with developing nuclear power sources for spacecraft, according to industry and Pentagon sources. The military had an ongoing flirtation with nuclear power for nearly 50 years, and now they are saying it is over, said Steven Aftergood, senior research analyst at the non-profit Federation of American Scientists, a think tank based in Washington, DC. Nuclear power offers at least a 100-fold increase in power generation over traditional technologies -- such as solar power or heat-based power -- which explains DOD's affinity for the technology as it relies more and more on space-based assets for its operations, according to Aftergood. However, he notes that the Pentagon's recently released Space Technology Guide does not mention nuclear power, an omission he describes as a real shift in DOD policy, or at least a significant departure. The National Space Policy and the Defense Department's space policy remain the same, said Pentagon spokeswoman Susan Hansen. Both policies preclude the use of nuclear power in Earth orbit without the specific approval of the president. Any requests for approval must take into account public safety, economic considerations, treaty obligations and U.S. national security and foreign policy interests, Hansen wrote in a statement for Inside the Air Force. Those policies have been in place for quite some time and have not changed. DOD created the Space Technology Guide in response to Congress' request for an overarching guide of investments in key technologies needed for national security space purposes. Congress requested the guide in the fiscal year 2000 defense authorization act, and the Defense Department released it earlier this month (ITAF, Feb. 9, p16). The guide includes a list of key enabling technologies for national security space that identifies a need for investment in advances for solid rocket motors, electric and plasma thrusters and solar and chemical power generation. Nuclear power does not appear on the list. In a query submitted to Charles Williams, who works on such issues in the office of the assistant secretary of defense for command, control, communications and intelligence, Aftergood suggested that the official omission of nuclear power in the guide could be the result of political pressures or technical considerations. In his response to Aftergood, Williams said that while politics and technical challenges were factors, the key reasons for the subject's removal from the guide were funding and public safety. In the STG, the Congress asked for an investment strategy for space technology. Given the severely constrained funding available for space technology development, funds for nuclear power devices would not make the priority cut, Williams wrote. Even if we could produce them economically, the mission costs would be unaffordable because of the measures necessary for safety. These scarce resources are needed to fund technologies that provide real, accountable leverage to meet future mission requirements, he continued. These economic and technical reasons obviate any need to pursue nuclear power options. Additionally, Hansen noted there is no DOD requirement for nuclear power sources for spacecraft. All of our space-based power needs are being met with alternative methods, such as vastly improved and more efficient solar cells, new battery technologies, and future power technologies such as flywheels. Advances in solar cells are also more than sufficient to maintain ample power supplies, Williams added. Before these alternate technologies matured, however, the Pentagon frequently funded research efforts into nuclear reactors for satellites. As recently as 1991, the Pentagon funded classified work on a nuclear-powered rocket engine program called Timberwind that was part of the Strategic Defense Initiative, Aftergood said. Prior to Timberwind, DOD dabbled in various programs -- some as a partner with the Energy Department or NASA -- to produce space-based nuclear reactors. Timberwind evolved out of such programs as SP-100, on which Aftergood said DOD spent about $500 million, and the Multi-Megawatt program, which is considered a basis for much of the modern understanding of space-based nuclear power technology. DOD also participated in a program that in 1965 launched an experimental reactor into space; the reactor malfunctioned 43 days later, Aftergood said.

Solar CP – Weaponization Solvency

Solar solves for weaponization

Grossman 91 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 5/31/91, http://www.flybynews.com/archives/karl/kg9105we.htm) JPG

Even for Star Wars, solar power could suffice (that is, if we want Star Wars in any form). Pressed at a congressional hearing in 1988 on "The Future of Space Nuclear Power," Col. George Hess, then of the Strategic Defense Initiative Organization, the Pentagon's Star Wars office, declared: "I believe in the inventiveness of the American engineer, sir; that if we were restricted to have no nuclear power that we would address other options." But other options have not been -Ä and are not being Ä- addressed. NASA and the Defense and Energy Departments have just opened up a Nuclear Propulsion Systems Office to develop nuclear-powered rockets for both space exploration and Star Wars. The United States is even balking at the UN General Assembly's efforts to set international rules restricting nuclear power in space. The Pentagon complains that the proposed UN guidelines could pose obstacles to Star Wars; NASA fears constraints on its missions. Good sense, the profound dangers of radioactivity, the lessons of history, economic limits and even the law of gravity are being ignored as the United States veers from safe alternatives to nuclearize space.

Solar Cp – Exploration Solvency

Solar solves for exploration – empirics

Grossman 10 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, 6/25/10, http://www.huffingtonpost.com/karl-grossman/obama-seeks-to-revive-spa\_b\_625356.html) JPG

Plutonium-238 has been used to generate electricity on space probes and rovers and also satellites. But in 1964 a satellite with a plutonium-fueled generator, after failing to achieve orbit, fell to Earth, breaking up as it hit the atmosphere and dispersing 2.1 pounds of Pu-238 from its SNAP -- (for Systems Nuclear Auxiliary Power) 9A system. A study by a group of European health and radiation protection agencies reported that "a worldwide soil sampling program in 1970 showed SNAP-9A debris present at all continents and at all latitudes." Dr. John Gofman, professor of medical physics at the University of California at Berkeley, long linked that fall-out to an increase of lung cancer on Earth. The accident caused NASA to pioneer the use of solar panels on satellites. NASA still used Pu-238 for space probes claiming there was no alternative -- even when there was. For example, NASA and the Department of Energy (DOE) insisted, including in court testimony, that there was no choice but plutonium power on the Galileo mission to Jupiter launched in 1989. Subsequently, through the Freedom of Information Act, I obtained a study done by NASA's Jet Propulsion Laboratory finding that solar panels could have worked. Currently, NASA is preparing to send its Juno space probe to Jupiter next year -- and it's to get all its on board electricity from solar panels. Rovers have also used solar panels.

Solar power can achieve the same mission goals

Chong 97 (Daniel, 10/26/97, engineer @ Boeing, http://www.awarenessmag.com/sepoct7/SO7\_NUKE.HTML) JPG

NASA IGNORES A SAFE ALTERNATIVE NASA claims that a nuclear-powered Cassini probe is the only option available to reach Saturn. However, NASA's own Jet Propulsion Laboratory (JPL) essentially refutes this claim. The plutonium on board the space probe is only to be used as a power source to produce electricity for instruments on the probe, not for propulsion. In preparation for the Galileo mission (a previous space probe containing the RTG-encased plutonium), NASA also claimed that nuclear power was the only method available. Yet just a few weeks after the launch, JPL was forced through the Freedom of Information Act to release a report which stated that the mission could have been performed with solar power "without changing the mission sequence or impacting science objectives."(8) NASA lied before the Galileo launch about the need to use plutonium. In fact, solar power could be used on the Cassini mission if NASA desired. In 1994, the European Space Agency (ESA) announced the development of new high-performance solar cells. ESA physicist Carla Signorini stated, "If given the money to do the work, within five years (ESA) could have solar cells ready to power a space mission to Saturn."(9) If the Cassini mission can be performed safely with solar power, why is NASA taking such a large risk by using deadly plutonium?

Solar power solves all of their internal links

Grossman 11 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”4/14/11, http://carmeloruiz.blogspot.com/2011/04/karl-grossman-time-to-close-nuclear.html) JPG

The Global Network noted that through the years it “has emphasized that there are safe alternatives to energize space devices. In recent times, NASA, at long last, has begun substituting solar energy for nuclear power in space. Indeed, in coming months NASA's solar-powered Juno spacecraft will be launched on a five-year mission to Jupiter. It was not long ago that NASA emphatically insisted that solar power could not substitute for nuclear beyond the orbit of Mars. Suddenly, it now can be done.” “Likewise,” said the statement, as “numerous studies have documented, safe, clean, renewable energy technologies now here can provide all the power we need on earth. Nuclear power and its deadly dangers are unnecessary” It cited a Scientific American 2009 cover story, “A Plan for A Sustainable future,” which concluded: “Wind, water and solar technologies can provide 100 percent of the world's energy needs."

Solar CP – Deep Space Solvency

Solar works in deep space

Bryson 96 (Chris, writer @ Christian Science Monitor, 12/17/96, http://www.animatedsoftware.com/cassini/crbryson.htm) JPG

NASA's game of nuclear Russian roulette with Cassini may be unnecessary. In April 1994, the European Space Agency (ESA) reported dramatic new advances in solar cells for "use in future demanding deep-space missions." ESA was studying solar power because the American nuclear RTG technology used on the NASA space flights was unavailable in Europe. The new silicon cells jointly developed by DASA in Germany and CISE in Italy, had a record 25% efficiency in the extreme cold and reduced sunlight of simulated deep-space conditions, ESA said. Last year, ESA physicist Carla Signorini told the newspaper Florida Today that, "if given the money to do the work, within five years ESA could have solar cells ready to power a space mission to Saturn."

Its more efficient than any other type of propulsion

Rosin and Grossman 96 (Carol – Coordinator of the World Space Commission and Karl – Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, World Citizen News, October/November 1996, http://www.worldservice.org/issues/octnov96/nukes.html) JPG

There are alternatives to using plutonium in space. In 1994, the European Space Agency (ESA) announced a breakthrough in the development of "new high performance silicon solar cells for use in future deep-space missions" to replace plutonium-fueled generating systems. Touting a "technology milestone," ESA developed cells with a 25-percent efficiency rate, "the highest efficiency ever reached worldwide." Other ongoing U.S. space nuclear projects include the Sandia National Laboratories' plan to develop nuclear-powered satellites to beam TV signals down to Earth; a proposed Air Force program to use nuclear reactors for power and propulsion for military satellites; and NASA's plans for a nuclear-powered colony on the moon.

Solar CP – General/Politics = NB

Solar power solves every internal link – avoids the link to politics

Grossman 3 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, April 2003, http://www.zcommunications.org/nukes-in-space-in-columbias-wake-by-karl-grossman) JPG

Project Prometheus, would be pushed as scientists in the European Space Agency—ESA, the European counterpart of NASA—and in space industry and at NASA itself have made breakthroughs in developing safer ways of propelling rockets and energizing space probes and planetary landers. This includes solar electric propulsion and the use of “solar sails” and other solar technologies that stress the generation of electricity with new high-efficiency solar cells. ESA has been working on the Rosetta project to launch a space probe with all its on-board electricity coming from solar cells with a record 25% efficiency to fly beyond Jupiter and rendezvous with a comet. ESA is “the first space mission to journey beyond the main asteroid belt and rely solely on solar cells for power generation, rather than traditional radioisotope thermal generators”(the plutonium system NASA favors for its space probes). NASA has a division—its Photovoltaics and Space Environment Branch headquartered at the John Glenn Research Center in Cleveland—which, like ESA, has been working on space solar energy development. There is no “edge” or limit to solar power, says a scientist at the branch, Dr. Geoffrey A. Landis, on its website. “In the long term, solar arrays won’t have to rely on the Sun. We’re investigating the concept of using lasers to beam photons to solar arrays. If you make a powerful-enough laser and can aim the beam, there really isn’t any edge of sunshine.” Solar energy technologies are being used now to propel spacecraft. NASA’s Deep Space 1 probe, launched in 1998, is the first space probe to be propelled with solar electric propulsion. There are “solar sails” utilizing ionized particles emitted by the Sun which constitute a force in space. A space device with solar sails built in Russia for the International Planetary Society was launched in 2001. In contrast, NASA’s renewed emphasis on nuclear power in space “is not only dangerous but politically unwise,” says Dr. Michio Kaku, professor of theoretical physics at the City University of New York. “The only thing that can kill the U.S. space program is a nuclear disaster. The American people will not tolerate a Chernobyl in the sky. That would doom the space program.” “NASA hasn’t learned its lesson from its history involving space nuclear power,” says Kaku, “and a hallmark of science is that you learn from previous mistakes. NASA doggedly pursues its fantasy of nuclear power in space. We have to save NASA from itself.” He cites “alternatives” space nuclear power. “Some of these alternatives may delay the space program a bit. But the planets are not going to go away. What’s the rush? I’d rather explore the universe slower than not at all if there is a nuclear disaster.” Yet despite the dangers and the advances in solar energy technologies and other safe forms of power for use in space, NASA would stress nuclear power. In fact, the situation is not so different from how the Bush administration has been pushing to “revive” nuclear power on Earth despite the availability today of safe, clean, economic, renewable energy technologies. And like terrestrial atomic power, space nuclear power has a problematic past.

Solar CP – Obama Bad = NB

Solar costs political capital

Gilster 7 (Paul, Technology Columnist – News & Observer, “Reflections on Space Policy in Washington”, Centauri Dreams, 11-15, <http://www.centauri-dreams.org/?p=1580>)

Ponder the solar sail itself as seen through the prism of NASA. Work at Marshall Space Flight Center has progressed to the point that the solar sail is close to or at the status of operational viability. In other words, it wouldn’t take much to launch and deploy an actual sail mission in terms of technology. But without the needed funding, such missions don’t happen, which is why space policy can be so difficult to sort out, and so frustrating. That’s one price you pay for democracy, and while I certainly would never want to live under any other form of government, it does account for the fact that our ventures into space sometimes seem to proceed by fits and stars rather than in a stable continuum.

Solar CP – Obama Good = NB

Congress and Obama back solar propulsion

TechWeb 2008 (“Space Exploration Alliance Wants Congress to Boost NASA Funding, Lex/Nex) JPG

Members also discussed maintaining support for NASA's robotic science missions and the importance of space exploration in addressing Earth's energy and environmental challenges. The group said that several congressional offices asked for more information about the National Security Space Office's recent study of space-based solar power systems. The study found possible sources of solar power in space. SEA steering committee member Chris Carberry said that lobbying has proven effective in encouraging support for space exploration. "We've already seen results with this year's presidential election, where space policy issues have received more attention than they have in decades," he said in a statement. "Now we're hoping to be able to do the same thing with Congress." SEA stresses that NASA's mission of human and robotic space exploration can inspire young people and the public, as well as the aerospace industry, and spur the creation of businesses and jobs. The NASA Reauthorization Act lends adequate funding to allow NASA to grow and solve problems found by the Augustine pane.

Bipartisan support for solar power

Zinshteyn 11 (Mikhail, writer @ American Independent, http://www.americanindependent.com/186980/bipartisan-solar-panel-bill-seeks-to-dramatically-cut-consumer-costs) JPG

An ambitious bill that would offer grants and subsidies to communities that adopt quicker and more efficient methods of installing solar panels was introduced today by Sens. Bernie Sanders (I-Vt.) and John Boozman (R-Ark.). The bipartisan legislation, titled the The 10 Million Solar Roofs Act of 2011 (PDF), would be a boon to a quickly changing solar panel industry. The Solar Energy Industries Association — the national trade association of the U.S. solar energy industry — stated during a conference call with businesses and in a June 1 congressional hearing that the industry already employs 100,000 people, and they expect that number to double by 2013. As interest in solar paneling has increased and the number of large-scale public projects has also jumped, the cost of manufacturing and production within in the industry has fallen. One prospective project near Blythe, Calif., called the Rice Solar Energy Project, aims to generate 150-megawatts from its solar panel facilities, enough electricity year-round for 68,000 homes, reports SolveClimate News.

Solar CP – Obama Good = NB

Solar is politically popular – its lobby has major clout in Washington

LaRussa 10 (Cassandra, writer @ Energy boom, 3/3/10, http://www.opensecrets.org/news/2010/03/solar-wind-power-becoming-prominent.html) JPG

By 2007, the alternative energy industry had begun to drastically increase its lobbying spending, almost doubling its expenditures from the previous year. In 2009, alternative energy organizations shelled out an unprecedented $30 million to protect and promote their interests on Capitol Hill. The alternative energy industry’s lobbying expenditures have grown to 12 times from its 1998 level. In comparison, oil and gas spending and mining spending have grown less than three times their 1998 amount, and electric utility spending has grown to just twice its 1998 amount. The growing involvement of the alternative energy industry in legislative affairs is reflected not just in increased spending, but also in the number of companies and organizations that employ federally registered lobbyists. In the late 1990s, only about 20 alternative energy industry organizations used federal lobbyists. By 2009, there were about 200 alternative energy companies and organizations employing lobbyists to help advance the industry’s interests. The American Wind Energy Association is one of those organizations that recently and significantly increased lobbying efforts. Until 2008, AWEA failed to crack the $1 million mark in annual lobbying expenditures -- and most years, it spent less than $500,000. In 2009, its expenditures experienced a drastic increase, and the group spent almost $5 million on lobbying for issues related to the wind power industry. But why did AWEA, and scores of other alternative energy corporations, trade organizations and non-profits, get involved in legislative affairs so suddenly and with such gusto? The involvement stems from the growth in number of alternative energy companies, which was made possible by the growth in popularity of wind power in the national consciousness, said Christine Real de Azua, an AWEA spokeswoman. Real de Azua states that this, in turn, increased AWEA's ranks by more than 1,000 new business members in 2009 alone, many of them "companies entering or seeking to enter the wind turbine supply chain." Last year "was a record year for wind power in the U.S.," Real de Azua said. "The industry installed 10,000 megawatts last year, enough to generate as much new electricity as three new nuclear plants." The recent involvement of AWEA in federal affairs, she said, "reflects the urgency of the industry's number one priority -- passing a national renewable electricity standard with aggressive, binding near- and long-term targets, as part of comprehensive energy and climate legislation." Azua de Real cites "market certainty" as a concern of AWEA's members, who need legislative support of their industry "in order to expand their operations and invest in new manufacturing as well as new wind farm facilities." She added that it is imperative to the members of AWEA that the U.S. government "steps up and clearly commits to developing renewable energy." AWEA cites the sheer potential of wind energy and the opportunity for job creation as two key points that their lobbyists emphasize in the fight for favorable legislation. Not as drastic but certainly notable is the increased lobbying by the Solar Energy Industries Association. Until 2007, the organization had never spent more than half a million dollars on federal lobbying efforts. In 2009, it spent more than $1.6 million. Monique Hanis, an SEIA spokeswoman, attributes the increase in lobbying presence to a growth in membership that enabled the organization to expand legislative activities. She explains how in late 2008, SEIA's increased lobbying pressure paid off when Congress "passed the eight-year extension of the solar investment tax credit," which allowed the organization to move on to lobbying regarding climate, renewable energy standards, green jobs and appropriations.

Solar is bipartisan – also a win for Obama

LaRussa 10 (Cassandra, writer @ Energy boom, 3/3/10, http://www.opensecrets.org/news/2010/03/solar-wind-power-becoming-prominent.html) JPG

Barack Obama labeled such legislation a high priority long before he became president, and people and political action committees associated with the alternative energy industry responded with campaign contributions of $173,500. The oil and gas industry poured more than five times that amount into Obama's campaign coffer, but gave most of its presidential campaign contributions to Sen. John McCain (R-Ariz.). Sens. John Kerry (D-Mass.), Joe Lieberman (I-Conn.) and Lindsey Graham (R-S.C.) are currently drafting a bill to address the nation's energy needs. The bill, if passed, could certainly become a major political victory for Obama. Although most of the conversation regarding the drafting of legislation has revolved around the question of greenhouse gases and the proposed “cap-and-trade” policy, the bipartisan bill also makes a point of emphasizing job creation and the use of renewable energy. In a statement in February, Kerry promoted his energy bill by stating, "Americans want us to be energy independent. Moreover, every job created in the course of energy independence is a job that stays here at home." And with political focus on alternative energy constantly expanding, the lobbying power of the alternative energy industry may soon become as plentiful as Great Plains breezes and desert sunshine.

Solar CP – Obama Good = NB

Solar lobby has massive clout – big bucks and staunch public support

Meehan 10 (Chris, writer @ clean energy authority,11/22/10http://www.cleanenergyauthority.com/solar-energy-news/rise-up-solar-campaign-112210/) JPG

To keep that from happening, the American Solar Energy Society (ASES) is building the Rise-Up Solar Nation campaign, which aims to have 1 million members to help influence Congress to pass legislation supporting the solar and renewable industries, which as of 2007, employed 9 million Americans. “The campaign for a solar nation is a bold call to action for our chapters like CRES, the solar advocates everywhere who will become known as the Rise Up campaign,” said Brad Collins, ASES national campaign director and former executive director during a presentation at the Colorado Renewable Energy Society’s monthly meeting on Nov. 18. “The sun rises up every day. It’s time for us to rise up and make this change happen, and we can do this.” The Rise-Up campaign will generate about $500,000 before it really gets underway, Collins said. “We’re going to raise 25 million dollars; we’re going to ask the million solar citizens to each give us 25 dollars,” he said. “You give us 25 bucks, we’ll make this happen. And we’re going to focus on solar energy’s immediate potential to improve the environment, increase energy independence create jobs and make America more competitive—all good things.” The campaign also will fight against misinformation, propagated by the fossil fuel industry, Collins said. According to Collins, the campaign will seek to recreate the successes of the Solar Lobby of the 1980’s. “There were about 60,000 people in the Solar Lobby,” he said. “Members of Congress called the Solar Lobby and asked for advice on rule-making and legislative writing because they knew it was a powerful group. That’s what we need to do. We need to create a powerful movement.” The campaign, he explained, will focus on social change as a means to increase awareness of solar’s benefits. “Here’s the marvelous thing about social change, all you have to do is create the momentum,” he said. “The change agents, the decision makers, the politicians, the spokesmen, the key stakeholders all around will be attracted to that. They will stand proudly in front of that parade and take it for their own. And more power to them. We don’t have to own this. We don’t have to lead it. All we have to do is start it.”

NSWR CP

NSWR is the same as Orion but doesn’t destroy satellites or link to spending

Montgomerie 3 (Ian, professional alternate historian, Dec 31, [www.alternatehistory.com/gateway/essays/OrionProblems.html#Environmental] AD: 7-6-11, jam)

In the "radiation-spewing atomic rocket" category, there is the Nuclear Salt Water Rocket. It is a concept for a rocket whose fuel is a solution that undergoes fission. This system would be just as polluting as an Orion rocket, but it would also produce an ISP even higher than that of the Orion design. An ISP of 6700 for an initial low-efficiency design has been projected. Unlike Orion, the NSWR does not generate satellite-frying X-rays or require a ship massing thousands of tons. Except for the ion drive, these systems are presently untested concepts that would require much development... but so would Orion. While Orion was the highest-performing option back in the 50s, by the present day that is not the case.

ESA CP – General

The ESA wants to use nuclear tech

De Selding 5 (Peter, writer @ Space News, http://www.space.com/692-esa-chief-europe-space-nuclear-power-options.html) JPG

Europe will have no choice but to develop nuclear-powered satellites if it wants to continue to explore the outer solar system, European Space Agency (ESA) Science Director David Southwood said. Several European nations, notably Germany, have strong anti-nuclear feelings and may resist any move to develop radioisotope thermoelectric generators (RTGs), which are currently the preferred method for providing power to satellites traveling too far away from the sun to make solar-electric power feasible. Europe's Rosetta comet-chaser satellite, launched in February, carries a huge solar-array system that Southwood agreed is about as far as solar-electric power can go. "Is this where we want to stop? I refuse to believe that," Southwood said in an interview here as he followed ESA's Huygens probe as it descended to the surface of Saturn's largest moon, Titan. Huygens was carried to Saturn orbit by NASA's Cassini satellite, which is nuclear-powered. "The fact is you cannot imagine going to the outer planets without a power source that doesn't depend on sunlight." Southwood said ESA program managers have been discussing the best way to introduce at least an RTG-development program, if not a nuclear-propulsion program, onto ESA's technology-research agenda. Sergio Vetrella, president of the Italian Space Agency, said he would favor a broad development program on new forms of nuclear power that focused not only on space applications but on uses in medical science and other areas. Concerning conventional RTGs aboard future ESA satellites, Vetrella said he would favor not an ESA development program but a policy of buying RTGs from the United States. "We shouldn't get too dispersed in what we develop," Vetrella said, adding that he recognized the need for alternate satellite-power sources. "For conventional nuclear power on satellites, let's buy it off the shelf." Southwood acknowledged that anything related to nuclear technology "remains very sensitive in Europe, even though several nations, including Britain and France, have mastered nuclear technology for civilian and military purposes. It is an issue we will have to treat delicately, but we've got to put it on our agenda. It's an issue ESA absolutely must address." Southwood said ESA is happy with its collaboration with NASA on Cassini and Huygens, but sooner or later Europe would need to develop technologies to permit it to lead big-ticket space-exploration missions. "We don't always want to be the younger brother in our collaboration with NASA," Southwood said. "For a real cooperation, you need two partners fully able to contribute." Southwood said long-duration rovers on Mars -- currently the subject of low-level research at ESA -- ultimately would need RTGs and that Europe's space-exploration program, called Aurora, may be the most logical avenue by which to start an RTG effort.

ESA CP – General

The ESA is looking to explore with nuclear technology

De Selding 7 (Peter, writer @ Space News,

http://www.space.com/3451-french-government-group-europe-join-2nd-space-race.html) JPG

A French parliamentary group said China’s recent anti-satellite demonstrations, plus Chinese and Indian plans for lunar exploration, are clear signs that a second global space race has begun and that Europe should join it. In a report issued Feb. 7, the French Parliamentary Office for the Evaluation of Scientific and Technological Choices makes a series of proposals, some of them specific, to reinvigorate Europe’s civil and military space policy. Among the 50 proposals: Sanctions should be imposed on any European government that does not give preference to European launch vehicles for its government civil and military satellites. France should begin preparing nuclear-powered satellites to permit deep-space exploration, using expertise at the French Atomic Energy Commission and in French industry. Europe’s heavy-lift Ariane 5 rocket should be made capable of launching astronauts within five years. Managers of Europe’s Galileo satellite-navigation project should engage in negotiations with the NATO alliance on how Galileo’s encrypted, government-only signal should be used and protected. France and other European governments should give assistance to companies that propose to develop suborbital flight systems designed to create a space-tourism industry. The parliamentary group views the growing space budgets of the United States, China, India and Russia in particular as confirmation that space remains a realm of strategic competition with multiple military and commercial applications. Europe, they say, is losing ground to these nations and is at risk of becoming a space also-ran if it does not redouble its financial effort and end duplication among individual European nations. The report says Europe’s NATO members should set a goal of making their existing military satellite telecommunications systems interoperable within two years. Britain, France, Germany, Italy and Spain operate independent systems and sometimes compete with each other for business. The principal authors of the report are Christian Cabal, a member of France’s National Assembly; and Sen. Henri Revol. Both have long been active in promoting French and European space [investment](http://www.space.com/3451-french-government-group-europe-join-2nd-space-race.html), saying Europe should not allow itself to fall too far behind the United States. But it is the recent acceleration of investment in China and India, and the reawakening of Russia’s space sector — the authors say Russia has multiplied space spending by 10 since 1999 — that is the focus of the report. The report’s one-paragraph introduction is an example. It mentions the following recent developments: The U.S. Vision for Space Exploration’s goal of a lunar base by 2020; China’s manned space flights; Chinese and Indian plans for lunar exploration; the successful atmospheric re-entry and recovery of an Indian orbital capsule; China’s alleged use of a laser to illuminate a U.S. military satellite; and China’s mid-January use of a ground-based missile to destroy a retired Chinese satellite. Member governments of the European Space Agency (ESA) agreed in December 2005 to give a “preference” to European rockets — Ariane 5 and the future medium- and light-class Soyuz and Vega vehicles — whenever technically and financially possible. They stopped short of adopting a French proposal for stronger language. ESA also has been considering the purchase of Russian nuclear-heating technology for Europe’s Mars exploration program. ESA science managers have said nuclear-propulsion technology should be considered for satellites traveling too far from the sun to rely on solar power. But the subject remains sensitive in Europe and ESA has not agreed to a full-scale nuclear-propulsion research effort .

\*\*Misc

AT: Nuclear Inevitable

Fukushima caused a backlash against nuclear power internationally

Dempsey & Ewing 11 (Judy, New York Times correspondent in Berlin, and Jack, Frankfurt bureau chief for BusinessWeek, May 30, [www.nytimes.com/2011/05/31/world/europe/31germany.html] AD: 7-8-11, jam)

BERLIN — The German government on Monday announced plans to shut all of the nation’s nuclear power plants within the next 11 years, a sharp reversal for Chancellor Angela Merkel after the Japanese disaster at Fukushima caused an electoral backlash by voters opposed to reliance on nuclear energy. The plan calls for phasing out all of Germany’s 17 nuclear reactors — eight of which are offline — and expanding the use of renewable resources. The decision was based on recommendations of an expert commission appointed after the Japanese disaster to study an industry that generates 23 percent of Germany’s electricity. “It’s definite — the latest end for the last three nuclear plants is 2022,” said Norbert Röttgen, the environment minister. The announcement, which still faces legislative approval, was applauded by environmentalists and expected to be popular among voters. But it was greeted skeptically around Europe and within German industry. Some predicted it could harm economic growth, force Germany to import nuclear power from France, or even inflate the cost of energy across the continent. “The German decision has direct implications for Europe’s energy sector,” said Georg Zachmann, an energy expert at Bruegel, a research institute in Brussels. For Mrs. Merkel, the embrace of clean energy represents a transformation based on the politics of the ballot box. Just last year, her center-right coalition forced through an unpopular plan to extend the life of nuclear power plants, with the last to close in 2036. That action inflamed public opinion but the Fukushima disaster politicized it. The nuclear crisis is widely believed to have caused Mrs. Merkel’s party to lose control of the German state of Baden-Württemberg for the first time in 58 years, in a March election that became a referendum on energy policy.

Nuclear power is not inevitable internationally

Scoblete 11 (Greg, writer for Real Clear World, Jun 28, [www.realclearworld.com/blog/2011/06/nuclear\_power\_globally\_unpopular.html] AD: 7-8-11, jam)

New research... shows that three in five global citizens (62%) oppose the use of nuclear energy – a quarter (26%) of those have been influenced by the recent nuclear disaster in Fukushima, Japan. The latest Ipsos Global @dvisor survey shows that support for nuclear energy is far below that for solar power (97%), wind power (93%), hydroelectric power (91%) and natural gas (80%) as a source of electricity. Just one in four (38%) adults across 24 countries support the use of nuclear energy. Support is highest in India (61%), Poland (57%) and the United States (52%).

Negative public perception of nuclear space power ensures it’s never adopted

Bruno 7 (Claudio, PhD. Princeton U, School of Aerospace Engineering @ State University of Rome La Sapienza, Fall, [iaaweb.org/iaa/Studies/nuclearpropulsion.pdf] AD: 7-8-11, jam)

6.3. Finding 2: In order for the great potential advantages of nuclear propulsion to be realized, it must be perceived by a majority of the population to be safe. The utility of nuclear power is almost axiomatic, however, nuclear power has a slightly blemished reputation; only a very small fraction of this impeachment is deserved or justified. These blemishes on an otherwise impressive history have created a perception amongst a small group of anti-nuclear aficionados that all nuclear power in space is either unsafe or has some clandestine military function. As with the introduction of many new technologies, nuclear power has experienced a learning curve. Early in its infancy, the totality of nuclear system hazards were not well understood, and some operational, administrative, design bases, and implementation procedures did not appreciate the potential risks associated with its early use. Over time, and, in some respects, as a consequence of some high-profile accidents, more well-defined procedures began to be developed.

AT: Nuclear Inevitable

Countries are modeling Germany in phasing out nuclear power

Baetz 11 (Juergen, Associated Press journalist, Mar 23, [www.msnbc.msn.com/id/42239367/ns/business-world\_business/t/germany-model-post-nuclear-power-age/] AD: 7-8-11, jam)

BERLIN — Germany is determined to show the world how abandoning nuclear energy can be done. The world's fourth-largest economy stands alone among leading industrialized nations in its decision to stop using nuclear energy because of its inherent risks. It is betting billions on expanding the use of renewable energy to meet power demands instead. The transition was supposed to happen slowly over the next 25 years, but is now being accelerated in the wake of Japan's Fukushima Dai-ichi nuclear plant disaster, which Chancellor Angela Merkel has called a "catastrophe of apocalyptic dimensions." Berlin's decision to take seven of its 17 reactors offline for three months for new safety checks has provided a glimpse into how Germany might wean itself from getting nearly a quarter of its power from atomic energy to none. And experts say Germany's phase-out provides a good map that countries such as the United States, which use a similar amount of nuclear power, could follow. The German model would not work, however, in countries like France, which relies on nuclear energy for more than 70 percent of its power and has no intention of shifting.

There’s no momentum for nuclear space power

Rudo 3 (Brian, writer for Red Colony, Mar 5, [www.redcolony.com/art.php?id=0303050] AD: 7-8-11, jam)

In reality the implications were much less beneficial to mankind. With the nuclear power disasters of the twentieth century, notably Chernobyl and Three Mile Island, the public has withdrawn from nuclear power. Further problems that have halted nuclear power generation have resulted from the storage of nuclear waste. Public disfavor with anything nuclear has extended itself into space. When the Cassini probe launched in 1997, its 73 pounds of plutonium sparked protests that called into question any future nuclear project in space. Protesters contended that an error in launch or an encounter with Earth later on in the voyage could result in dangerous radioactivity raining down from the sky. What the protestors failed to realize was the actual risk involved: the increase in radioactivity that would result from the destruction of Cassini would have been equivalent to a 15,000th of a normal lifetime absorption of radioactivity. There is most likely more radioactivity in a tanning booth or dental X-ray.

Uq – No Plutonium

NASA is out of plutonium – its out of alternatives

O’Neill 9 (Ian, writer @ Universe Today, 5/8/9, http://www.universetoday.com/30610/nasa-is-running-out-of-plutonium/) JPG

Decommissioning nuclear weapons is a good thing. But when our boldest space missions depend on surplus nuclear isotopes derived from weapons built at the height of the Cold War, there is an obvious problem. If we’re not manufacturing any more nuclear bombs, and we are slowly decommissioning the ones we do have, where will NASA’s supply of plutonium-238 come from? Unfortunately, the answer isn’t easy to arrive at; to start producing this isotope, we need to restart plutonium production. And buying plutonium-238 from Russia isn’t an option, NASA has already been doing that and they’re running out too… This situation has the potential of being a serious limiting factor for the future of spaceflight beyond the orbit of Mars. Exploration of the inner-Solar System should be OK, as the strength of sunlight is substantial, easily powering our robotic orbiters, probes and rovers. However, missions further afield will be struggling to collect the meagre sunlight with their solar arrays. Historic missions such as Pioneer, Voyager, Galileo, Cassini and New Horizons would not be possible without the plutonium-238 pellets. So the options are stark: Either manufacture more plutonium or find a whole new way of powering our spacecraft without radioisotope thermal generators (RTGs). The first option is bound to cause some serious political fallout (after all, when there are long-standing policies in place to restrict the production of plutonium, NASA may not get a fair hearing for its more peaceful applications) and the second option doesn’t exist yet. Although plutonium-238 cannot be used for nuclear weapons, launching missions with any kind of radioactive material on board always causes a public outcry (despite the most stringent safeguards against contamination should the mission fail on launch), and hopelessly flawed conspiracy theories are inevitable. RTGs are not nuclear reactors, they simply contain a number of tiny plutonium-238 pellets that slowly decay, emitting α-particles and generating heat. The heat is harnessed by thermocouples and converted into electricity for on board systems and robotic experiments. RTGs also have astonishingly long lifespans. The Voyager probes for example were launched in 1977 and their fuel is predicted to keep them powered-up until 2020 at least. Next, the over-budget and delayed Mars Science Laboratory will be powered by plutonium-238, as will the future Europa orbiter mission. But that is about as far as NASA’s supply will stretch. After Europa, there will be no fuel left.

More ev

Dillow 9 (Clay, writer @ Popular Science, 9/29/9, http://www.popsci.com/military-aviation-amp-space/article/2009-09/nasas-plutonium-shortage-threatens-deep-space-exploration) JPG

Imagine you’re driving across the Mojave Desert, and somewhere in the middle of absolutely nowhere you realize that the next gas station is further away than your car can travel on its current supply of gasoline. What next? That’s the problem NASA mission planners are facing as the agency's supply of plutonium-238, the fuel used to power deep space probes like Cassini and surface scouts like the upcoming Mars Science Laboratory, are dwindling. Unfortunately, that leaves NASA in a pretty tight spot: we’ve depleted our reserves of plutonium-238, and there isn’t anywhere to refuel ahead on the horizon either. Plutonium-238 powers spacecraft via heat given off by its radioactive decay. A small pellet—smaller than one’s fist—glows red from its own heat and can power equipment in extremely hostile environments like the vacuum of space, where temperatures vary greatly. For missions to the outer planets or the Kuiper belt, where sunlight is a thousand times lower and the temperature near absolute zero, plutonium-238 is the only option, as solar power is too weak to provide an effective charge. But this special brand of plutonium was a byproduct of Cold War activities and hasn’t been produced by the U.S. since the ‘80s (plutonium-239 goes in nuclear warheads, so naturally we keep plenty of that laying around). NASA has launched nearly two dozen missions over the past four decades that were powered by plutonium-238, including the Voyager probes, the Galileo probe that studied Jupiter and its moons, and the Cassini that is currently doing laps around Saturn. Those missions ran on either U.S. reserves of plutonium-238 or excess stock purchased from Russia. But now neither nation is producing the stuff, and even if we started again today, it would take eight years to build up production to the volumes necessary for annual deep space missions.

Normal Means = Plutonium

NASA uses plutonium for nuclear propulsion

Gagnon 3 (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space group, Synthesis/Regeneration 30 (Winter 2003), http://www.greens.org/s-r/30/30-13.html) JPG

Last year the Department of Energy (DoE) and NASA announced that present facilities must be expanded. The DoE will spend over $35 million to renovate the Oak Ridge National Laboratory in Tennessee to help with space plutonium production. Oak Ridge workers would purify the plutonium, which then would be shipped to Los Alamos National Laboratory in New Mexico where it would be formed into pellets used in space power systems.

Satellites D/A

Orion causes X-Rays kills every satellite in low earth orbit

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Orion's side-effects would not be limited to fallout, they would also include EMP and X-rays. EMP, or Electro-Magnetic Pulse, is essentially a powerful charge differential that will destroy nearby electronics (unless they are specially shielded). It is produced by explosions at ground level and in the stratosphere. While Orion's small fission bombs would not produce large amounts of EMP, they would produce some of it especially while passing through the stratosphere. X-rays are even more destructive. They are absorbed effectively in the atmosphere, but travel long distances in space. The nuclear explosions in space created by an Orion spacecraft would release large amounts of X-rays. The effect of those X-rays would be to cause severe damage, even destruction, to the electronics of anything else in space within a significant distance of the spacecraft (up to thousands of miles or more). When Orion was originally proposed, there was very little in space. Within a decade, however, satellites were already beginning to appear. Many of those satellites would be destroyed by operating an Orion in Earth orbit. If an Orion was launched today, it would cause tens of billions of dollars in damage to commercial and military satellites from many countries.

Satellites key to heg

Cynamon 99 (Charles, Major in USAF, April 1999, http://www.au.af.mil/au/awc/awcgate/acsc/99-035.pdf) JPG

For the military, it’s a forgone conclusion commercial space will be key to providing fully mission-capable operational forces. Because our operational forces are now predominantly stationed in the continental United States (CONUS), we must be expeditionary in our ability to meet America’s global commitments. We must be ready to operate in an environment with little or no existing communications infrastructure, areas where little mapping has occurred, and vast expanses where continuous overhead intelligence collection will be key to real-time situational awareness. Among other burdens this reality incurs, it places a premium on such commercial capability as satellite communications to connect our forces with their logistics pipelines in the 26 US or to connect our combatant commanders with their CONUS-based staffs and in-theater component commanders. Even in today’s peacetime environment, the military relies on commercial products and services, such as imagery and communications.7 As important as these commercial capabilities are for training and exercises, they are vital for conducting operational planning and implementing military operational as directed by the National Command Authority. The military implications should these commercial capabilities not be available is rather simple. The military mantra is “train like we fight.” The sudden loss of critical information to support war planning and execution will significantly diminish our military effectiveness. One should not and could not say this alone would spell defeat. However, there is no doubt a diminishing of military effectiveness directly equates to the number of body bags for US forces.

Loss of satellites kills the economy and hegemony

Cynamon 99 (Charles, Major in USAF, April 1999, http://www.au.af.mil/au/awc/awcgate/acsc/99-035.pdf) JPG

Qualitative assessment convinces us the economic implications of losing commercial space capability are real and too painful to bear. The May 1998 failure of the Galaxy IV satellite should stand as testament of the havoc an adversary might create. The more our economy becomes dependent on the information and services provided by these systems, the more significant the impacts are sure to be. The loss of a single Iridium satellite will not be catastrophic, not even significant. Many of these big low earth orbit (LEO) systems will provide on-orbit spares to enable near real-time switchover to the spare. However, we must be concerned with the potential for an “Informational Pearl Harbor” whether perpetrated by another 25 state or a terrorist intending to cripple our economy in the furtherance of their own interests. In this scenario, a peer competitor could attack our commercial space systems (a decisive point) to damage our economy (a center of gravity) via our financial markets. By devastating the US economy, an adversary might employ this diversionary tactic to turn our national focus inward. If US intervention can be prevented, our adversary’s goals are more likely to be achieved. A secondary benefit would be the negation of US military effectiveness in countering our adversary’s aggression. One might argue, an “Informational Pearl Harbor” is a worst case scenario we cannot afford to defend against. Unfortunately, the threat of an asymmetrical attack on the US is growing. The drug trafficking war on our southwestern border is analogous to the threats against our commercial systems. We know we can never completely negate the flow of drugs with surveillance and response alone. However, like the drug threat, we must take the necessary steps to reduce the threat to an acceptable level by using all of the tools at our disposal to identify, classify and, if possible, negate the sources before they manifest themselves.

I-Law/OST Link

Nuclear propulsion violates the OST and international law – causes accidents and fatal cancer

Grossman 98 (Karl, Journalism prof @ the State U of NY and author of "Cover Up: What You Are Not Supposed To Know About Nuclear Power”, Earth Island Journal, Wntr-Spring, 1999, http://findarticles.com/p/articles/mi\_hb6393/is\_1\_14/ai\_n28726032/) JPG

Nuclear-powered activities in space are illegal under the Outer Space Treaty of 1967, which the United Nations describes as the "basic framework on international space law." The Outer Space Treaty also specifies: "States shall be liable for damage caused by their space objects." On August 18, 1999, NASA's Cassini space probe -- and its 72.3 pounds of plutonium dioxide fuel -- will come hurtling toward Earth at 42,300 miles per hour for a gravity-assisted "slingshot" maneuver to gain the extra speed needed to reach Saturn. It's supposed to buzz the Earth 496 miles up, but NASA's Final Environmental Impact Statement for the Cassini Mission concedes that, if the probe wobbles in the upper atmosphere, it will break up, plutonium will be released and "approximately 5 billion of the estimated 7 to 8 billion world population ... could receive 99 percent or more of the radiation exposure." NASA says 2,300 fatal cancers could result. It also outlines its plan: if plutonium rains down on areas of natural vegetation, "relocate animals;" if it falls on agricultural land, "ban future agricultural land uses;" and if it descends on urban areas, "demolish some or all structures" and "relocate affected population permanently."

A2 – Space Hegemony Adv

Orion doesn’t guarantee space hegemony

Montgomerie 3 (Ian, Computer Sci @ Waterloo U, 12/30/3, http://www.alternatehistory.com/gateway/essays/OrionProblems.html) JPG

Orion is basically nothing more than a cheap per unit weight, but high in absolute cost, option that is best used to get lots of stuff off Earth with a lot of nasty side effects. It is a propulsion system, nothing more - it puts stuff into space, and into places around the solar system. Granted this would be nice, but you still have to research and then build the useful stuff, and for any continued operations in space, you have to get more stuff up there somehow to supply it. And in most applications it helps to have a lot of experience before you actually ship all the stuff into space. Orion can't carry a space program by itself - in fact the only real sense of using it is as the major lift component of a \_much\_ larger and more extensive space program, which has very concrete long term plans and is very prepared, in which case costs of lifting to Earth orbit aren't so high a proportion anyway, and the budget is big enough that better propulsion systems than Orion could be researched. Orion isn't a "magic bullet" that produces a cheaper better space program. It would have to be part of a space program with much greater funding than our space program historically had, within which it could save money or expand capability in very large-scale operations.

Orion causes international backlash – public hates nuclear power and treaty breaking

Schweitzer 9 (Curtis, student at Biola University, Apr 27, [curtisschweitzer.net/blog/?p=2546] AD: 7-9-11, jam)

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. 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. Continung 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.

Turns hegemony

Kohut & Stokes 6 (Andrew, President of the Pew Research Center, and Burce, international economics columnist for the National Journal, May 9, [pewresearch.org/pubs/23/the-problem-of-american-exceptionalism] AD: 7-9-11, jam)

Two aspects of the American character -- nationalism and religiosity -- are assumed to significantly influence the way the United States conducts itself in the world. As Minxin Pei of the Carnegie Endowment for International Peace has put it, "Today's strident anti-Americanism represents much more than a wimpy reaction to U.S. resolve or generic fears of a hegemon running amok. Rather, the growing unease with the United States should be seen as a powerful global backlash against the spirit of American nationalism that shapes and animates U.S. foreign policy."1 Reflecting the world's worries at the time of the run-up to the war in Iraq, the editors of The Economist opined that, "only one thing unsettles George Bush's critics more than the possibility that his foreign policy is secretly driven by greed. That is the possibility that it is secretly driven by God….War for oil would merely be bad. War for God would be catastrophic."2

A2 – Space Hegemony Adv

International public backlash hurts U.S influence

Bobrow 8 (Davis, prof of public and international affairs and political science at the U of Pittsburgh, "Hegemony Constrained," p. 222-224, jam)

International public opinion often provides a context in which foreign actors can attempt to modify, evade, delay, or even resist what Washington would like to do and have others do. This chapter explores how international public opinion relates to challenges to U.S. government policy preferences. It presents a secondary analysis of poll responses given by a representative sample of the general public both inside and outside the United States. This analysis thus addresses both the domestic public opinion that political elites face within their own countries (that is, in those countries where polls were conducted) and the international public opinion that U.S. policy makers face. Public opinion abroad has shifted in ways that reduce incentives for quick acquiescence to U.S. official preferences. The consequences of cooperation are weighing more heavily on compliant actors abroad as well as on the U.S. government. That does not generally mean that the international public is demanding direct confrontation with the United Stales, withdrawal from en¬gagement with it, or commitment to alternative alignments and hard counter¬balancing. Most foreign publics are more receptive to attempts to stand aside from, delay, divert, or modify U.S. government preferences than to direct, dramatically visible resistance. I argue that international public opinion is important for the United Slates to consider because of the need to understand and anticipate challenges to American policies. I also introduce conservative rules of interpretation to employ when drawing inferences from poll responses. Furthermore, 1 analyze patterns of public opinion from readily available polls of high technical qual¬ity conducted mostly from September 11, 2001, through 2006 (see the appen¬dix to this chapter). These polls covered particular national publics, and thus those publics are the unit of analysis here. All reported patterns and interpre¬tations are of those aggregates.' How International Public Opinion Matters How might reported public opinion affect the policy choices of governments? In an extreme view, public opinion actually controls policy choices. Foreign political elites act as if they expect a referendum on what they have done vis¬a-vis U.S. preferences, altering their positions to fit with what they think to be majority views. In my own view, international public opinion has a number of different functions that affect foreign elites. It is an indicator of the domes¬tic political risks and rewards likely to result from a particular stance toward a U.S. policy preference. It also offers a clue as to how other non-U.S. elites are likely to behave toward a U.S. policy preference and whether there will be opportunities for challenge coalitions with other foreign actors. Global opin¬ions may also be an instrument for bargaining with Washington to extract side-payments for support or offer foreign actors a credible excuse to use when trying to gain Washington's acceptance, even if grudging, of their inability to support a U.S. policy preference. Finally, foreigners may use their knowledge of U.S. public opinion to gauge domestic pressures on Washington to modify a particular policy and opportunities for challenge coalitions with American organizations and groups. International public opinion may also serve a number of functions for U.S. government elites. It can indicate the domestic situation that foreign leaders will be facing. It may indicate the possibility of a Pyrrhic victory, in which foreign leaders who have complied with U.S. preferences are subse¬quently replaced by less compliant leaders. Global public opinion can also suggest whether policies requiring foreign contributions will actually generate those contributions promptly, in adequate volume, and for sufficient duration. It can clarify how large U.S. side-payments on other issues might need to be in order to secure compliance on a particular issue. Finally, international opin¬ion, both pro and con, may help U.S. proponents of a policy develop strategies to gain domestic public support (i.e.. positive public opinion in valued foreign countries, hostile opinion in negatively valued countries). Conversely, it may-help U.S. opponents discredit a policy (i.e., negative public opinion in valued foreign countries, positive opinion in negatively valued countries). International public opinion can constrain U.S. and foreign policy actors or serve as a resource as the major players engage in direct confrontations or joint attempts to modify policy. How others treat U.S. policy preferences and how the United States responds usually result from bargaining at both the do¬mestic and international levels (Putnam 19S8). Elites have less difficulty har¬monizing the two bargaining levels when dealing with issues that are relatively low profile for pertinent national publics, receive scant media attention, and exhibit little apparent change from past policies. Policy elites with a strong grip on power at home have more latitude when it comes to bargaining; it is relatively safe for them to step outside the "zone of permissiveness" that public opinion offers. One kind of situation in which policy actors have considerable leeway is the absence of a competitive opposition with a clearly different stance on dealings with the United States. Another is when the next scheduled "man¬date renewal" (e.g., a national election) is some distance in the future. A third situation of relative freedom for policy actors is when there is a high degree of public approval of incumbent policy performance on matters less related to U.S. foreign policy. One or more of those facilitating conditions often is missing abroad or in the United States. With regard to foreign elites, since U.S. acts of commis¬sion and omission can substantially impact their society, they would be wise to pay close attention to U.S. public opinion that calls for Washington to main¬tain or alter its policies. For U.S. elites, wise policy choice involves recognizing how foreign populations view American actions and motives, making appro¬priate responses with regard to those views, and having some foresight about the American public supporting or at least not opposing a particular policy choice. If U.S. policy elites indulge in unwarranted optimism, they risk under¬estimating the costs and overestimating the benefits of Washington^ policy emphases.

A2 – Space Hegemony Adv – Int’l Public Backlash

Worldwide public hates the plan

Schweitzer 9 (Curtis, freelance writer, 4/27/9, http://curtisschweitzer.net/blog/?page\_id=1438) JPG

`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. Continung 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.

There’s international opposition to nuclear reactors in space

Urfer and LaForge 5 (Bonnie – anti-nuclear activist and John – writer @ NukeWatch, Summer 2005, www.nukewatchinfo.org/Quarterly/20052summer/20052page5.pdf) JPG

Opposition continues around the world. The Global Network Against Weapons and Nuclear Power in Space says plans for nuclear reactors and weapons in space are illegal and risk catastrophe. (The Outer Space Treaty prohibits WMD in outer space. It was ratified by the U.S. Senate and entered into force Oct. 10, 1967.) Two hundred Global Network representatives from as far as Alaska, Vancouver, Japan, Eastern Europe, and Britain met April 29 in New York City for its 13th annual conference, “Full Spectrum Resistance” — a play on the Pentagon’s published plans for “Full Spectrum Dominance.” Dr. Michio Kaku, a physicist with the City University of New York, presented the keynote at the conference. Kaku reminded the group that in 1978, the Cosmos-954 satellite, with 100 pounds of enriched uranium onboard, disintegrated NASA’s slick rendition of the proposed nuclear powered Project Prometheus visiting the three moons of Jupiter.

A2 – Asteroid/Comet Adv

Wont work – safer options prevent asteroid impacts

Rowe 8 (Aaron, writer @ Wired, 7/2/8, http://www.wired.com/wiredscience/2008/07/nukes-are-not-t/) JPG

Nuclear weapons could be used to stop earth-bound asteroids, but in most instances, they are not the best option, said Apollo astronaut Rusty Schweickart during a public lecture this Wednesday in San Francisco. The venerable scientist explained that all but the largest heavenly bodies can be redirected by rear-ending or towing them with an unmanned spacecraft. But last year, NASA issued a report stating that using nukes is the best strategy to prevent a catastrophic collision with earth. Although Schweickart has a great deal of faith in the agency, enough to risk his life piloting their lunar lander, he feels that they issued the misleading statement — under immense political pressure. It was a nefarious excuse to put nuclear weapons in space. His own organization, the B612 Foundation, intends to use gentler tactics to alter the course of an asteroid by 2015.

Asteroids or comets will just reassemble

O’Neill 10 (Ian, PhD Solar Phys @ Wales U, 3/21/10, http://news.discovery.com/space/another-good-reason-not-to-shoot-nukes-at-asteroids.html) JPG

Don Korycansky of the University of California, Santa Cruz, and Catherine Plesko of the Los Alamos National Laboratory in New Mexico have simulated the nuke versus asteroid scenario and demonstrated that if the explosion of an interceptor nuke was too small, the asteroid will reform under its mutual gravity much faster than expected. (This is assuming the asteroid was made of rock, acting like a "rubble pile" rather than a solid lump of iron ore. It's debatable whether any explosion could do anything about an asteroid that's mainly metal, apart from heating it up a little.) Trying to destroy asteroids with nuclear explosions is a risky business at the best of times, but this research has found that a 1 kilometer-wide asteroid could reassemble itself in a matter of hours. "The high-speed stuff goes away but the low-speed stuff reassembles [in] 2 to 18 hours," said Korycansky at the meeting.

Breaks asteroids into smaller pieces, magnifies the impact

O’Neill 10 (Ian, PhD Solar Phys @ Wales U, 3/21/10, http://news.discovery.com/space/another-good-reason-not-to-shoot-nukes-at-asteroids.html) JPG

Unfortunately, the commonly held opinion is to dispense an incoming asteroid or comet with a few carefully placed atomic bombs (by a generic crew of Hollywood oil drillers). Alas, Armageddon this ain’t. Even if we were able to get a bomb onto the surface of an incoming object, there is little hope of it doing any good (whether we get Bruce Willis to drop it off or launch it ICBM style… or would that be IPBM, as in Interplanetary Ballistic Missile?). What if we are dealing with a near-Earth asteroid composed mainly of metal? A nuclear blast might just turn it into a hot radioactive lump of metal. What if the comet is simply a collection of loosely bound pieces of rock? The force of the blast will probably be absorbed as if nothing happened. In most cases, and if we are faced with an asteroid measuring 10 km across (i.e. a dinosaur killer), it would be like throwing an egg at a speeding train and expecting it to be derailed. There are of course a few situations where a nuclear missile might work too well; blowing the object up into thousands of chunks. But in this case it would be like making the choice between being shot by a single bullet or a shot gun; it’s bad if you have one impact with a single lump of rock, but it might be worse if thousands of smaller pieces make their own smaller impacts all over the planet. If you ever wondered what it might be like to be sandblasted from space, this might be the way to find out! There may be a few situations where nuclear missiles are successful, but their use would be limited.

A2 – Other Solar Systems Adv

Takes 85 years to get to new solar systems in Orion

O’Neill 8 (Ian, PhD Solar Physics @ University of Wales, 7/8/8, http://www.universetoday.com/15403/how-long-would-it-take-to-travel-to-the-nearest-star/) JPG

The Partial Test Ban Treaty of 1963 is largely attributed to the cancellation of Project Orion (due to the obvious design flaw that huge amounts of radioactive waste would be pumped into space), but what kind of velocities could a nuclear pulse propulsion spaceship attain? Some estimates suggest a ballpark figure of 5% the speed of light (or 5.4×107 km/hr). So assuming a spacecraft could travel at these speeds, it would take a Project Orion-type craft approximately 85 years to travel from the Earth to Proxima Centauri.

A2 – Weaponization Adv

Empirically proven Orion wont be used for the military

Schwartz 98 (Stephen, Guest Scholar in the Foreign Policy Studies @ Brookings Inst., August 1998,

http://www.brookings.edu/projects/archive/nucweapons/box2\_2.aspx) JPG

One other project deserves mention for it demonstrates the lengths scientists and engineers went to in attempts to utilize the power of nuclear weapons. Project Orion, was a proposal to power a spacecraft by detonating nuclear bombs behind it, allowing the force of the blast to hit a specially-designed plate on the back of the craft and thus propel it forward. Despite the obvious problem of safely launching such a vehicle from Earth, scientists worked up a number of studies of the concept, one of which modeled the device to eject the bombs from the craft on the bottle dispensing mechanism in Coca-Cola vending machines.7 From 1958 until early 1965 the studies consumed nearly $50 million. In 1960, the program was transferred from the Advanced Research Projects Agency (ARPA) to the Air Force which, seeing little weapons potential in it, appeared to abandon it. However, a recently declassified memorandum to General Curtis LeMay, dated June 9, 1964, indicates that the concept was kept alive through at least that date by the Air Force, General Atomics (a defense contractor) and scientists at Livermore Laboratory, who had transformed it into Project Helios, proposing to use lower yield nuclear explosives to propel a smaller, lighter spacecraft from orbit.8 Scientists at Livermore suggested proving the new concept via underground nuclear tests, an approach the Air Force Scientific Advisory Board favored so long as NASA and the AEC would take a direct financial interest in the project. The outcome of this proposal is unclear, but Orion never took flight.